

**Draft Submittal**  
(Pink Paper)

**SIMULATOR SCENARIOS**

**CRYSTAL RIVER OCTOBER 2007**

**EXAM NO. 50-302/2007-301**

Facility: Crystal River #3Scenario No.: #1 (NRC)Op-Test No.: 1

Examiners: \_\_\_\_\_

Operators: \_\_\_\_\_

Initial Conditions: The plant is at 85% power following CWP-1B maintenance.Turnover: Power escalation to 100% was scheduled for last shift when 'A' OTSG tube leakage rose to ~ 20gpd. RM-A12 shiftily logging is in progress. SWP-1C and FWP-7 are OOS for planned maintenance. Thunderstorms are predicted for Citrus and Levy Counties.

Event No.	Malf. No.	Event Type*	Event Description
1	1	C (BOP) C (SRO)	SWP-1A shaft shears, SWP-1B fails to automatically start. [CT] SRO TS determination (TS 3.7.7)
2	N/A	N (BOP)	Letdown isolates on high temperature due to loss of SW. (OP-402)
3	2	I (BOP) I (SRO)	NI-7 bottom detector fails low. (OP-507) SRO TS determination (3.3.1)
4	3	R (RO) R (SRO)	RCP-1B seal failure requiring rapid power reduction. (AP-510)
5	4	I (RO)	When RCP-1B is tripped, FW fails to re-ratio. (AP-545)
6	5	M (All)	Spurious OPC actuation (EOP-2)
7	6	C (RO) C (SRO)	Reactor fails to trip (EOP-2) [CT]
8	7	M (All)	250 gpm RCS leak; rises to > 4000 gpm after 10 minutes. [CT] (AP-520, EOP-8A, EOP-3)
9	8	C (BOP or RO)	MUV-73 fails to open on HPI.

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

Plant is initialized in Mode 1 at approximately 85% power. Power escalation to 100% (scheduled for last shift) was delayed when 'A' OTSG tube leakage rose to approximately 20 gpd. RM-A12 shift logging is in progress. SWP-1C and FWP-7 are out of service for planned maintenance. Thunderstorms are predicted for Citrus and Levy counties.

Soon after turnover is complete SWP-1A shaft shears and SWP-1B fails to automatically start. SWP-1B must be manually started (using 'prompt and prudent' or OP-408, Nuclear Services Cooling System) [CT]. TS 3.7.7, Condition A, should be entered.

Very soon after SWP-1A shaft shears, while the crew is dealing with the failure, letdown will isolate on high temperature. The crew will use OP-402, Makeup and Purification System, to restore letdown.

After actions for the SWP failure have been completed and letdown has been restored Power Range NI-7 bottom detector will fail low. TS 3.3.1, Condition A, should be entered. The crew will bypass RPS Channel 'C' using OP-507, Operation of the ES, RPS, and ATWAS Systems.

Once the actions are completed for the NI-7 failure RCP-1B will experience a seal failure that will require a power reduction and pump shutdown. OP-302, Reactor Coolant Pump Operation, will be used to determine the leak rate and will direct a power reduction per AP-510, Rapid Power Reduction. The crew will reduce power to less than 72% power.

When the crew secures RCP-1B per OP-302, and implements AP-545, Plant Runback. FW flows will fail to re-ratio. The crew will take FW Demand stations to hand and manually re-ratio FW flow using skill of the operator.

Once the plant is stable an OPC actuation will occur. On the actuation, the reactor will fail to automatically trip. The crew should enter EOP-2, Vital System Status Verification, and must manually trip the reactor [CT].

When the OPC actuation occurs, a 250 gpm RCS leak will develop. The crew should implement AP-520, Loss of RCS Coolant or Pressure, in parallel with EOP-2. After approximately 10 minutes the leak will rise to > 4000 gpm resulting in a loss of SCM and requiring entry into EOP-3, Inadequate Subcooling Margin. The crew must secure all RCPs within 1 minute [CT].

When HPI actuates, MUV-73, BWST Suction to MUP-1B will fail to open. The crew must direct the valve be opened locally or secure MUP-1B prior to losing suction.

Once the failure of MUV-73 to open has been addressed and the crew transitions to EOP-8A the scenario may be terminated.

**Procedures used:** (ARs not listed)

OP-302	AP-510	EOP-2
OP-402	AP-520	EOP-3
OP-408	AP-545	EOP-8A
OP-507		

Target Quantitative Attributes – Scenario 1 – 2K7 NRC	Actual Attributes
1. Total Malfunctions (5-8)	7
2. Malfunctions after EOP entry (1-2)	2
3. Abnormal Events (2-4)	2
4. Major Transients (1-2)	2
5. EOPs entered requiring substantive actions (1-2)	2
6. EOP contingencies requiring substantive actions (0-2)	0
7. Critical Task (2-3)	3

## SHIFT TURNOVER

### A. Initial Conditions:

1. Time in core life – 300 EFPD
2. Shift:  Day  Swing  Mid
3. Rx power and power history – 85% for 6 days. Previously 100% power for 3 months.
4. Boron concentration – 1020 ppmb
5. Xenon – See Saxon
6. RCS Activity - See Status Board
7. EOOS is Green

### B. Tech. Spec. Action requirement(s) in effect:

- CP-500, FWP-7

### C. Clearances in effect:

- FWP-7 for shaft alignment due to high vibration. Expected return to service in 12 hours.
- SWP-1C for pump impeller replacement. Expected return to service in 8 hours.

### D. Significant problems/abnormalities:

- Down power was to support CWP-1B maintenance. Maintenance has been completed and the pump is in service.
- Power escalation to 100% was delayed when 'A' OTSG tube leakage rose to approximately 20 gpd last shift. RM-A12 shiftily logging is in progress per CP-152. CP-152 Operations Actions have been completed.
- Citrus and Levy counties are under a severe thunderstorm watch for the next 2 hours.

### E. Evolutions/maintenance for the on-coming shift:

- Maintain current power level pending completion of a site leadership team meeting regarding the tube leakage.
- Maintenance will continue to work on FWP-7 and SWP-1C.

### F. CRS – Instruct the ROs to walk down the main control boards.

### G. Required Emergency Plan Implementation

- Full Implementation, including all required notifications.  
 Initial/upgrade classifications - internal notifications.  
 None

*Examination Setup/Execution*  
*Scenario 2*

**INITIAL CONDITIONS**

- A. “Restore” the simulator to IC# 101 (FATHER) developed for this SES.
- B. “Unfreeze” the simulator and ensure the following configuration is setup:
1. SWP-1C in Normal-After-Stop
  2. SWP-1A running
  3. Plant stable at approximately 85% power
  4. RCV-150 OPEN placard on MCB
- C. “Freeze” the simulator and enter ‘NRCEXAM’ lesson plan directory:
1. “Start” Lesson Plan NRC SES #1.lsn in the NRCEXAM directory – (NRC Scenario #1)
- D. “Unfreeze” the simulator and “Trigger” Setup Step(s) which will:
1. See simulator lesson plan.
- E. Tag out the following equipment:
1. Place CIT on FWP-7 C/S in Normal-After-Stop
  2. Place CIT on SWP-1C C/S in Normal-After-Stop
- F. Additional Modifications required to the IC.
1. Ensure SPDS selected to NORM/IMB and history traces cleared and history trace selected. Also ensure “A” and “B” SPDS are properly selected for RCS Loops and Primary instruments selected.
  2. Ensure SPDS on CNO/SSO/STA computers displaying correct data for IC.
  3. Ensure Group 59 indicative of current reactor power.
  4. Acknowledge computer and annunciator alarms.
  5. *Ensure proper PICS groups AND correct scaling displayed on overhead screens. Specifically ensure that RM-A12 is indicating on scale..*
- G. Freeze the simulator and notify the lead examiner.
- H. **Consumable copies of OP-402 and OP-507 available.**

- A. **EVENT #1**  
When directed, input the SWP-1A failure.  
**[Trigger step labeled Event 1 and 2]**
- B. **EVENT #2**  
Letdown isolates on high temperature.  
**[This failure occurs automatically as a result of failures in the previous event]**
- C. **EVENT #3**  
When directed, input the failure of NI-7 bottom detector.  
**[Trigger step labeled Event 3]**
- D. **EVENT #4**  
When directed, input the RCP-1B seal failure.  
**[Trigger step labeled Event 4 and 5]**
- E. **EVENT #5**  
Feedwater fails to re-ratio.  
**[Failure included as part of setup step]**
- F. **EVENT #6**  
When directed, insert OPC actuation. The reactor fails to trip.  
**[Trigger step labeled Event 6, 7, 8]**  
**[Rx trip failure included in setup step]**
- G. **EVENTs #7 and 8**  
When the OPC actuation occurs, an RCS leak will develop worsen. MUV-73 fails to open on HPI.  
**[Leak linked to Event 6. MUV-73 included in setup step]**

**Role Play:** If contacted as the SPO to perform EOP-14, Enclosure 1, run lesson plan Enc\_1.lsn from the MISC directory. Report completion after 23 minutes.

**Role Play:** If contacted as the PPO to perform EOP-14 Enclosure 2, run lesson plan Enc\_2.lsn from the MISC directory. Report completion after 15 minutes.

Op-Test No.: 1 Scenario No.: 1 Event No.: 1 Rev.: 0

Event Description: (Examiner Cue) Soon after turnover is complete SWP-1A shaft shears and SWP-1B fails to automatically start [MALF]. SWP-1B must be manually started (using 'prompt and prudent') [CT]. TS 3.7.7, Condition A, should be entered.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (I-01-03) (I-02-03) (I-03-03) (I-04-03) RC Pump Clg Wtr Flow Low</li> <li>○ (C-02-05) SW System Press. Low</li> </ul> </li> <li>• Note SW pressure and amps low</li> <li>• Diagnose sheared shaft on SWP-1B</li> <li>• Notifies SRO of failure</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Starts SWP-1B within 5 minutes using 'prompt and prudent' [CT]</li> <li>• Stops SWP-1A using 'prompt and prudent'</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists RO/BOP with diagnosis of sheared shaft</li> <li>• Enters TS 3.7.7 Condition A for one SW Pump inoperable</li> <li>• May address FPP for the SW Pump inoperable</li> <li>• Contacts work controls to initiate repair efforts</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Reviews AR-303 and AR-501</li> <li>• Monitors temperatures of SW cooled components</li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 2 Rev.: 0

Event Description: (Examiner Cue) Very soon after SWP-1A shaft shears, while the crew is dealing with the failure, letdown will isolate on high temperature. The crew will use OP-402, Makeup and Purification System, to restore letdown.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (H-04-04) Letdown Temp High</li> </ul> </li> <li>• Observes MUV-49 closed</li> <li>• Diagnoses letdown isolation on high temperature</li> <li>• Reviews AR-403</li> <li>• Notifies SRO of isolation</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists BOP with diagnosis of letdown isolation</li> <li>• When SW is restored, directs BOP to restore letdown using OP-402</li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 2 Rev.: 0

Event Description: (Examiner Cue) Very soon after SWP-1A shaft shears, while the crew is dealing with the failure, letdown will isolate on high temperature. The crew will use OP-402, Makeup and Purification System, to restore letdown.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Restores letdown using OP-402:               <ul style="list-style-type: none"> <li>○ ENSURE CLOSED the following:                   <ul style="list-style-type: none"> <li>▪ MUV-133 MUDM-1B Inlet</li> <li>▪ MUV-201 1A to 1B Series</li> <li>▪ MUV-116 MUDM-1A Outlet</li> </ul> </li> <li>○ ENSURE OPEN the following:                   <ul style="list-style-type: none"> <li>▪ MUV-124 MUDM-1A Inlet</li> <li>▪ MUV-200 1B to 1A Series</li> <li>▪ MUV-117 MUDM-1B Outlet</li> </ul> </li> <li>○ ENSURE CLOSED the following:                   <ul style="list-style-type: none"> <li>▪ MUV-50 Block Orifice Isolation</li> <li>▪ MUV-51 Block Orifice Bypass</li> </ul> </li> <li>○ ENSURE OPEN SWV-47 and SWV-50 for MUHE-1A</li> <li>○ ENSURE OPEN SWV-48 and SWV-49 for MUHE-1B</li> <li>○ ENSURE MUV-194 is open</li> <li>○ ENSURE makeup demin is bypassed</li> <li>○ ENSURE at least 1 Post-Filter in service</li> <li>○ SELECT "MUV-49 HIGH TEMP BYPASS" switch to "BYPASS"</li> <li>○ OPEN MUV-49</li> <li>○ ENSURE OPEN MUV-567</li> <li>○ Ensures the following valves open:                   <ul style="list-style-type: none"> <li>▪ SWV-47</li> <li>▪ SWV-48</li> <li>▪ SWV-49</li> <li>▪ SWV-50</li> <li>▪ MUV-38</li> <li>▪ MUV-39</li> <li>▪ MUV-40</li> <li>▪ MUV-41</li> </ul> </li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 2 Rev.: 0

Event Description: (Examiner Cue) Very soon after SWP-1A shaft shears, while the crew is dealing with the failure, letdown will isolate on high temperature. The crew will use OP-402, Makeup and Purification System, to restore letdown.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>○ Establish desired letdown flow:           <ul style="list-style-type: none"> <li>▪ THROTTLE OPEN MUV-51 to 25 gpm and INCREASE letdown flow 15 to 20 gpm each minute until desired flow is reached</li> <li>▪ OPEN MUV-50, Block Orifice Isolation</li> <li>▪ ADJUST MUV-51 for desired Letdown flow</li> </ul> </li> <li>○ <u>WHEN</u> letdown temperature is &lt; 130°F, <u>THEN</u> SELECT "MUV-49 HIGH TEMP BYPASS" to "NORMAL"</li> <li>○ ENSURE OPEN the following:           <ul style="list-style-type: none"> <li>▪ MUV-124 MUDM-1A Inlet</li> <li>▪ MUV-116 MUDM-1A Outlet</li> </ul> </li> <li>○ ENSURE CLOSED the following:           <ul style="list-style-type: none"> <li>▪ MUV-133 MUDM-1B Inlet</li> <li>▪ MUV-117 MUDM-1B Outlet</li> <li>▪ MUV-200 1B to 1A Series</li> <li>▪ MUV-201 1A to 1B Series</li> <li>▪ MUV-126 MU Demin Bypass Valve</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 3 Rev.: 0

Event Description: (Examiner Cue) After actions for the SWP failure have been completed and letdown has been restored Power Range NI-7 bottom detector will fail low [MALF]. TS 3.3.1, Condition A, should be entered. The crew will bypass RPS Channel 'C' using OP-507, Operation of the ES, RPS, and ATWAS Systems.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (J-07-01) RPS Channel C Trip</li> <li>○ (J-07-04) RPS Channel C Trouble</li> <li>○ (J-07-05) Turbine Trip Bypass</li> </ul> </li> <li>• Reviews AR-502</li> <li>• Observes NI-7 reading significantly lower</li> <li>• Observes NI-7 delta-flux excessive</li> <li>• Diagnoses NI-7 failure</li> <li>• Notifies SRO of failure</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Assists RO with diagnoses</li> <li>• Investigates RPS cabinet C</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists RO with diagnoses</li> <li>• Enters TS 3.3.1 Condition A for one RPS channel inoperable</li> <li>• Contacts work controls to initiate repair efforts</li> <li>• Directs BOP to bypass RPS channel C using OP-507</li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 3 Rev.: 0

Event Description: (Examiner Cue) After actions for the SWP failure have been completed and letdown has been restored Power Range NI-7 bottom detector will fail low [MALF]. TS 3.3.1, Condition A, should be entered. The crew will bypass RPS Channel 'C' using OP-507, Operation of the ES, RPS, and ATWAS Systems.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Verifies "MANUAL BYPASS" lamp on top of EACH cabinet is DIM</li> <li>• Verifies EFIC bypass annunciator (H-6-6) <u>NOT</u> lit</li> <li>• Obtains Key #2</li> <li>• Repositions channel bypass key switch for RPS channel C</li> <li>• Verifies the following:               <ul style="list-style-type: none"> <li>• MANUAL BYPASS light on RTM illuminates brightly</li> <li>• Annunciator alarm, "RPS CHANNEL C BYPASSED" LIT</li> <li>• Event point 0993 received</li> <li>• Notifies SRO that RPS channel C is bypassed</li> </ul> </li> <li>• May select IC-4112-HS2 to NI-5/6</li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 4 Rev.: 0

Event Description: (Examiner Cue) Once the actions are completed for the NI-7 failure RCP-1B will experience a seal failure that will require a power reduction and pump shutdown [MALF]. OP-302, Reactor Coolant Pump Operation, will be used to determine the leak rate and will direct a power reduction per AP-510, Rapid Power Reduction. The crew will reduce power to less than 72% power.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (H-04-05) RC Pump Seal Bleed Off High</li> <li>○ Several computer alarms for RCP-1B seal pressures</li> </ul> </li> <li>• Reviews AR-403</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Refers to OP-302 Section 4.7.2</li> <li>• Directs BOP to perform actions in accordance with OP-302 (details in BOP section below)</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• MONITOR RCP seal conditions               <ul style="list-style-type: none"> <li>○ RCP seal leakage</li> <li>○ Second stage cavity pressure</li> <li>○ Third stage cavity pressure</li> <li>○ Upper seal outlet temperature</li> </ul> </li> <li>• ENSURE CBO valve for RCP-1B is open</li> <li>• Determines seal leakage is ~ 4 gpm using Enclosure 4</li> <li>• Reports seal leakage to SRO</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs a rapid power reduction to 72% per AP-510 (details in RO and BOP sections below)</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Adjust ICS "LOAD RATE" to desired setpoint.</li> <li>• Adjust "UNIT LOAD MASTER" to "10".</li> <li>• Verify Imbalance within limits using SPDS</li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 4 Rev.: 0

Event Description: (Examiner Cue) Once the actions are completed for the NI-7 failure RCP-1B will experience a seal failure that will require a power reduction and pump shutdown [MALF]. OP-302, Reactor Coolant Pump Operation, will be used to determine the leak rate and will direct a power reduction per AP-510, Rapid Power Reduction. The crew will reduce power to less than 72% power.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Notify personnel of entry into AP-510</li> <li>• Notify Chemistry if <math>\geq 15\%</math> Rx power change in any 1 hour time period.</li> <li>• <u>WHEN</u> Rx power is <math>&lt; 80\%</math>, <u>THEN</u> notify SPO to ensure MS is supplying AS.</li> <li>• Maintain DFT level between 8 and 11 ft.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• When reactor power reaches 72% directs RO to stop RCP-1B</li> <li>• Enters AP-545</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Stops RCP-1B</li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 5 Rev.: 0

Event Description: (Examiner Cue) When the crew secures RCP-1B per OP-302, and implements AP-545, Plant Runback. FW flows will fail to re-ratio [MALF]. The crew will take FW Demand stations to hand and manually re-ratio FW flow using skill of the operator.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (K-03-02) SASS Mismatch</li> <li>○ (K-06-01) RCS delta-Tc High</li> </ul> </li> <li>• Identifies FW failure to re-ratio</li> <li>• Notifies SRO of failure</li> <li>• Takes both FW Demand stations to hand and manually re-ratios FW flow</li> <li>• May take Rx Diamond to hand</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assist RO with diagnoses of FW re-ratio failure</li> <li>• Directs actions per AP-545 (details in RO and BOP sections below)</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Notifies personnel of entry into AP-545</li> <li>• Ensure narrow range RCS PRESS control is selected to the loop with 1 RCP running.</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Ensure RCS PRESS is stable between 2130 and 2185 psig</li> <li>• Ensure lift oil pump is running on RCP-1B</li> <li>• Ensure Rx power is <math>\leq 75\%</math> (1926 MWt)</li> <li>• Ensure RC-5A-MS2 selected to TT1</li> <li>• Stabilizes delta-Tc between <math>\pm 5</math> degrees</li> <li>• Ensures pressurizer level, Tave, and MS Header Pressure are approaching stability</li> <li>• Ensures regulating rod index is within limits of OP-103D</li> <li>• Ensures rods are within <math>\pm 6.5\%</math> of group average height</li> <li>• Verifies imbalance within limits using SPDS</li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 6 Rev.: 0

Event Description: (Examiner Cue) Once the plant is stable an OPC actuation will occur [MALF]. On the actuation, the reactor will fail to automatically trip. The crew should enter EOP-2, Vital System Status Verification, and must manually trip the reactor [CT].

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (O-03-04) Turb Throttle Press High/Low</li> <li>○ (O-04-02) Turbine Steam Flow Low</li> <li>○ (O-04-09) Turb Gen Speed Channel Trouble</li> </ul> </li> <li>• Observes that all governor valves and intercept valves are closed</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Observes rapid rise in Tave and RCS pressure.</li> <li>• Recognizes reactor trip is required</li> <li>• Manually trips the reactor [CT]</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Enters EOP-2</li> <li>• Directs actions of EOP-2 (attached)</li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Performs actions of EOP-2 (attached)</li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 7 Rev.: 0

Event Description: (Examiner Cue) When the OPC actuation occurs, a 250 gpm RCS leak will develop [MALF]. The crew should implement AP-520, Loss of RCS Coolant or Pressure, in parallel with EOP-2. After approximately 10 minutes the leak will rise to > 4000 gpm resulting in a loss of SCM and requiring entry into EOP-3, Inadequate Subcooling Margin. The crew must secure all RCPs within 1 minute [CT]. When HPI actuates, MUV-73, BWST Suction to MUP-1B will fail to open [MALF]. The crew must direct the valve be opened locally or secure MUP-1B prior to losing suction.

Time	Position	Applicant's Actions or Behavior
	BOP/RO	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (C-02-13) RB Sump Pump Trouble</li> <li>○ (B-02-05) (E-02-05) RB Fan Condensate High</li> <li>○ (H-02-02) Atmospheric Monitor Warning (EP 1728)</li> <li>○ (H-02-01) Atmospheric Radiation High (EP 1727)</li> </ul> </li> <li>• Recognizes indications of RCS leakage</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges RCS leakage</li> <li>• Continues in EOP-2</li> <li>• May direct the RO or BOP to concurrently perform AP-520 (EOP-2 will eventually direct this)</li> <li>• Transitions to EOP-8A when directed by EOP-2 (if SCM has not already been lost)</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Recognizes RCS leakage increase</li> <li>• Recognizes loss of SCM</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Enters EOP-3</li> <li>• Directs actions per EOP-3 (applicable steps attached)</li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Performs actions per EOP-3 (applicable steps attached)</li> <li>• Secures RCPs within 1 minute of loss of SCM [CT]</li> <li>• Recognizes failure of MUV-73 to open on HPI actuation</li> <li>• Reports MUV-73 failure to SRO</li> </ul>

Op-Test No.: 1 Scenario No.: 1 Event No.: 7 Rev.: 0

Event Description: (Examiner Cue) When the OPC actuation occurs, a 250 gpm RCS leak will develop [MALF]. The crew should implement AP-520, Loss of RCS Coolant or Pressure, in parallel with EOP-2. After approximately 10 minutes the leak will rise to > 4000 gpm resulting in a loss of SCM and requiring entry into EOP-3, Inadequate Subcooling Margin. The crew must secure all RCPs within 1 minute [CT]. When HPI actuates, MUV-73, BWST Suction to MUP-1B will fail to open [MALF]. The crew must direct the valve be opened locally or secure MUP-1B prior to losing suction.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Directs MUV-73 be opened manually or MUP-1B be secured prior to losing suction to MUP-1B.</li> </ul>

*Scenario may be terminated when MUV-73 failure has been addressed and the crew reaches Step 3.11 of EOP-3*

Facility: **Crystal River #3**Scenario No.: #2 (NRC)Op-Test No.: 1

Examiners: \_\_\_\_\_

Operators: \_\_\_\_\_

Initial Conditions: The plant is in Mode 2 at approximately 2% power.Turnover: EGDG-1B is OOS. Maintain this power level until relieved. Next shift will continue startup. RCS activity is slightly elevated w/ DEI @  $7.0 \times 10^{-3}$   $\mu\text{Ci/g}$ .

Thunderstorms are predicted for Citrus and Levy Counties.

Event No.	Malf. No.	Event Type*	Event Description
1	1	I (BOP) I (SRO)	RC-3A-PT3 (ES Channel 1) fails low. (OP-507) SRO TS determination. (3.3.5)
2	2	C (BOP)	RM-A5G fails high (AP-250)
3	3	C (BOP)	Condenser vacuum leak – ARP-1B fail to start (OP-607)
4	4	I (RO) I (SRO)	Selected pressurizer level instrument fails low. (OP-501) SRO TS determination. (3.3.17)
5	5	C (RO)	FWV-39 (Startup Control Valve) fails open.
6	6	M (All)	OTSG tube leak on the 'B' OTSG, requiring a Rx trip. (EOP-6)
7	7	C (RO)	Manual Rx trip pushbutton failure. (EOP-6) [CT]
8	8	C (RO or BOP)	B MUP bearing fails. (EOP-6, EOP-13) [CT]

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

Plant is initialized in Mode 2 at approximately 2% power. EGDG-1B has been out of service for 4 hours due to a fuel oil leak. Required actions were completed 3 hours ago. This power level should be maintained until the crew is relieved. RCS activity is slightly elevated w/ DEI @  $7.0 \times 10^{-3} \mu\text{Ci/g}$ . Thunderstorms are predicted for Citrus and Levy counties.

Soon after turnover is complete RC-3A-PT3 (ES Channel 1 pressure transmitter) will fail low. Since this trips only one ES channel an actuation will not occur. HPI and LPI bistables will trip in ES Cabinet 1 and the block loading alarms will be received. TS 3.3.5, Condition A, and TS 3.3.17, Condition A, should be entered. The CRS will direct the BOP to place ES Channel 1 in the trip condition per OP-507, Operation of the ES, RPS and ATWAS Systems.

Once the actions for ES Channel 1 pressure transmitter have been addressed, RM-A5G will fail high. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the meter has failed high. No automatic actions occur. Crew may isolate the CC per Step 3.1 of AP-250. Crew discussion about loss of CC ventilation, if isolated, should occur. OP-409, Plant Ventilation, may be used to restore Control Complex emergency recirc until the monitor can be repaired.

A small vacuum leak occurs and ARP-1B fails to auto-start. OP-607, Condenser Vacuum System, will be utilized to perform required actions. Once ARP-1B is manually started vacuum will start to recover.

The selected PZR level transmitter will fail low. MUV-31 must be taken to manual and makeup flow controlled. Actions will be taken per OP-501 to select a good level signal and the stations will be returned to automatic.

Following the PZR level transmitter failure FWV-39, "B" OTSG SUCV, will fail open. Multiple alarms will come in to alert the RO. The RO will first attempt to reduce demand on the H/A station but that will not work. Closing the SU Block valve will isolate the failed valve and level control can be regained using the low load control valve.

Following completion of the SUCV failure an OTSG tube leak (30 gpm) will occur and the reactor will be tripped, if not already, per EOP-6, OTSG Tube Rupture. This will meet the criteria to enter an Unusual Event. Following the trip the tube leak will increase to 125 gpm and the main condenser will develop a large leak causing a loss of vacuum. The loss of vacuum will mean a loss of the TBVs. Combined with the RCS activity value provided in the turnover, this will require the crew to establish a cooldown using emergency rates and to isolate the OTSG using TRACC guidance.

The manual Rx trip pushbutton will not work. Breakers 3305 and 3312 must be opened. [CT]

A bearing will fail on MUP-1A. MUP-1C and its cooling water pumps must be started [CT].

This scenario may be terminated when normal makeup flow is restored and an emergency cool-down has been commenced.

**Procedures used:** (ARs not listed)

OP-409	AP-250	EOP-6
OP-507		
OP-501		

Target Quantitative Attributes – Scenario 2 – 2K7 NRC	Actual Attributes
1. Total Malfunctions (5-8)	8
2. Malfunctions after EOP entry (1-2)	2
3. Abnormal Events (2-4)	2
4. Major Transients (1-2)	1
5. EOPs entered requiring substantive actions (1-2)	1
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical Task (2-3)	2

**SHIFT TURNOVER**

A. Initial Conditions:

- 1. Time in core life – 300 EFPD
- 2. Shift:  Day  Swing  Mid
- 3. Rx power and power history – 2% for 1 hour – Plant startup following Rx trip four days ago
- 4. Boron concentration – 1429 ppmb
- 5. Xenon – 0% ΔK/K
- 6. RCS Activity –  $7.0 \times 10^{-3}$  μCi/g
- 7. EOOS – Green

B. Tech. Spec. Action requirement(s) in effect:

- ITS 3.8.1 Condition B entered 4 hours ago for EDG-1B. SP-321 Enclosure 1 completed 3 hours ago.

Deleted: , for the "A"

Deleted: ,

Deleted: 6 hours into the 72 hr action statement.

C. Clearances in effect:

- EGDG-1B due to a fuel oil leak. The leak has been isolated. Estimated return to service is unknown. EDG-1A has been evaluated for common cause failure and is not affected.

D. Significant problems/abnormalities:

- Citrus and Levy counties are under a severe thunderstorm watch for the next 2 hours.

E. Evolutions/maintenance for the on-coming shift:

- Maintain current power level until relieved. The on-coming shift will continue the plant startup when EGDG-1B is repaired.
- Maintenance to continue work on EGDG-1B.

F. CRS – Instruct the ROs to walk down the main control boards.

G. Required Emergency Plan Implementation

- Full Implementation, including all required notifications.
- Initial/upgrade classifications - internal notifications.
- None

*Examination Setup/Execution*  
*Scenario 2*

**INITIAL CONDITIONS**

- A. “Restore” the simulator to IC# 102 (FATHER) developed for this SES.
- B. “Unfreeze” the simulator and ensure the following configuration is setup:
  - 1. Plant stable at approximately 2% power.
- C. “Freeze” the simulator and enter ‘NRCEXAM’ lesson plan directory:
  - 1. “Start” Lesson Plan **NRC\_SES#2.lsn** – (NRC Scenario #2)
- D. “Unfreeze” the simulator and “Trigger” Setup Step(s) which will:
  - 1. See simulator lesson plan.
- E. Tag out the following equipment:
  - 1. Place CIT on EGDG-1B start pushbutton
  - 2. Place CIT on BKR 3210 C/S
- F. Additional Modifications required to the IC.
  - 1. Ensure SPDS selected to NORM/IMB and history traces cleared and history trace selected. Also ensure “A” and “B” SPDS are properly selected for RCS Loops and Primary instruments selected.
  - 2. Ensure SPDS on CNO/SSO/STA computers displaying correct data for IC.
  - 3. Ensure Group 59 indicative of current reactor power.
  - 4. Acknowledge computer and annunciator alarms.
  - 5. *Ensure proper PICS groups AND correct scaling displayed on overhead screens.*
- G. Freeze the simulator and notify the lead examiner.
- H. Ensure copy of OP-203 available with appropriate steps signed off.**
- I. Consumable copies of OP-607 and OP-501 available.**
- J. Ensure Radiation Alarm Setpoint book is in Simulator.**

A. **EVENT #1**  
When directed, input the failure on RC-3A-PT3.  
[Trigger step labeled Event 1]

B. **EVENT #2**  
When directed, input the RM-A5 gas failure.  
[Trigger step labeled Event 2]

**Role Play:** When called as HP wait two minutes and report no increase in radiation in the Control Complex.

**Role Play:** If needed, direct as SSO to place the CC in recirc per OP-409, Section 4.10.

D. **EVENT #3**  
When directed, input the condenser vacuum leak.  
[Trigger step labeled Event 3]

E. **EVENT #4**  
When directed, input the PZR level instrument failure low.  
[Trigger step labeled Event 4]

F. **EVENT #5**  
When directed, input the FWV-39 failure.  
[Trigger step labeled Event 5]

G. **EVENTS #6 & 7**  
When directed, input the OTSG tube leak.  
[Trigger step labeled Event 6 and 7]

H. **EVENT #8**  
When directed, input MUP failure.  
[Trigger step labeled Event 8]

**Role Play:** If contacted as the SPO to perform EOP-14 Enclosure 1, run lesson plan Enc\_1.lsn from the MISC directory. Report completion after 23 minutes.

**Role Play:** If contacted as the PPO to perform EOP-14 Enclosure 2, run lesson plan Enc\_2.lsn from the MISC directory. Report completion after 15 minutes.

Op-Test No.: 1 Scenario No.: 2 Event No.: 1

Event Description: (Examiner Cue) Soon after turnover is complete RC-3A-PT3 (ES Channel 1 pressure transmitter) will fail low [MALF]. Since this trips only one ES channel an actuation will not occur. HPI and LPI bistables will trip in ES Cabinet 1 and the block loading alarms will be received. TS 3.3.5, Condition A, and TS 3.3.17, Condition A, should be entered. The CRS will direct the BOP to place ES Channel 1 in the trip condition per OP-507, Operation of the ES, RPS and ATWAS Systems.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (J-2-1) "RCS Pressure Low-Low"</li> <li>○ (C-1-1) "RC 1 High Pressure Bistable Trip"</li> <li>○ (C-1-2) "RC 4 Low Pressure Bistable Trip"</li> <li>○ Multiple block loading alarms</li> <li>○ Reviews AR-502</li> </ul> </li> <li>• Verifies the plant is stable</li> <li>• Notifies SRO of failure</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists the RO/BOP in diagnosing the failed pressure transmitter</li> <li>• Enters TS 3.3.5, Condition A, for one ES Channel inoperable</li> <li>• Enters TS 3.3.17 Condition A for RCS Pressure Transmitter</li> <li>• Contacts work controls to initiate repair efforts</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Assists RO in diagnosing the failed pressure transmitter</li> <li>• Assists RO in verifying the plant is stable</li> <li>• Reviews alarms</li> <li>• Verifies HPI and LPI bistables are tripped in ES Actuation Channel Cabinet 1</li> <li>• Reviews AR-301 and AR-303</li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 1

Event Description: (Examiner Cue) Soon after turnover is complete RC-3A-PT3 (ES Channel 1 pressure transmitter) will fail low [MALF]. Since this trips only one ES channel an actuation will not occur. HPI and LPI bistables will trip in ES Cabinet 1 and the block loading alarms will be received. TS 3.3.5, Condition A, and TS 3.3.17, Condition A, should be entered. The CRS will direct the BOP to place ES Channel 1 in the trip condition per OP-507, Operation of the ES, RPS and ATWAS Systems.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Directs the BOP to place ES Channel 1 to the tripped condition per OP-507               <ul style="list-style-type: none"> <li>○ Verify the operable channels are not bypassed</li> <li>○ Place channel in tripped condition</li> <li>○ Select "Test Operate" position of the "Pressure Test Module"</li> <li>○ Verify annunciator alarms</li> <li>○ Verify proper ES status panel lights are on for Trains A &amp; B</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Executes actions per SRO and OP-507, Section 4.1, to place ES Channel 1 in the tripped condition               <ul style="list-style-type: none"> <li>○ Verifies the other two ES channels are not tripped</li> <li>○ Selects the Pressure Test Module on Channel 1 to the Test Operate position</li> <li>○ Verifies multiple annunciator alarms</li> <li>○ Verifies proper ES status panel lights are ON</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 2

Event Description: (Examiner Cue) Once the actions for ES Channel 1 pressure transmitter have been addressed RM-A5G will fail high [**MALF**]. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the meter has failed high. No automatic actions occur. The Control Complex may be manually isolated or the CRS may determine that the meter has failed and not isolate the CC.

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> <li>• Recognize RM-A5G failure high alarms &amp; indications               <ul style="list-style-type: none"> <li>○ (H-2-1) "Atmospheric Radiation High"</li> <li>○ (H-2-2) "Atmospheric Monitor Warning"</li> </ul> </li> <li>• Radiation Monitor Panel indication</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Observe RM-A5G radiation monitor</li> <li>• Report to SRO that the monitor appears to be failed high</li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 2

Event Description: (Examiner Cue) Once the actions for ES Channel 1 pressure transmitter have been addressed RM-A5G will fail high [MALF]. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the meter has failed high. No automatic actions occur. The Control Complex may be manually isolated or the CRS may determine that the meter has failed and not isolate the CC.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• <i>CRS may use his discretion and determine that only the meter has failed and not isolate the Control Complex (this is an acceptable course of action)</i></li> <li>• Directs BOP actions per AP-250, Radiation Monitor Actuation               <ul style="list-style-type: none"> <li>○ Ensure Auto actions of affected radiation monitors                   <ul style="list-style-type: none"> <li>▪ The following dampers closed:                       <ul style="list-style-type: none"> <li>• AHD-17</li> <li>• AHD-22</li> <li>• AHD-12</li> <li>• AHD-12D</li> <li>• AHD-2C and AHD-2E</li> <li>• AHD-1C and AHD-1E</li> </ul> </li> <li>▪ The following damper open:                       <ul style="list-style-type: none"> <li>• AHD-3</li> </ul> </li> <li>▪ The following fans stopped:                       <ul style="list-style-type: none"> <li>• AHF-19A and AHF-19B</li> <li>• AHD-17A and AHF-17B</li> </ul> </li> <li>▪ The following fans stopped or in slow:                       <ul style="list-style-type: none"> <li>• AHF-20A and AHF-20B</li> </ul> </li> <li>▪ If AHF-20A and AHF-20B are stopped then ensure the following fans stopped:                       <ul style="list-style-type: none"> <li>• AHF-44A and AHF-44B</li> <li>• AHF-30</li> </ul> </li> </ul> </li> <li>○ Notify personnel of entry into AP-250</li> <li>○ Ensure proper radiation monitor operation</li> <li>○ Notify HP and Chemistry</li> <li>○ If alarm is not valid then perform corrective actions                   <ul style="list-style-type: none"> <li>▪ Depress "Horn Silence"</li> <li>▪ Initiate repair efforts</li> </ul> </li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 2

Event Description: (Examiner Cue) Once the actions for ES Channel 1 pressure transmitter have been addressed RM-A5G will fail high [MALF]. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the meter has failed high. No automatic actions occur. The Control Complex may be manually isolated or the CRS may determine that the meter has failed and not isolate the CC.

Time	Position	Applicant's Actions or Behavior
11/28/2007	BOP	<ul style="list-style-type: none"> <li>• Execute AP actions in accordance with SRO directions</li> <li>• Ensure Auto actions of affected radiation monitors               <ul style="list-style-type: none"> <li>▪ The following dampers closed:                   <ul style="list-style-type: none"> <li>• AHD-17</li> <li>• AHD-22</li> <li>• AHD-12</li> <li>• AHD-12D</li> <li>• AHD-2C and AHD-2E</li> <li>• AHD-1C and AHD-1E</li> </ul> </li> <li>▪ The following damper open:                   <ul style="list-style-type: none"> <li>• AHD-3</li> </ul> </li> <li>▪ <i>Use of the "Control Complex HVAC Isolate/Reset" switches will be used to reposition the dampers</i></li> <li>▪ The following fans stopped:                   <ul style="list-style-type: none"> <li>• AHF-19A and AHF-19B</li> <li>• AHD-17A and AHF-17B</li> </ul> </li> <li>▪ The following fans stopped or in slow:                   <ul style="list-style-type: none"> <li>• AHF-20A and AHF-20B</li> </ul> </li> <li>▪ If AHF-20A and AHF-20B are stopped then ensure the following fans stopped:                   <ul style="list-style-type: none"> <li>• AHF-44A and AHF-44B</li> <li>• AHF-30</li> </ul> </li> <li>▪ <i>All fans must be manually secured</i></li> </ul> </li> <li>• Notify personnel of entry into AP-250</li> <li>• Ensure proper radiation monitor operation               <ul style="list-style-type: none"> <li>○ Ensure monitor energized</li> <li>○ Ensure switch in OPERATE position</li> <li>○ Ensure high alarm setpoint is set correctly</li> <li>○ Ensure Range switch is set to "1M"</li> <li>○ Observe trends on other monitors</li> </ul> </li> <li>• Notify HP and Chemistry</li> <li>• If alarm is not valid then perform corrective actions               <ul style="list-style-type: none"> <li>▪ Depress "Horn Silence"</li> <li>▪ Initiate repair efforts</li> </ul> </li> <li>• Notify SRO of failures</li> </ul>

11/28/2007

9:32 AM

Op-Test No.: 1 Scenario No.: 2 Event No.: 2

Event Description: (Examiner Cue) Once the actions for ES Channel 1 pressure transmitter have been addressed RM-A5G will fail high [**MALF**]. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the meter has failed high. No automatic actions occur. The Control Complex may be manually isolated or the CRS may determine that the meter has failed and not isolate the CC.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Recognize that RM-A5G is failed high but no radiation concerns</li> <li>• <i>IF</i> CC was isolated then:               <ul style="list-style-type: none"> <li>○ Recognize that with all CC ventilation stopped that the CC may reach its design limit of 95° F within 30 minutes</li> <li>○ Recognize that even without direct procedural guidance to establish CC ventilation that it needs to be accomplished</li> <li>○ Direct the BOP to establish CC Emergency Recirculation                   <ul style="list-style-type: none"> <li>▪ EOP-14, Enclosure 17, or</li> <li>▪ Skill of the operator</li> </ul> </li> <li>○ May direct the BOP to start AHF-18A and AHF-19A</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Perform actions as directed by the SRO</li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 3

Event Description: (Examiner Cue) After the actions for RM-A5G failure are complete a small condenser vacuum leak occurs. ARP-1B fails to auto-start [MALF]. OP-607, Condenser Vacuum System is entered and ARP-1B is manually started. Vacuum will recover when the ARP is started.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Recognizes degrading condenser vacuum               <ul style="list-style-type: none"> <li>○ RECL-118 point on overhead CRT</li> <li>○ CD-007-PIR on MCB indication</li> <li>○ (O-3-2) "Turb Vacuum Pretrip" will annunciate if vacuum degrades to 25" HgV</li> <li>○ Reviews AR-603</li> </ul> </li> <li>• Notifies SRO of vacuum problem</li> <li>• Starts ARP-1B</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists the BOP in diagnosing problem</li> <li>• Directs BOP actions per OP-607</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Directs SPO to monitor vacuum at MFWP and Turbine pedestals</li> <li>• Monitors point T-215</li> <li>• Starts ARP-1B if not already started</li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 4

Event Description: (Examiner Cue) When ARP-1B is started and vacuum starts to recover the selected PZR level transmitter will fail low [**MALF**]. Manual control of MUV-31 will be required and a good instrument will be selected using OP-501.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (K-3-2) "SASS Mismatch"</li> <li>○ (I-8-1) "Pressurizer Level Low" will reflash</li> <li>○ Reviews AR-501 and AR-503</li> </ul> </li> <li>• Monitors plant conditions               <ul style="list-style-type: none"> <li>○ MUV-31 opens fully</li> <li>○ PZR SCR heater demand stations lock up (red and white lights on)</li> </ul> </li> <li>• Selects MUV-31 control station to manual and lowers demand</li> <li>• May direct BOP to monitor alternate PZR level indication (RIP or computer)</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists the RO in diagnosing failure</li> <li>• Approves selection of MUV-31 control station to hand</li> <li>• Enters TS 3.3.17, Condition A, for one PZR level channel inoperable</li> <li>• Enter TS 3.4.8 Condition B due to lost pressurizer heaters</li> <li>• Contacts work controls to initiate repair efforts</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Assists RO in diagnosing the failure</li> <li>• Assists RO in verifying the plant is stable</li> <li>• Reviews alarms</li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 4

Event Description: (Examiner Cue) When ARP-1B is started and vacuum starts to recover the selected PZR level transmitter will fail low [**MALF**]. Manual control of MUV-31 will be required and a good instrument will be selected using OP-501.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Directs RO to transfer PZR level signal to unaffected channel per OP-501</li> <li>• Step 4.7.2               <ul style="list-style-type: none"> <li>○ Determine proper operating channel</li> <li>○ Select control switch to proper operating channel</li> <li>○ Generate a work request</li> <li>○ Notify Reactor Engineer to consider impact on plant heat balance</li> </ul> </li> <li>• May review SRO checklist for unplanned equipment status change</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Executes actions per SRO and OP-501 to select alternate signal source</li> <li>• Step 4.7.2               <ul style="list-style-type: none"> <li>○ Determines proper operating channel</li> <li>○ Selects control switch to proper operating channel                   <ul style="list-style-type: none"> <li>▪ Selects RC-1MS to LT3-Y</li> </ul> </li> <li>○ Generates a work request (BOP)</li> <li>○ Notifies Reactor Engineer to consider impact on plant heat balance (BOP)</li> </ul> </li> <li>• Returns MUV-31 to automatic</li> <li>• Returns PZR heater demand station to automatic control</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• BOP will assist with OP-501</li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 5

Event Description: (Examiner Cue) Following the PZR level transmitter failure FWV-39, "B" OTSG SUCV, will fail open [MALF]. Multiple alarms will come in to alert the RO. The RO will first attempt to reduce demand on the H/A station but that will not work. Closing the SU Block valve will isolate the failed valve and level control can be regained using the low load control valve.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (O-3-4) "Turbine Throttle Pressure High/Low"</li> <li>○ (K-8-4) "Steam Gen B Low Level Limited" <i>CLEARs</i></li> <li>○ (K-3-2) "SASS Mismatch"</li> <li>○ (K-6-1) "RCS ΔTc High"</li> </ul> </li> <li>• Additional indications               <ul style="list-style-type: none"> <li>○ FWV-32 (LLBV) opens</li> <li>○ Valve position indication (not valve demand) increases</li> <li>○ SU flow increases on SP-7B-FI</li> <li>○ OTSG level increase</li> </ul> </li> <li>• Diagnoses alarms               <ul style="list-style-type: none"> <li>○ Recognizes FWV-39 is full open</li> </ul> </li> <li>• Attempts to lower FWV-39 demand               <ul style="list-style-type: none"> <li>○ No valve or FW flow response</li> </ul> </li> <li>• Requests permission to close the SU Block Valve</li> <li>• Notifies CRS of plant conditions</li> <li>• Controls OTSG level on FWV-38 using manual or automatic control</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assist RO in diagnosing alarms</li> <li>• Directs/concurs with RO to close SUBV</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Assist in diagnosing alarms and plant conditions</li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 6 & 7

Event Description: (Examiner Cue) When the plant is stabilized, a 30 gpm OTSG tube leak develops [MALF]. This will meet the criteria to enter an Unusual Event. Once diagnosed EOP-6, OTSG Tube Rupture, will be entered. The manual Rx trip pushbutton will fail [MALF] requiring breakers 3305 and 3312 to be opened. [CT] Following the Rx trip the tube leak will increase to 125 gpm. Post trip, the main condenser will develop a large leak causing a loss of vacuum. The loss of vacuum will mean a loss of the TBVs. Combined with the RCS activity value provided in the turnover, this will require the crew to establish a cooldown using emergency rates and to isolate the OTSG using TRACC guidance

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Direct RO/BOP actions per EOP-6, OTSG Tube Rupture               <ul style="list-style-type: none"> <li>○ See attached partial EOP-6 for required actions.</li> </ul> </li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Execute EOP actions in accordance with SRO directions               <ul style="list-style-type: none"> <li>○ See attached partial EOP-6 for required actions. The following Critical Task applies:                   <ul style="list-style-type: none"> <li>• Manual Rx trip pushbutton will fail</li> <li>• <b>Breakers 3305 and 3312 must be opened [CT]</b></li> </ul> </li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 2 Event No.: 8

Event Description: (Examiner Cue) A bearing will fail on MUP-1B [**MALF**]. MUP-1C and its cooling water pumps must be started [**CT**].

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Direct RO/BOP actions for loss of running MUP               <ul style="list-style-type: none"> <li>○ Close MUV-49</li> <li>○ Ensure MUV-58 open</li> <li>○ Start required cooling water pumps for affected MUP</li> <li>○ Start ES selected MUP</li> <li>○ Maintain PZR level</li> </ul> </li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Execute EOP actions in accordance with SRO directions               <ul style="list-style-type: none"> <li>○ Close MUV-49</li> <li>○ Ensure MUV-58 open</li> <li>○ Start required cooling water pumps for affected MUP                   <ul style="list-style-type: none"> <li>• Starts RWP-3B</li> <li>• Starts DCP-1B</li> </ul> </li> <li>○ <b>Start ES selected MUP [CT]</b> <ul style="list-style-type: none"> <li>• Starts MUP-1C</li> </ul> </li> <li>○ Maintain PZR level</li> </ul> </li> </ul>
<p><i>Scenario may be terminated when makeup flow is restored and an emergency cool-down has been commenced.</i></p>		

Facility: **Crystal River #3**Scenario No.: #3 (NRC)Op-Test No.: 1

Examiners: \_\_\_\_\_

Operators: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Initial Conditions: Plant is at 100% power.

Turnover: EGDG-1A has been OOS for 6 hours due to a breaker problem. Required actions were completed 5 hours ago. RWP-2B is running due to RWP-1 elevated vibrations. Thunderstorms are predicted for Citrus and Levy Counties.

Event No.	Malf. No.	Event Type*	Event Description
1	1	C (BOP) C (SRO)	RWP-2B trips; SRO TS determination. (3.7.9, 3.8.1.B.2)
2	2	I (SRO) I (RO)	B MFW flow transmitter slowly fails low. (OP-501)
3	3	C (BOP) C (SRO)	Breaker 3211 trips, causing 'A' ES bus to de-energize. (AP-770) SRO TS determination. (3.0.3, 3.8.9, 3.8.1)
4	4	C (RO) C (SRO)	RWP-1 trips requiring a manual Rx trip. (AP-330, EOP-2) [CT]
5	5	M (BOP)	On the Rx trip a LOOP occurs (AP-770)
6	6	C (RO) C (SRO)	One MSSV on each OTSG fails to reseat following the Rx trip. (EOP-2, EOP-5) [CT]
7	N/A	M (ALL)	Isolating both OTSGs per EOP-5 leads to IHT requiring "trickle feed". (EOP-4, EOP-5) [CT]

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

Plant is initialized in Mode 1 at 100% power. EGDG-1A has been out of service for 6 hours due to a breaker problem. Required actions were completed 5 hours ago. RWP-2B is running due to elevated vibrations on RWP-1. Thunderstorms are predicted for Citrus and Levy Counties.

Soon after turnover is completed a cooling water leak on RWP-2B leads to a pump trip. Since RWP-2A has no automatic start, RWP-2A must be manually started using AR-304. TS 3.7.9, Condition A, should be entered. TS 3.8.1 Required Action B.2 must also be entered.

Once the actions for the RWP failure have been completed B MFW flow transmitter slowly fails low. This leads to excessive feedwater. The crew should take manual control of ICS and stabilize the plant. Once a good instrument is selected all ICS stations can be returned to automatic using OP-501, Reactor Non-Nuclear Instrumentation.

When the plant is stable and all ICS stations are in automatic breaker 3211 trips, causing 'A' ES Bus to de-energize. The crew will address the casualty with AP-770, Emergency Diesel Generator Actuation. RWP-1 must be started using 'prompt and prudent' or AP-770. TS 3.0.3 must be entered due to a loss of safety related RW Pumps. TS 3.8.1 Conditions A and D should be entered. TS 3.8.9 Condition A should be entered.

When makeup flow has been restored RWP-1 vibrations will worsen leading to a pump trip. This will require entry into AP-330, Loss of Nuclear Service Cooling. With all SW-RW lost AP-330 directs a reactor trip [CT] and entry into EOP-2, Vital System Status Verification.

On the reactor trip a Loss of Offsite Power will occur. This will require re-entry into AP-770.

Following the trip one MSSV on each OTSG fails to reset. This leads to an overcooling event. Once the symptom becomes apparent, EOP-5, Excessive Heat Transfer, should be entered. The crew will isolate both OTSGs per EOP-5 [CT] and will ultimately transition to EOP-4, Inadequate Heat Transfer. EOP-4 will be used to re-establish feed to the OTSGs using 'trickle feed' [CT].

Once trickle feed has been established the scenario may be terminated.

**Procedures used:** (ARs not listed)

OP-408	AP-330	EOP-2
OP-501	AP-770	EOP-4
		EOP-5

Target Quantitative Attributes – Scenario 3 – 2K7 NRC	Actual Attributes
1. Total Malfunctions (5-8)	6
2. Malfunctions after EOP entry (1-2)	2
3. Abnormal Events (2-4)	2
4. Major Transients (1-2)	2
5. EOPs entered requiring substantive actions (1-2)	2
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical Task (2-3)	3

**SHIFT TURNOVER**

A. Initial Conditions:

- 1. Time in core life – 300 EFPD
- 2. Shift:  Day  Swing  Mid
- 3. Rx power and power history – 100% for 40 days
- 4. Boron concentration – 995 ppmb
- 5. Xenon – Equilibrium @ -2.45% ΔK/K
- 6. RCS Activity - See Status Board
- 7. EOOS – Green

B. Tech. Spec. Action requirement(s) in effect:

- ITS 3.8.1 Condition B entered 6 hours ago for EDG-1A. SP-321 Enclosure 1 completed 5 hours ago.

Deleted: , for the "A"  
Deleted: ,  
Deleted: 6 hours into the 72 hr action statement.

C. Clearances in effect:

- EGDG-1A due to unexpected breaker trip during SP-354A. Estimated return to service is unknown. EGDG-1B has been evaluated for common cause concerns and it remains operable.

D. Significant problems/abnormalities:

- RWP-1 was shutdown 8 hours ago due to excessive vibrations. Emergency use only per system engineer.
- Citrus and Levy Counties are under a severe thunderstorm watch for the next 2 hours.

E. Evolutions/maintenance for the on-coming shift:

- Maintenance will continue to work on EGDG-1A breaker problem.

F. CRS – Instruct the ROs to walk down the main control boards.

G. Required Emergency Plan Implementation

- Full Implementation, including all required notifications.
- Initial/upgrade classifications - internal notifications.
- None

*Examination Setup/Execution*  
*Scenario 3*

**INITIAL CONDITIONS**

- A. "Restore" the simulator to any 100% power IC.
- B. "Unfreeze" the simulator and ensure the following configuration is setup:
- Start RWP-2B and stop RWP-1
  - Ensure RWV-150 CLOSED placard is in place on MCB
- C. "Freeze" the simulator and enter 'NRCEXAM' lesson plan directory:
1. "Start" Lesson Plan **NRC\_SES#3.Isn** – (NRC Scenario #3)
- D. "Unfreeze" the simulator and "Trigger" Setup Step(s) which will:
1. See simulator lesson plan.
- E. Tag out the following equipment:
1. Place CIT on EGDG-1A start pushbutton
  2. Place CIT on BKR 3209 C/S
- F. Additional Modifications required to the IC.
1. Ensure SPDS selected to NORM/IMB and history traces cleared and history trace selected. Also ensure "A" and "B" SPDS are properly selected for RCS Loops and Primary instruments selected.
  2. Ensure SPDS on CNO/SSO/STA computers displaying correct data for IC.
  3. Ensure Group 59 indicative of current reactor power.
  4. Acknowledge computer and annunciator alarms.
  5. *Ensure proper PICS groups AND correct scaling displayed on overhead screens.*
- G. Freeze the simulator and notify the lead examiner.
- H. **Consumable copies of OP-501 available.**

**A. EVENT #1**

When directed, input the failure on RWP-2B.

[Trigger step labeled Event 1]

**Role Play:** If contacted as the PPO to investigate RWP-2B trip wait ~ 1 minute and report water coming from motor cooler area. If contacted as PPO to isolate leak, Trigger step labeled ISOLATE SW TO RWP-2B.

Deleted: called

**B. EVENT #2**

When directed, input the B MFW flow transmitter failure.

[Trigger step labeled Event 2]

**C. EVENT #3**

When directed, input the Breaker 3211 failure.

[Trigger step labeled Event 3]

**Role Play:** If contacted as PPO to check out RWP-1, wait ~1 minute and report that the pump is vibrating a little more than normal.

Deleted: Estimate 1-2 hours to repair.

Deleted: called

**Role Play:** If contacted as the PPO to select MUP-1A for start wait ~2 minutes and report selection.

[Trigger step labeled PPO ES Select MUP-1A]

**Role Play:** If contacted as the PPO to energize MUV-62 and MUV-69 wait ~2 minutes and report completion.

[Trigger step labeled PPO Energize MUV-62 and MUV-69]

**D. EVENTS #4, 5, and 6**

When directed, input the RWP-1 failure. The remaining events occur automatically.

[Trigger step labeled Event 4, 5, 6]

**Role Play:** If contacted as the SPO to perform EOP-14 Enclosure 1, run lesson plan Enc\_1.lsn from the MISC directory. Report completion after 23 minutes.

Op-Test No.: 1 Scenario No.: 3 Event No.: 1 Rev.: 1

Event Description: (Examiner Cue) Soon after turnover is completed a cooling water leak on RWP-2B leads to a pump trip [MALF]. Since RWP-2A has no automatic start, RWP-2A must be manually started using AR-304. TS 3.7.9, Condition A, should be entered. TS 3.8.1 Required Action B.2 must also be entered.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ C-3-5, "SW RW SYSTEM PRESS LOW"</li> <li>○ D-8-3, "SW RW PUMP B MOTOR OVERLOAD"</li> <li>○ D-8-2, "SW RW PUMP B TRIP"</li> </ul> </li> <li>• Diagnoses trip of RWP-2B</li> <li>• Notifies SRO of failure</li> <li>• Reviews AR-304</li> <li>• Starts RWP-2A</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists BOP with diagnosis of RWP-2B failure</li> <li>• Directs BOP to start RWP-2A using AR-304</li> <li>• Directs PPO to investigate and isolate the SW leak.</li> <li>• Enters TS 3.7.9 Condition A for failure</li> <li>• Enters TS 3.8.1 Required Action B.2 due to cross-train inoperability within 4 hours.</li> <li>• Contacts work controls to initiate repair efforts</li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 2 Rev.: 1

Event Description: (Examiner Cue) Once the actions for the RWP failure have been completed B MFW flow transmitter slowly fails low [MALF]. This leads to excessive feedwater. The crew should take manual control of ICS and stabilize the plant. Once a good instrument is selected all ICS stations can be returned to automatic using OP-501, Reactor Non-Nuclear Instrumentation.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ K-3-2 "SASS MISMATCH"</li> <li>○ K-4-3 "REACTOR LIMITED BY FEEDWATER"</li> <li>○ K-6-2 "UNIT MASTER IN TRACK"</li> </ul> </li> <li>• Observes B MFW lowering</li> <li>• Observes B OTSG level rising</li> <li>• Determines that undesired plant movement is occurring due to an instrument failure and performs the following:               <ul style="list-style-type: none"> <li>○ Places both FW Loop master and both FW Pump bailey stations in hand</li> <li>○ Places diamond in manual and reactor bailey station in hand</li> <li>○ Announces current reactor power</li> <li>○ Stabilizes the plant</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Assists RO in diagnosis of instrument failure</li> <li>• Places CDP master in hand</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assist RO diagnosis of instrument failure</li> <li>• Contacts work controls to initiate repair efforts</li> <li>• Directs RO to select FT2-Y on SP-8B per OP-501</li> <li>• Directs RO to select TT2 on SP-5B per OP-501</li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 2 Rev.: 1

Event Description: (Examiner Cue) Once the actions for the RWP failure have been completed B MFW flow transmitter slowly fails low [**MALF**]. This leads to excessive feedwater. The crew should take manual control of ICS and stabilize the plant. Once a good instrument is selected all ICS stations can be returned to automatic using OP-501, Reactor Non-Nuclear Instrumentation.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Selects FT2-Y on SP-8B</li> <li>• Selects TT2 on SP-5B</li> <li>• Returns ICS stations to auto:               <ul style="list-style-type: none"> <li>○ Diamond panel</li> <li>○ Reactor demand</li> <li>○ Main Feed Pumps</li> <li>○ FW Loop masters</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Returns CDP master to auto</li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 3 Rev.: 1

Event Description: (Examiner Cue) When the plant is stable and all ICS stations are in automatic breaker 3211 trips, causing 'A' ES Bus to de-energize [MALF]. The crew will address the casualty with AP-770, Emergency Diesel Generator Actuation. RWP-1 must be started using AP-770. TS 3.0.3 must be entered due to a loss of safety related RW Pumps. TS 3.7.9 Condition A should be entered again. TS 3.8.1 Conditions A and D should be entered. TS 3.8.9 Condition A should be entered.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ Q-2-1 "4KV ES BUS A DEAD"</li> </ul> </li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs actions per AP-770 (see details in RO and BOP sections below)</li> <li>• May direct a power reduction due to the degraded condition of the last remaining RW pump</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Notifies personnel of entry into AP-770</li> <li>• Isolates letdown by closing MUV-49</li> <li>• Ensures SWP-1C is running</li> <li>• Starts RWP-1 (may have started earlier using 'prompt and prudent')</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Ensures reactor power is &lt; 100%</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs BOP to restore a MUP using Enclosure 3 of AP-770 (see details in BOP section below)</li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 3 Rev.: 1

Event Description: (Examiner Cue) When the plant is stable and all ICS stations are in automatic breaker 3211 trips, causing 'A' ES Bus to de-energize [MALF]. The crew will address the casualty with AP-770, Emergency Diesel Generator Actuation. RWP-1 must be started using AP-770. TS 3.0.3 must be entered due to a loss of safety related RW Pumps. TS 3.7.9 Condition A should be entered again. TS 3.8.1 Conditions A and D should be entered. TS 3.8.9 Condition A should be entered.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Ensures MUV-16 and MUV-31 closed</li> <li>• Starts DCP-1B and RWP-3B</li> <li>• Ensures MUV-53 and MUV-257 open</li> <li>• Ensures MUP-2C running</li> <li>• Ensures MUP-3C in normal after-stop</li> <li>• Starts MUP-4C</li> <li>• Ensures MUP-5C in auto</li> <li>• Selects all MUPs to normal after-stop</li> <li>• Notifies PPO to ES Select MUP-1A</li> <li>• Notifies PPO to unlock and close breakers for MUV-69 and MUV-62</li> <li>• Operates MUV-58 based on MUT level (closed if &gt; 55", open if &lt; 55")</li> <li>• Closes MUV-69</li> <li>• Opens MUV-62</li> <li>• Ensure MUV-73 open (no power, cannot be opened from CR)</li> <li>• Starts MUP-1C</li> <li>• Ensures MUP-4C in auto</li> <li>• Maintain pressurizer level: <ul style="list-style-type: none"> <li>○ Ensure MUV-596 and MUV-27 open</li> <li>○ Control level using MUV-31</li> </ul> </li> <li>• Restore seal injection: <ul style="list-style-type: none"> <li>○ Ensure MUV-18 open</li> <li>○ Throttle MUV-16 open to establish 12 gpm total over a 2 minute period</li> <li>○ After 10 minutes, raise seal flow to 24 gpm total</li> <li>○ After 10 minutes, raise seal flow to 36 gpm total</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 3 Rev.: 1

Event Description: (Examiner Cue) When the plant is stable and all ICS stations are in automatic breaker 3211 trips, causing 'A' ES Bus to de-energize [MALF]. The crew will address the casualty with AP-770, Emergency Diesel Generator Actuation. RWP-1 must be started using AP-770. TS 3.0.3 must be entered due to a loss of safety related RW Pumps. TS 3.7.9 Condition A should be entered again. TS 3.8.1 Conditions A and D should be entered. TS 3.8.9 Condition A should be entered.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Enters the following TS (depending on progression, may need to be discussed after scenario):               <ul style="list-style-type: none"> <li>○ 3.7.9 Condition A</li> <li>○ 3.8.1 Conditions A and D</li> <li>○ 3.8.9 Condition A</li> <li>○ 3.0.3</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 4 Rev.: 0

Event Description: (Examiner Cue) When makeup flow has been restored RWP-1 vibrations will worsen leading to a pump trip. This will require entry into AP-330, Loss of Nuclear Service Cooling. With all SW-RW lost AP-330 directs a reactor trip [CT] and entry into EOP-2, Vital System Status Verification.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ C-3-3 "RWP-1 TRIP"</li> <li>○ C-3-4 "SW RW PUMP MOTOR OVERLOAD"</li> <li>○ C-3-5 "SW RW SYSTEM PRESS LOW"</li> </ul> </li> <li>• Diagnoses RWP-1 trip</li> <li>• Announces failure to SRO</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Enters AP-330 and directs the RO to trip the reactor</li> <li>• Directs BOP to continue performing AP-330 independently</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Performs AP-330               <ul style="list-style-type: none"> <li>○ See attached partial AP-330 for actions</li> </ul> </li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs RO to perform immediate actions of EOP-2 (see details in RO section below)</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Depress reactor trip pushbutton [CT]</li> <li>• Verify CRD groups 1 through 7 fully inserted</li> <li>• Verify NIs indicate reactor is shut down</li> <li>• Depress main turbine trip pushbutton</li> <li>• Verify throttle valves and governor valves are closed</li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 5 Rev.: 0

Event Description: (Examiner Cue) On the reactor trip a Loss of Offsite Power will occur [MALF]. This will require re-entry into AP-770.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Directs BOP perform actions of AP-770               <ul style="list-style-type: none"> <li>○ Personnel limitations will prevent performance of both AP-770 and AP-330 concurrently.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Performs actions of AP-770               <ul style="list-style-type: none"> <li>○ See attached partial AP-770 for actions</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Rev.: 0

Event Description: (Examiner Cue) Following the trip one MSSV on each OTSG fails to reset [MALF]. This leads to an overcooling event. Once the symptom becomes apparent, EOP-5, Excessive Heat Transfer, should be entered. The crew will isolate both OTSGs per EOP-5 [CT] and will ultimately transition to EOP-4, Inadequate Heat Transfer. EOP-4 will be used to re-establish feed to the OTSGs using 'trickle feed' [CT].

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> <li>• During EOP-2, crew performs a symptom scan. The following should be noted:               <ul style="list-style-type: none"> <li>○ No station blackout</li> <li>○ No inadequate SCM</li> <li>○ No Inadequate heat transfer</li> <li>○ Excessive heat transfer DOES exist</li> </ul> </li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Transitions to EOP-5</li> <li>• Directs RO perform actions of EOP-5</li> <li>• Recognize that both OTSGs are affected and both must be isolated [CT]               <ul style="list-style-type: none"> <li>○ See attached partial EOP-5 for actions</li> </ul> </li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Perform actions of EOP-5 as directed by SRO               <ul style="list-style-type: none"> <li>○ See attached partial EOP-5 for actions</li> </ul> </li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Transitions to EOP-4 when directed by EOP-5</li> <li>• Directs RO perform actions of EOP-4</li> <li>• Navigate EOP-4 to establish trickle feed to either (or both) OTSGs [CT]               <ul style="list-style-type: none"> <li>○ See attached partial EOP-4 for actions</li> </ul> </li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Performs actions of EOP-4 as directed by SRO               <ul style="list-style-type: none"> <li>○ See attached partial EOP-4 for actions</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Rev.: 0

Event Description: (Examiner Cue) Following the trip one MSSV on each OTSG fails to reset [MALF]. This leads to an overcooling event. Once the symptom becomes apparent, EOP-5, Excessive Heat Transfer, should be entered. The crew will isolate both OTSGs per EOP-5 [CT] and will ultimately transition to EOP-4, Inadequate Heat Transfer. EOP-4 will be used to re-establish feed to the OTSGs using 'trickle feed' [CT].

Time	Position	Applicant's Actions or Behavior
<i>Scenario may be terminated when trickle feed has been established.</i>		

Facility: **Crystal River #3**Scenario No.: 4 (NRC)Op-Test No.: 1Examiners: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_Operators: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_Initial Conditions: Plant is at 100% power.Turnover: Air Compressor IAP-3B OOS for scheduled maintenance. Tropical Storm warning and hurricane watch is in effect for Hernando, Citrus, and Levy Counties.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N(BOP)	Start RWP-2A for post-maintenance test. (OP-408)
2	1	C (BOP) C(SRO) R(RO)	Condenser tube leak in 'B' waterbox. (AP-604, AP-510) {Event #6 (FW leak in RB) begins here at ~ 2 gpm and gradually worsens throughout entire scenario}
3	2	I (RO) I (SRO)	Selected 'A' side Th fails high. (OP-504) SRO TS determination. (3.3.17, 3.3.18)
N/A	3	I (RO)	'A' FW loop fails to return to auto.
4	4	I (BOP) I (SRO)	ES Channel 1 LPI Bistable trip. (OP-507) SRO TS determination (3.3.5)
5	5	C (RO) C (SRO)	Main Feed Booster FWP-1A trips. (AP-545)
6	6	M (All)	'B' Feed line leak into RB worsens requiring Rx trip. (EOP-2, EOP-5)
7	7	C (RO or BOP)	FOGG fails to isolate EFP-3 feed to 'B' OTSG. [CT]
8	8	C (RO or BOP)	MUV-257 (MUP recirc) fails closed following ESAS [CT]

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

Plant is initialized in Mode 1 at 100% power. Air Compressor IAP-3B has been out of service for 8 hours for scheduled maintenance. A tropical storm warning and hurricane watch are in effect for Hernando, Citrus, and Levy Counties.

Per the turnover, the BOP will start RWP-2A per OP-408 Nuclear Services Cooling System to restore operability.

Soon after RWP-2A is in service, a condenser tube leak will occur in the 'B' waterbox. Plant power will be reduced per AP-604, Waterbox Tube Failure and AP-510, Rapid Power Reduction. Once power is reduced below 85% CWP-1B will be secured. Additionally, at ~96% power a very small main feed leak (~2 gpm) will begin in the RB.

After CWP-1B has been secured and AP-604 actions have been completed, the selected 'A' loop Th instrument fails high. TS 3.3.17 Condition A and 3.3.18 Condition A should be entered. The crew should take manual control of ICS and stabilize the plant. Once a good instrument is selected the crew will attempt to return all ICS stations to AUTO using OP-504, Integrated Control System. Additionally, several minutes after this failure the feed leak in the RB will rise slightly.

When the crew attempts to return ICS stations to AUTO, the A feedwater demand station will fail to return to AUTO. The crew should ensure both feedwater demand stations are in HAND to maintain ICS in track.

When the crew has addressed the A feedwater demand station failure, the ES Channel 1 LPI Bistable will fail in a tripped condition. The crew will trip ES Channel 1 using OP-507, Operation of the ES, RPS, and ATWAS Systems. TS 3.3.5 Condition A should be entered.

When ES Channel 1 has been tripped and the TS implications have been addressed, Main Feed Booster Pump FWP-1A will develop a large oil leak requiring a power reduction using AP-510. At 70% power the pump will trip requiring entry into AP-545, Plant Runback. Additionally, several minutes after this failure the feed leak in the RB will rise slightly.

Once the plant has been stabilized and AP-545 has been completed, the feed line leak in the RB will rise rapidly requiring a reactor trip. The crew will enter EOP-2, Vital System Status Verification and should diagnose an excessive heat transfer event. EOP-5, Excessive Heat Transfer, will be entered.

Following the trip, FOGG fails to isolate EFP-3 feed to the 'B' OTSG. The crew must manually isolate feed to 'B' OTSG [CT].

Following the ES Actuation, MUV-257 (MUP Recirc Valve) will fail closed and cannot be reopened from the control room. The crew must establish a MUP recirc flow path or secure makeup prior to throttling HPI below pump damage limits (simulator model will trip pumps if flow is too low) once the overcooling is terminated [CT].

The scenario may be terminated when RCS pressure and temperature and pressurizer level are controlled.

**Procedures used:** (ARs not listed)

OP-504	AP-510	EOP-2
OP-507	AP-545	EOP-5
OP-408	AP-604	

Target Quantitative Attributes – Scenario 4 – 2K7 NRC	Actual Attributes
1. Total Malfunctions (5-8)	8
2. Malfunctions after EOP entry (1-2)	2
3. Abnormal Events (2-4)	3
4. Major Transients (1-2)	1
5. EOPs entered requiring substantive actions (1-2)	1
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical Task (2-3)	2

## SHIFT TURNOVER

### A. Initial Conditions:

1. Time in core life – 300 EFPD
2. Shift:  Day  Swing  Mid
3. Rx power and power history – 100% for 90 days
4. Boron concentration – 995 ppmb
5. Xenon – Equilibrium @ -2.45%  $\Delta K/K$
6. RCS Activity - See Status Board
7. EOOS – Yellow

### B. Tech. Spec. Action requirement(s) in effect:

- ITS 3.7.9 Condition A entered 8 hours ago for an RWP-2A breaker failure.
- CP-500, IAP-3B.

### C. Clearances in effect:

- IAP-3B for compressor rebuild. Expected return to service in 8 hours.

### D. Significant problems/abnormalities:

- Citrus, Hernando, and Levy Counties are under a Tropical Storm warning and a Hurricane watch. EM-220, Violent Weather, preparations are being implemented by the Violent Weather Committee.
- RWP-2A was out of service due to a breaker failure. Maintenance work has been completed.

### E. Evolutions/maintenance for the on-coming shift:

- Start RWP-2A using OP-408, Nuclear Services Cooling System, and run for at least 1 hour for post maintenance testing.
- Maintenance to expedite work on IAP-3B.

### F. CRS – Instruct the ROs to walk down the main control boards.

### G. Required Emergency Plan Implementation

- Full Implementation, including all required notifications.  
 Initial/upgrade classifications - internal notifications.  
 None

*Examination Setup/Execution*  
*Scenario 4*

**INITIAL CONDITIONS**

- A. “Restore” the simulator to any 100% power IC.
- B. “Unfreeze” the simulator and ensure the following configuration is setup:
- Add blue OOS label to IAP-3B
  - Ensure RWV-150 CLOSED placard is displayed on MCB
  - Swap in service SC heat exchangers:
    - Open CWV-5, CWV-6, CWV-7, CWV-8
    - Close CWV-1, CWV-2, CWV-3, CWV-4
- C. “Freeze” the simulator and enter ‘NRCEXAM’ lesson plan directory:
1. “Start” Lesson Plan **NRC\_SES#4.lsn** – (NRC Scenario #4)
- D. “Unfreeze” the simulator and “Trigger” Setup Step(s) which will:
1. See simulator lesson plan.
- E. Tag out the following equipment:
1. N/A
- F. Additional Modifications required to the IC.
1. Ensure SPDS selected to NORM/IMB and history traces cleared and history trace selected. Also ensure “A” and “B” SPDS are properly selected for RCS Loops and Primary instruments selected.
  2. Ensure SPDS on CNO/SSO/STA computers displaying correct data for IC.
  3. Ensure Group 59 indicative of current reactor power.
  4. Acknowledge computer and annunciator alarms.
  5. *Ensure proper PICS groups AND correct scaling displayed on overhead screens.*
- G. Freeze the simulator and notify the lead examiner.
- H. Consumable copies of OP-504 and OP-507 available.**

**A. EVENT #1**

**ROLE PLAY:** If contacted as PPO report that RWP-2A is ready for start.

If contacted as PPO to verify RWV-150 is not in service, report that it is not.

If contacted as PPO to examine RWP-2A after start, report that it appears to be operating properly.

**B. EVENT #2**

When directed, input the condenser tube leak. This step will also insert a small feed leak in the RB.

**[Trigger step labeled Event 2]**

**ROLE PLAY:** If called as Chemistry Department to verify CE-2 is greater than 10  $\mu\text{mho/cm}$  then wait 2 minutes and report that CE-2 (CDP-1A discharge) is 11.2  $\mu\text{mho/cm}$  and slowly rising.

**ROLE PLAY:** If requested to check CE-5 (Demin Outlet), then report CE-5 has not changed from initial values.

**ROLE PLAY:** If Chemistry is requested to identify leaking waterbox, wait approx. 2 minutes and report that it appears to be "B".

**ROLE PLAY:** If asked as the SPO to perform AP-604 Enclosure 1, then report back after approx. 10 min that "AP-604 Enclosure 1 is completed"

**[Trigger step labeled SPO Perform AP-604 Enclosure 1]**

**ROLE PLAY:** If asked as the SPO to close ARV-46, then report back after approx. 2 min that "ARV-46 is closed"

**[Trigger step labeled SPO Close ARV-46 (AP-604 Step 3.7)]**

**ROLE PLAY:** If asked as the SPO to close MSV-23, then report back after approx. 3 min that "MSV-23 is closed"

**[Trigger step labeled SPO Close MSV-23 (AP-604 Step 3.9)]**

**C. EVENT #3**

When directed, input the 'A' Loop Th failure.

**[Trigger step labeled Event 3]**

**ROLE PLAY:** If contacted as PPO to investigate RSP, report the following information (as requested):

- RC-4A-TI-3-2 is reading 760°F
- RC-4A-TI-3-3 is reading 70°F

**D. EVENT #4**

When directed, input the ES Channel 1 LPI Bistable trip.

**[Trigger step labeled Event 4]**

**E. EVENT #5**

When directed, input the FWP-1A failure.

**[Trigger step labeled Event 5]**

**Role Play:** When RO calls SPO to investigate the auto-start of FWP-6A, wait ~1.5 minutes then report that FWP-1A oil reservoir has a crack in its side creating an oil leak. You have the hole partially plugged with rags but it is still losing oil. Report that oil level is visible in the sight glass but is lowering slowly.

**F. EVENTS #6**

When directed, input the large 'B' feed line break in the RB.

**[Trigger step labeled Event 6]**

**Role Play:** If contacted as the SPO to perform EOP-14 Enclosure 1, run lesson plan Enc\_1.lsn from the MISC directory. Report completion after 23 minutes.

**G. EVENTS #7 and 8**

Events 7 and 8 are already triggered by the setup steps.

**Role Play:** If contacted as the PPO to manually open MUV-257, wait ~ 4 minutes and report completion.

**[Trigger step labeled PPO Manually Opens MUV-257]**

**Role Play:** If contacted as the PPO to Energize MUP recirc to RB Sump valves, wait ~ 2 minutes and report completion.

**[Trigger step labeled PPO Energize MUP Recirc to RB Sump Valves]**

Op-Test No.: 1 Scenario No.: 4 Event No.: 1 Rev.: 1

Event Description: (Examiner Cue) Per the turnover, the BOP will start RWP-2A per OP-408 Nuclear Services Cooling System to restore operability.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Directs BOP to start RWP-2A per OP-408</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Performs the following actions per OP-408:               <ul style="list-style-type: none"> <li>○ Notifies PPO to ensure RWP-2A is ready to start</li> <li>○ Notifies PPO to ensure RWV-150 is not in service</li> <li>○ Starts RWP-2A</li> <li>○ Stops RWP-1 before it automatically stops</li> <li>○ Notifies PPO to ensure adequate packing leakoff exists</li> <li>○ Notifies CRS that RWP-2A is in service</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 2 Rev.: 1

Event Description: (Examiner Cue) Soon after turnover is completed, a condenser tube leak will occur in the 'B' waterbox [MALF]. Plant power will be reduced per AP-604, Waterbox Tube Failure and AP-510, Rapid Power Reduction. Once power is reduced below 85% CWP-1B will be secured. Additionally, at ~ 96% power a very small main feed leak (~2 gpm) will begin in the RB.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ H-2-8, "SEC SAMPLE SYSTEM ALARM"</li> </ul> </li> <li>• Observes conductivity readings rising</li> <li>• Notifies SRO of indications</li> <li>• Reviews AR-403</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs BOP to contact chemistry to investigate alarm</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Contacts chemistry to investigate alarm</li> <li>• Relays chemistry report of CE-2 &gt; 10 <math>\mu\text{mho/cm}</math> to the SRO</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs actions per AP-604 (see BOP section below for details)</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Notify chemistry to determine affected CWP and to monitor for CE-5 rise of &gt; .25 <math>\mu\text{mho/cm}</math> above initial value</li> <li>• Notify personnel of entry into AP-604</li> <li>• Notify SPO to perform Enclosure 1 of AP-604</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs actions per AP-510 when directed by AP-604 (see RO and BOP sections below for details)</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 2 Rev.: 1

Event Description: (Examiner Cue) Soon after turnover is completed, a condenser tube leak will occur in the 'B' waterbox [MALF]. Plant power will be reduced per AP-604, Waterbox Tube Failure and AP-510, Rapid Power Reduction. Once power is reduced below 85% CWP-1B will be secured. Additionally, at ~96% power a very small main feed leak (~2 gpm) will begin in the RB.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>Adjust ICS load rate to desired setpoint</li> <li>Set unit load master to hand and adjust demand to 10</li> <li>Maintain pressurizer level (Rule 7)</li> <li>Verify imbalance within limits per SPDS</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Notify personnel of entry into AP-510</li> <li>Notify chemistry if power changes &gt; 15% in one hour</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>When power is &lt; 85%, continues actions in AP-604 (see details in BOP section below for actions)</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Stop CWP-1B</li> <li>Notify SPO to close ARV-46</li> <li>Notify chemistry of CWP-1B shutdown</li> <li>Open ARV-55 and ARV-54</li> <li>Notify SPO to close MSV-23</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>Enters LCO 3.7.4 Condition A when MSV-23 is isolated</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>Crew may observe rising RB sump level. Crew should determine that leak is not RCS leakage and should monitor leakage at this time.</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 3 Rev.: 1

Event Description: (Examiner Cue) After CWP-1B has been secured and AP-604 actions have been completed, the selected 'A' loop Th instrument fails high [MALF]. TS 3.3.17 Condition A and 3.3.18 Condition A should be entered. The crew should take manual control of ICS and stabilize the plant. Once a good instrument is selected the crew will attempt to return all ICS stations to AUTO using OP-504, Integrated Control System. When the crew attempts to return ICS stations to AUTO, the A feedwater demand station will fail to return to AUTO [MALF]. The crew should ensure both feedwater demand stations are in HAND to maintain ICS in track. Additionally, several minutes after this failure the feed leak in the RB will rise slightly.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ J-3-2, "RCS Th TEMP HIGH"</li> <li>○ K-3-2, "SASS MISMATCH"</li> <li>○ K-6-2, "UNIT MASTER IN TRACK"</li> </ul> </li> <li>• Diagnoses failure of selected Th instrument</li> <li>• Determines that undesired plant movement is occurring due to an instrument failure and performs the following:               <ul style="list-style-type: none"> <li>○ Places both FW loop master and both FW pump bailey stations to hand</li> <li>○ Places diamond in manual and reactor bailey station in hand</li> <li>○ Announces current reactor power</li> <li>○ Stabilizes the plant</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Assists RO with diagnosis</li> <li>• May place CDP master to hand</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assist RO with diagnosis</li> <li>• Enters TS 3.3.17 Condition A and 3.3.18 Condition A</li> <li>• May enter FPP and CP-500</li> <li>• Contacts work controls to initiate repair efforts</li> <li>• Directs RO to select RC-4A-MS to TT4-Y per OP-501</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 3 Rev.: 1

Event Description: (Examiner Cue) After CWP-1B has been secured and AP-604 actions have been completed, the selected 'A' loop Th instrument fails high [MALF]. TS 3.3.17 Condition A and 3.3.18 Condition A should be entered. The crew should take manual control of ICS and stabilize the plant. Once a good instrument is selected the crew will attempt to return all ICS stations to AUTO using OP-504, Integrated Control System. When the crew attempts to return ICS stations to AUTO, the A feedwater demand station will fail to return to AUTO [MALF]. The crew should ensure both feedwater demand stations are in HAND to maintain ICS in track. Additionally, several minutes after this failure the feed leak in the RB will rise slightly.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Selects RC-4A-MS to TT4-Y</li> <li>• Returns ICS stations to auto:               <ul style="list-style-type: none"> <li>○ Diamond panel</li> <li>○ Reactor demand</li> <li>○ Main Feed Pumps</li> <li>○ FW Loop Masters</li> </ul> </li> <li>• Recognize that 'A' feedwater loop master fails to return to auto and notifies SRO of failure</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Direct RO to maintain both FW loop masters in hand to maintain ICS in track</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Crew may note a rise in the sump fill rate. Again, no thresholds are crossed and the crew should continue to monitor</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 4 Rev.: 1

Event Description: (Examiner Cue) When the crew has addressed the A feedwater demand station failure, the ES Channel 1 LPI Bistable will fail in a tripped condition [MALF]. The crew will trip ES Channel 1 using OP-507, Operation of the ES, RPS, and ATWAS Systems. TS 3.3.5 Condition A should be entered.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ B-2-6 ES A Actuation Trouble</li> <li>○ A-1-2 Thru A-1-5 Block loading alarms</li> </ul> </li> <li>• Diagnoses Channel 1 LPI bistable trip</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists BOP with diagnosis</li> <li>• Enters TS 3.3.5 Condition A</li> <li>• Contacts work controls to initiate repair efforts</li> <li>• Directs BOP to trip ES channel 1 per OP-507 (details in BOP section below)</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 4 Rev.: 1

Event Description: (Examiner Cue) When the crew has addressed the A feedwater demand station failure, the ES Channel 1 LPI Bistable will fail in a tripped condition [MALF]. The crew will trip ES Channel 1 using OP-507, Operation of the ES, RPS, and ATWAS Systems. TS 3.3.5 Condition A should be entered.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Verify operable channels are not tripped</li> <li>• SELECT "TEST OPERATE" on "Pressure Test Module" in channel #1</li> <li>• VERIFY the following annunciator event points are in ALARM:               <ul style="list-style-type: none"> <li>○ 1020 LOADING SEQUENCE BLOCK 2 ACTUATION "A"</li> <li>○ 1021 LOADING SEQUENCE BLOCK 3 ACTUATION "A"</li> <li>○ 1022 LOADING SEQUENCE BLOCK 4 ACTUATION "A"</li> <li>○ 0851 LOADING SEQUENCE BLOCK 5 ACTUATION "A"</li> <li>○ 0852 LOADING SEQUENCE BLOCK 6 ACTUATION "A"</li> <li>○ 1023 LOADING SEQUENCE BLOCK 2 ACTUATION "B"</li> <li>○ 1025 LOADING SEQUENCE BLOCK 3 ACTUATION "B"</li> <li>○ 1026 LOADING SEQUENCE BLOCK 4 ACTUATION "B"</li> <li>○ 0853 LOADING SEQUENCE BLOCK 5 ACTUATION "B"</li> <li>○ 1019 LOADING SEQUENCE BLOCK 6 ACTUATION "B"</li> </ul> </li> <li>• Verify ES channel 1 has tripped using the ES status panel lights</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 5 Rev.: 1

Event Description: (Examiner Cue) When ES Channel 1 has been tripped and the TS implications have been addressed, Main Feed Booster Pump FWP-1A will develop a large oil leak requiring a power reduction using AP-510 [MALF]. At 70% power the pump will trip requiring entry into AP-545, Plant Runback. Additionally, several minutes after this failure the feed leak in the RB will rise slightly.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ L-4-4, "FWBP LUBE OIL PUMP AUTO START"</li> </ul> </li> <li>• Directs SPO to investigate problem</li> <li>• Notifies SRO of SPO report of large oil leak</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Determines need to reduce power and trip FWP-1A</li> <li>• Enters AP-510 and directs actions (see RO and BOP sections below for actions)</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Lowers power using the FW demand stations</li> <li>• Maintain pressurizer level (Rule 7)</li> <li>• Verify imbalance within limits per SPDS</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Notify personnel of entry into AP-510</li> <li>• Notify chemistry if power changes &gt; 15% in one hour</li> <li>• When power is &lt; 80% notify SPO to ensure MS is supplying AS</li> <li>• Maintain DFT between 8' and 11'</li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Observes trip of FWP-1A at ~ 70% power and reports trip to SRO</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs actions of AP-545 (see RO and BOP sections below for actions)</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 5 Rev.: 1

Event Description: (Examiner Cue) When ES Channel 1 has been tripped and the TS implications have been addressed, Main Feed Booster Pump FWP-1A will develop a large oil leak requiring a power reduction using AP-510 [MALF]. At 70% power the pump will trip requiring entry into AP-545, Plant Runback. Additionally, several minutes after this failure the feed leak in the RB will rise slightly.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Ensure plant runback in progress</li> <li>• Ensure RCS pressure stable between 2130 and 2180 psig</li> <li>• Ensure runback to 52% (1335 MWt)</li> <li>• Ensure pressurizer level, Tave, and main steam header pressure are approaching stability</li> <li>• Ensure regulating rod index is within the limits of OP-103D</li> <li>• Verify rods are within 6.5% of their group average height</li> <li>• Verify imbalance is within limits using SPDS</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Notify personnel of entry into AP-545</li> <li>• Notify chemistry if power changes &gt; 15% in one hour</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 6, 7, 8 Rev.: 1

Event Description: (Examiner Cue) Once the plant has been stabilized and AP-545 has been completed, the feed line leak in the RB will rise rapidly requiring a reactor trip [MALF]. The crew will enter EOP-2, Vital System Status Verification and should diagnose an excessive heat transfer event. EOP-5, Excessive Heat Transfer, will be entered. Following the trip, FOGG fails to isolate EFP-3 feed to the 'B' OTSG [MALF]. The crew must manually isolate feed to 'B' OTSG [CT]. Following the ES Actuation, MUV-257 (MUP Recirc Valve) will fail closed and cannot be reopened from the control room [MALF]. The crew must establish a MUP recirc flow path or secure makeup prior to throttling HPI below pump damage limits (simulator model will trip pumps if flow is too low) once the overcooling is terminated [CT].

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ B-2-5 "RB FAN A CONDENSATE HIGH"</li> <li>○ E-2-5 "RB FAN B CONDENSATE HIGH"</li> <li>○ E-3-2 "REACTOR BLD TEMP HIGH"</li> </ul> </li> <li>• Observes lowering level on B OTSG</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs reactor trip and entry into EOP-2.</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Performs EOP-2 immediate actions               <ul style="list-style-type: none"> <li>○ Depress reactor trip pushbutton</li> <li>○ Verify CRD groups 1 through 7 fully inserted</li> <li>○ Verify NIs indicate reactor is shutdown</li> <li>○ Depress turbine trip pushbutton</li> <li>○ Verify throttle valves and governor valves are closed</li> </ul> </li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs RO to re-perform immediate actions (described above).</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Perform symptom scan per EOP-2. The following should be noted:               <ul style="list-style-type: none"> <li>○ No station blackout</li> <li>○ No inadequate SCM</li> <li>○ No inadequate heat transfer</li> <li>○ Excessive heat transfer does exist (symptom may be masked initially due to the leak being a FW break</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 6, 7, 8 Rev.: 1

Event Description: (Examiner Cue) Once the plant has been stabilized and AP-545 has been completed, the feed line leak in the RB will rise rapidly requiring a reactor trip [MALF]. The crew will enter EOP-2, Vital System Status Verification and should diagnose an excessive heat transfer event. EOP-5, Excessive Heat Transfer, will be entered. Following the trip, FOGG fails to isolate EFP-3 feed to the 'B' OTSG [MALF]. The crew must manually isolate feed to 'B' OTSG [CT]. Following the ES Actuation, MUV-257 (MUP Recirc Valve) will fail closed and cannot be reopened from the control room [MALF]. The crew must establish a MUP recirc flow path or secure makeup prior to throttling HPI below pump damage limits (simulator model will trip pumps if flow is too low) once the overcooling is terminated [CT].

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Transitions to EOP-5</li> <li>• Directs RO and BOP perform actions of EOP-5                             <ul style="list-style-type: none"> <li>○ See attached partial EOP-5 for actions. Critical actions are as follows:                                     <ul style="list-style-type: none"> <li>• Isolate EFW to the B OTSG by securing EFP-3 [CT]. This may be performed using EOP-5 or using 'prompt and prudent'</li> <li>• Establish makeup pump recirc flow path or secure makeup prior to throttling HPI below pump damage limits (simulator model will trip pumps if flow is too low) once overcooling is terminated [CT]</li> </ul> </li> </ul> </li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Perform actions in EOP-5 as directed by the SRO.                             <ul style="list-style-type: none"> <li>○ See attached partial EOP-5 for actions.</li> </ul> </li> </ul>

*Once RCS pressure and temperature and pressurizer level are controlled the scenario may be terminated.*