

Facility: **Crystal River #3** Scenario No.: #1 (NRC 2009) Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: The plant is at approximately 30% power.

Turnover: The following equipment is OOS: DHP-1A (12 hours); MUP-1A (12 hours); RWP-1 (24 hours); FWP-7 (32 hours). An emergency need for power exists.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R (RO)	Manual power escalation. (OP-204)
2	1	C (RO or BOP)	FW-223/224-TE trend up. Requires startup of FWP-1B and shutdown of FWP-1A. (OP-605)
3	2	C (BOP) C (SRO)	OPT major alarm. (OP-703) SRO TS determination. (TS 3.8.1)
4	N/A	N (BOP)	Perform SP-321, Page 1 of Enclosure 1. (SP-321)
5	3	I (BOP)	RM-A5G fails high. (AP-250)
6	4	I (RO) I (SRO)	RC-1-LT1 fails low. (OP-501) SRO TS determination. (TS 3.3.17)
7	5	M (ALL)	PZR steam space leak, RPS fails to actuate. [CT] (EOP-2)
8	6	C (RO or BOP)	MUV-586 fails closed, MUV-25 fails to open. [CT] (EOP-3, EOP-13 Rules 1, 2 & 3)
9	7	C (RO or BOP)	RCP-1D breaker will not open. [CT] (AI-505)

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

The plant is at $\approx 30\%$ power following initial loading of the main generator. The OAC/BOP will continue in OP-204 from step 4.1.26.

After power has increased (5 to 10%) FW temperature elements on the running FWBP rise. The other booster pump should be started, the running booster pump shutdown and maintenance called to investigate.

After FWP-1A is secured an OPT major alarm will be received. The "A" ES 4160 bus will be transferred to the BEST. Two seconds after the transfer the OPT breaker will trip open. The SRO may direct the transfer from memory or may utilize OP-703, Plant Distribution System. Either way is acceptable. TS 3.8.1, Condition A, will be entered for one offsite circuit inoperable. The BOP will perform SP-321, Enclosure 1.

When SP-321 is completed RM-A5G will fail high. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the monitor/meter has failed high. No automatic actions occur. The Control Complex will be isolated and CC Emergency Recirc initiated.

While the BOP is performing actions of AP-250 RC-1-LT1 (PZR level control) transmitter will fail low. This will require the OAC to take manual control of MUV-31 and utilize OP-501 to select a good instrument. TS 3.3.17 will be entered for loss of PAM instrumentation.

Following selection of RC-1-LT3 for PZR level control a PZR steam space leak occurs. RPS will **not** actuate on low pressure and the OAC must manually trip the reactor [CT]. The reactor trip will cause a larger leak that will lead to an ISCM event.

When HPI actuates MUV-586 (HPI cross-tie valve) fails closed, MUV-25 will not open due to a normal source power failure. Alternate power source will be selected during the performance of EOP-3 [CT]. Since MUP-1C will experience a sheared shaft on start this action is critical to ensure sufficient HPI flow to the RCS. Entry into an "Alert" is required due to the loss of SCM.

When the loss of SCM occurs RCPs must be tripped within 1 minute [CT]. RCP-1D breaker will not open when commanded and the OAC/BOP must open breaker 3104 ("B" 6900V Rx Aux Bus feeder breaker).

Once incore temps start lowering and the RCPs are secured this scenario may be terminated.

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

Event Description: Manual power increase. Emergency need for power exists.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none">• Increase load with the ULD Station• Adjusts load rate to 0.5%• Monitor plant parameters
	SRO	<ul style="list-style-type: none">• Direct power increase at 30% per hour

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

Event Description: (Examiner Cue) After a 5% to 10% power escalation FW-223 & 224-TEs trend up indicating bearing problems on FWP-1A (**MALF**). This will require startup of FWP-1B and shutdown of FWP-1A.

Time	Position	Applicant's Actions or Behavior
	RO/BOP'	<ul style="list-style-type: none"> • Recognize temperature increase on FWP-1A <ul style="list-style-type: none"> ○ Computer alarms only • Direct SPO to investigate temperature rise
	BOP	<ul style="list-style-type: none"> • Using OP-605 direct the OAC in the startup of FWP-1B and shutdown of FWP-1A
	RO	<ul style="list-style-type: none"> • Startup FWP-1B using OP-605, Section 4.4 <ul style="list-style-type: none"> ○ Procedure signed off up to Step 4.4.9 ○ Ensure flow path exists ○ Verify permit lights ○ Start FWP-1B ○ Direct SPO to locally stroke FWV-7 30% to 50% open ○ Open FWV-7 ○ Stop FWP-6B ○ Select FWV-48 to AUTO • Secure FWP-1A using OP-605, Section 4.5 <ul style="list-style-type: none"> ○ Start FWP-6A ○ Open FWV-47 ○ Close FWV-8 ○ Stop FWP-1A
	SRO	<ul style="list-style-type: none"> • Direct startup of FWP-1B and shutdown of FWP-1A • Notify maintenance to investigate temperature rise

Op-Test No.: 1 Scenario No.: 1 Event No.: 3/4 Rev.: 00

Event Description: (Examiner Cue) After FWP-1A is secured an OPT major alarm will be received [MALF]. The "A" ES 4160 bus will be transferred to the BEST. Two seconds after the transfer the OPT breaker will trip open. The SRO may direct the transfer from memory or may utilize OP-703, Plant Distribution System. Either way is acceptable. TS 3.8.1, Condition A, will be entered.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarm <ul style="list-style-type: none"> ○ (Q-8-3) "Offsite Pwr Source XFMR Major Alarm" • Reviews AR-702 • Notifies SRO of malfunction • Recommends reducing the load on the transformer per AR directions
	SRO	<ul style="list-style-type: none"> • Direct BOP actions from memory or per OP-703 <ul style="list-style-type: none"> ○ Select "Sync 3205" to ON position ○ Close breaker 3205 ○ Open breaker 3211 ○ Select "Sync 3205" to OFF position • Enters TS 3.8.1, Condition A, for one required Offsite circuit inoperable <ul style="list-style-type: none"> ○ Recognizes SP-321 is required to be completed within 1 hour ○ Directs BOP to perform Enclosure 1, Page 1
	RO	<ul style="list-style-type: none"> • Assists BOP in diagnosing the failure • Verifies the plant is stable
	BOP	<ul style="list-style-type: none"> • Selects Sync switch to ON for breaker 3205 • Closes breaker 3205 • Matches target on breaker 3211 • Selects Sync switch to OFF and removes • Performs SP-321, Enclosure 1, Page 1 <ul style="list-style-type: none"> ○ See next page

DATA SHEET I
OFF-SITE TO ON-SITE BREAKER/POWER VERIFICATION

1.0 Mode 1 thru 4 Alignment (This Section does NOT apply in Modes 5 or 6) (NOCS 62810)

NOTE

Testing of the batteries in the Switchyard is performed by Substation Maintenance. Batteries are considered operable unless CR-3 is notified otherwise.

- (v)
- 1.1 CONTACT System Dispatcher and VERIFY 230kv switchyard voltage is between 238kv and 242kv _____
- 1.2 VERIFY that only one of the following ES "A" 4160v feeder breakers is CLOSED and supplying power: _____
- 3205 Backup ES Transformer to ES "A" 4160v Bus
 - OR
 - 3211 Off-Site Power Source Transformer to ES "A" 4160v Bus (Preferred) _____
- 1.3 VERIFY that only one of the following ES "B" 4160v feeder breakers is CLOSED and supplying power: _____
- 3206 Backup ES Transformer to ES "B" 4160v Bus (Preferred)
 - OR
 - 3212 Off-Site Power Source Transformer to 4160v ES "B" Bus _____
- 1.4 UTILIZING the Synch Scope, VERIFY power is available to ES 4160v Bus Supply Breakers: _____
- a. 3205 Backup ES transformer to ES "A" 4160v Bus _____
 - b. 3206 Backup ES transformer to ES "B" 4160v Bus _____
- 1.5 UTILIZING the Synch Scope, VERIFY power is available to ES 4160v Bus Supply Breakers: _____
- a. 3211 Off-Site Power Source Transformer to ES "A" 4160v Bus _____
 - b. 3212 Off-Site Power Source Transformer to ES "B" 4160v Bus _____
- 1.6 VERIFY at least one 6900v Reactor Aux. Bus is energized _____
- a. VERIFY "A" 6900v Bus Breaker 3101 or 3103 is closed and supplying power
 - OR
 - b. VERIFY "B" 6900v Bus Breaker 3102 or 3104 is closed and supplying power _____
- 1.7 VERIFY BEST Differential Relaying ES Buses CT Isolation switch closed _____
- 1.8 VERIFY BEST Ground Differential Relaying ES Buses CT Isolation switch closed _____
- 1.9 VERIFY 4160v Best Aux Bus Breaker 3237 is racked out (TB 119) _____
- 1.10 VERIFY 4160v Best Aux Bus Breaker 3239 is closed (TB 119) _____
- 1.11 VERIFY 4160v Best Aux Bus Breaker 3239 Control Power Disconnect Breaker off (TB 119) _____

Section 1.0 Performed By: _____ Date: _____ Time: _____

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

Event Description: (Examiner Cue) When SP-321 is completed RM-A5G will fail high [MALF]. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the monitor/meter has failed high. No automatic actions occur. The Control Complex will be isolated and CC Emergency Recirc initiated.

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

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

Event Description: (Examiner Cue) When SP-321 is completed RM-A5G will fail high [MALF]. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the monitor/meter has failed high. No automatic actions occur. The Control Complex will be isolated and CC Emergency Recirc initiated.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Directs BOP actions per AP-250, Radiation Monitor Actuation <ul style="list-style-type: none"> ○ Ensure Auto actions for affected radiation monitors <ul style="list-style-type: none"> ▪ The following dampers closed: <ul style="list-style-type: none"> • AHD-17 • AHD-22 • AHD-12 • AHD-12D • AHD-2C • AHD-2E • AHD-1C • AHD-1E ▪ The following damper open: <ul style="list-style-type: none"> • AHD-3 ▪ The following fans stopped: <ul style="list-style-type: none"> • AHF-19A • AHF-19B • AHD-17A • AHF-17B ▪ The following fans stopped or slow speed: <ul style="list-style-type: none"> • AHF-20A • AHF-20B ▪ <u>IF</u> AHF-20A and 20B are stopped <u>THEN</u> ensure stopped: <ul style="list-style-type: none"> • AHF-44A • AHF-44B • AHF-30 ○ Notify personnel of entry into AP-250 ○ Ensure proper radiation monitor operation ○ Notify HP and Chemistry ○ If alarm is not valid then perform corrective actions <ul style="list-style-type: none"> ▪ Depress "Horn Silence" ▪ Initiate repair efforts ▪ GO TO Enclosure 5

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

Event Description: (Examiner Cue) When SP-321 is completed RM-A5G will fail high [MALF]. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the monitor/meter has failed high. No automatic actions occur. The Control Complex will be isolated and CC Emergency Recirc initiated.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Execute AP actions in accordance with SRO directions <ul style="list-style-type: none"> ○ Ensure Auto actions for of affected radiation monitors <ul style="list-style-type: none"> ▪ <i>Use of the "Control Complex HVAC Isolate/Reset" switches will be used to reposition the dampers</i> ▪ The following dampers closed: <ul style="list-style-type: none"> • AHD-17 • AHD-22 • AHD-12 • AHD-12D • AHD-2C • AHD-2E • AHD-1C • AHD-1E ▪ The following damper open: <ul style="list-style-type: none"> • AHD-3 ▪ The following fans stopped: <ul style="list-style-type: none"> • AHF-19A • AHF-19B • AHD-17A • AHF-17B ▪ The following fans stopped or slow speed: <ul style="list-style-type: none"> • AHF-20A • AHF-20B ▪ <u>IF</u> AHF-20A and 20B are stopped <u>THEN</u> ensure stopped: <ul style="list-style-type: none"> • AHF-44A • AHF-44B • AHF-30 ○ Notify personnel of entry into AP-250 ○ Ensure proper radiation monitor operation <ul style="list-style-type: none"> ▪ Ensure monitor energized ▪ Ensure switch in OPERATE position ▪ Ensure high alarm setpoint is set correctly ▪ Ensure Range switch is set to "1M" ▪ Observe trends on other monitors ○ Notify HP and Chemistry

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

Event Description: (Examiner Cue) When SP-321 is completed RM-A5G will fail high [MALF]. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the monitor/meter has failed high. No automatic actions occur. The Control Complex will be isolated and CC Emergency Recirc initiated.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> ○ If alarm is not valid then perform corrective actions <ul style="list-style-type: none"> ▪ Depress "Horn Silence" ▪ Initiate repair efforts ▪ GO TO Enclosure 5
	SRO	<ul style="list-style-type: none"> • Directs BOP actions per Enclosure 5 of AP-250, Radiation Monitor Actuation

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

Event Description: (Examiner Cue) When SP-321 is completed RM-A5G will fail high [MALF]. Entry conditions for AP-250, Radiation Monitor Actuation, are met. Only the monitor/meter has failed high. No automatic actions occur. The Control Complex will be isolated and CC Emergency Recirc initiated.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Execute AP actions (Enclosure 5) in accordance with SRO directions <ul style="list-style-type: none"> ○ IF alarm is <u>NOT</u> valid, <u>AND</u> radiation monitor can be reset, <u>THEN</u> reset monitor. <ul style="list-style-type: none"> ▪ Alarm monitor CANNOT be reset. ○ Verify proper CC cooling. <ul style="list-style-type: none"> ▪ Perform EOP-14, Enclosure 17 • Establish CC Emergency Recirculation: <ul style="list-style-type: none"> ○ Verify ES MCC 3AB is energized ○ If CC ventilation will be powered from a diesel, verify load is acceptable (Step is N/A) ○ Align CC ventilation recirc: <ul style="list-style-type: none"> ▪ Select A and B Train Control Complex HVAC Isolate/Reset switches to "ISO" ○ Verify CC isolation dampers are closed: <ul style="list-style-type: none"> ▪ AHD-12 and AHD-12D ▪ AHD-2C and AHD-2E ▪ AHD-1C and AHD-1E ○ Ensure CC ventilation fans shutdown: <ul style="list-style-type: none"> ▪ AHF-19A and AHF-19B ▪ AHF-17A and AHF-17B ○ Start 1 train of CC ventilation in emergency (starting B Train would be acceptable, but would complicate the restoration): <ul style="list-style-type: none"> ▪ Start AHF-18A ▪ Start AHF-19A ○ Verify AHF-54A still running ○ Establish chemistry sampling ventilation: <ul style="list-style-type: none"> ▪ Start AHF-20A in slow ▪ Start AHF-44A ▪ Start AHF-30 ○ Assuming A Train was started, exit the enclosure

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

Event Description: (Examiner Cue) During the performance of AP-250 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. ITS 3.3.17 will be entered for loss of PAM instrumentation.

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

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

Event Description: (Examiner Cue) During the performance of AP-250 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. ITS 3.3.17 will be entered for loss of PAM instrumentation.

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

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

Event Description: (Examiner Cue) Following selection of RC-1-LT3 for PZR level control a PZR steam space leak occurs [MT]. AP-520 may be entered but there will be little time to perform any actions. RPS will not actuate on low pressure and the RO must manually trip the reactor [CT]. The reactor trip will cause the steam leak to rise and will lead to an ISCM event.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Diagnose RCS leak <ul style="list-style-type: none"> ○ RCS pressure lowering ○ All heaters energized ○ (H-1-1) "Gamma Radiation High" ○ (H-1-2) "Gamma Monitor Warning" ○ (H-2-1) "Atmospheric Radiation High" ○ (H-2-2) "Atmospheric Monitor Warning" • If Rx trip criteria is given by SRO, notifies SRO when trip criteria is reached and Trips the Rx [CT] • When the Rx is tripped, performs EOP-02 Immediate Actions <ul style="list-style-type: none"> ○ Depress Rx Trip pushbutton ○ Verifies CRD groups 1 thru 7 fully inserted ○ Verifies NIs indicate Rx is shutdown ○ Depress Turbine Trip pushbutton ○ Verifies all TVs and GVs are closed • Re-performs EOP-02 Immediate Actions as directed by SRO • When EOP-02 Immediate Actions are completed, performs symptom scan along with BOP and SRO.

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

Event Description: (Examiner Cue) Following selection of RC-1-LT3 for PZR level control a PZR steam space leak occurs [MT]. AP-520 may be entered but there will be little time to perform any actions. RPS will not actuate on low pressure and the RO must manually trip the reactor [CT]. The reactor trip will cause the steam leak to rise and will lead to an ISCM event.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Assists the RO/BOP in diagnosing failure • Direct RO/BOP to quantify the leakage • Should provide RO with Rx trip criteria based upon RCS and/or RB pressure • TS 3.4.12, Condition A, is now applicable • Enters and directs actions of AP-520, Loss of RCS Coolant or Pressure • Should direct manual Reactor trip due to uncontrolled lowering of RCS pressure • When Rx is tripped, enters EOP-02 and ensures RO performs EOP-02 Immediate Actions. • Verifies EOP-02, Immediate Actions • Directs formal Symptom Scan with RO and BOP <ul style="list-style-type: none"> ○ Check for Station Black Out ○ Check for Inadequate Sub Cooling Margin ○ Check for Inadequate Heat Transfer ○ Check for Excessive Heat Transfer ○ Check for OTSG Tube Rupture
	BOP	<ul style="list-style-type: none"> • Attempts to quantify leak rate • Perform actions of AP-520 as directed by SRO <ul style="list-style-type: none"> ○ Notify Personnel <ul style="list-style-type: none"> ▪ PA announcement ▪ SPO/PPO contacted via radio ○ Verify OTSG leakage has not increased <ul style="list-style-type: none"> ▪ Checks RM-A12 ▪ Checks RM-G25, RM-G26, RM-G27, & RM-G28 for increase ○ Concurs significant increase in RCS leakage exists ○ Assist in determination of leak location • When the Rx is tripped, depresses the global alarm silence pushbutton. • When EOP-02 Immediate Actions are completed, performs symptom scan along with RO and SRO.

Op-Test No.: 1 Scenario No.: 1 Event No.: 8 Rev.: 0

Event Description: (Automatic Parameter Cue) Following the reactor trip the PZR steam space leak rises. HPI will automatically actuate. MUV-25 normal source power failure occurs concurrent with MUV-586 failing as is [MALF]. Alternate power source must be selected [CT].

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none">• Steam space leak will depressurize the RCS outside the post trip window.<ul style="list-style-type: none">○ RCS pressure will lower and cause an ES actuation○ EFW actuation○ Loss of adequate SCM

Op-Test No.: 1 Scenario No.: 1 Event No.: 8 Rev.: 0

Event Description: (Automatic Parameter Cue) Following the reactor trip the PZR steam space leak rises. HPI will automatically actuate. MUV-25 normal source power failure occurs concurrent with MUV-586 failing as is [MALF]. Alternate power source must be selected [CT].

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Directs BOP/RO to perform EOP-13, Rule 1 <ul style="list-style-type: none"> ○ When RCP-1D breaker doesn't open, ensures 6900 V Aux Bus 3B is de-energized ○ Direct actions of EOP-3, Loss of SCM Perform Rule 1 <ul style="list-style-type: none"> ▪ Stop all RCPs within 1 minute ▪ Manually actuate ES ▪ Depress "ISCM" pushbuttons for EFIC channels ▪ Ensure Tincore is selected on SPDS ○ Notify personnel of entry into EOP-3 ○ Directs RO/BOP to notify PPO to perform EOP-14 Enclosure 2 ○ Verify proper HPI discharge flowpath exists <ul style="list-style-type: none"> ▪ Verifies MUV-23, MUV-24, MUV-25, MUV-26, MUV-586, and MUV-587 open ▪ Select the "B" source for MUV-25 to ON ○ Ensure at least 1 HPI train is properly aligned <ul style="list-style-type: none"> ▪ Verifies MUV-73 and MUV-58 are open. ▪ Verifies at least 1 MUP running with required cooling pumps ▪ Verifies MUP recirc valves MUV-53 and MUV-257 are closed ▪ Verifies all HPI recirc to sump valves MUV-543, MUV-544, MUV-545 and MUV-546 closed ▪ Verifies Makeup and Seal Injection isolation valves MUV-596, MUV-18 and MUV-27 closed ○ Ensure at least 1 letdown isolation valve is closed, MUV-567 or MUV-49 ○ Ensure DHV-3 is closed ○ Verify EFW is operating and flow is controlled • Recognizes Emergency Plan entry (not required to classify)

Op-Test No.: 1 Scenario No.: 1 Event No.: 8 Rev.: 0

Event Description: (Automatic Parameter Cue) Following the reactor trip the PZR steam space leak rises. HPI will automatically actuate. MUV-25 normal source power failure occurs concurrent with MUV-586 failing as is [MALF]. Alternate power source must be selected [CT].

Time	Position	Applicant's Actions or Behavior
	BOP/RO	<ul style="list-style-type: none"> • Ensures ES equipment is properly aligned • Performs EOP-13, Rule 1, ISCM <ul style="list-style-type: none"> ○ Trip RCPs in less than 1 minute since loss of ASCM <ul style="list-style-type: none"> • When RCP-1D breaker doesn't open, opens (ensures open) breaker 3104 to de-energize the 6900 V Aux Bus 3B ○ Depress "HPI MAN ACT" push buttons on Trains A and B ○ Depress "RB ISO MAN ACTUATION" push buttons on Trains A and B ○ Depress "ISCM" push buttons for EFIC channels A and B ○ Ensure Tincore is selected on SPDS • Verifies all ES components are operating via the actuation light indications (green) for ES actuated equipment. <ul style="list-style-type: none"> ○ Recognizes MUV-586 still closed. ○ Attempt to open MUV-586 (not successful) ○ Recognizes loss of power to MUV-25 ○ Notifies SRO of malfunction with MUV-586 and MUV-25 ○ Notify personnel of entry into EOP-3 ○ Directs RO/BOP to notify PPO to perform EOP-14 Enclosure 2 ○ Verify proper HPI discharge flowpath exists <ul style="list-style-type: none"> ▪ Verifies MUV-23, MUV-24, MUV-25, MUV-26, MUV-586, and MUV 587 open ▪ Selects the "B" source for MUV-25 to ON (CT) ○ Ensures at least 1 HPI train is properly aligned <ul style="list-style-type: none"> ▪ Verifies MUV-73 and MUV-58 are open. ▪ Verifies at least 1 MUP running with required cooling pumps ▪ Verifies MUP recirc valves MUV-53 and MUV-257 are closed ▪ Verifies all HPI recirc to sump valves MUV-543, MUV-544, MUV-545 and MUV-546 closed ▪ Verifies Makeup and Seal Injection isolation valves MUV-596, MUV-18 and MUV-27 closed ○ Ensures at least 1 letdown isolation valve is closed, MUV-567 or MUV-49

Op-Test No.: 1 Scenario No.: 1 Event No.: 8 Rev.: 0

Event Description: (Automatic Parameter Cue) Following the reactor trip the PZR steam space leak rises. HPI will automatically actuate. MUV-25 normal source power failure occurs concurrent with MUV-586 failing as is [MALF]. Alternate power source must be selected [CT].

Time	Position	Applicant's Actions or Behavior
	BOP/RO	<ul style="list-style-type: none">○ Ensures DHV-3 is closed○ Verifies EFW is operating and flow is controlled<ul style="list-style-type: none">▪ Uses EOP-13, Rule 3

Op-Test No.: 1 Scenario No.: 1 Event No.: 9 Rev.: 0

Event Description: (Automatic Parameter Cue) RCP-1D will not trip (**MALF**) on the loss of SCM. The 6900V bus must be de-energized. (**CT**)

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Loss of SCM <ul style="list-style-type: none"> ○ Trip all RCPs ○ RCP-1D will not trip ○ Breaker closed light "LIT" (red)
	SRO	<ul style="list-style-type: none"> • May direct the RO to perform actions to stop RCP-1D
	RO/BOP	<ul style="list-style-type: none"> • Secures RCP-1D <ul style="list-style-type: none"> ○ Opens breaker 3104 to de-energize 6900V Aux Bus 3B. ○ RCP-1D de-energizes ○ All RCPs tripped within 1 minute from the loss of adequate SCM (CT)
<p><i>Scenario may be terminated when incore temperatures start lowering and all RCPs are secured.</i></p>		

RULE 1, LOSS OF SCM

- IF < 1 min has elapsed since losing adequate SCM, THEN immediately stop all RCPs.
- IF RCPs were NOT stopped within 1 min, THEN ensure all operating RCPs remain running until any of the following exist:
 - SCM is restored
 - LPI flow > 1400 gpm in each injection line.
- Progress toward a maximum allowable plant cooldown to achieve CFT and LPI flow as soon as possible.

-
- Manually actuate ES.
 - Depress "HPI MAN ACT" push buttons on Trains A and B.
 - Depress "RB ISO MAN ACTUATION" push buttons on Trains A and B.
 - IF LPI has NOT actuated, AND RCS PRESS ≤ 300 psig, THEN depress "LPI MAN ACT" push buttons on Trains A and B.

-
- Depress "ISCM" push buttons for EFIC channels A and B.

-
- Ensure Tincore is selected on SPDS.

RULE 2, HPI CONTROL

- IF HPI has actuated,
THEN bypass or reset
ES actuation.
- 1 Obtain SRO concurrence to
bypass or reset ES.
- 2 Bypass or reset ES actuation:
 - Auto
 - Manual

- Open MUP recirc prior to
throttling HPI flow
< 200 gpm/pump.
- IF recirc to MUT is desired,
THEN open MUP recirc to MUT valves:

<input type="checkbox"/> MUV-53	<input type="checkbox"/> MUV-257
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- IF recirc to RB sump is desired,
THEN open HPI recirc to sump valves:

<input type="checkbox"/> MUV-543	<input type="checkbox"/> MUV-544
<input type="checkbox"/> MUV-545	<input type="checkbox"/> MUV-546

- IF adequate SCM exists based,
on Tincore,
THEN throttle HPI to maintain
required conditions.
- Prevent exceeding NDT limit
- IF OTSG isolated for TRACC,
THEN maintain RCS PRESS
< 1000 psig.
- IF PTS, SGTR, or dry OTSG exists,
THEN maintain minimum adequate
SCM.

- IF adequate SCM can be
maintained with 1 HPI pump,
AND stopping second HPI pump
is desired,
THEN stop 1 HPI pump.
- Ensure running HPI pump is
aligned to MUT.

RULE 3, EFW/AFW CONTROL

- ___ Ensure available OTSGs are at or trending toward required level.

"LLL"	> 20 in
"NAT CIRC"	> 70%
"ISCM"	> 90%

- ___ IF manual control of EFW flow is desired, THEN establish manual EFIC control.

- 1 ___ Obtain SRO concurrence to place EFIC in manual.
- 2 ___ Control EFW to maintain required EFW flow and OTSG level.
- 3 ___ IF EFW flow is NOT controlled, THEN depress EFIC channels A and B "MANUAL PERMISSIVE" push buttons and close affected EFW block valve.

- ___ IF adequate SCM does NOT exist, AND level in available OTSGs is NOT at or trending toward "ISCM" level, THEN establish manual required flow.

EFW	2 OTSGs	> 280 gpm in 1 line to each OTSG
	1 OTSG	> 470 gpm in 1 line to 1 OTSG
AFW	2 OTSGs	> 250 gpm to < 300 gpm/OTSG
	1 OTSG	> 450 gpm to < 600 gpm

- ___ IF adequate SCM exists, THEN throttle flow to prevent OTSG PRESS from lowering > 100 psig below desired PRESS.

- Do not allow OTSG level to lower.

RULE 4, PTS

- IF any of the following exist:
 - Tincore < 400°F,
AND cooldown rate
exceeds ITS limit
 - RCPs off,
AND HPI flow exists
 - Throttle HPI flow to minimize
adequate SCM.
 - Throttle LPI flow to minimize
adequate SCM.
 - PTS is applicable until an
Engineering evaluation has been
completed.
- THEN perform required PTS
actions.

RULE 7, PZR LEVEL CONTROL

- 1 IF PZR level is < PZR level band,
THEN restore PZR level.

PZR Level Band	
Rx at power > 20%	200 in to 240 in
Rx at power ≤ 20%	120 in to 200 in
Rx tripped	50 in to 120 in

- Cycle appropriate BWST to MUP valve to maintain MUT level ≥ 55 in:

<input type="checkbox"/> MUV-73	<input type="checkbox"/> MUV-58
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- Close MUV-49

- 2 IF PZR level does NOT recover,
THEN establish manual HPI flow.

- 1 Open MUV-24
- 2 Notify SSO to evaluate Emergency Plan entry.
- 3 IF PZR level does NOT recover,
THEN start second MUP and required cooling pumps.

[Rule 5, Diesel Load Control]

- 4 IF PZR level does NOT recover,
THEN open additional HPI valves.
- 5 IF PZR level does NOT recover,
THEN close MUP to MUT recircs:

<input type="checkbox"/> MUV-53	<input type="checkbox"/> MUV-257
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- 3 IF PZR level recovers,
THEN restore normal PZR conditions.

[Rule 2, HPI Control]

- IF adequate SCM exists,
AND letdown is desired,
THEN CONCURRENTLY PERFORM
EOP-14, Enclosure 4,
Letdown Recovery (if accessible).

Facility: **Crystal River #3** Scenario No.: #2 (NRC 2009) Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: The plant is in Mode 2 at approximately 2% power.

Turnover: The following equipment is OOS: MUP-1B (12 hours). Maintain this power level until you are relieved. 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. (TS 3.3.5)
2	2	C (BOP) C (SRO)	Condenser tube leak. (AP-604)
3	3	I (RO)	PZR level controller fails low. Manual level control required. (AI-500)
4	N/A	N (SRO)	CFT boron concentration low. (Chemistry call) SRO TS determination. (TS 3.5.1)
5	4	C (BOP)	MUV-258 spurious closure. (AI-500)
6	5	C (RO)	RCP-1A seal failure. (OP-302, AP-545)
7	6	M (ALL)	OTSG tube leak on the "B" OTSG which will require a reactor trip. (EOP-6)
8	7	C (RO)	Manual Rx trip pushbutton failure. (EOP-6) [CT]
9	8	C (RO or BOP)	"A" 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. This power level should be maintained until the crew is relieved. 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.

After the ES channel has been tripped a small condenser tube leak occurs. AP-604, Waterbox Tube Failure, will be entered and CWP-1A secured.

When the actions of AP-604 are complete the PZR level controller will fail low. This will require manual PZR level control for the remainder of the scenario. *Insertion of the failure during the actions of AP-604 is recommended due to the lengthy time it takes to recognize the malfunction (5 to 10 minutes).*

Chemistry reports the monthly CFT sample results are 2656 ppmB for the CFT-1A and 2250 ppmB for CFT-1B. The SRO will enter ITS 3.5.1, Condition A, with actions to restore concentration to within limits in 72 hours.

Once the ITS determination is completed MUV-258 will close (RCP-1A CBO isolation valve). The BOP will open the valve with SRO concurrence. Thirty seconds later RCP-1A will experience 1st and 2nd stage seal failures. OP-302, RCP Operation, will direct securing the RCP immediately.

Following the shutdown of RCP-1A an OTSG tube leak (40 gpm) on the "B" OTSG will occur and the reactor will be tripped per EOP-6, OTSG Tube Rupture. This will meet the criteria to enter an Unusual Event. Following the trip the tube leak will rise to 155 gpm.

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 a plant cooldown/depressurization has been started.

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

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"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (J-2-1) "RCS Pressure Low-Low" ○ (C-1-1) "RC 1 High Pressure Bistable Trip" ○ (C-1-2) "RC 4 Low Pressure Bistable Trip" ○ Multiple block loading alarms ○ Reviews AR-502 • Verifies the plant is stable • Notifies SRO of failure
	SRO	<ul style="list-style-type: none"> • Assists the RO/BOP in diagnosing the failed pressure transmitter • Enters TS 3.3.5, Condition A, for one ES Channel inoperable • Contacts work controls to initiate repair efforts
	BOP	<ul style="list-style-type: none"> • Assists RO in diagnosing the failed pressure transmitter • Assists RO in verifying the plant is stable • Reviews alarms • Verifies HPI and LPI bistables are tripped in ES Actuation Channel Cabinet 1 • Reviews AR-301 and AR-303
	SRO	<ul style="list-style-type: none"> • Directs the BOP to place ES Channel 1 to the tripped condition per OP-507 <ul style="list-style-type: none"> ○ Verify the operable channels are not bypassed ○ Place channel in tripped condition ○ Select "Test Operate" position of the "Pressure Test Module" ○ Verify annunciator alarms ○ Verify proper ES status panel lights are on for Trains A & B

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

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
	BOP	<ul style="list-style-type: none"> • 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"> ○ Verifies the other two ES channels are not tripped ○ Selects the "Pressure Test Module" on Channel 1 to the "Test Operate" position ○ Verifies multiple annunciator alarms ○ Verifies proper ES status panel lights are ON

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

Event Description: (Examiner Cue) After the ES channel has been tripped a small condenser tube leak occurs [MALF]. AP-604, Waterbox Tube Failure, will be entered and CWP-1A secured.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarm <ul style="list-style-type: none"> ○ (H-2-8) "Sec Sample System Alarm" ○ Reviews AR-403 • Notifies SRO of alarm and to refer to CP-138 • Notifies Secondary Chemistry to investigate • Determines affected waterbox <ul style="list-style-type: none"> ○ Using SS-141-CIR determines that leak is in the "A" waterbox ○ Point A – CE-2 rising
	SRO	<ul style="list-style-type: none"> • Assists the BOP in diagnosing problem • Directs BOP actions per AR-403 • Refers to CP-138 • Evaluates entry into AP-604, Waterbox Tube Failure
	BOP	<ul style="list-style-type: none"> • Notifies SRO when CE-2 exceeds 10 $\mu\text{mho/cm}$
	SRO	<ul style="list-style-type: none"> • Directs BOP actions per AP-604 <ul style="list-style-type: none"> ○ Notify chemistry ○ Notify personnel of entry into AP-604 ○ Notify SPO to perform Enclosure 1 ○ Determines no power reduction required ○ Stops CWP-1A ○ Notify SPO to close ARV-47 ○ Notify chemistry of CWP shutdown ○ Opens ARV-56 and ARV-57 ○ Notifies SPO to close MSV-24 ○ Refers to OP-204

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

Event Description: (Examiner Cue) After the ES channel has been tripped a small condenser tube leak occurs [MALF]. AP-604, Waterbox Tube Failure, will be entered and CWP-1A secured.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Performs actions as directed by the SRO <ul style="list-style-type: none"> ○ Notifies chemistry ○ Notifies personnel of entry into AP-604 ○ Notifies SPO to perform Enclosure 1 ○ Stops CWP-1A ○ Notifies SPO to close ARV-47 ○ Notifies chemistry of CWP shutdown ○ Opens ARV-56 and ARV-57 ○ Notifies SPO to close MSV-24

Op-Test No.: 1 Scenario No.: 2 Event No.: 3 Rev.: 0

Event Description: (Examiner Cue) When the actions of AP-604 are complete the PZR level controller will fail low [**MALF**]. This will require manual PZR level control for the remainder of the scenario. Insertion of the failure during the actions of AP-604 is recommended due to the lengthy time it takes to recognize the malfunction (5 to 10 minutes).

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Recognize RC-001-LIC failure low <ul style="list-style-type: none"> ○ Lowering PZR level with no rise in controller demand ○ Take manual control of level controller • Maintain manual PZR level control during the remainder of the scenario
	SRO	<ul style="list-style-type: none"> • Acknowledge failure of PZR level controller • Directs RO to maintain level IAW with OP-103A, Curve 5 • Contacts work controls to initiate repair efforts

Op-Test No.: 1 Scenario No.: 2 Event No.: 4 Rev.: 0

Event Description: (Examiner Cue) After the actions for RM-A5G failure are complete 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">• Chemistry reports monthly CFT sample results are 2656 ppmB for CFT-1A and 2250 ppmB for CFT-1B• Enters TS 3.5.1, Condition A, with actions to restore concentration to within limits in 72 hours.

Op-Test No.: 1 Scenario No.: 2 Event No.: 5/6 Rev.: 0

Event Description: (Examiner Cue) Once the TS determination is completed MUV-258 will close [MALF] (RCP-1A CBO isolation valve). The BOP will open the valve with SRO concurrence. Thirty seconds later RCP-1A will experience 1st and 2nd stage seal failures [MALF]. OP-302, RCP Operation, will direct securing the RCP immediately.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (H-4-5) "RCP Seal Bleed Off High" • Recognizes MUV-258 has closed • Reports failure to SRO • Reviews AR-403 <ul style="list-style-type: none"> ○ Maximum of 5 minutes to reopen the valve • Requests permission to open the valve • Opens MUV-258
	SRO	<ul style="list-style-type: none"> • Assists BOP in diagnosing the failure • Directs BOP to open MUV-258
	RO/BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (I-4-4) "RCP Seal Upper Stage Temp High" • Reviews AR-501 • Notifies SRO of failure
	SRO	<ul style="list-style-type: none"> • Assists the RO/BOP in diagnosing the failure • Directs the BOP to check the RCP Seal Data recorders • Enters OP-302, RCP Operation • Directs the BOP to: <ul style="list-style-type: none"> ○ Monitor RCP seal conditions ○ Verify proper service water, seal injection flows and temperatures ○ Ensure CBO valve for affected pump is open • Determines to immediately trip RCP-1A due to high seal stage temperature and differential pressure ≥ 2100 psig • Directs the RO/BOP to trip RCP-1A

Op-Test No.: 1 Scenario No.: 2 Event No.: 5/6 Rev.: 0

Event Description: (Examiner Cue) Once the TS determination is completed MUV-258 will close [MALF] (RCP-1A CBO isolation valve). The BOP will open the valve with SRO concurrence. Thirty seconds later RCP-1A will experience 1st and 2nd stage seal failures [MALF]. OP-302, RCP Operation, will direct securing the RCP immediately.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Assist in diagnosing alarms • Determines that seal outlet temperatures are > 200 degrees and seal differential pressure is > 2100 psig • Perform additional actions as directed by the SRO
	SRO	<ul style="list-style-type: none"> • Enters AP-545, Plant Runback <ul style="list-style-type: none"> ○ Directs the BOP to: <ul style="list-style-type: none"> • Notify personnel of entry into AP-545 • Ensure narrow range Tc is selected to RCP-1B • Ensure narrow range RCS pressure control is selected to "A" RCS loop • Ensure lift oil pump running • Ensure regulating rod index is within insertion limits ○ Directs the RO to: <ul style="list-style-type: none"> • Ensure MFW flows are re-ratioing (very little change due to low power level) • Ensure RCS pressure is stable • Ensure Rx power is less than maximum based on FWPs • Ensure delta Tc stabilizes • Ensure vital plant parameters are approaching stability • Maintain imbalance within limits • Verify rods are within 6.5% of their group average height

Op-Test No.: 1 Scenario No.: 2 Event No.: 5/6 Rev.: 0

Event Description: (Examiner Cue) Once the TS determination is completed MUV-258 will close [MALF] (RCP-1A CBO isolation valve). The BOP will open the valve with SRO concurrence. Thirty seconds later RCP-1A will experience 1st and 2nd stage seal failures [MALF]. OP-302, RCP Operation, will direct securing the RCP immediately.

Time	Position *	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Perform actions as directed by the SRO <ul style="list-style-type: none"> ○ Ensure MFW flows are re-ratioing (very little change due to low power level) ○ Ensure RCS pressure is stable ○ Ensure Rx power is less than maximum based on FWPs ○ Ensure delta Tc stabilizes ○ Ensure vital plant parameters are approaching stability <ul style="list-style-type: none"> • Verifies PZR level, Tave and MS Hdr Pressure are normal ○ Maintain imbalance within limits ○ Verify rods are within 6.5% of their group average height
	BOP	<ul style="list-style-type: none"> • Perform actions as directed by the SRO <ul style="list-style-type: none"> ○ Notify personnel of entry into AP-545 ○ Ensure narrow range Tc is selected to RCP-1B <ul style="list-style-type: none"> • Selects TT3 on RC-5A-MS2 ○ Ensure narrow range RCS pressure control is selected to "A" RCS loop <ul style="list-style-type: none"> • Verifies RCS pressure control is selected to "A" loop in SASS cabinets ○ Ensure lift oil pump running <ul style="list-style-type: none"> • Verifies RCP-3A is running ○ Ensure regulating rod index is within insertion limits <ul style="list-style-type: none"> • Refers to OP-103D

Op-Test No.: 1 Scenario No.: 2 Event No.: 7/8 Rev.: 0

Event Description: (Examiner Cue) When the plant is stabilized, or following the shutdown of RCP-1A, a 40 gpm OTSG tube leak develops on the "B" OTSG [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 155 gpm.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Direct RO/BOP actions per EOP-6, OTSG Tube Rupture <ul style="list-style-type: none"> ○ Maintain PZR level (Rule 7, attached) ○ If PZR level is < 100 in then trip the reactor ○ Notify personnel ○ Determine affected OTSG ○ Close MSV-56 ○ Maintain DFT level between 8 and 11 feet ○ Concurrently perform EOP-14, Enclosure 17 ○ Notify SPO to concurrently perform EOP-14, Enclosure 6 ○ Notify SPO to concurrently perform EOP-14, Enclosure 1 ○ Trip the reactor <ul style="list-style-type: none"> • Manual Rx trip pushbutton will fail • Breakers 3305 and 3312 must be opened ○ Verify control rod groups inserted ○ Verify NIs indicate Rx is shutdown ○ Verify MSSVs are closed ○ Verify CC cooling running in emergency mode ○ Select PZR heaters to off ○ Maintain adequate SCM <ul style="list-style-type: none"> • Start RCS depressurization • Fully open Spray valve • Control HPI • Rule 2 & Rule 7 (attached) ○ Start RCS boration ○ Start RCS cooldown within normal limits using both OTSGs

Op-Test No.: 1 Scenario No.: 2 Event No.: 7/8 Rev.: 0

Event Description: (Examiner Cue) When the plant is stabilized, or following the shutdown of RCP-1A, a 40 gpm OTSG tube leak develops on the "B" OTSG [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 155 gpm.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Execute EOP actions in accordance with SRO directions <ul style="list-style-type: none"> ○ Maintain PZR level per Rule 7 (attached) <ul style="list-style-type: none"> • Close MUV-49 • Open MUV-24 • Open MUV-73 ○ Notify personnel ○ Determine affected OTSG <ul style="list-style-type: none"> • "B" is affected OTSG ○ Close MSV-56 ○ Maintain DFT level between 8 and 11 feet ○ Concurrently perform EOP-14, Enclosure 17 ○ Notify SPO to concurrently perform EOP-14, Enclosure 6 ○ Notify SPO to concurrently perform EOP-14, Enclosure 1 ○ Trip the reactor <ul style="list-style-type: none"> • Adjust MS Hdr Pressure setpoint to 46 • Manual Rx trip pushbutton will fail • Breakers 3305 and 3312 must be opened [CT] ○ Verify control rod groups inserted ○ Verify NIs indicate Rx is shutdown <ul style="list-style-type: none"> • Monitor PR and IR NIs ○ Verify MSSVs are closed <ul style="list-style-type: none"> • Checks steam safety valve monitor ○ Verify CC cooling running in emergency mode ○ Select PZR heaters to off ○ Maintain adequate SCM <ul style="list-style-type: none"> • Start RCS depressurization • Fully open Spray valve • Control HPI • Rule 2 & Rule 7 (attached) ○ Start RCS boration <ul style="list-style-type: none"> • Ensure at least 1 post-filter in service • Open CAV-60, start CAP-1A or 1B • Start RCS cooldown within normal limits using both OTSGs

Op-Test No.: 1 Scenario No.: 2 Event No.: 9 Rev.: 0

Event Description: (Examiner Cue) A bearing will fail on MUP-1A [**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"> • Direct RO/BOP actions for loss of running MUP • Rule 7, PZR Level control <ul style="list-style-type: none"> ○ Close MUV-49 ○ Ensure MUV-58 open ○ Start required cooling water pumps for affected MUP ○ Start ES selected MUP • May use OP-402, Section 4.6 to start MUP-1C (either way is acceptable)
	RO/BOP,	<ul style="list-style-type: none"> • Execute EOP actions in accordance with SRO directions • Rule 7, PZR Level control <ul style="list-style-type: none"> ○ Ensure MUV-58 open ○ Check closed MUV-49 ○ Start required cooling water pumps for affected MUP <ul style="list-style-type: none"> • Starts RWP-3B • Starts DCP-1B ○ Start ES selected MUP [CT] <ul style="list-style-type: none"> • Starts MUP-1C ○ Maintain PZR level

Scenario may be terminated when makeup flow is restored and a plant cooldown/depressurization started.

RULE 1, LOSS OF SCM

- IF < 1 min has elapsed since losing adequate SCM, THEN immediately stop all RCPs.

- IF RCPs were NOT stopped within 1 min, THEN ensure all operating RCPs remain running until any of the following exist:
 - SCM is restored
 - LPI flow > 1400 gpm in each injection line.

- Progress toward a maximum allowable plant cooldown to achieve CFT and LPI flow as soon as possible.

-
- Manually actuate ES.

 - Depress "HPI MAN ACT" push buttons on Trains A and B.

 - Depress "RB ISO MAN ACTUATION" push buttons on Trains A and B.

 - IF LPI has NOT actuated, AND RCS PRESS \leq 300 psig, THEN depress "LPI MAN ACT" push buttons on Trains A and B.

-
- Depress "ISCM" push buttons for EFIC channels A and B.

-
- Ensure Tincore is selected on SPDS.

RULE 2, HPI CONTROL

- ___ IF HPI has actuated,
THEN bypass or reset
ES actuation. *

1 ___ Obtain SRO concurrence to
bypass or reset ES.

2 Bypass or reset ES actuation:

___ Auto

___ Manual

- ___ Open MUP recirc prior to
throttling HPI flow
< 200 gpm/pump.

- ___ IF recirc to MUT is desired,
THEN open MUP recirc to MUT valves:

___ MUV-53	___ MUV-257
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- ___ IF recirc to RB sump is desired,
THEN open HPI recirc to sump valves:

___ MUV-543	___ MUV-544
___ MUV-545	___ MUV-546

- ___ IF adequate SCM exists based,
on Tincore,
THEN throttle HPI to maintain
required conditions.

- ___ Prevent exceeding NDT limit

- ___ IF OTSG isolated for TRACC,
THEN maintain RCS PRESS
< 1000 psig.

- ___ IF PTS, SGTR, or dry OTSG exists,
THEN maintain minimum adequate
SCM.

- ___ IF adequate SCM can be
maintained with 1 HPI pump,
AND stopping second HPI pump
is desired,
THEN stop 1 HPI pump.

- ___ Ensure running HPI pump is
aligned to MUT.

RULE 3, EFW/AFW CONTROL

- Ensure available OTSGs are at or trending toward required level.

"LLL"	> 20 in
"NAT CIRC"	> 70%
"ISCM"	> 90%

- IF manual control of EFW flow is desired, THEN establish manual EFIC control.

- 1 Obtain SRO concurrence to place EFIC in manual.
- 2 Control EFW to maintain required EFW flow and OTSG level.
- 3 IF EFW flow is NOT controlled, THEN depress EFIC channels A and B "MANUAL PERMISSIVE" push buttons and close affected EFW block valve.

- IF adequate SCM does NOT exist, AND level in available OTSGs is NOT at or trending toward "ISCM" level, THEN establish manual required flow.

EFW	2 OTSGs	> 280 gpm in 1 line to each OTSG
	1 OTSG	> 470 gpm in 1 line to 1 OTSG
AFW	2 OTSGs	> 250 gpm to < 300 gpm/OTSG
	1 OTSG	> 450 gpm to < 600 gpm

- IF adequate SCM exists, THEN throttle flow to prevent OTSG PRESS from lowering > 100 psig below desired PRESS.

- Do not allow OTSG level to lower.

RULE 4, PTS

- IF any of the following exist:
 - Tincore < 400°F,
AND cooldown rate
exceeds ITS limit
 - RCPs off,
AND HPI flow exists
 - Throttle HPI flow to minimize
adequate SCM.
 - Throttle LPI flow to minimize
adequate SCM.
 - PTS is applicable until an
Engineering evaluation has been
completed.
- THEN perform required PTS
actions.

RULE 7, PZR LEVEL CONTROL

- 1 ___ IF PZR level is < PZR level band,
THEN restore PZR level.

PZR Level Band	
Rx at power > 20%	200 in to 240 in
Rx at power ≤ 20%	120 in to 200 in
Rx tripped	50 in to 120 in

- Cycle appropriate BWST to MUP valve to maintain MUT level ≥ 55 in:

___ MUV-73	___ MUV-58
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- ___ Close MUV-49

- 2 ___ IF PZR level does NOT recover,
THEN establish manual HPI flow.

- 1 ___ Open MUV-24
- 2 ___ Notify SSO to evaluate Emergency Plan entry.
- 3 ___ IF PZR level does NOT recover,
THEN start second MUP and required cooling pumps.

[Rule 5, Diesel Load Control]

- 4 ___ IF PZR level does NOT recover,
THEN open additional HPI valves.
- 5 ___ IF PZR level does NOT recover,
THEN close MUP to MUT recircs:

___ MUV-53	___ MUV-257
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- 3 ___ IF PZR level recovers,
THEN restore normal PZR conditions.

[Rule 2, HPI Control]

- ___ IF letdown is desired,
THEN CONCURRENTLY PERFORM EOP-14, Enclosure 4, Letdown Recovery (if accessible).

Facility: Crystal River #3 Scenario No.: <u>#3 (NRC 2009)</u> Op-Test No.: <u>1</u>			
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
<u>Initial Conditions:</u> The plant is at \approx 90% power.			
<u>Turnover:</u> The following equipment is OOS: MUP-1B (12 hours); FWP-7 (4 hours); MSV-55 (8 hours). "A" RPS channel in bypass due to the failure low of RC-4A-TE2 (2 hours).			
Event No.	Malf. No.	Event Type*	Event Description
1	1	C (BOP) C (SRO)	CIV-34 fails closed (air failure). (OP-417) SRO TS determination. (TS 3.6.3)
2	2	I (SRO)	EF-98-LT fails low. SRO TS determination. (TS 3.3.17)
3	3	C (RO)	CDP-1A magnetic coupling failure. Power decrease to approximately 65%. (AP-510, OP-603)
4	4	C (BOP)	Turbine automatic control failure at \approx 80%. (AP-510)
5	5	M (ALL)	"B" OTSG steam leak. (EOP-2, AI-505)
6	6	C (BOP)	MFLI trips both MFWPs. (EOP-13, Rule 3)
7	7	C (BOP)	DCP-1B fails to start. (AI-505) [CT]
8	8	C (RO or BOP)	Loss of all feedwater. Initiate HPI/PORV cooling. (EOP-4) [CT]
9	N/A	C (RO or BOP)	Loss of ASCM. Secure Reactor Coolant Pumps. (EOP-13, Rule 1) [CT]
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Plant is initialized at 90% power for turbine valve testing. MUP-1B, FWP-7 and MSV-55 are OOS. RPS Channel "A" is bypassed due to the failure of RC-4A-TE2.

Soon after turnover CIV-34 will fail closed. Actions to secure CIP-3A, starting CIP-3B and swapping Cavity Cooling fans are required. TS 3.6.3, Condition C, should be addressed with actions to isolate the flowpath within 4 hours.

Once TS actions are completed EF-98-LT (EFT level) fails low and TS 3.3.17 is addressed. Condition A should be entered with the action to restore the channel to operable status within 30 days.

Following the failure of EF-98-LT the magnetic coupling on CDP-1A experiences a control circuit failure. Power must be lowered quickly so that MFW booster pump suction is not lost. AP-510, Rapid Power Reduction, will be entered and power reduced to about 65%. At about 80% power automatic control of the turbine will be lost. The crew must recognize this failure and take manual control of the turbine for the remainder of the down power.

After the plant is stabilized the "B" OTSG develops a steam leak. Plant shutdown is started with the Turbine in manual. SG/Rx Master station may also be taken to manual. After the reactor is tripped the steam leak increases and "B" OTSG is isolated. When MFLI is actuated both the "A" and "B" MFWPs will trip due to a failure of the EFIC FWP trip logic circuitry.

DCP-1B fails to start resulting in a loss of cooling to DHP-1B, RWP-3B and MUP-1C. The "B" train DC cooled equipment must be secured and MUP-1C either secured or placed on SW cooling [CT].

EFP-2 will stop supplying EFW when the "B" OTSG depressurizes. EFP-3 will trip due to a mechanical failure. EFP-1 breaker will not close when demanded. EOP-4, Inadequate Heat Transfer, will be entered based on symptoms of inadequate primary to secondary heat transfer or loss of all main and emergency feedwater. HPI/PORV cooling must be established [CT]. An ALERT condition will exist when HPI/PORV cooling is started.

If a loss of ASCM condition exists the RCPs must be secured within 1 minute [CT].

This scenario may be terminated when HPI/PORV cooling is established and incore temperatures are starting to lower.

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

Event Description: (Examiner Cue) Soon after turnover CIV-34 will fail closed [MALF]. Actions to secure CIP-3A, starting CIP-3B and swapping Cavity Cooling fans are required. TS 3.6.3, Condition C should be addressed with actions to isolate the flowpath within 4 hours.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarm: <ul style="list-style-type: none"> ○ (C-2-14) "SW ISO Valve Air Failure" • Reviews AR-303 • Diagnoses failure <ul style="list-style-type: none"> ○ CIV-34 green light ON • Informs SRO of air failure to CIV-34 • Recommends swapping Cavity Cooling fans and pumps
	SRO	<ul style="list-style-type: none"> • Assists BOP in diagnosing CIV-34 failure • Directs the BOP to swap Cavity Cooling fans and pumps IAW OP-417 • Enters TS 3.6.3, Condition C • Contacts Work Control to initiate repair efforts • May review the SRO checklist for unplanned equipment status changes
	BOP	<ul style="list-style-type: none"> • Swaps Cavity Cooling fans and pumps IAW OP-417, Section 4.9.2 <ul style="list-style-type: none"> ○ Stops AHF-2A ○ Stops CIP-3A ○ Closes CIV-35 ○ Opens CIV-40 ○ Opens CIV-41 ○ Starts CIP-3B ○ Starts AHF-2B

Op-Test No.: 1 Scenario No.: 3 Event No.: 2 Rev.: 0

Event Description: (Examiner Cue) EF-98-LT (EF tank level) fails low. **(MALF)** TS 3.3.17 entry required.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarm <ul style="list-style-type: none"> ○ (H-7-1) "EF Tank Level Low-Low" ○ Reviews AR-403 ○ Notes that EF-98-LI1 is failed low while EF-99-LI1 still indicates proper EFT level ○ Informs SRO of instrument failure ○ May dispatch SPO to ensure no leak at EFT-2
	SRO	<ul style="list-style-type: none"> • Evaluates TS 3.3.17 for applicability. Enters Condition A. (has to use Basis to determine) • May evaluate TS 3.3.18 for applicability. No entry required. (has to use Basis to determine.) • Contacts Work Control to initiate repair efforts • May review SRO checklist for unplanned equipment status change

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

Event Description: (Examiner Cue) After TS determination the magnetic coupling on CDP-1A experiences a control circuit failure. [MALF]. Power must be decreased quickly so that MFW booster pump suction is not lost. AP-510, Rapid Power Reduction, will be entered and power reduced to about 65%. At about 80% power automatic control of the turbine will be lost. [MALF]. The crew must recognize this failure and take manual control of the turbine for the remainder of the power decrease.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (N-2-2) "Cond Pump A Uncoupled" ○ (N-1-5) "Hotwell Level High/Low" • Diagnoses failure <ul style="list-style-type: none"> ○ Large decrease in condensate flow ○ DFT level lowering ○ Low motor current on CDP-1A • May attempt to increase demand on CDP-1A • Reviews AR-602 • Notifies SRO of malfunction • Recommends reducing power
	SRO	<ul style="list-style-type: none"> • Acknowledges receipt of alarms • Assists RO/BOP in diagnosing CDP failure • Enters AP-510, Rapid Power Reduction • Directs RO/BOP actions per AP-510 <ul style="list-style-type: none"> ○ Adjust Load Rate to desired setpoint ○ Set Unit Load Demand to "10" ○ Notify personnel of entry into AP-510 ○ Maintain PZR level (Rule 7, attached) ○ Notify Chemistry of power change ○ Verify Imbalance within limits ○ When power is < 80% notify SPO to ensure MS is supplying AS ○ Maintain DFT level between 8 and 11 feet ○ If MBVs close, then ensure MBVs remain closed ○ Verify Aux Transformer is not supplying any bus

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

Event Description: (Examiner Cue) After TS determination the magnetic coupling on CDP-1A experiences a control circuit failure. [MALF]. Power must be decreased quickly so that MFW booster pump suction is not lost. AP-510, Rapid Power Reduction, will be entered and power reduced to about 65%. At about 80% power automatic control of the turbine will be lost. [MALF]. The crew must recognize this failure and take manual control of the turbine for the remainder of the power decrease.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per AP-510 <ul style="list-style-type: none"> ○ Adjust Load Rate to desired setpoint ○ Set Unit Load Demand to "10" ○ Verify Imbalance within limits ○ Maintain DFT level between 8 and 11 feet ○ If MBVs close, then ensure MBVs remain closed
	BOP	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per AP-510 <ul style="list-style-type: none"> ○ Notify personnel of entry into AP-510 ○ Maintain PZR level (Rule 7, attached) ○ Notify Chemistry of power change ○ When power is < 80% notify SPO to ensure MS is supplying AS ○ Maintain DFT level between 8 and 11 feet ○ Verify Aux Transformer is not supplying any bus
	SRO	<ul style="list-style-type: none"> • Assists RO/BOP in diagnosing turbine failure • Directs BOP to take manual control of the turbine and maintain header pressure as power lowers • Directs the RO to continue the down power with the SG/RX Master station in Manual • Directs RO/BOP to stabilize plant parameters at approximately 65% • Contacts Work Control to initiate repair efforts • May review SRO checklist for unplanned equipment status change

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

Event Description: (Examiner Cue) After TS determination the magnetic coupling on CDP-1A experiences a control circuit failure. [MALF]. Power must be decreased quickly so that MFW booster pump suction is not lost. AP-510, Rapid Power Reduction, will be entered and power reduced to about 65%. At about 80% power automatic control of the turbine will be lost. [MALF]. The crew must recognize this failure and take manual control of the turbine for the remainder of the power decrease.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Recognizes turbine failure to lower demand • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (O-3-4) "Turb Throttle Press High/Low" (possible) ○ (N-6-4) "Turb EHC on Manual" ○ (K-6-2) "Unit Master In Track" • Manually reduces turbine to maintain header pressure • Continues manual control until power reduction is completed (approximately 65%) • Stabilizes plant parameters
	RO	<ul style="list-style-type: none"> • Recognizes turbine failure to lower demand • May take manual control of the SG/RX Master station • Continues power reduction with the Turbine and/or SG/RX Master station(s) in Manual • Stops power decrease at 60% to 70% power • Monitors DFT level • Stabilizes plant parameters

Op-Test No.: 1 Scenario No.: 3 Event No.: 5/6 Rev.: 00

Event Description: (Examiner Cue) After the plant is stabilized the "B" OTSG develops a steam leak [MT]. Plant shutdown is started with the Turbine and/or SG/Rx Master stations in manual. After the reactor is tripped the steam leak rises and the "B" OTSG is isolated. When MFLI is actuated both the "A" and "B" MFWPs will trip due to a failure of the EFIC FWP trip logic circuitry [MALF].

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> • Recognize indications of a steam leak in the IB
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (F-3-2) Aux Bldg Fire Alert • Reviews AR-401 • Notifies SRO of failure • Directs SPO to investigate
	SRO	<ul style="list-style-type: none"> • Assists the RO/BOP in diagnosing the failure • May re-enter AP-510, Rapid Power Reduction • May direct RO/BOP actions per AP-510 <ul style="list-style-type: none"> ○ Adjust Load Rate to desired setpoint ○ Set Unit Load Demand to "10" <ul style="list-style-type: none"> ▪ Should direct RO to use SG/Rx master station and BOP to use the turbine or BOP to use the turbine only ○ Notify personnel of entry into AP-510 ○ Maintain PZR level (Rule 7, attached) ○ Notify Chemistry of power change ○ Maintain Imbalance within limits ○ When power is < 80% ensure MS is supplying AS (N/A) • Maintain DFT level between 8 and 11 feet • Directs the RO to trip the reactor prior to 4 psig RB pressure
	RO	<ul style="list-style-type: none"> • Assist in diagnosing alarms • Starts plant shutdown • Perform additional actions as directed by the SRO

Op-Test No.: 1 Scenario No.: 3 Event No.: 5/6 Rev.: 00

Event Description: (Examiner Cue) After the plant is stabilized the "B" OTSG develops a steam leak [MT]. Plant shutdown is started with the Turbine and/or SG/Rx Master stations in manual. After the reactor is tripped the steam leak rises and the "B" OTSG is isolated. When MFLI is actuated both the "A" and "B" MFWPs will trip due to a failure of the EFIC FWP trip logic circuitry [MALF].

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Maintains header pressure with Turbine in Manual • Perform additional actions as directed by the SRO
	RO	<ul style="list-style-type: none"> • Trips the reactor when directed • Perform first pass of EOP-2 Immediate Actions from memory <ul style="list-style-type: none"> ○ Depress the Rx trip pushbutton ○ Verify CRD groups 1 through 7 are fully inserted ○ Verify NIs indicate Rx is shutdown ○ Depress Main Turbine trip pushbutton ○ Verify TVs and GVs are closed • Perform second pass of EOP-2 Immediate Actions with SRO direction
	SRO	<ul style="list-style-type: none"> • Direct RO actions per EOP-2 <ul style="list-style-type: none"> ○ Depress the Rx trip pushbutton ○ Verify CRD groups 1 through 7 are fully inserted ○ Verify NIs indicate Rx is shutdown ○ Depress Main Turbine trip pushbutton ○ Verify TVs and GVs are closed • Directs BOP to determine failed OTSG and isolate
	BOP	<ul style="list-style-type: none"> • Depresses Global Silence pushbutton • Isolates the "B" OTSG • Recognizes that both MFWPs tripped when MFLI was actuated • Notifies SRO of loss of both MFWPs

Op-Test No.: 1 Scenario No.: 3 Event No.: 5/6 Rev.: 00

Event Description: (Examiner Cue) After the plant is stabilized the "B" OTSG develops a steam leak [MT]. Plant shutdown is started with the Turbine and/or SG/Rx Master stations in manual. After the reactor is tripped the steam leak rises and the "B" OTSG is isolated. When MFLI is actuated both the "A" and "B" MFWPs will trip due to a failure of the EFIC FWP trip logic circuitry [MALF].

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> • Perform symptom scan <ul style="list-style-type: none"> ○ Station Blackout ○ Inadequate SCM ○ Inadequate Heat Transfer ○ Excessive Heat Transfer ○ SG Tube Rupture • Determine that no symptoms are evident, continue in EOP-2 • Recognize that Rule 2, HPI Control and Rule 3, EFW Control are in effect (attached)
	RO/BOP	<ul style="list-style-type: none"> • Perform actions as directed by the SRO

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

Event Description: (Automatic Parameter Cue) DCP-1B fails to start [**MALF**] resulting in a loss of cooling to DHP-1B, RWP-3B. MUP-1C must be secured or placed on SW cooling [**CT**]. DHP-1B and RWP-3B may also be secured.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Perform Rule 2, HPI Control (attached) <ul style="list-style-type: none"> ○ Bypass or Reset ES actuation ○ Open MUP recirc valves prior to throttling < 200 gpm/pump • Determine that DCP-1B failed to start <ul style="list-style-type: none"> ○ (D-5-6) "BS/DH Pump B DC Flow Low" ○ Amber light remains on for DCP-1B on "B" ES Status Panel • Attempt to start DCP-1B • Notify SRO of failure <ul style="list-style-type: none"> ○ Secures MUP-1C OR places on SW cooling [CT] • May note time when RCPs must be secured
	SRO	<ul style="list-style-type: none"> • Directs BOP to: <ul style="list-style-type: none"> ○ Attempt start of DCP-1B ○ Secure DC cooled equipment ○ Shutdown MUP-1C or place on SW ○ Stop RCPs within 30 minutes due to loss of CBO flow

Op-Test No.: 1 Scenario No.: 3 Event No.: 8/9 Rev.: 00

Event Description: (Automatic Parameter Cue) EFP-2 will stop supplying EFW when the "B" OTSG depressurizes. EFP-3 will trip due to a mechanical failure [MALF]. EFP-1 breaker will not close when demanded. EOP-4, Inadequate Heat Transfer, will be entered based on symptoms of inadequate primary to secondary heat transfer or loss of all main and emergency feedwater. HPI/PORV cooling must be established [CT]. An ALERT should be declared when HPI/PORV cooling is started. Once adequate SCM is lost RCPs must be secured within 1 minute [CT].

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Perform Rule 3, EFW Control (attached) • Recognize EFP-2 flow decrease (isolation of "B" OTSG) • Recognize loss of EFP-3 <ul style="list-style-type: none"> ○ (H-8-3) "EFP 3 Start Failure" ○ No EFW flow ○ Green light on control handle • Notifies SRO of malfunction

Op-Test No.: 1 Scenario No.: 3 Event No.: 8/9 Rev.: 00

Event Description: (Automatic Parameter Cue) EFP-2 will stop supplying EFW when the "B" OTSG depressurizes. EFP-3 will trip due to a mechanical failure [MALF]. EFP-1 breaker will not close when demanded. EOP-4, Inadequate Heat Transfer, will be entered based on symptoms of inadequate primary to secondary heat transfer or loss of all main and emergency feedwater. HPI/PORV cooling must be established [CT]. An ALERT should be declared when HPI/PORV cooling is started. Once adequate SCM is lost RCPs must be secured within 1 minute [CT].

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Enters EOP-4 and directs RO/BOP actions <ul style="list-style-type: none"> ○ Notify personnel ○ Verify EFW or AFW pumps running <ul style="list-style-type: none"> ▪ Directs closure of EFIC and AFW control valves ▪ Directs RO or BOP to concurrently perform EOP-14, Enclosure 7 ○ Notify PPO to perform EOP-14, Enclosure 2 ○ Adjust MUV-31 setpoint to 100 inches (use Rule 7) ○ Record initial Tincore temp ○ Minimize RCS pressure rise <ul style="list-style-type: none"> ▪ PZR spray, PZR heaters, HPI flow ○ Reduce running RCPs to 1 per loop ○ Waits at step 3.13 until any of the following occur: <ul style="list-style-type: none"> ▪ RCS pressure approaches NDT limit ▪ PORV automatically opens ▪ RCS pressure is ≥ 2400 psig ○ Determines HPI/PORV cooling is required ○ Actuates HPI <ul style="list-style-type: none"> ▪ If MUP-1C cooling water has not been swapped to SW then MUP-1C must be secured ○ Ensure proper HPI alignment ○ Ensure HPI recirc valves to sump closed ○ Establish HPI PORV cooling <ul style="list-style-type: none"> ▪ Ensure RCV-11 is open and open PORV ○ Select all PZR heaters to OFF ○ Reduces RCPs to only 1 running ○ Ensure PZR spray valve in AUTO • Should recognize entry into an Alert condition. • Directs RCP shutdown based on either of the following: [CT] <ul style="list-style-type: none"> ○ Within 1 minute of Loss of ASCM ○ If incore temp rises $\geq 50^\circ$ F above initial value in EOP-4 • Goes to EOP-8B, HPI Cooldown

Op-Test No.: 1 Scenario No.: 3 Event No.: 8/9 Rev.: 00

Event Description: (Automatic Parameter Cue) EFP-2 will stop supplying EFW when the "B" OTSG depressurizes. EFP-3 will trip due to a mechanical failure [MALF]. EFP-1 breaker will not close when demanded. EOP-4, Inadequate Heat Transfer, will be entered based on symptoms of inadequate primary to secondary heat transfer or loss of all main and emergency feedwater. HPI/PORV cooling must be established [CT]. An ALERT should be declared when HPI/PORV cooling is started. Once adequate SCM is lost RCPs must be secured within 1 minute [CT].

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Performs actions directed by the SRO <ul style="list-style-type: none"> ○ Notify personnel ○ Verify EFW or AFW pumps running <ul style="list-style-type: none"> ▪ Closes EFIC and AFW control valves ▪ Concurrently performs EOP-14, Enclosure 7 ○ Notify PPO to perform EOP-14, Enclosure 2 ○ Adjust MUV-31 setpoint to 100 inches ○ Record initial Tincore temp ○ Minimize RCS pressure rise <ul style="list-style-type: none"> ▪ PZR spray, PZR heaters, HPI flow ○ Reduce running RCPs to 1 per loop ○ Waits at step 3.13 until any of the following occur: <ul style="list-style-type: none"> ▪ RCS pressure approaches NDT limit ▪ PORV automatically opens ▪ RCS pressure is ≥ 2400 psig ○ Concurs that HPI/PORV cooling is required ○ Actuates HPI <ul style="list-style-type: none"> ▪ If MUP-1C cooling water has not been swapped to SW then MUP-1C must be secured ○ Ensures at least 1 train of HPI is properly aligned ○ Ensures HPI recirc valves to sump closed ○ When at least 1 train of HPI flow is established opens PORV [CT] ○ Selects all PZR heaters to OFF ○ Reduces RCPs to one ○ Ensures PZR spray valve in AUTO • Performs RCP shutdown based on either of the following: [CT] <ul style="list-style-type: none"> ○ Within 1 minute of Loss of ASCM ○ If incore temp rises $\geq 50^\circ$ F above initial value in EOP-4

Op-Test No.: 1 Scenario No.: 3 Event No.: 8/9 Rev.: 00

Event Description: (Automatic Parameter Cue) EFP-2 will stop supplying EFW when the "B" OTSG depressurizes. EFP-3 will trip due to a mechanical failure [MALF]. EFP-1 breaker will not close when demanded. EOP-4, Inadequate Heat Transfer, will be entered based on symptoms of inadequate primary to secondary heat transfer or loss of all main and emergency feedwater. HPI/PORV cooling must be established [CT]. An ALERT should be declared when HPI/PORV cooling is started. Once adequate SCM is lost RCPs must be secured within 1 minute [CT].

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Performs EOP-14, Enclosure 7 <ul style="list-style-type: none"> ○ Verifies EFP-3 is not running and goes to Step 7.6 ○ Verifies EFP-2 is not running and goes to Step 7.8 ○ Verifies EDG A is not supplying A ES bus ○ Verifies EFP-1 is available ○ Ensures EFP-1 is running • Notifies SRO of EFP-1 failure to start per Enclosure 7

Scenario may be terminated when HPI/PORV cooling is established and incore temperatures are lowering.

RULE 1, LOSS OF SCM

- ___ IF < 1 min has elapsed since losing adequate SCM, THEN immediately stop all RCPs.
 - ___ IF RCPs were NOT stopped within 1 min, THEN ensure all operating RCPs remain running until any of the following exist:
 - ___ SCM is restored
 - ___ LPI flow > 1400 gpm in each injection line.
 - ___ Progress toward a maximum plant cooldown to achieve CFT and LPI flow as soon as possible.
-
- ___ Manually actuate ES.
 - ___ Depress "HPI MAN ACT" push buttons on Trains A and B.
 - ___ Depress "RB ISO MAN ACTUATION" push buttons on Trains A and B.
 - ___ IF LPI has NOT actuated, AND RCS PRESS ≤ 300 psig, THEN depress "LPI MAN ACT" push buttons on Trains A and B.
-
- ___ Depress "ISCM" push buttons for EFIC channels A and B.
-
- ___ Ensure Tincore is selected on SPDS.

RULE 2, HPI CONTROL

- ___ IF HPI has actuated,
THEN bypass or reset
ES actuation.

1 ___ Obtain SRO concurrence to
bypass or reset ES.

2 Bypass or reset ES actuation:

___ Auto

___ Manual

- ___ Open MUP recirc prior to
throttling HPI flow
< 200 gpm/pump.

- ___ IF recirc to MUT is desired,
THEN open MUP recirc to MUT valves:

___ MUV-53	___ MUV-257
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- ___ IF recirc to RB sump is desired,
THEN open HPI recirc to sump valves:

___ MUV-543	___ MUV-544
___ MUV-545	___ MUV-546

- ___ IF adequate SCM exists based,
on Tincore,
THEN throttle HPI to maintain
required conditions.

- ___ Prevent exceeding NDT limit

- ___ IF OTSG isolated for TRACC,
THEN maintain RCS PRESS
< 1000 psig.

- ___ IF PTS, SGTR, or dry OTSG exists,
THEN maintain minimum adequate
SCM.

- ___ IF adequate SCM can be
maintained with 1 HPI pump,
AND stopping second HPI pump
is desired,
THEN stop 1 HPI pump.

- ___ Ensure running HPI pump is
aligned to MUT.

RULE 3, EFW/AFW CONTROL

- ___ Ensure available OTSGs are at or trending toward required level.

"LLL"	> 20 in
"NAT CIRC"	> 70%
"ISCM"	> 90%

- ___ IF manual control of EFW flow is desired,
THEN establish manual EFIC control.

- 1 ___ Obtain SRO concurrence to place EFIC in manual.
- 2 ___ Control EFW to maintain required EFW flow and OTSG level.
- 3 ___ IF EFW flow is NOT controlled,
THEN depress EFIC channels A and B "MANUAL PERMISSIVE" push buttons and close affected EFW block valve.

- ___ IF adequate SCM does NOT exist,
AND level in available OTSGs is NOT at or trending toward "ISCM" level,
THEN establish manual required flow.

EFW	2 OTSGs	> 280 gpm in 1 line to each OTSG
	1 OTSG	> 470 gpm in 1 line to 1 OTSG
AFW	2 OTSGs	> 250 gpm to < 300 gpm/OTSG
	1 OTSG	> 450 gpm to < 600 gpm

- ___ IF adequate SCM exists,
THEN throttle flow to prevent OTSG PRESS from lowering > 100 psig below desired PRESS.

- Do not allow OTSG level to lower.

RULE 4, PTS

- IF any of the following exist:
 - Tincore < 400°F,
AND cooldown rate
exceeds ITS limit
 - RCPs off,
AND HPI flow exists
 - Throttle HPI flow to minimize
adequate SCM.
 - Throttle LPI flow to minimize
adequate SCM.
 - PTS is applicable until an
Engineering evaluation has been
completed.
- THEN perform required PTS
actions.

RULE 7, PZR LEVEL CONTROL

- 1 ___ IF PZR level is < PZR level band,
THEN restore PZR level.

PZR Level Band	
Rx at power > 20%	200 in to 240 in
Rx at power ≤ 20%	120 in to 200 in
Rx tripped	50 in to 120 in

- Cycle appropriate BWST to MUP valve to maintain MUT level ≥ 55 in:

___ MUV-73	___ MUV-58
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- ___ Close MUV-49

- 2 ___ IF PZR level does NOT recover,
THEN establish manual HPI flow.

- 1 ___ Open MUV-24
- 2 ___ Notify SSO to evaluate Emergency Plan entry.
- 3 ___ IF PZR level does NOT recover,
THEN start second MUP and required cooling pumps.

[Rule 5, Diesel Load Control]

- 4 ___ IF PZR level does NOT recover,
THEN open additional HPI valves.
- 5 ___ IF PZR level does NOT recover,
THEN close MUP to MUT recircs:

___ MUV-53	___ MUV-257
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- 3 ___ IF PZR level recovers,
THEN restore normal PZR conditions.

[Rule 2, HPI Control]

- ___ IF letdown is desired,
THEN CONCURRENTLY PERFORM EOP-14, Enclosure 4,
Letdown Recovery (if accessible).

Facility: Crystal River #3 Scenario No.: 4 (NRC 2009) Op-Test No.: 1

Examiners: _____

Operators: _____

Initial Conditions: The plant is at 100% power.

Turnover: The following equipment is OOS: MUP-1A (12 hours). Severe thunderstorms are predicted for Citrus and Levy counties.

Event No.	Malf. No.	Event Type*	Event Description
1	1	I (SRO)	CF-2-LT4 fails low (CFT level transmitter). SRO TS determination. (TS 3.5.1)
2	2	C (RO)	RHV-4 closes. (AP-510)
3	N/A	N (BOP)	Swap Unit buses to Startup transformer. (AP-510)
4	3	I (RO) I (SRO)	Dropped rod with automatic runback continuing through setpoint. (AP-545, AP-504, AI-505) SRO ITS determination. (ITS 3.1.4)
5	4	R (RO)	Electrical generator hydrogen leak resulting in manual turbine trip. (AP-660)
6	5	M (ALL)	"A" OTSG steam leak in the RB following the turbine trip. Manual MFLI required. (EOP-2, EOP-5) [CT]
7	6	C (RO or BOP)	EFV-58 fails as is, EFV-14 fuse blows. (EOP-13, Rule 3) [CT]
8	7	C (RO or BOP)	MUV-73 fails to open remotely. (EOP-13, Rule 2) [CT]

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

The plant is at 100% power. Severe thunderstorms are predicted for Citrus and Levy counties.

Soon after turnover is complete CF-2-LT4 (CFT level transmitter) fails low. TS 3.5.1, CFT Operability, will be referred to but the SRO should determine that the other CFT level instrument satisfies the TS requirement. (SP-300, Sequence 59)

RHV-4 (IV-4) will fail closed. Per OP-204, Power Operations, unit load must be reduced to \leq 75% power within 15 minutes. The SRO will enter AP-510, Rapid Power Reduction, and reduce reactor power.

Following the power reduction control rod 2-4 drops into the core. AP-545, Plant Runback, will be entered. The automatic runback will occur as designed but will not stop at setpoint (60% reactor power). The RO, at a minimum, must take the SG/Rx Master control station to manual. The RO will probably perform the Immediate Actions of AP-504, Integrated Control System Failure and take multiple ICS stations to hand. When the plant is stabilized OP-504, Integrated Control System, will be used to return stations to automatic. The SG/Rx Master control station must remain in manual. ITS 3.1.4, Condition A, should be addressed.

After ICS stations are returned to automatic (may not be returned to automatic if malfunction cannot be diagnosed) a hydrogen leak will occur on the main generator. The SRO may enter AP-510, Rapid Power Reduction, dependent on current power level, to reduce reactor power below the anticipatory reactor trip setpoint (41% power) and trip the main turbine. AP-660, Turbine Trip, should be concurrently performed. Alternatively the SRO may elect to trip the reactor at this point. This option is allowable and will not detract from the scenario.

The turbine trip will cause a steam leak on the "A" OTSG inside the reactor building. RB pressure will start rising and a manual reactor trip should be initiated (if not already actuated) prior to reaching 4 psig in the RB. EOP-2, Vital System Status Verification, will be entered and a symptom scan performed. EOP-5, Excessive Heat Transfer, should be entered. Once the steam leak is confirmed a MSLI and MFLI will be performed. The MFLI will not work automatically and the operator must manually perform the actions (CT).

EFIC will actuate from the HPI signal. The operator will recognize excessive EFW flow to the "A" OTSG through EFV-58. Rule 3 will be in effect and the operator will attempt to isolate flow by taking EFIC to manual and closing EFV-14 (block valve). The block valve will stroke partially in the closed direction and then the motor power fuse will blow. The operator must secure EFP-3 (CT) to stop EFW flow to the OTSG.

When the ES actuation occurs MUV-73 will not open from the MCB and MUP-1C will not start. The operator must monitor MUT level and either have MUV-73 manually opened in the field, MUV-62 powered up and opened from the control room or secure MUP-1B (CT) prior to the MUT going empty. MUP-1B is the only available MUP.

This scenario may be terminated any time after actions to minimize subcooling margin have been taken.

Op-Test No.: 1 Scenario No.: 4 Event No.: 1 Rev.: 00

Event Description: (Examiner Cue) Soon after turnover is complete CF-2-LT4 (CFT level transmitter) fails low [**MALF**]. TS 3.5.1, CFT Operability, will be referred to but the SRO should determine that the other CFT level instrument satisfies the TS requirement.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarm <ul style="list-style-type: none"> ○ (E-8-4) "CF Tank B Level High/Low" • Refers to AR-305 • Notifies SRO of level transmitter failure
	SRO	<ul style="list-style-type: none"> • Assists the BOP in diagnosing the failed level transmitter • Should review TS 3.5.1 <ul style="list-style-type: none"> ○ Determines alternate CFT level instrument satisfies this TS requirement ○ May use SP-300, Sequence 59 • Contacts Work Control to initiate repair efforts • May review SRO checklist for unplanned equipment status change

Op-Test No.: 1

Scenario No.: 4

Event No.: 2

Rev.: 00

Event Description: (Examiner Cue) After the CFT TS actions are addressed RHV-4 (IV-4) will fail closed. [MALF] Per OP-204, Power Operations, unit load must be reduced to $\leq 73\%$ power within 15 minutes. The SRO will enter AP-510, Rapid Power Reduction, and reduce reactor power.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarm <ul style="list-style-type: none"> ○ (K-2-2) ICS NNI Trouble ○ Event Point 1116 AULD Trouble ○ Review AR-503 ○ Event Point 0041 Reheat Steam Non-Return Valve Trip • Informs CRS of alarms • Informs CRS that Intercept Valve 4 is closed (computer alarm) • May report power above 2609 MWth • May review OP-204 Limits and Precautions • Notifies CRS that maximum power level is 73%
	SRO	<ul style="list-style-type: none"> • Acknowledges receipt of alarms • Assists RO/BOP in diagnosing failure • Enters AP-510, Rapid Power Reduction • Directs RO/BOP actions per AP-510 <ul style="list-style-type: none"> ○ Adjust Load Rate to desired setpoint ○ Set Unit Load Demand to "10" ○ Notify personnel of entry into AP-510 ○ Maintain PZR Level (Rule 7, attached) ○ Notify Chemistry of power change ○ Verify Imbalance within limits ○ When power is $< 80\%$ notify SPO to ensure MS is supplying AS ○ Maintain DFT level between 8 and 11 feet • If MBVs close, then ensure MBVs remain closed • Directs RO/BOP to stabilize plant parameters at approximately 73% power

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

Event No.: 2

Rev.: 00

Event Description: (Examiner Cue) After the CFT TS actions are addressed RHV-4 (IV-4) will fail closed. [MALF] Per OP-204, Power Operations, unit load must be reduced to $\leq 73\%$ power within 15 minutes. The SRO will enter AP-510, Rapid Power Reduction, and reduce reactor power.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per AP-510 <ul style="list-style-type: none"> ○ Adjust Load Rate to desired setpoint ○ Set Unit Load Demand to "10" ○ Verify Imbalance within limits ○ Maintain DFT level between 8 and 11 feet ○ If MBVs close, then ensure MBVs remain closed • Stops power reduction at about 73% power • Stabilizes plant parameters
	BOP	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per AP-510 <ul style="list-style-type: none"> ○ Notify personnel of entry into AP-510 ○ Maintain PZR level (Rule 7, attached) ○ Notify Chemistry of power change ○ When power is $< 80\%$ notify SPO to ensure MS is supplying AS ○ Maintain DFT level between 8 and 11 feet ○ Transfer Unit loads to the Startup Transformer
	SRO	<ul style="list-style-type: none"> • Goes to OP-204, Power Operations • Directs BOP actions per OP-204
	BOP	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per OP-204

Op-Test No.: 1 Scenario No.: 4 Event No.: 3 Rev.: 00

Event Description: (Normal Evolution) Swap Unit buses to Startup Transformer per EOP-14, Enclosure 23.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Direct BOP to perform EOP-14, Enclosure 23, shutdown Electrical Lineup
	BOP	<ul style="list-style-type: none"> • Align A 6900V bus to the Startup transformer <ul style="list-style-type: none"> ○ Select Auto Transfer 3103 to Manual ○ Close breaker 3103 ○ Open breaker 3101 • Align A Unit 4160V bus to the Startup transformer <ul style="list-style-type: none"> ○ Select Auto Transfer 3203 to Manual ○ Close breaker 3203 ○ Open breaker 3201 • Align B 6900V bus to the Startup transformer <ul style="list-style-type: none"> ○ Select Auto Transfer 3104 to Manual ○ Close breaker 3104 ○ Open breaker 3102 • Align B Unit 4160V bus to the Startup transformer <ul style="list-style-type: none"> ○ Select Auto Transfer 3204 to Manual ○ Close breaker 3204 ○ Open breaker 3202

Op-Test No.: 1 Scenario No.: 4 Event No.: 4 Rev.: 00

Event Description: (Examiner Cue) Once the plant is stable control rod 2-4 drops into the core. (MALF) AP-545, Plant Runback, will be entered. The automatic runback will occur as designed but will not stop at setpoint (60% reactor power) (MALF). The RO, at a minimum, must take the SG/Rx Master control station to manual. The crew will probably enter AP-504. When the plant is stabilized OP-504, Integrated Control System, will be used to return stations to automatic. The SG/Rx Master control station must remain in manual. TS 3.1.4, Condition A, should be addressed.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (K-4-2) Asymmetric Rod Runback ○ (K-6-2) Unit Master in Track ○ (K-5-3) FW Limited by Reactor ○ (J-2-3) CRD Out Inhibit ○ (J-2-4) CRD Asymmetric Alarm • Observes the following: <ul style="list-style-type: none"> ○ Control rod 2-4 inserted into the core ○ Runback in progress • Notifies SRO of dropped control rod and runback occurring as expected
	SRO	<ul style="list-style-type: none"> • Acknowledges dropped rod and runback in progress • Enters AP-545, Plant Runback • Directs RO/BOP actions per AP-545 <ul style="list-style-type: none"> ○ Ensures plant runback is in progress ○ Directs notification of plant personnel ○ Ensures RCS pressure is stable ○ Ensures reactor power \leq 60% power ○ Ensures vital plant parameters approaching stability ○ Notifies Reactor Engineer ○ Verifies quadrant power tilt is within limits ○ Notifies Chemistry of power change ○ Ensures rod index within insertion limits ○ Verifies adequate SDM exists ○ Verifies imbalance within limits

Op-Test No.: 1 Scenario No.: 4 Event No.: 4 Rev.: 00

Event Description: (Examiner Cue) Once the plant is stable control rod 2-4 drops into the core. (MALF) AP-545, Plant Runback, will be entered. The automatic runback will occur as designed but will not stop at setpoint (60% reactor power) (MALF). The RO, at a minimum, must take the SG/Rx Master control station to manual. The crew will probably enter AP-504. When the plant is stabilized OP-504, Integrated Control System, will be used to return stations to automatic. The SG/Rx Master control station must remain in manual. TS 3.1.4, Condition A, should be addressed.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Monitors plant parameters
	RO	<ul style="list-style-type: none"> • Monitors plant runback • Notifies SRO that Main Block Valves are closing (unexpected) • Once MBVs are closed may take the following ICS stations to hand per AP-504. <ul style="list-style-type: none"> ○ Both FW Loop Master Stations ○ Both FW pump Stations ○ Rx Diamond ○ Rx Demand Station ○ Condensate Master Station • SG/Rx Master to Hand is the only required station to stop the power reduction • Announces current reactor power • Stabilizes plant parameters
	BOP	<ul style="list-style-type: none"> • Controls RCS pressure <ul style="list-style-type: none"> ○ Spray ○ PZR heaters ○ Utilizes Rule 7, PZR Level Control (attached) • May place CD Pump Master in Hand • Assists RO with stabilizing plant parameters

Op-Test No.: 1 Scenario No.: 4 Event No.: 4 Rev.: 00

Event Description: (Examiner Cue) Once the plant is stable control rod 2-4 drops into the core. (MALF) AP-545, Plant Runback, will be entered. The automatic runback will occur as designed but will not stop at setpoint (60% reactor power) (MALF). The RO, at a minimum, must take the SG/Rx Master control station to manual. The crew will probably enter AP-504. When the plant is stabilized OP-504, Integrated Control System, will be used to return stations to automatic. The SG/Rx Master control station must remain in manual. TS 3.1.4, Condition A, should be addressed.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Ensures OAC and BOP actions are in progress • Monitors progress via SPDS • Maintains overview of plant conditions and directs plant trip if limits are closely approached. • Once the plant is stable, holds a mini brief to ensure all crew members understand plant status • Contacts Work Control to initiate repair efforts
	CREW	<ul style="list-style-type: none"> • Diagnose ICS failure • If unable to diagnose failure then ICS stations should remain in hand
	SRO	<ul style="list-style-type: none"> • Direct RO/BOP to return ICS stations to automatic IAW OP-504, Integrated Control System • Addresses TS 3.1.4, Condition A • Addresses TS 3.1.5, Condition A • May address TS 3.1.7, Condition A
	RO/BOP	<ul style="list-style-type: none"> • ICS stations are returned to "Auto" in accordance with OP-504 (BOP will normally assist by reading OP-504)

Op-Test No.: 1 Scenario No.: 4 Event No.: 5 Rev.: 00

Event Description: (Examiner Cue) After ICS stations are returned to automatic, if applicable, a hydrogen leak will occur on the main generator. **(MALF)** The SRO will probably enter AP-510, Rapid Power Reduction, to reduce reactor power below the anticipatory reactor trip setpoint (41% power) and trip the main turbine. AP-660, Turbine Trip, should be concurrently performed. Dependent upon power level and status of ICS stations the SRO may elect to manually trip the reactor once the hydrogen leak is confirmed. This action is allowable and will not detract from the scenario.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Recognize generator hydrogen pressure decreasing • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ Generator Hydrogen Pressure (Computer Point G200) ○ (O-5-9) Hydrogen Panel Alarm • Direct SPO to investigate hydrogen leak • Notify SRO of generator hydrogen pressure decrease
	SRO	<ul style="list-style-type: none"> • Acknowledges receipt of alarms • Assists RO/BOP in diagnosing failure • <i>Dependent upon the current power level additional power decrease to trip the turbine may not be needed</i> • Enters AP-510, Rapid Power Reduction • Direct RO/BOP actions per AP-510 <ul style="list-style-type: none"> ○ Adjust Load Rate to desired setpoint ○ Set Unit Load Demand to "10" ○ Notify personnel of entry into AP-510 ○ Maintain PZR Level (Rule 7, attached) ○ Notify Chemistry of power change ○ Verify Imbalance within limits ○ Maintain DFT level between 8 and 11 feet • Directs BOP to trip the turbine when reactor power is below the anticipatory reactor trip setpoint (41% power).

Op-Test No.: 1 Scenario No.: 4 Event No.: 5 Rev.: 00

Event Description: (Examiner Cue) After ICS stations are returned to automatic, if applicable, a hydrogen leak will occur on the main generator. **(MALF)** The SRO will probably enter AP-510, Rapid Power Reduction, to reduce reactor power below the anticipatory reactor trip setpoint (41% power) and trip the main turbine. AP-660, Turbine Trip, should be concurrently performed. Dependent upon power level and status of ICS stations the SRO may elect to manually trip the reactor once the hydrogen leak is confirmed. This action is allowable and will not detract from the scenario.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per AP-510 <ul style="list-style-type: none"> ○ Adjust Load Rate to desired setpoint ○ Set Unit Load Demand to "10" ○ Verify Imbalance within limits ○ Maintain DFT level between 8 and 11 feet • Continues power reduction until within the capability of the TBVs (\approx 20% reactor power) • Stabilizes plant parameters
	BOP	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per AP-510 <ul style="list-style-type: none"> ○ Notify personnel of entry into AP-510 ○ Maintain PZR level (Rule 7, attached) ○ Notify Chemistry of power change ○ Maintain DFT level between 8 and 11 feet
	SRO	<ul style="list-style-type: none"> • Enters AP-660, Turbine Trip • Direct BOP actions per AP-660 <ul style="list-style-type: none"> ○ Depress Main Turbine trip push button ○ Ensures TVs and GVs are closed ○ Ensures RCS pressure is stable ○ Notify personnel of entry into AP-660 ○ Ensures MS header pressure between 870 and 900 psig ○ Ensures main generator output breakers are open ○ Shutdown main generator ○ Ensures plant conditions stabilize ○ Maintain PZR level

Op-Test No.: 1 Scenario No.: 4 Event No.: 5 Rev.: 00

Event Description: (Examiner Cue) After ICS stations are returned to automatic, if applicable, a hydrogen leak will occur on the main generator. **(MALF)** The SRO will probably enter AP-510, Rapid Power Reduction, to reduce reactor power below the anticipatory reactor trip setpoint (41% power) and trip the main turbine. AP-660, Turbine Trip, should be concurrently performed. Dependent upon power level and status of ICS stations the SRO may elect to manually trip the reactor once the hydrogen leak is confirmed. This action is allowable and will not detract from the scenario.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per AP-660 <ul style="list-style-type: none"> ○ Depress Main Turbine trip push button ○ Ensure TVs and GVs are closed ○ Ensure RCS pressure is stable ○ Notify personnel of entry into AP-660 ○ Ensure MS header pressure between 870 and 900 psig ○ Ensure main generator output breakers are open <ul style="list-style-type: none"> ▪ Breakers 1661 & 1662 ○ Shutdown main generator <ul style="list-style-type: none"> ▪ Open field breaker ▪ Select voltage regulator to "OFF" ○ Ensure plant conditions stabilize ○ Maintain PZR level

Op-Test No.: 1 Scenario No.: 4 Event No.: 6 Rev.: 00

Event Description: (Automatic Parameter Cue) The turbine trip will cause a steam leak on the "A" OTSG (MALF) inside the reactor building. (MT) RB pressure will start rising and a manual reactor trip should be initiated prior to reaching 4 psig in the RB. EOP-2, Vital System Status Verification, will be entered and a symptom scan performed. EOP-5, Excessive Heat Transfer, should be entered. Once the steam leak is confirmed a MSLI and MFLI will be performed. The MFLI will not work automatically (MALF) and the operator must manually perform the actions (CT).

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> • Recognize indications of a steam leak in the RB <ul style="list-style-type: none"> ○ Alarms ○ RB pressure and temperature increase ○ No RM-A6 increase ○ No loss of RCS inventory
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (B-2-5) RB Fan A Condensate High ○ (E-2-5) RB Fan B Condensate High ○ (E-3-2) Reactor Bldg Temp High • Monitors RB pressure, temperature and sump level • Verifies no increase in RM-A6 • Verifies no loss of RCS inventory

Op-Test No.: 1 Scenario No.: 4 Event No.: 6 Rev.: 00

Event Description: (Automatic Parameter Cue) The turbine trip will cause a steam leak on the "A" OTSG (MALF) inside the reactor building. (MT) RB pressure will start rising and a manual reactor trip should be initiated prior to reaching 4 psig in the RB. EOP-2, Vital System Status Verification, will be entered and a symptom scan performed. EOP-5, Excessive Heat Transfer, should be entered. Once the steam leak is confirmed a MSLI and MFLI will be performed. The MFLI will not work automatically (MALF) and the operator must manually perform the actions (CT).

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Acknowledges receipt of alarms • Assists the RO/BOP in diagnosing the failure • Directs the RO to trip the reactor prior to 4 psig RB pressure • Enters EOP-2, Vital System Status Verification • Direct RO actions per EOP-2 <ul style="list-style-type: none"> ○ Depress the Rx trip pushbutton ○ Verify CRD groups 1 through 7 are fully inserted ○ Verify NIs indicate Rx is shutdown ○ Depress Main Turbine trip pushbutton ○ Verify TVs and GVs are closed • Direct formal Symptom Scan with RO and BOP <ul style="list-style-type: none"> ○ Check for Station Black Out ○ Check for Adequate Sub Cooling Margin ○ Check for Inadequate Heat Transfer ○ Check for Excessive Heat Transfer ○ Check for OTSG Tube Rupture • Directs BOP to determine faulted OTSG and isolate
	RO	<ul style="list-style-type: none"> • When the Rx is tripped, performs EOP-2, Immediate Actions, from memory <ul style="list-style-type: none"> ○ Depresses Rx Trip pushbutton ○ Verifies Groups 1 thru 7 rod inserted ○ Verifies NIs indicate Rx is shutdown ○ Depress Turbine Trip pushbutton ○ Verifies all TVs and GVs are closed • Re-performs EOP-2, Immediate Actions, as directed by SRO

Op-Test No.: 1 Scenario No.: 4 Event No.: 6 Rev.: 00

Event Description: (Automatic Parameter Cue) The turbine trip will cause a steam leak on the "A" OTSG (MALF) inside the reactor building. (MT) RB pressure will start rising and a manual reactor trip should be initiated prior to reaching 4 psig in the RB. EOP-2, Vital System Status Verification, will be entered and a symptom scan performed. EOP-5, Excessive Heat Transfer, should be entered. Once the steam leak is confirmed a MSLI and MFLI will be performed. The MFLI will not work automatically (MALF) and the operator must manually perform the actions (CT).

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> • Perform symptom scan <ul style="list-style-type: none"> ○ Station Blackout ○ Inadequate SCM ○ Inadequate Heat Transfer ○ Excessive Heat Transfer ○ SG Tube Rupture • Determine that Excessive Heat Transfer symptom exists and enters EOP-5, Excessive Heat Transfer • Recognize that Rule 2, HPI Control and Rule 3, EFW Control are in effect (attached)
	BOP	<ul style="list-style-type: none"> • Depresses Global Silence pushbutton • Isolates the "A" OTSG (CT) • Recognizes that MFLI did not occur and performs the following: <ul style="list-style-type: none"> ○ Selects close FWV-31 ○ Selects close FWV-30 ○ Selects close FWV-36 ○ Selects close FWV-28 ○ Selects close FWV-14 ○ Trips FWP-2A • Notifies SRO of MFLI automatic isolation failure

Op-Test No.: 1 Scenario No.: 4 Event No.: 7 Rev.: 00

Event Description: (Automatic Parameter Cue) EFIC will actuate from the HPI signal. The operator will recognize excessive EFW flow to the "A" OTSG through EFV-58. Rule 3 will be in effect and the operator will attempt to isolate flow by taking EFIC to manual and closing EFV-14 (block valve). The block valve will stroke partially in the closed direction and then the motor power fuse will blow. [MALF] The operator must secure EFP-3 (CT) to stop EFW flow to the OTSG.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Enters EOP-5, Excessive Heat Transfer • Direct RO/BOP actions per EOP-5 <ul style="list-style-type: none"> ○ Isolate affected OTSGs <ul style="list-style-type: none"> ▪ Depress MSLI and MFLI push buttons ▪ Ensure FW sources and leak paths are closed ▪ If any affected EFIC control valve fails to close then select Manual Permissive and close the associated block valve. ○ Ensure ES equipment is properly aligned <ul style="list-style-type: none"> ▪ If RBIC has actuated and adequate SCM exists, then stop all RCPs ○ Maintain PZR level (Rule 7, attached) ○ Notify personnel of entry into EOP-5 ○ If RCS temp remains < 532° F then start RCS boration ○ Ensure proper MSLI and MFLI ○ Notify Chemistry to sample for tube leakage ○ Verify proper CC cooling ○ Ensure level in available OTSG trending to correct level ○ Minimize RCS temperature changes ○ Minimize RCS pressure changes ○ Verify OTSG tube leakage ≤ 1 gpm ○ Ensure MSR HP bundle isolation valves are closed ○ Bypass ES if permit exists ○ Maintain minimum adequate SCM

Op-Test No.: 1 Scenario No.: 4 Event No.: 7 Rev.: 00

Event Description: (Automatic Parameter Cue) EFIC will actuate from the HPI signal. The operator will recognize excessive EFW flow to the "A" OTSG through EFV-58. Rule 3 will be in effect and the operator will attempt to isolate flow by taking EFIC to manual and closing EFV-14 (block valve). The block valve will stroke partially in the closed direction and then the motor power fuse will blow. [MALF] The operator must secure EFP-3 (CT) to stop EFW flow to the OTSG.

Time	Position	Applicant's Actions or Behavior
	RO/BOP.	<ul style="list-style-type: none"> • Performs Rule 3, EFW/AFW Control • Attempts to close EFV-58 • Determines that EFW flow is not controlled and depresses "Manual Permissive" on both channels • Selects close EFV-14 • Recognizes that EFV-14 did not fully close <ul style="list-style-type: none"> ○ Amber light only ○ Flow indication on EF-25-FI1 • Requests permission from SRO to secure EFP-3 • Secures EFP-3 (CT) • Ensure ES equipment is properly aligned <ul style="list-style-type: none"> ○ If RBIC has actuated and adequate SCM exists, then stop all RCPs • Maintain PZR level (Rule 7, attached) • Notifies personnel of entry into EOP-5 • If RCS temp remains < 532° F then start RCS boration • Ensures proper MSLI and MFLI • Notify Chemistry to sample for tube leakage • Verify proper CC cooling • Minimizes RCS temperature changes • Minimizes RCS pressure changes • Verifies OTSG tube leakage ≤ 1 gpm • Ensures MSR HP bundle isolation valves are closed • Maintains minimum adequate SCM <ul style="list-style-type: none"> ○ PZR Spray ○ PORV

Op-Test No.: 1 Scenario No.: 4 Event No.: 8 Rev.: 00

Event Description: (Automatic Parameter Cue) When the ES actuation occurs MUV-73 will not open from the MCB. (**MALF**) The operator must monitor MUT level and either have MUV-73 manually opened in the field or secure MUP-1B (**CT**) prior to the MUT going empty.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Directs the RO/BOP to ensure all ES equipment is properly aligned
	RO/BOP	<ul style="list-style-type: none"> • Performs Rule 2, HPI Control (attached) • Verifies all ES components are operating via the actuation light indications (green) for ES actuated equipment. <ul style="list-style-type: none"> ○ Recognizes MUV-73 still closed ○ Attempts to open MUV-73 manually ○ Recognizes MUP-1C is not running ○ Attempts to start MUP-1C ○ Notifies SRO of malfunction with MUV-73 and MUP-1C ○ Directs PPO to manually open MUV-73 ○ Monitors MUT level • Secures MUP-1B, opens MUV-73 (or opens MUV-62) prior to loss of suction (CT)

Scenario may be terminated any time after actions to minimize subcooling margin have been taken.

RULE 1, LOSS OF SCM

- ___ IF < 1 min has elapsed since losing adequate SCM, THEN immediately stop all RCPs.
- ___ IF RCPs were NOT stopped within 1 min, THEN ensure all operating RCPs remain running until any of the following exist:
 - ___ SCM is restored
 - ___ LPI flow > 1400 gpm in each injection line.
- ___ Progress toward a maximum plant cooldown to achieve CFT and LPI flow as soon as possible.

-
- ___ Manually actuate ES.
 - ___ Depress "HPI MAN ACT" push buttons on Trains A and B.
 - ___ Depress "RB ISO MAN ACTUATION" push buttons on Trains A and B.
 - ___ IF LPI has NOT actuated, AND RCS PRESS ≤ 300 psig, THEN depress "LPI MAN ACT" push buttons on Trains A and B.

-
- ___ Depress "ISCM" push buttons for EFIC channels A and B.

-
- ___ Ensure Tincore is selected on SPDS.

RULE 2, HPI CONTROL

- IF HPI has actuated,
THEN bypass or reset
ES actuation. •
 - 1 Obtain SRO concurrence to
bypass or reset ES.
 - 2 Bypass or reset ES actuation:
 - Auto
 - Manual
-
- Open MUP recirc prior to
throttling HPI flow
< 200 gpm/pump.
 - IF recirc to MUT is desired,
THEN open MUP recirc to MUT valves:

<input type="checkbox"/> MUV-53	<input type="checkbox"/> MUV-257
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 - IF recirc to RB sump is desired,
THEN open HPI recirc to sump valves:

<input type="checkbox"/> MUV-543	<input type="checkbox"/> MUV-544
<input type="checkbox"/> MUV-545	<input type="checkbox"/> MUV-546
-
- IF adequate SCM exists based,
on Tincore,
THEN throttle HPI to maintain
required conditions.
 - Prevent exceeding NDT limit
 - IF OTSG isolated for TRACC,
THEN maintain RCS PRESS
< 1000 psig.
 - IF PTS, SGTR, or dry OTSG exists,
THEN maintain minimum adequate
SCM.
-
- IF adequate SCM can be
maintained with 1 HPI pump,
AND stopping second HPI pump
is desired,
THEN stop 1 HPI pump.
 - Ensure running HPI pump is
aligned to MUT.

RULE 3, EFW/AFW CONTROL

- Ensure available OTSGs are at or trending toward required level.

"LLL"	> 20 in
"NAT CIRC"	> 70%
"ISCM"	> 90%

- IF manual control of EFW flow is desired, THEN establish manual EFIC control.

- 1 Obtain SRO concurrence to place EFIC in manual.
- 2 Control EFW to maintain required EFW flow and OTSG level.
- 3 IF EFW flow is NOT controlled, THEN depress EFIC channels A and B "MANUAL PERMISSIVE" push buttons and close affected EFW block valve.

- IF adequate SCM does NOT exist, AND level in available OTSGs is NOT at or trending toward "ISCM" level, THEN establish manual required flow.

EFW	2 OTSGs	> 280 gpm in 1 line to each OTSG
	1 OTSG	> 470 gpm in 1 line to 1 OTSG
AFW	2 OTSGs	> 250 gpm to < 300 gpm/OTSG
	1 OTSG	> 450 gpm to < 600 gpm

- IF adequate SCM exists, THEN throttle flow to prevent OTSG PRESS from lowering > 100 psig below desired PRESS.

- Do not allow OTSG level to lower.

RULE 4, PTS

- IF any of the following exist:
 - Tincore < 400°F,
AND cooldown rate
exceeds ITS limit
 - RCPs off,
AND HPI flow exists
 - Throttle HPI flow to minimize
adequate SCM.
 - Throttle LPI flow to minimize
adequate SCM.
 - PTS is applicable until an
Engineering evaluation has been
completed.
- THEN perform required PTS
actions.

RULE 7, PZR LEVEL CONTROL

- 1 ___ IF PZR level is < PZR level band,
THEN restore PZR level.

PZR Level Band	
Rx at power > 20%	200 in to 240 in
Rx at power ≤ 20%	120 in to 200 in
Rx tripped	50 in to 120 in

- Cycle appropriate BWST to MUP valve to maintain MUT level ≥ 55 in:

___ MUV-73	___ MUV-58
------------	------------

- ___ Close MUV-49

- 2 ___ IF PZR level does NOT recover,
THEN establish manual HPI flow.

- 1 ___ Open MUV-24
- 2 ___ Notify SSO to evaluate Emergency Plan entry.
- 3 ___ IF PZR level does NOT recover,
THEN start second MUP and required cooling pumps.

[Rule 5, Diesel Load Control]

- 4 ___ IF PZR level does NOT recover,
THEN open additional HPI valves.
- 5 ___ IF PZR level does NOT recover,
THEN close MUP to MUT recircs:

___ MUV-53	___ MUV-257
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- 3 ___ IF PZR level recovers,
THEN restore normal PZR conditions.

[Rule 2, HPI Control]

- ___ IF letdown is desired,
THEN CONCURRENTLY PERFORM EOP-14, Enclosure 4,
Letdown Recovery (if accessible).

Facility: **Crystal River #3** Scenario No.: Spare (NRC 2009) Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: The plant is at 100% power.

Turnover: The following equipment is OOS: DHP-1A (12 hours); MUP-1A (12 hours) and RWP-1 (24 hours). Severe thunderstorms are predicted for Citrus and Levy counties.

Event No.	Malf. No.	Event Type*	Event Description
1	1	C (BOP) C (SRO)	MUP-1B sheared shaft. (OP-402) SRO ITS determination. (ITS 3.5.2)
2	NA	N (BOP)	Restore Seal Injection, Letdown and PZR level. (OP-402)
3	2	C (BOP) C (SRO)	AHF-1A high vibration, then trip. (OP-417) SRO TS determination. (TS 3.6.6)
4	3	R (RO)	40 gpm "A" OTSG tube leak. Rapid power reduction. (EOP-6)
5	4	I (RO)	ULD station fails "as is" during power decrease. (OP-504)
6	N/A	N (BOP)	Transfer buses to Startup Transformer. (EOP-14)
7	5	M (RO)	Two MSIVs close at 70% power / manual reactor trip (AI-505, EOP-2) [CT]
8	6	C (RO)	One TV and one GV fail to close when Rx tripped requiring closure of remaining two MSIVs. (EOP-2) [CT]
9	7	M (ALL)	Tube leak increases to 330 gpm when the Rx is tripped. (EOP-6)
10	8	C (RO or BOP)	RCV-14, PZR spray valve failed closed requiring use of PORV to reduce SCM. (EOP-6)

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

Plant is initialized at 100% power. Severe thunderstorms are predicted for Citrus and Levy counties.

Soon after turnover is complete MUP-1B will experience a sheared shaft. OP-402, Makeup and Purification System, will be used to start MUP-1C. Section 4.6, System Restoration after MU Pump Trip, is a much easier section to use for this failure, however use of Section 4.5, MU Pump Transfer, is allowable. The crew should start MUP-1C and restore PZR level, Seal Injection and Letdown. ITS 3.5.2, Condition A, should be addressed.

After the plant has been stabilized AHF-1A will experience high vibration due to a failing bearing. The fan will trip after one minute if not already secured. TS 3.6.6, Condition C, will be entered. OP-417, Containment Operating Procedure, will be used to select AHF-1C for ES start.

After AHF-1C is selected for ES start and TS actions are addressed a 36 gpm SGTR develops on the "A" OTSG. Crew diagnoses the tube leak using MS line monitor increase, RM-A12 indication and RCS leak rate determination. EOP-6 will be entered and a power reduction commenced.

At approximately 95% power ULD station output will fail "as is". The RO will diagnose the problem and receive permission from the SRO to lower power in manual using the SG/RX master station.

At approximately 70% power two MSIVs close (opposite OTSGs). A manual reactor trip is required per AI-505 (CT). Immediate actions of EOP-2 are performed. During the Immediate Actions, one TV and one GV will be found open. The RO will have to close the remaining two MSIVs (CT). The Immediate Actions will then be verified and a symptom scan performed. Due to the trip the SGTR increases to ≈ 330 gpm. After the symptom scan is performed the SRO should return to the beginning of EOP-6 and start a plant cooldown and depressurization.

Since all MSIVs are closed TBVs are lost requiring steaming to atmosphere. Emergency Plan upgrade should be recognized but classification is not required.

When RCS depressurization is attempted RCV-14 (spray valve) fails to open. Crew should use the PORV to decrease subcooling margin.

The scenario may be terminated when SCM is minimized and a plant cooldown has commenced.

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

Event Description: (Examiner Cue) Soon after turnover is complete MUP-1B will experience a sheared shaft. (MALF) OP-402, Makeup and Purification System, will be used to start MUP-1C. Section 4.6, System Restoration after MU Pump Trip, is a much easier section to use for this failure, however use of Section 4.5, MU Pump Transfer, is allowable. The crew should start MUP-1C and restore PZR level, Seal Injection and Letdown. ITS 3.5.2, Condition A, should be addressed.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (B-6-2) Makeup PP B Gear Oil Press Low ○ (H-5-7) RC Pump Seal Flows High/Low • Informs SRO of the following: <ul style="list-style-type: none"> ○ Auto-start of MUP-5B ○ Low current indication on MUP-1B ($\approx 30\%$) ○ Seal injection flow indication at 0 gpm ○ Makeup flow indication at 0 gpm
	SRO	<ul style="list-style-type: none"> • Acknowledges receipt of alarms • Directs BOP to secure MUP-1B • May direct BOP to isolate letdown • May direct BOP to have DC knife switch for MUP-1B opened • Directs BOP to start MUP-1C IAW OP-402, Makeup and Purification System • Addresses ITS 3.5.2, Condition A, and declares MUP-1B inoperable

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

Event Description: (Examiner Cue) Soon after turnover is complete MUP-1B will experience a sheared shaft. (**MALF**) OP-402, Makeup and Purification System, will be used to start MUP-1C. Section 4.6, System Restoration after MU Pump Trip, is a much easier section to use for this failure, however use of Section 4.5, MU Pump Transfer, is allowable. The crew should start MUP-1C and restore PZR level, Seal Injection and Letdown. ITS 3.5.2, Condition A, should be addressed.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Performs OP-402, Section 4.6 <ul style="list-style-type: none"> ○ Closes MUV-16 ○ Closes MUV-31 ○ Closes MUV-50 ○ Closes MUV-51 ○ Observes RCP parameters ○ Directs the PPO to energize MUV-62 and MUV-69 ○ Closes MUV-58 ○ Closes MUV-69 ○ Opens MUV-62 ○ Opens MUV-73 ○ Starts MUP-4C ○ Starts DCP-1B ○ Starts RWP-3B ○ Starts MUP-1C ○ Places MUP-4C to auto ○ Restores makeup and letdown flow ○ Slowly re-establishes Seal Injection flow ○ Directs the PPO to de-energize MUV-62 and MUV-69 ○ Notifies SRO to review Tech Specs
	SRO	<ul style="list-style-type: none"> • Once the plant is stable, holds a mini brief to ensure all crew members understand plant status • Contacts Work Control to initiate repair efforts • May review the SRO checklist for unplanned equipment status changes

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

Event Description: (Examiner Cue) After the plant has been stabilized AHF-1A will experience high vibration due to a failing bearing [MALF]. The fan will trip after one minute if not already secured. TS 3.6.6, Condition C, will be entered. OP-417, Containment Operating Procedure, will be used to select AHF-1C for ES start.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (B-2-4) "RB Fan A Vibration High" ○ Reviews AR-302 • Notifies SRO of malfunction • May attempt to reset alarm • May recommend securing fan
	SRO	<ul style="list-style-type: none"> • May direct BOP to secure AHF-1A • Directs BOP to start AHF-1C using OP-417 • Enters TS 3.6.6, Condition C, for one required containment cooling train inoperable • Contacts Work Control to initiate repair efforts • May review SRO checklist for unplanned equipment status change
	BOP	<ul style="list-style-type: none"> • Uses OP-417, Section 4.7, to perform the following: <ul style="list-style-type: none"> ○ Notifies PPO to seal closed SWV-36 ○ Selects AHF-1C using the "RB Fan ES A Select" switch in ES Act Relay Cabinet 4D ○ Notifies SRO to review TS 3.6.6 ○ Notifies PPO to seal open SWV-105 ○ Ensures open SWV-39 and SWV-45 ○ Starts AHF-1C

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

Event Description: (Examiner Cue) After AHF-1C is selected for ES start and TS actions are addressed a 36 gpm SGTR develops on the "A" OTSG [MALF]. Crew diagnoses the tube leak using MS line monitor increase, RM-A12 indication and RCS leak rate determination. EOP-6 will be entered and a power reduction commenced.

Time	Position *	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (H-1-5) "MN Stm Line A/B High Rad Monitor Fail" • Diagnoses OTSG tube leak <ul style="list-style-type: none"> ○ RM-G27 in Hi/Hi alarm ○ Mismatch between makeup and letdown ○ SPDS shows RM-G27 at 100 GPD ○ Monitors RM-A12 • Perform leak rate calculation
	RO	<ul style="list-style-type: none"> • Assists BOP with diagnosing tube leak • Monitors SPDS • Verifies PZR level is being maintained • Performs backup leak calculation
	SRO	<ul style="list-style-type: none"> • Assist RO/BOP in diagnosing the tube leak. • Enters EOP-06 if leakage is reported > 1GPM and directs RO/BOP actions <ul style="list-style-type: none"> ○ Maintains PZR level, Rule 7 (attached) ○ Directs adjustment of ICS load rate ○ Directs adjustment of Unit Load Master to 10 ○ Directs RO to trip Rx if PZR level goes < 100" ○ Direct BOP to make a PA announcement, inform SPO/PPO of EOP-06 entry ○ Verifies affected OTSG ○ Directs closure of MSV-55 • Recognize E-plan entry conditions are met (not required to classify at this time)

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

Event Description: (Examiner Cue) After AHF-1C is selected for ES start and TS actions are addressed a 36 gpm SGTR develops on the "A" OTSG [MALF]. Crew diagnoses the tube leak using MS line monitor increase, RM-A12 indication and RCS leak rate determination. EOP-6 will be entered and a power reduction commenced.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per EOP-6 <ul style="list-style-type: none"> ○ Make PA announcement, inform SPO/PPO of EOP-06 entry ○ Verifies affected OTSG <ul style="list-style-type: none"> ▪ Closes MSV-55
	RO	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per EOP-6 <ul style="list-style-type: none"> ○ Maintains PZR level, Rule 7 (attached) ○ Adjusts of ICS load rate ○ Adjusts Unit Load Master to 10

Op-Test No.: 1 Scenario No.: Spare Event No.: 5/6 Rev.: 0

Event Description: (Examiner Cue) Power reduction is started per EOP-6. Initially the ULD station will be used for the power reduction. The ULD station output will fail "as is" at approximately 95% power [MALF]. The RO will diagnose the problem and receive permission from the SRO to decrease power in manual using the SG/RX master station. BOP will transfer Unit buses to the Startup Transformer.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Directs RO/BOP actions IAW EOP-6 • Assists RO in diagnosing ULD failure • Directs RO to continue the power reduction with the SG/RX Master in Hand <ul style="list-style-type: none"> ○ When power is < 80% notify SPO to ensure MS is supplying AS ○ Maintain DFT level between 8 and 11 feet ○ Verify Aux Transformer is not supplying any bus <ul style="list-style-type: none"> ▪ Directs BOP to perform EOP-14, Enclosure 23 ○ Concurrently performs EOP-14, Enclosure 17
	RO	<ul style="list-style-type: none"> • Perform actions as directed by the SRO per EOP-6 • At approximately 95% power recognizes power reduction is not in progress when plant quits responding • Informs the SRO of failure • Takes SG/RX master to hand and continue power reduction • Monitors <ul style="list-style-type: none"> ○ RCS Tave ○ "A" and "B" FW flows ○ Turbine Setter/Reference • Maintains DFT level between 8 and 11 feet
	BOP	<ul style="list-style-type: none"> • Performs EOP-14, Enclosure 23 <ul style="list-style-type: none"> ○ Selects AUTO Transfer switches for breakers 3103, 3203, 3104 and 3204 to Manual ○ Closes breaker 3103/opens breaker 3101 ○ Closes breaker 3203/opens breaker 3201 ○ Closes breaker 3104/opens breaker 3102 ○ Closes breaker 3204/opens breaker 3202

Op-Test No.: 1 Scenario No.: Spare Event No.: 7/8/9 Rev.: 0

Event Description: (Examiner Cue) At approximately 70% power 2 MSIVs close [MT] which requires a manual reactor trip (CT). The SGTR increases to approximately 330 gpm (triggered by the reactor trip). When the Rx is tripped, one TV and one GV do not close, [MALF] requiring the closure of the remaining two MSIVs. (CT) Plant cooldown commences per EOP-6. TBVs are unavailable due to MSIV closure.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Announces and responds to alarms <ul style="list-style-type: none"> ○ (H-5-3) "Main Steam Iso Vlv Air Failure" ○ SV1/SV2 lights flashing intermittently • Announce MSIV closures as they occur • Manually trips the reactor due to the closure of 2 MSIVs (CT) • Performs Immediate Actions of EOP-2 from memory <ul style="list-style-type: none"> ○ Depress Rx Trip pushbutton ○ Verify Groups 1-7 fully inserted ○ Verifies NIs indicate the Rx is shutdown ○ Depresses Turbine Trip pushbutton ○ Verifies all TVs and GVs Closed <ul style="list-style-type: none"> ▪ Notes 1 TV and 1 GV NOT closed ▪ Closes the remaining two MSIVs (CT) ▪ Report failure of 1 TV and 1 GV to close ▪ Report completion of EOP-02 Immediate Actions • Perform EOP-02 Immediate Action verification with SRO

Op-Test No.: 1 Scenario No.: Spare Event No.: 7/8/9 Rev.: 0

Event Description: (Examiner Cue) At approximately 70% power 2 MSIVs close [MT] which requires a manual reactor trip (CT). The SGTR increases to approximately 330 gpm (triggered by the reactor trip). When the Rx is tripped, one TV and one GV do not close, [MALF] requiring the closure of the remaining two MSIVs. (CT) Plant cooldown commences per EOP-6. TBVs are unavailable due to MSIV closure.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Performs Symptom Scan <ul style="list-style-type: none"> ○ Verifies No Station Blackout ○ Verifies No Inadequate Subcooling Margin ○ Verifies No Inadequate Heat Transfer ○ Verifies No Excessive Heat Transfer ○ Verifies Increased OTSG Tube Leakage • Diagnoses rise in OTSG tube leakage • Informs SRO of increased leakage • Performs follow-up actions of EOP-6 <ul style="list-style-type: none"> ○ Maintains PZR level per Rule 7 (attached) <ul style="list-style-type: none"> ▪ Open MUV-58 ▪ Close MUV-49 ▪ Open MUV-24 ▪ Open MUV-23, 25, and 26 if necessary ▪ Close MUV-53 and 257 if necessary ○ Verifies MSSVs are closed <ul style="list-style-type: none"> ▪ Controls OTSG pressure using ADVs ○ Check closed MSV-55 ○ Verifies proper CC cooling <ul style="list-style-type: none"> ▪ Places CC ventilation in emergency recirc ▪ Verifies CC chiller running ○ Sets MUV-31 to 100 inches ○ Selects all PZR heaters to "Off" ○ Bypasses ES if a permit exists

Op-Test No.: 1 Scenario No.: Spare Event No.: 7/8/9 Rev.: 0

Event Description: (Examiner Cue) At approximately 70% power 2 MSIVs close [MT] which requires a manual reactor trip (CT). The SGTR increases to approximately 330 gpm (triggered by the reactor trip). When the Rx is tripped, one TV and one GV do not close, [MALF] requiring the closure of the remaining two MSIVs. (CT) Plant cooldown commences per EOP-6. TBVs are unavailable due to MSIV closure.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Enters EOP-2 and verifies Immediate Actions are complete <ul style="list-style-type: none"> ○ Rx Trip pushbutton depressed ○ Group 1-7 rods inserted ○ NIs indicate Rx shutdown ○ Turbine Trip pushbutton depressed ○ All TVs and GV closed (One TV and one GV not closed) <ul style="list-style-type: none"> ▪ Verifies all MSIVs are closed • Directs Symptom scan <ul style="list-style-type: none"> ○ Verifies No Station Blackout ○ Verifies No Inadequate Subcooling Margin ○ Verifies No Inadequate Heat Transfer ○ Verifies No Excessive Heat Transfer ○ Verifies Increase OTSG tube leakage and transitions to EOP-06 • Assist ROs in diagnosing rise in OTSG tube leakage • Transitions to beginning of EOP-6 and directs ROs actions <ul style="list-style-type: none"> ○ Maintains PZR level per Rule 7 (attached) <ul style="list-style-type: none"> ▪ Open MUV-58 ▪ Close MUV-49 ▪ Open MUV-24 ▪ Open MUV-23, 25, and 26 if necessary ▪ Close MUV-53 and 257 if necessary ○ Verifies MSSVs are closed <ul style="list-style-type: none"> ▪ Controls OTSG pressure using ADVs ○ Directs closure of MSV-55 ○ Verifies MSSVs are closed ○ Verifies proper CC cooling ○ Select all PZR heaters to "Off" ○ Bypass ES if a bypass permit exists • Recognizes E-plan actions need to be taken (HPI valve open, steaming to atmosphere with a tube leak)

Op-Test No.: 1 Scenario No.: Spare Event No.: 10 Rev.: 0

Event Description: When RCS pressure reduction is required per EOP-06, RCV-14 (spray valve) fails to open [MALF]. Procedural guidance is provided to use the PORV to minimize SCM.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Attempts to open RCV-14 to minimize SCM as directed <ul style="list-style-type: none"> ○ Diagnoses failure of RCV-14 to open. • Cycles the PORV to minimize SCM as directed • Controls SCM within band • Controls HPI flow, Rule 2 (attached) • Starts of RCS boration <ul style="list-style-type: none"> ○ Ensures post-filter(s) in service ○ Opens CAV-60 ○ Starts CAP-1A or 1B • Starts RCS cooldown within normal limits on both OTSGs using ADVs
	SRO	<ul style="list-style-type: none"> • Directs ROs to maintain minimum subcooling margin with a target value of 15 degrees (will probably give a band to maintain of 10 to 20 degrees) <ul style="list-style-type: none"> ○ Directs RO to open RCV-14 per EOP-6 <ul style="list-style-type: none"> ▪ Assists in diagnosing RCV-14 failure ○ Directs RO to minimize SCM by opening the PORV ○ Directs RO to control HPI flow • Directs start of RCS boration • Directs start of RCS cooldown with both OTSGs

Scenario may be terminated when SCM is minimized and a plant cooldown has commenced.

RULE 1, LOSS OF SCM

- IF < 1 min has elapsed since losing adequate SCM, THEN immediately stop all RCPs.
- IF RCPs were NOT stopped within 1 min, THEN ensure all operating RCPs remain running until any of the following exist:
 - SCM is restored
 - LPI flow > 1400 gpm in each injection line.
- Progress toward a maximum allowable plant cooldown to achieve CFT and LPI flow as soon as possible.

-
- Manually actuate ES.
 - Depress "HPI MAN ACT" push buttons on Trains A and B.
 - Depress "RB ISO MAN ACTUATION" push buttons on Trains A and B.
 - IF LPI has NOT actuated, AND RCS PRESS \leq 300 psig, THEN depress "LPI MAN ACT" push buttons on Trains A and B.

-
- Depress "ISCM" push buttons for EFIC channels A and B.

-
- Ensure Tincore is selected on SPDS.

RULE 2, HPI CONTROL

- IF HPI has actuated,
THEN bypass or reset
ES actuation.
- 1 Obtain SRO concurrence to
bypass or reset ES.
- 2 Bypass or reset ES actuation:
 - Auto
 - Manual

- Open MUP recirc prior to
throttling HPI flow
< 200 gpm/pump.
- IF recirc to MUT is desired,
THEN open MUP recirc to MUT valves:

<input type="checkbox"/> MUV-53	<input type="checkbox"/> MUV-257
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- IF recirc to RB sump is desired,
THEN open HPI recirc to sump valves:

<input type="checkbox"/> MUV-543	<input type="checkbox"/> MUV-544
<input type="checkbox"/> MUV-545	<input type="checkbox"/> MUV-546

- IF adequate SCM exists based,
on Tincore,
THEN throttle HPI to maintain
required conditions.
- Prevent exceeding NDT limit
- IF OTSG isolated for TRACC,
THEN maintain RCS PRESS
< 1000 psig.
- IF PTS, SGTR, or dry OTSG exists,
THEN maintain minimum adequate
SCM.

- IF adequate SCM can be
maintained with 1 HPI pump,
AND stopping second HPI pump
is desired,
THEN stop 1 HPI pump.
- Ensure running HPI pump is
aligned to MUT.

RULE 3, EFW/AFW CONTROL

- ___ Ensure available OTSGs are at or trending toward required level.

"LLL"	> 20 in
"NAT CIRC"	> 70%
"ISCM"	> 90%

- ___ IF manual control of EFW flow is desired, THEN establish manual EFIC control.

- 1 ___ Obtain SRO concurrence to place EFIC in manual.
- 2 ___ Control EFW to maintain required EFW flow and OTSG level.
- 3 ___ IF EFW flow is NOT controlled, THEN depress EFIC channels A and B "MANUAL PERMISSIVE" push buttons and close affected EFW block valve.

- ___ IF adequate SCM does NOT exist, AND level in available OTSGs is NOT at or trending toward "ISCM" level, THEN establish manual required flow.

EFW	2 OTSGs	> 280 gpm in 1 line to each OTSG
	1 OTSG	> 470 gpm in 1 line to 1 OTSG
AFW	2 OTSGs	> 250 gpm to < 300 gpm/OTSG
	1 OTSG	> 450 gpm to < 600 gpm

- ___ IF adequate SCM exists, THEN throttle flow to prevent OTSG PRESS from lowering > 100 psig below desired PRESS.

- Do not allow OTSG level to lower.

RULE 4, PTS

- ___ IF any of the following exist:
 - ___ Tincore < 400°F,
AND cooldown rate
exceeds ITS limit
 - ___ RCPs off,
AND HPI flow exists
 - ___ Throttle HPI flow to minimize
adequate SCM.
 - ___ Throttle LPI flow to minimize
adequate SCM.
 - ___ PTS is applicable until an
Engineering evaluation has been
completed.
- THEN perform required PTS
actions.

RULE 7, PZR LEVEL CONTROL

- 1 ___ IF PZR level is < PZR level band,
 THEN restore PZR level.

PZR Level Band	
Rx at power > 20%	200 in to 240 in
Rx at power ≤ 20%	120 in to 200 in
Rx tripped	50 in to 120 in

- Cycle appropriate BWST to MUP valve to maintain MUT level ≥ 55 in:

___ MUV-73	___ MUV-58
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- ___ Close MUV-49

- 2 ___ IF PZR level does NOT recover,
 THEN establish manual HPI flow.

- 1 ___ Open MUV-24
- 2 ___ Notify SSO to evaluate Emergency Plan entry.
- 3 ___ IF PZR level does NOT recover,
 THEN start second MUP and required cooling pumps.

[Rule 5, Diesel Load Control]

- 4 ___ IF PZR level does NOT recover,
 THEN open additional HPI valves.
- 5 ___ IF PZR level does NOT recover,
 THEN close MUP to MUT recircs:

___ MUV-53	___ MUV-257
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- 3 ___ IF PZR level recovers,
 THEN restore normal PZR conditions.

[Rule 2, HPI Control]

- ___ IF adequate SCM exists,
 AND letdown is desired,
 THEN **CONCURRENTLY PERFORM**
 EOP-14, Enclosure 4,
 Letdown Recovery (if accessible).