

Facility: **Crystal Unit #3** Scenario No. 1 (NRC 2011) Op-Test No.: 1

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Initial Conditions: The plant is at 75% power due to the loss of RCP-1D.

Turnover: The following equipment is OOS: Breaker 3210 (EDG-1B) (6 hours); FWP-7 (4 hours); RWP-1, emergency use only. All required surveillances have been completed.

Event No.	Malf. No.	Event Type*	Event Description
1	1	C (RO)	FWP-2A thrust bearing friction. (AP-510/AP-545)
2	2	C (BOP) TS (SRO)	RWP-2A trips. (AR-301) SRO TS determination. (TS 3.7.9 & 3.8.1.B.2)
3	3	C (BOP) TS (SRO)	“B” ES Bus is lost due to troubleshooting activities associated with the “B” EDG breaker. (AP-770) SRO TS determination. (TS 3.0.3 & 3.8.9)
4	N/A	R (RO)	Manual power reduction. (AP-510)
5	N/A	N (BOP)	Perform EOP-14, Enclosure 23, electrical bus swap. (EOP-14)
6	4	C (RO)	FWV-40 malfunction requiring reactor trip. (AI-505)
7	5	C (RO)	Turbine fails to trip. [CT] (EOP-02)
8	6	M (ALL)	EFP-3 fails to start and ASV-5 fails to open. (EOP-13, Rule 3 & EOP-04)
9	N/A	C (BOP)	Start EFP-1 or commence HPI/PORV cooling. [CT] (EOP-14, Enclosure 7)

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

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

Event Description: (Examiner Cue) After turnover is completed FWP-2A thrust bearing slowly fails. **(MALF)** High bearing temperature alarm will require shutdown of feedwater pump. A manual plant runback (AP-510) will probably be started and the FWP tripped at 50% power. The CRS may elect to trip the pump at the current power level and perform the actions of AP-545. Either choice is acceptable.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Recognize computer alarm               <ul style="list-style-type: none"> <li>○ FWP thrust bearing temperature high (computer alarm does not come in until approximately 2 minutes after the failure is input)</li> <li>○ Monitor rising thrust bearing temperature</li> </ul> </li> <li>• May elect to trip the pump at this time based on high thrust bearing temperature               <ul style="list-style-type: none"> <li>○ (L-1-2) "FWP A Vibration High" (possible)</li> <li>○ (L-3-4) "FWP Brg Oil Drain Temp High" (possible)</li> <li>○ (L-3-5) "FWP Oil Clr Outlet Temp High" (possible)</li> </ul> </li> <li>• Notifies the CRS of FWP computer and annunciator alarms</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Evaluates FWP alarms</li> <li>• Makes determination to secure FWP-2A</li> <li>• Directs RO/BOP actions IAW AP-510 and/or AP-545</li> <li>• Contacts work controls to initiate repair efforts</li> </ul>

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Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• AP-510 actions:               <ul style="list-style-type: none"> <li>○ Notifies plant personnel</li> <li>○ Notifies Chemistry of power change</li> <li>○ Verifies Imbalance within limits</li> <li>○ Notifies SPO to isolate MSR Shell Drain Heat Exchangers (N/A)</li> <li>○ When Rx power &lt; 80% notifies SPO to ensure MS is supplying AS (N/A)</li> <li>○ Notify PPO to align EFIC MFW isolation switches</li> <li>○ Maintains DFT level between 9 and 11 feet 6 in</li> <li>○ Ensures AUX transformer not supplying any bus                   <ul style="list-style-type: none"> <li>▪ Transfers loads to Startup transformer</li> <li>▪ Performs EOP-14, Enclosure 23, Shutdown Electrical Lineup (attached)</li> </ul> </li> </ul> </li>   <li>• AP-545 actions:               <ul style="list-style-type: none"> <li>○ Notifies plant personnel</li> <li>○ Notifies Chemistry of power change</li> <li>○ Ensure regulating rod index is within limits</li> <li>○ Notify PPO to align EFIC MFW isolation switches</li> <li>○ Verifies Imbalance within limits</li> </ul> </li> </ul>

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Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• AP-510 actions:               <ul style="list-style-type: none"> <li>○ Adjusts load rate per CRS instructions</li> <li>○ Adjusts Unit Load Master to 10</li> <li>○ Maintains PZR level (Rule 7, attached)</li> <li>○ Ensures MBVs remain closed</li> </ul> </li> <li>• Monitors plant parameters</li>   <li>• AP-545 actions:               <ul style="list-style-type: none"> <li>○ Ensure plant runback is in progress</li> <li>○ Ensure proper FW valve positions                   <ul style="list-style-type: none"> <li>• FWV-28 open</li> <li>• FWV-30 closed</li> <li>• FWV-29 closed</li> </ul> </li> <li>○ Ensure reactor power is less than maximum                   <ul style="list-style-type: none"> <li>• Manually lowers power to &lt;1174 MWt</li> </ul> </li> <li>○ Ensure vital plant parameters are approaching stability</li> <li>○ Verify rods with <math>\pm 6.5\%</math> of group average</li> </ul> </li> <li>• Monitors plant parameters</li> </ul>

Op-Test No.: 1    Scenario No.: 1    Event No.: 2    Rev.: 00

Event Description: (Examiner Cue) RWP-2A fails due to an SW leak into its oil cooler. RWP-2B auto-start is defeated. BOP must manually start RWP-2B. SW is isolated to RWP-2A's oil cooler. TS 3.7.9, Condition A, and TS 3.8.1, required Action B.2, are now applicable.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Acknowledge alarms               <ul style="list-style-type: none"> <li>○ (A-8-3) "SW RW Pump A Motor Overload"</li> <li>○ (C-3-5) "SW RW System Pressure Low"</li> <li>○ (A-8-2) "SW RW Pump B Trip"</li> <li>○ Reviews AR-304</li> </ul> </li> <li>• Checks for common cause failure prior to starting RWP-2B</li> <li>• Notifies SRO of RWP-2A failure</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Evaluates possible common cause failure concerns</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Directs PPO to check RWP-2A and report back</li> <li>• Informs SRO of SW leak</li> <li>• Directs PPO to isolate SW to RWP-2A</li> <li>• Places RWP-2A in PTL or directs PPO to open DC knife switch</li> <li>• Starts RWP-2B</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs BOP to start RWP-2B</li> <li>• Directs isolation of SW to RWP-2A</li> <li>• Directs BOP to secure RWP-2A</li> <li>• Evaluates TS for applicability               <ul style="list-style-type: none"> <li>○ TS 3.7.9, Condition A, 72 hours</li> <li>○ TS 3.8.1, Required Action B2, is applicable (after 4 hours TS 3.0.3 must be entered)</li> </ul> </li> <li>• Contacts work controls to initiate repair efforts</li> </ul>

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

Event Description: (Examiner Cue) After RWP-2B is started and TS actions addressed breaker 3206 opens, feeder breaker to the “B” ES 4160V bus. The over-current relaying is shorted out. **(MALF)** This is due to troubleshooting activities associated with EDG-1B. RWP-2B and other miscellaneous plant equipment is lost. The loss of RWP-2B requires entry into TS 3.0.3.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announces and responds to alarms associated with the loss of the “B” ES 4160V bus</li> <li>• Performs the followup actions of AP-770 as directed               <ul style="list-style-type: none"> <li>○ Ensures letdown flow path</li> <li>○ Notifies plant personnel</li> <li>○ Ensures at least 1 SW pump is running</li> <li>○ Ensures RWP-1 is running</li> <li>○ Verifies a MUP running</li> <li>○ Verifies MUP cooling pumps running</li> <li>○ Performs EOP-14, Enclosure 4, Letdown Recovery (attached) if letdown restoration is desired (N/A)</li> <li>○ Verifies 4160V Reactor Aux Bus 3 is energized</li> <li>○ Ensures ES MCC 3AB is energized</li> <li>○ Verifies proper CC cooling                   <ul style="list-style-type: none"> <li>▪ Performs EOP-14, Enclosure 17 (not required, “A” train ventilation in service)</li> </ul> </li> <li>○ Verifies 4160V Unit bus status</li> <li>○ Verifies ES 480V UV lockout status (no lockouts)</li> <li>○ Verifies IA pressure &gt; 90 psig</li> <li>○ Ensure RB cooling in service                   <ul style="list-style-type: none"> <li>▪ Closes SWV-151, 152 &amp; 355</li> <li>▪ Opens SWV-353 &amp; 354</li> </ul> </li> <li>○ Verifies PZR power supply status</li> <li>○ Prevents MUP auto start on “B” ES bus                   <ul style="list-style-type: none"> <li>▪ Ensure ES actuations reset</li> </ul> </li> <li>○ Prevents pump auto start capability on “B” ES bus                   <ul style="list-style-type: none"> <li>▪ Places RWP-2B and SWP-1B in PTL</li> </ul> </li> <li>○ Ensures breakers 3212, 3206, 3208 &amp; 3210 open</li> <li>○ Ensures ES 4160V bus available for recovery                   <ul style="list-style-type: none"> <li>▪ Per earlier role play the “B” ES bus is NOT available for recovery, also 86B-3206 LO is tripped</li> </ul> </li> <li>○ May notify PPO to restore heat tracing</li> <li>○ Verifies SF cooling in operation</li> <li>○ Verifies FSP operation</li> </ul> </li> </ul>

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

Event Description: (Examiner Cue) After RWP-2B is started and TS actions addressed breaker 3206 opens, feeder breaker to the “B” ES 4160V bus. The over-current relaying is shorted out. **(MALF)** This is due to troubleshooting activities associated with EDG-1B. RWP-2B and other miscellaneous plant equipment is lost. The loss of RWP-2B requires entry into TS 3.0.3.

Time	Position	Applicant’s Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Monitors plant parameters</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Enters AP-770 and directs followup actions</li> <li>• Directs BOP to start RWP-1 and have PPO monitor its operation</li> <li>• May direct BOP to concurrently perform Enclosure 1, Recovery of Faulted ES Bus (no actions since bus cannot be recovered)</li> <li>• Determines ES Bus NOT available for recovery</li> <li>• Exits AP-770 at Step 3.56</li> <li>• Evaluates TS for applicability               <ul style="list-style-type: none"> <li>○ TS 3.8.9, Condition A, 8 hours</li> <li>○ TS 3.0.3, plant shutdown required due to loss of both safety related RWPs</li> </ul> </li> <li>• Directs RO to start a plant shutdown per AP-510</li> <li>• Contacts work controls to initiate repair efforts</li> </ul>

Op-Test No.: 1    Scenario No.: 1    Event No.: 4    Rev.: 00  Event Description: (Normal Evolution) Plant shutdown started IAW AP-510, Rapid Power Reduction.		
Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Starts power reduction               <ul style="list-style-type: none"> <li>○ Adjusts load rate per CRS instructions</li> <li>○ Adjusts Unit Load Master to 10</li> <li>○ Maintains PZR level (Rule 7 attached)</li> </ul> </li> <li>• Monitors plant parameters</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs RO/BOP actions IAW AP-510</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Performs actions as directed               <ul style="list-style-type: none"> <li>○ Notifies plant personnel</li> <li>○ Notifies Chemistry of power change</li> <li>○ Verifies Imbalance within limits</li> <li>○ Notifies SPO to isolate MSR Shell Drain Heat Exchangers</li> <li>○ When Rx power &lt; 80% notifies SPO to ensure MS is supplying AS (N/A)</li> <li>○ Maintains DFT level between 9 and 11 feet 6 in</li> </ul> </li> </ul>



Op-Test No.: 1    Scenario No.: 1    Event No.: 5    Rev.: 00		
Event Description: (Normal Evolution) During the power reduction the BOP will perform EOP-14, Enclosure 23, Shutdown Electrical Lineup.		
Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>Performs EOP-14, Enclosure 23, Shutdown Electrical Lineup (attached)</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>Directs BOP to perform EOP-14, Enclosure 23</li> </ul>

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

Event Description: (Examiner Cue) Following a 5% to 10% power reduction FWV-40 will slowly fail closed. **(MALF)** This results in a loss of all MFW flow to the “A” train. The CRS should direct a reactor trip and initiation of EFW.

Time	Position	Applicant’s Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Recognize lower MFW flow               <ul style="list-style-type: none"> <li>○ SU flow lowering</li> <li>○ Valve position indication</li> <li>○ LLBV closing</li> </ul> </li> <li>• May attempt to raise flow with the FWV-40 control station</li> <li>• May attempt to open FWV-31</li> <li>• Notifies CRS of feedwater flow malfunction</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists in diagnosing lowering FW flow</li> <li>• Directs the RO to trip the reactor and perform EOP-02 actions</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Assists in diagnosing lowering FW flow</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Manually trips the reactor when directed               <ul style="list-style-type: none"> <li>○ Depresses Rx trip push button</li> <li>○ Verifies CRD groups 1 through 7 are fully inserted</li> <li>○ Verifies NIs indicate the Rx is shutdown</li> <li>○ Verifies SPDS is available</li> </ul> </li> </ul>

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

Event Description: (Examiner Cue) After the reactor trip the turbine will fail to trip. **(MALF)** The RO will close all MSIVs **(CT)** per the Immediate Actions of EOP-2. The BOP will initiate EFIC and verify EFW flow. A symptom scan will be performed after the Immediate Actions of EOP-2 have been verified by the SRO and RO.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Performs Immediate Actions of EOP-2               <ul style="list-style-type: none"> <li>○ Depresses Main Turbine trip push button</li> <li>○ Verifies TVs and GVs are closed                   <ul style="list-style-type: none"> <li>▪ <b>Closes MSIVs when turbine does not trip (CT)</b> <ul style="list-style-type: none"> <li>• <i>To meet this CT the MSIVs must be closed prior to OTSG pressure reaching 600 psig.</i></li> </ul> </li> </ul> </li> </ul> </li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs the BOP to ensure EFW is operating</li> <li>• Enters EOP-2 and verifies Immediate Actions are complete</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Verifies EFW is operating               <ul style="list-style-type: none"> <li>○ EOP-13, Rule 3</li> </ul> </li> </ul>
	ALL	<ul style="list-style-type: none"> <li>• Perform symptom scan</li> </ul>

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

Event Description: (Conditional) EFP-3's diesel start circuit is blocked and will not start. **(MALF)** ASV-5 will not open when commanded by EFIC. **(MALF)** The BOP should attempt to open ASV-5. The BOP may attempt to open ASV-204, which will open, however EFP-2 will trip two minutes later. The SRO may elect to enter EOP-4 at this time or may wait until symptoms are apparent. EOP-14, Enclosure 7, will be entered and EFP-1 started. **(CT)**

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> <li>• Respond to important alarms</li> <li>• Diagnoses EFP-3 failure               <ul style="list-style-type: none"> <li>○ Attempts to start EFP-3</li> </ul> </li> <li>• Diagnoses EFP-2 failure               <ul style="list-style-type: none"> <li>○ (H-7-3) "EF Pump 2 Start Failure"</li> </ul> </li> <li>• Attempts to open ASV-5 (prompt and prudent action)</li> <li>• May attempt to open ASV-204</li> <li>• Reports failures to SRO</li> <li>• Performs actions as directed from EOP-4               <ul style="list-style-type: none"> <li>○ Notify personnel</li> <li>○ <b>Start EFP-1 per EOP-14, Enclosure 7 (CT)</b> (attached)                   <ul style="list-style-type: none"> <li>▪ <i>To meet this CT EFP-1 must be started prior to exiting Enclosure 7.</i></li> </ul> </li> </ul> </li> <li>• Notifies PPO to perform EOP-14, Enclosure 2</li> <li>• Maintain PZR level               <ul style="list-style-type: none"> <li>○ Adjust MUV-31 to 100 inches (Rule 7 attached)</li> <li>○ Record Tincore temp</li> <li>○ Minimize RCS pressure rise</li> <li>○ Secure RCP-1A if adequate SCM exists</li> </ul> </li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists in diagnosing EF pump failures</li> <li>• Directs RO/BOP to open ASV-204</li> <li>• Evaluates loss of all feedwater               <ul style="list-style-type: none"> <li>○ May enter EOP-04 at this time, or</li> <li>○ May wait until symptoms are apparent</li> </ul> </li> <li>• Direct actions of EOP-04               <ul style="list-style-type: none"> <li>○ Directs RO/BOP to perform EOP-14, Enclosure 7 (attached)</li> </ul> </li> </ul>

**The scenario may be terminated when EFP-1 is started and controlled EFW flow to each OTSG is achieved.**

**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:
    - \_\_\_ T<sub>in</sub>core < 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

Rx Power	> 25%	≤ 25%	Rx Shutdown
PZR Level Band	200 in – 240 in	120 in – 200 in	50 in – 120 in

- Control PZR level using normal makeup and letdown flow.
- Control letdown and MU flow
- Cycle BWST to MUP valve as required to maintain MUT level ≥ 55 in.

**NOTE**

**The Rx shall be tripped when an RCS leak exceeds the capacity of normal makeup and a SGTR is not in progress.**

- IF PZR level cannot be controlled ≥ minimum level THEN establish HPI flow.
- 1  Close MUV-49
- 2  IF PZR level does NOT recover, THEN open MUV-24.
- 3  Notify SM to evaluate EP entry.
- 4  IF PZR level does NOT recover, THEN start second MUP and required cooling pumps.

[Rule 5, Diesel Load Control]

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

- IF PZR level is ≥ minimum level, AND adequate SCM exists THEN restore normal PZR conditions.
- IF letdown restoration is desired, THEN CONCURRENTLY PERFORM EOP-14, Enclosure 4, Letdown Recovery (if accessible).

**ENCLOSURE 7 EFWP MANAGEMENT**

ACTIONS

DETAILS

**STATUS**

**EFW required.**

- 7.1    \_\_\_    Verify EFP-3 is running.
- \_\_\_    IF EFP-3 is NOT running,  
           THEN GO TO Step 7.6 in this enclosure.

- 7.2    \_\_\_    IF MFW is NOT available,  
           THEN ensure MFW remains isolated.

- Select MBV to “MAN” and select all FW isolation valves to “CLOSE”.

FW valve	A OTSG	B OTSG
LLBV	___ FWV-31	___ FWV-32
MBV toggle	___ "MAN"	___ "MAN"
MBV	___ FWV-30	___ FWV-29
SUBV	___ FWV-36	___ FWV-33
Cross-tie	___ FWV-28	___ FWV-28
Suction	___ FWV-14	___ FWV-15

**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**

ACTIONS

DETAILS

7.3 \_\_\_ Verify EFP-2 is running.

\_\_\_ IF EFP-2 is NOT running,  
THEN EXIT this enclosure.

7.4 \_\_\_ WHEN available OTSGs are at  
required level,  
THEN stop EFP-2

1 \_\_\_ Ensure available OTSGs are at required  
level.

See Table 1

2 \_\_\_ Depress "MANUAL PERMISSIVE" or  
"TEST RESULTS/RESET" push  
button on EFIC channel B.  
(as required)

3 Ensure EFP-2 steam supply valves are  
closed:

\_\_\_ ASV-204

\_\_\_ ASV-5

7.5 \_\_\_ WHEN EFP-2 is shutdown,  
THEN EXIT this enclosure.

**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**

ACTIONS

DETAILS

<p><b>STATUS</b></p> <p><b>EFP-3 not running.</b></p>
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7.6    \_\_\_    Verify EFP-2 is running.

      \_\_\_    IF EFP-2 is NOT running,  
          THEN GO TO Step 7.8 in this enclosure.

7.7    \_\_\_    IF OTSG PRESS is  $\leq$  200 psig,      • Control OTSG PRESS using TBVs and ADVs.  
          AND adequate primary to secondary heat transfer exists,  
          THEN stop RCS cooldown.

7.8    \_\_\_    IF EDG A is supplying power to A ES 4160V Bus,  
          THEN GO TO Step 7.15 in this enclosure.

7.9    \_\_\_    Verify EFP-1 is available.

      \_\_\_    IF EFP-1 is NOT available,  
          THEN GO TO Step 7.15 in this enclosure.

**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**

ACTIONS

DETAILS

<p><b>STATUS</b></p> <p><b>EFP-1 available.</b></p>
---

7.10 \_\_\_ Ensure EFP-1 is running.

1 \_\_\_ Depress "MANUAL PERMISSIVE" or "TEST RESULTS/RESET" push buttons on EFIC channel A and B. (as required).

2 Ensure EFP-1 EFIC control valves to OTSGs are closed:

A OTSG	B OTSG
___ EFV-58	___ EFV-57

3 Ensure EFP-1 EFW block valves to available OTSGs are open:

A OTSG	B OTSG
___ EFV-14	___ EFV-33

4 \_\_\_ Ensure EFP-3 is in "PULL TO LOCK".

5 \_\_\_ Start EFP-1

**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**

ACTIONS

DETAILS

7.11    \_\_\_    Establish EFW flow to each available OTSG.

- \_\_\_    IF adequate SCM exists, AND OTSG level is  $\leq 12\frac{1}{2}$  in, THEN feed each available dry OTSG with continuous EFW flow to 1 line within the following limits:

\_\_\_    Cooldown rate minimized

See Table 2

EFW or AFW Flow Limit	
Any RCP running	$\leq 390$ gpm
No RCPs running	$\leq 200$ gpm

- \_\_\_    IF adequate SCM exists, AND OTSG level is  $> 12\frac{1}{2}$  in, THEN ensure EFW flow is controlled.

[Rule 3, EFW/AFW Control]

- \_\_\_    IF adequate SCM does NOT exist, THEN feed available OTSGs at inadequate SCM flow rate.

[Rule 3, EFW/AFW Control]

**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**

ACTIONS

DETAILS

7.12 \_\_\_ IF EFP-2 is running,  
THEN stop EFP-2

1 \_\_\_ WHEN available OTSGs are at required level,  
THEN ensure EFP-2 steam supply valves are closed:

\_\_\_ ASV-204

\_\_\_ ASV-5

See Table 1

2 \_\_\_ Depress "EFW INITIATE"  
push buttons on EFIC channel A.

7.13 \_\_\_ IF MFW is NOT available,  
THEN ensure MFW remains isolated.

- Select MBV to "MAN" and select all FW isolation valves to "CLOSE".

FW valve	A OTSG	B OTSG
LLBV	___ FWV-31	___ FWV-32
MBV toggle	___ "MAN"	___ "MAN"
MBV	___ FWV-30	___ FWV-29
SUBV	___ FWV-36	___ FWV-33
Cross-tie	___ FWV-28	___ FWV-28
Suction	___ FWV-14	___ FWV-15

7.14 \_\_\_ WHEN OTSG level in available OTSGs is > 12½ in,  
THEN **EXIT** this enclosure.

**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**ACTIONSDETAILS**STATUS****Any of the following exist:**

- **EDG A supplying power to the A ES 4160V Bus.**
- **EFP-1 not available.**

7.15 \_\_\_ Verify AFW is available.

- \_\_\_ Verify all of the following exist:

\_\_\_ Neither ES 4160V Bus aligned to Alternate AC Diesel

\_\_\_ FWP-7 available

\_\_\_ CDT-1 level &gt; 9 ft

\_\_\_ IF AFW is NOT available,  
THEN GO TO Step 7.24 in this enclosure.



**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**

ACTIONS

DETAILS

7.16 \_\_\_ Verify 4160V REACTOR AUX  
BUS 3 is energized.

\_\_\_ IF 4160V REACTOR AUX  
BUS 3 is NOT energized,  
THEN energize 4160V  
REACTOR AUX BUS 3

- 1 \_\_\_ Open Bkr 3223
- 2 \_\_\_ Select Alternate AC Diesel to "START"  
and hold until  
"EGDG-1C AVAILABLE" white light  
is lit (normally < 10 seconds).
- 3 \_\_\_ Close Bkr 3225
- 4 \_\_\_ Verify 4160V REACTOR AUX  
BUS 3 voltage is stable.
- 5 \_\_\_ Notify SPO to open all doors to Non-  
1E battery and battery charger rooms  
(95 ft TB near IAPs).

ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)ACTIONSDETAILS

7.17 \_\_\_ IF EFP-2 is running,  
THEN ensure EFW control  
valves are closed.

- \_\_\_ WHEN available OTSGs are at  
required level,  
THEN close EFIC control valves:

\_\_\_ EFV-56

\_\_\_ EFV-55

See Table 1

7.18 \_\_\_ Ensure AFW control valves are  
closed.

___ FWV-216
-------------

___ FWV-217
-------------

7.19 \_\_\_ Start FWP-7

**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**

ACTIONS

DETAILS

7.20              Establish AFW flow to each available OTSG.

- IF adequate SCM exists, AND OTSG level is  $\leq 12\frac{1}{2}$  in, THEN feed each available dry OTSG with continuous AFW flow to 1 line within the following limits:

          Cooldown rate minimized

See Table 2

EFW or AFW Flow Limit	
Any RCP running	$\leq 390$ gpm
No RCPs running	$\leq 200$ gpm

          Maintain total AFW flow < 600 gpm

- IF adequate SCM exists, AND OTSG level is  $> 12\frac{1}{2}$  in, THEN ensure AFW flow is controlled.

          Maintain total AFW flow < 600 gpm

[Rule 3, EFW/AFW Control]

- IF adequate SCM does NOT exist, THEN feed available OTSGs at inadequate SCM flow rate.

          Maintain total AFW flow < 600 gpm

[Rule 3, EFW/AFW Control]

**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**

ACTIONS

DETAILS

7.21 \_\_\_ IF EFP-2 is running,  
THEN stop EFP-2

1 \_\_\_ WHEN available OTSGs are at  
required level,  
THEN depress "MANUAL  
PERMISSIVE" or "TEST  
RESULTS/RESET" push button on  
EFIC channel B.  
(as required)

See Table 1

2 Close EFP-2 steam supply valves:

\_\_\_ ASV-204

\_\_\_ ASV-5

**ENCLOSURE 7 EFWP MANAGEMENT (CONT'D)**

ACTIONS

DETAILS

7.22 \_\_\_ IF MFW is NOT available,  
THEN ensure MFW remains  
isolated.

- Select MBV to “MAN” and select  
all FW isolation valves to “CLOSE”.

FW valve	A OTSG	B OTSG
LLBV	___ FWV-31	___ FWV-32
MBV toggle	___ "MAN"	___ "MAN"
MBV	___ FWV-30	___ FWV-29
SUBV	___ FWV-36	___ FWV-33
Cross-tie	___ FWV-28	___ FWV-28
Suction	___ FWV-14	___ FWV-15

7.23 \_\_\_ WHEN OTSG level in available  
OTSGs is > 12½ in,  
THEN EXIT this enclosure.

**ENCLOSURE 23 SHUTDOWN ELECTRICAL LINEUP**

<u>ACTIONS</u>	<u>DETAILS</u>
23.1 ___ <u>IF</u> Bkr 3101 is closed, <u>THEN</u> transfer A 6900V BUS to the START UP transformer.	1 ___ Select "AUTO TRANSFER 3103" to "MAN". 2 ___ Close Bkr 3103 3 ___ Open Bkr 3101
<hr/>	
23.2 ___ <u>IF</u> Bkr 3201 is closed, <u>THEN</u> transfer A Unit 4160V BUS to the START UP transformer.	1 ___ Select "AUTO TRANSFER 3203" to "MAN". 2 ___ Close Bkr 3203 3 ___ Open Bkr 3201
<hr/>	
23.3 ___ <u>IF</u> Bkr 3102 is closed, <u>THEN</u> transfer B 6900V BUS to the START UP transformer.	1 ___ Select "AUTO TRANSFER 3104" to "MAN". 2 ___ Close Bkr 3104 3 ___ Open Bkr 3102
<hr/>	
23.4 ___ <u>IF</u> Bkr 3202 is closed, <u>THEN</u> transfer B Unit 4160V BUS to the START UP transformer.	1 ___ Select "AUTO TRANSFER 3204" to "MAN". 2 ___ Close Bkr 3204 3 ___ Open Bkr 3202
<hr/>	
23.5 ___ <b>EXIT</b> this enclosure.	

Facility: **Crystal River #3** Scenario No.: 3 (NRC 2011) Op-Test No.: 1

Examiners: K. Schaaf Operators: F. Lawrence  
P. Capehart M. Kennard  
D. Bacon D. Taylor

Initial Conditions: The plant is in Mode 2 at  $\approx$  2% power.

Turnover: The following equipment is OOS: MUP-1A (12 hours); FWP-7 (4 hours); RWP-1, emergency use only.

Event No.	Malf. No.	Event Type*	Event Description
1	1	I (RO) I (BOP) TS (SRO)	RC-3A-PT1 fails high. (AP-520/OP-501/OP-507) SRO TS determination. (TS 3.3.1)
2	2	TS (SRO)	RM-A6 sample pumps fail. SRO TS determination. (TS 3.4.14)
3	3	C (BOP)	MUV-260 spurious closure. (AI-500)
4	4	C (RO) C (BOP)	RCP-1C seal failure. (OP-302, AP-545)
5	5	M (ALL)	OTSG tube leak on the "B" OTSG which will require a reactor trip. (EOP-06)
6	6	C (RO)	Manual Rx trip pushbutton failure. [CT] (EOP-06)
7	7	C (BOP)	"B" MUP bearing degradation and pump trip. [CT] (EOP-06, EOP-13)

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

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

Event Description: (Examiner Cue) Soon after turnover is complete RC-3A-PT1 (selected RCS narrow range pressure transmitter) will fail high [MALF]. This will cause the Spray valve and PORV to open. Prompt action by the RO will be required to prevent a reactor trip on low RCS pressure. AP-520 may be entered to verify correct immediate actions taken. TS 3.3.1, Condition A, will be entered. The CRS will direct the BOP to place RPS Channel A to Bypass per OP-507, Operation of the ES, RPS and ATWAS Systems.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (K-03-02) "SASS Mismatch" (RC Press mismatch)</li> <li>○ (J-03-01) "RCS Press High"</li> <li>○ Reviews AR-502</li> </ul> </li> <li>• PZR Spray valve opens               <ul style="list-style-type: none"> <li>○ PZR Spray or Block valve will be closed</li> </ul> </li> <li>• PZR PORV may open if timely actions not taken               <ul style="list-style-type: none"> <li>○ PORV or PORV block valve will be closed</li> </ul> </li> <li>• Verifies the plant is stable</li> <li>• May create another CT if timely actions not taken (CRD trip override failure is in, ie reactor will not automatically trip if an RPS setpoint is reached)</li> <li>• Notifies SRO of failure</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists the RO in diagnosing the failed pressure transmitter</li> <li>• Enters TS 3.3.1, Condition A, for RPS Channel A, 1 hour</li> <li>• May check TS 3.4.10. N/A for this failure</li> <li>• May enter AP-520 to verify correct prompt and prudent actions taken</li> <li>• Direct selection of alternate pressure transmitter IAW OP-501</li> <li>• Direct bypassing RPS Channel A IAW OP-507</li> <li>• Contacts work controls to initiate repair efforts</li> </ul>



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

Event Description: (Examiner Cue) Soon after turnover is complete RC-3A-PT1 (selected RCS narrow range pressure transmitter) will fail high [**MALF**]. This will cause the Spray valve and PORV to open. Prompt action by the RO will be required to prevent a reactor trip on low RCS pressure. AP-520 may be entered to verify correct immediate actions taken. TS 3.3.1, Condition A, will be entered. The CRS will direct the BOP to place RPS Channel A to Bypass 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"> <li>• Assists RO in diagnosing the failed pressure transmitter</li> <li>• Assists RO in verifying the plant is stable</li> <li>• Reviews alarms</li> <li>• Selects alternate pressure transmitter IAW OP-501               <ul style="list-style-type: none"> <li>○ PZR heaters to Hand</li> <li>○ RCV-14 to manual</li> <li>○ RCV-10 closed</li> <li>○ RC Pressure signal select switch to RPS-B position</li> <li>○ PZR heaters to Auto</li> <li>○ RCV-14 to Auto</li> <li>○ RCV-10 to Auto</li> </ul> </li> <li>• Bypasses RPS Channel A IAW OP-507               <ul style="list-style-type: none"> <li>○ Reposition channel bypass key switch in RPS Channel A</li> <li>○ Verify J-05-03 annunciated</li> <li>○ Verify EP 0965</li> </ul> </li> </ul>

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

Event Description: (Examiner Cue) Once the RPS channel is bypassed RM-A6 sample pumps will fail. This will require the SRO to enter TS 3.4.14, Condition B for RCS leakage detection instrumentation.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Acknowledge alarm               <ul style="list-style-type: none"> <li>○ (H-02-02) "Atmospheric Monitor Warning"</li> <li>○ High flow light on RM panel</li> <li>○ Reviews AR</li> </ul> </li> <li>• Inform SRO of RM-A6 failure</li> <li>• May request PPO to check monitor</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• TS 3.4.14, RCS Leak Detection, Condition B, 24 hours</li> </ul>

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

Event Description: (Examiner Cue) Once the TS determination is completed MUV-260 will close [MALF] (RCP-1C CBO isolation valve). The BOP will open the valve with SRO concurrence. Two minutes later RCP-1C will experience 1<sup>st</sup> and 2<sup>nd</sup> stage seal failures [MALF]. OP-302, RCP Operation, will direct securing the RCP immediately. AP-545 will be entered and actions performed.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (H-04-05) "RCP Seal Bleed Off High"</li> </ul> </li> <li>• Recognizes MUV-260 has closed</li> <li>• Reports failure to SRO</li> <li>• Reviews AR-403               <ul style="list-style-type: none"> <li>○ Maximum of 5 minutes to reopen the valve</li> </ul> </li> <li>• Requests permission to open the valve</li> <li>• Opens MUV-260</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists BOP in diagnosing the failure</li> <li>• Directs BOP to open MUV-260</li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (I-04-04) "RCP Seal Upper Stage Temp High"</li> </ul> </li> <li>• Reviews AR-501</li> <li>• Notifies SRO of failure</li> </ul>

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

Event Description: (Examiner Cue) Once the TS determination is completed MUV-260 will close [MALF] (RCP-1C CBO isolation valve). The BOP will open the valve with SRO concurrence. Two minutes later RCP-1C will experience 1<sup>st</sup> and 2<sup>nd</sup> stage seal failures [MALF]. OP-302, RCP Operation, will direct securing the RCP immediately. AP-545 will be entered and actions performed.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Assists the RO/BOP in diagnosing the failure</li> <li>• Directs the BOP to check the RCP Seal Data recorders</li> <li>• Enters OP-302, RCP Operation</li> <li>• Directs the BOP to:               <ul style="list-style-type: none"> <li>○ Monitor RCP seal conditions</li> <li>○ Verify proper service water, seal injection flows and temperatures</li> <li>○ Ensure CBO valve for affected pump is open</li> </ul> </li> <li>• Determines to immediately trip RCP-1C due to high seal stage temperature and differential pressure <math>\geq 2100</math> psig</li> <li>• Directs the RO/BOP to trip RCP-1C</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Assist in diagnosing alarms               <ul style="list-style-type: none"> <li>○ (H-04-05) "RCP Seal Bleed Off High"</li> <li>○ (I-04-04) "RCP Seal Upper Stage Temp High"</li> </ul> </li> <li>• Determines that seal outlet temperatures are <math>&gt; 180</math> degrees and seal differential pressure is <math>&gt; 2100</math> psig</li> <li>• Perform additional actions as directed by the SRO</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Enters AP-545, Plant Runback, and directs RO/BOP actions</li> </ul>

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

Event Description: (Examiner Cue) Once the TS determination is completed MUV-260 will close [MALF] (RCP-1C CBO isolation valve). The BOP will open the valve with SRO concurrence. Two minutes later RCP-1C will experience 1<sup>st</sup> and 2<sup>nd</sup> stage seal failures [MALF]. OP-302, RCP Operation, will direct securing the RCP immediately. AP-545 will be entered and actions performed.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Perform actions as directed by the SRO               <ul style="list-style-type: none"> <li>○ Ensure MFW flows are re-ratioing (very little change due to low power level)</li> <li>○ Ensure RCS pressure is stable</li> <li>○ Ensure Rx power is less than maximum based on FWPs</li> <li>○ Ensure narrow range Tc is selected to RCP-1D                   <ul style="list-style-type: none"> <li>• Selects TT3 on RC-5B-MS2</li> </ul> </li> <li>○ Ensure delta Tc stabilizes</li> <li>○ Ensure vital plant parameters are approaching stability                   <ul style="list-style-type: none"> <li>• Verifies PZR level, Tave and MS Hdr Pressure are normal (Rule 7, PZR Level Control, attached)</li> </ul> </li> <li>○ Verify rods are within 6.5% of their group average height</li> <li>○ Maintain imbalance within limits</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Perform actions as directed by the SRO               <ul style="list-style-type: none"> <li>○ Notify personnel of entry into AP-545</li> <li>○ Ensure narrow range RCS pressure control is selected to "B" RCS loop                   <ul style="list-style-type: none"> <li>• Verifies RCS pressure control is selected to "B" loop in SASS cabinets</li> </ul> </li> <li>○ Ensure lift oil pump running                   <ul style="list-style-type: none"> <li>• Verifies RCP-3C is running</li> </ul> </li> <li>○ Ensure regulating rod index is within insertion limits                   <ul style="list-style-type: none"> <li>• Refers to OP-103D</li> </ul> </li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 5/6 Rev.: 0

Event Description: (Examiner Cue) When the plant is stabilized, or following the shutdown of RCP-1C, a 30 gpm OTSG tube leak develops on the “B” OTSG [MT] . 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]

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Direct RO/BOP actions per EOP-6, OTSG Tube Rupture</li> <li>• Direct BOP to determine leak rate</li> <li>• May evaluate Emergency Plan entry</li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (H-01-05) “MN Steam Line A/B High Rad Monitor Fail”</li> <li>○ (H-02-02) “Atmospheric Monitor Warning”</li> <li>○ (H-02-01) “Atmospheric Radiation High”</li> </ul> </li> <li>• Determines &gt; 1gpm leak rate for EOP-06 entry</li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Execute EOP actions in accordance with SRO directions               <ul style="list-style-type: none"> <li>○ Maintain PZR level per Rule 7 (attached)</li> <li>○ Notify personnel</li> <li>○ Determine affected OTSG                   <ul style="list-style-type: none"> <li>• “B” is affected OTSG</li> </ul> </li> <li>○ Close MSV-56</li> <li>○ Maintain DFT level between 9 and 11 ft 6 in</li> <li>○ Ensure MBVs remain closed</li> <li>○ Concurrently perform EOP-14, Enclosure 17, attached</li> <li>○ Notify SPO to concurrently perform EOP-14, Enclosure 6</li> <li>○ Ensure MSR high pressure bundle valves are closed</li> <li>○ Verify ICS aligned for shutdown conditions</li> <li>○ Notify SPO to concurrently perform EOP-14, Enclosure 1</li> <li>○ When power &lt; 20% trip the main turbine, N/A</li> <li>○ Ensure generator output breakers open</li> <li>○ Ensure field breaker open and voltage regulator OFF</li> <li>○ Trip the reactor                   <ul style="list-style-type: none"> <li>• Adjust MS Hdr Pressure setpoint to 46</li> <li>• Manual Rx trip pushbutton will fail</li> <li>• <b>Breakers 3305 and 3312 must be opened [CT] prior to continuing past Step 3.27 (MSSV verification)</b></li> </ul> </li> </ul> </li> <li>○ Verify control rod groups inserted</li> </ul>

Op-Test No.: 1 Scenario No.: 3 Event No.: 5/6 Rev.: 0

Event Description: (Examiner Cue) When the plant is stabilized, or following the shutdown of RCP-1C, a 30 gpm OTSG tube leak develops on the "B" OTSG [MT] . 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]

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>○ Verify NIs indicate Rx is shutdown               <ul style="list-style-type: none"> <li>● Monitor PR and IR NIs</li> </ul> </li> <li>○ Verify MSSVs are closed               <ul style="list-style-type: none"> <li>● Checks steam safety valve monitor</li> </ul> </li> <li>○ Notify SPO to concurrently perform EOP-14, Enclosure 13</li> <li>○ Notify personnel</li> <li>○ Verify MSV-56 closed</li> <li>○ Verify CC cooling running in emergency mode</li> <li>○ Notify SPO to concurrently perform EOP-14, Enclosure 1</li> <li>○ Verify MUV-31 setpoint at 100 inches</li> <li>○ Select PZR heaters to off</li> <li>○ Bypass ES when any bypass permit exists</li> <li>○ Maintain adequate SCM               <ul style="list-style-type: none"> <li>● Start RCS depressurization</li> <li>● Fully open Spray valve                   <ul style="list-style-type: none"> <li>▪ Spray valve does not work and Aux spray is not aligned, PORV must be used</li> </ul> </li> <li>● Control HPI</li> <li>● Rule 2 &amp; Rule 7 (attached)</li> </ul> </li> <li>○ Start RCS boration               <ul style="list-style-type: none"> <li>● Ensure at least 1 post-filter in service</li> <li>● Open CAV-60, start CAP-1A or 1B</li> </ul> </li> <li>○ Bypass EFIC when either OTSG &lt; 725 psig</li> <li>○ Start RCS cooldown within normal limits using both OTSGs</li> <li>○ Verify OTSG levels at or trending to required level</li> <li>○ Determine if preferential steaming is required</li> <li>○ Ensure ES systems properly aligned</li> </ul>

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

Event Description: (Automatic Parameter Cue) After HPI is bypassed, approximately 2 minutes, MUP-1B will experience a bearing failure and eventually trip [MALF]. MUP-1C and its cooling water pumps must be started prior to losing subcooling margin [CT].

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Direct RO/BOP actions for loss of running MUP</li> <li>• Rule 7, PZR Level control (attached)               <ul style="list-style-type: none"> <li>○ Close MUV-49</li> <li>○ Ensure MUV-58 open</li> <li>○ Start required cooling water pumps for affected MUP</li> <li>○ Start ES selected MUP</li> </ul> </li> <li>• May use OP-402, Section 4.6 to start MUP-1C (either way is acceptable)</li> </ul>
	RO/BOP	<ul style="list-style-type: none"> <li>• Execute EOP actions in accordance with SRO directions</li> <li>• Rule 7, PZR Level control (attached)               <ul style="list-style-type: none"> <li>○ Ensure MUV-58 open</li> <li>○ Check closed MUV-49</li> <li>○ Start required cooling water pumps for affected MUP                   <ul style="list-style-type: none"> <li>• Starts RWP-3B</li> <li>• Starts DCP-1B</li> </ul> </li> <li>○ <b>Start ES selected MUP prior to losing subcooling margin [CT]</b> <ul style="list-style-type: none"> <li>• Starts MUP-1C</li> </ul> </li> <li>○ Maintain PZR level</li> </ul> </li> </ul>

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



**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
------------	-------------

- \_\_\_ 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:
    - \_\_\_ T<sub>in</sub>core < 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

Rx Power	> 25%	≤ 25%	Rx Shutdown
PZR Level Band	200 in – 240 in	120 in – 200 in	50 in – 120 in

- \_\_\_ Control PZR level using normal makeup and letdown flow.
- \_\_\_ Control letdown and MU flow
- \_\_\_ Cycle BWST to MUP valve as required to maintain MUT level  $\geq$  55 in.

#### NOTE

**The Rx shall be tripped when an RCS leak exceeds the capacity of normal makeup and a SGTR is not in progress.**

- \_\_\_ IF PZR level cannot be controlled  $\geq$  minimum level THEN establish HPI flow.
  - 1 \_\_\_ Close MUV-49
  - 2 \_\_\_ IF PZR level does NOT recover, THEN open MUV-24.
  - 3 \_\_\_ Notify SM to evaluate EP entry.
  - 4 \_\_\_ IF PZR level does NOT recover, THEN start second MUP and required cooling pumps.
- [Rule 5, Diesel Load Control]
- 5 \_\_\_ IF PZR level does NOT recover, THEN open additional HPI valves.
  - 6 \_\_\_ IF PZR level does NOT recover, THEN close MUP to MUT recircs.

- 
- \_\_\_ IF PZR level is  $\geq$  minimum level, AND adequate SCM exists THEN restore normal PZR conditions.
  - \_\_\_ IF letdown restoration is desired, THEN **CONCURRENTLY PERFORM** EOP-14, Enclosure 4, Letdown Recovery (if accessible).

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING**ACTIONSDETAILS

17.1 \_\_\_ Verify ES MCC 3AB is energized.

\_\_\_ IF ES MCC 3AB is NOT energized,  
THEN energize ES MCC 3AB.

1 \_\_\_ IF energized ES 480V Bus is powered from Diesel,  
THEN ensure Diesel load is  $\leq 3200$  KW.

2 \_\_\_ Depress transfer push button for ES MCC 3AB to energized bus.

***NOTE***

**A Train is preferred if ES has actuated with B ES 4160V Bus powered by B ES Diesel.**

17.2 \_\_\_ IF CC ventilation will be powered by a Diesel,  
THEN verify Diesel load is  $<$  Max Allowable Load on applicable Diesel.

Diesel Max Allowable Load	3280 KW
A ES Diesel Load	_____ KW
B ES Diesel Load	_____ KW
Alternate AC Diesel Load	_____ KW

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONS

DETAILS

17.3 \_\_\_ Align CC ventilation in recirc.

- Select "CONTROL COMPLEX HVAC ISOLATE/RESET" switches to "ISO":

\_\_\_ A Train

\_\_\_ B Train

17.4 \_\_\_ Verify CC isolation dampers are closed.

___ AHD-12
___ AHD-12D
___ AHD-2C
___ AHD-2E
___ AHD-1C
___ AHD-1E

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**ACTIONSDETAILS

17.5 \_\_\_ Ensure CC ventilation fans are shut down.

1 Stop Control Complex Return Fans:

A Train	B Train
___ AHF-19A	___ AHF-19B

2 Stop Control Complex Normal Duty Supply Fans:

A Train	B Train
___ AHF-17A	___ AHF-17B

***NOTE***

**A Train is preferred if ES has actuated with B ES 4160V Bus powered by B ES Diesel.**

17.6 \_\_\_ Start 1 train of CC ventilation in emergency recirc.

1 Start Control Complex Emergency Duty Supply Fans:

A Train	B Train
___ AHF-18A	___ AHF-18B

2 Start Control Complex Return Fans:

A Train	B Train
___ AHF-19A	___ AHF-19B



**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONS

DETAILS

17.7 \_\_\_ IF no EFIC fan is running,  
THEN start an EFIC Fan.

- \_\_\_ IF starting AHF-54A,  
THEN perform the following:
  - \_\_\_ Select "TEMP CONT. VV,  
CHV-113" switch to "MOD"  
position.
  - \_\_\_ Start AHF-54A
- \_\_\_ IF starting AHF-54B,  
THEN perform the following:
  - \_\_\_ Select "TEMP CONT. VV,  
CHV-100" switch to "MOD"  
position.
  - \_\_\_ Start AHF-54B

17.8 \_\_\_ Establish ventilation for  
chemistry sampling.

- Start 1 train of ventilation:

A Train	B Train
___ AHF-20A in "SLOW"	___ AHF-20B in "SLOW"
___ AHF-44A	___ AHF-44B
___ AHF-30 (if available)	

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONS

DETAILS

17.9 \_\_\_ IF all the following exist:

\_\_\_ CC chiller running

\_\_\_ Ventilation trains have  
NOT been shifted

THEN EXIT this enclosure.

***NOTE***

**A Train is preferred if ES has actuated with B ES 4160V Bus powered by B ES Diesel.**

17.10 \_\_\_ IF ES has actuated,  
AND all of the following exist:

\_\_\_ B ES 4160V Bus is  
powered by B ES Diesel

\_\_\_ B Train CC chiller will  
be started

\_\_\_ TBP-2 is running

THEN shutdown TBP-2

1 \_\_\_ Start TBP-3

2 \_\_\_ Select TBP-2 to "PULL TO LOCK".

3 \_\_\_ IF 4160V REACTOR AUX BUS 3 is  
NOT energized,  
THEN CONCURRENTLY  
**PERFORM** AP-770, Emergency  
Diesel Generator Actuation, beginning  
with Step 3.1

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONS

DETAILS

17.11 \_\_\_ Ensure at least 1 CC chiller Bkr is closed.

___ CHHE-1A
___ CHHE-1B

---

17.12 \_\_\_ Notify PPO to **PERFORM** the remainder of this enclosure.

---

17.13 \_\_\_ IF a CC chiller is running, THEN GO TO Step 17.26 in this enclosure.

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**ACTIONSDETAILS**STATUS****CC chiller not running.**

- 
- 17.14    \_\_\_ IF AHF-18A is running,  
          \_\_\_ THEN ensure chilled water is  
          properly aligned.
- \_\_\_ Ensure CHV-4  
      \_\_\_ "CC COOLER A OUTLET ISO"  
      is open  
      (164 ft CC between AHHE-5A and  
      AHHE-5B).
  - \_\_\_ Ensure CHV-2  
      \_\_\_ "CC COOLER B OUTLET ISO"  
      is closed  
      (164 ft CC by  
      Ventilation Room door).
- 
- 17.15    \_\_\_ IF AHF-18B is running,  
          \_\_\_ THEN ensure chilled water is  
          properly aligned.
- \_\_\_ Ensure CHV-2  
      \_\_\_ "CC COOLER B OUTLET ISO"  
      is open  
      (164 ft CC by  
      Ventilation Room door).
  - \_\_\_ Ensure CHV-4  
      \_\_\_ "CC COOLER A OUTLET ISO"  
      is closed  
      (164 ft CC between AHHE-5A and  
      AHHE-5B).

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONS

DETAILS

**STATUS**

**CC chiller startup required.**

17.16 \_\_\_ Notify Control Room to determine CC chiller to be started.

___ CHHE-1A
___ CHHE-1B

17.17 \_\_\_ IF CHHE-1A is selected, THEN ensure cooling water is aligned to CHHE-1A (164 ft CC above chillers).

1 \_\_\_ Ensure SWV-60 "SW ISO TO CHHE-1B" is closed.

2 \_\_\_ Ensure SWV-59 "SW ISO TO CHHE-1A" is open.

17.18 \_\_\_ IF CHHE-1B is selected, THEN ensure cooling water is aligned to CHHE-1B (164 ft CC above chillers).

1 \_\_\_ Ensure SWV-59 "SW ISO TO CHHE-1A" is closed.

2 \_\_\_ Ensure SWV-60 "SW ISO TO CHHE-1B" is open.

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONS

DETAILS

17.19 \_\_\_ Prepare desired CC chiller for startup.

- \_\_\_ Ensure "TEMPERATURE CONTROL POINT" is at marked setpoint.
- \_\_\_ Ensure "MAX. LOAD ADJUSTMENT IN %" is at 100
- \_\_\_ Ensure "PREROTATION VANES" switch is selected to "HOLD".
- \_\_\_ Depress "STOP-RESET" push button.
- \_\_\_ Ensure "AUX. OIL PUMP" switch is selected to "AUTO".
- \_\_\_ Record "OIL PRESSURE":  
   \_\_\_ psig
- \_\_\_ Verify "OIL HEATER" white light is lit.
- \_\_\_ Ensure "PURGE UNIT" switch is selected to "ON".
- \_\_\_ Verify "OIL/MOTOR TEMP" red light is off.

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**ACTIONSDETAILS

17.20 \_\_\_ Start chilled water pump.

1 \_\_\_ Notify Control Room to ensure adequate Diesel margin exists to start chilled water pump.

[Rule 5, Diesel Load Control]

2 Start chilled water pump for selected CC chiller:

\_\_\_ CHP-1A  
"A CHILLED WATER PUMP"  
(164 ft CC on wall north of CHHE-1A)\_\_\_ CHP-1B  
"B CHILLED WATER PUMP"  
(164 ft CC on wall south of  
CHHE-1B)

3 \_\_\_ Verify "CH WATER FLOW" amber light is off.

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONSDETAILS**NOTE**

High SW temperature during a LOCA can cause the CC Chiller to trip on high condenser pressure. 30 minute interlock timer prevents restarting the CC Chiller after initial starting.

17.21 \_\_\_ Start CC chiller compressor.

1 \_\_\_ Notify Control Room to ensure adequate Diesel margin exists to start CC chiller.

[Rule 5, Diesel Load Control]

2 \_\_\_ Depress "COMPRESSOR START" push button.

3 \_\_\_ Verify "AUX. OIL PUMP" white light is lit.

4 \_\_\_ Verify "OIL PRESSURE" raises to  $\approx$  35 psig above prestart "OIL PRESSURE" and record:

\_\_\_\_\_ psig

5 \_\_\_ Verify compressor auto starts after  $\approx$  30 sec time delay.

6 \_\_\_ Record CC chiller start time:

\_\_\_\_\_



**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**ACTIONSDETAILS

17.22 \_\_\_ Verify CC chiller operating conditions.

- \_\_\_ "OIL PRESSURE" 60 to 75 psig
- \_\_\_ "CONDENSER PRESSURE" 0 to 14.5 psig
- \_\_\_ "SYSTEM RUN" white light lit
- \_\_\_ "ANTI-RECYCLE" amber light lit
- \_\_\_ "AUX. OIL PUMP" white light off  $\approx$  3 min after compressor starts
- \_\_\_ All other lights off

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONS

DETAILS

- |  |  |
|--|--|
| <p>17.23 ___ <u>IF</u> at any time, while manually loading CC chiller, surging of load exists, <u>THEN</u> reduce load prior to subsequent reload.</p> | <p>1 ___ Jog "PREROTATION VANES" switch between "CLOSE" and "HOLD" until surging of load stops.</p> <p>2 ___ <u>WHEN</u> surging has stopped, <u>THEN</u> continue manually loading CC chiller.</p>  |
| <hr/>  |  |
| <p>17.24 ___ <u>WHEN</u> CC chiller has been running for &gt; 3 min, <u>THEN</u> manually load CC chiller.</p>   | <p>1 Jog "PREROTATION VANES" switch between "OPEN" and "HOLD" until <u>any</u> of the following exists:</p> <p>___ "CONDENSER PRESSURE" stabilizes at &lt; 14 psi.</p> <p>___ Jogging open "PREROTATION VANES" switch causes no rise in "CONDENSER PRESSURE"</p> <p>___ Chiller outlet temperature at CH-650-TI "CHHE-1A &amp; CHHE-1B OUTLET TEMPERATURE" is ≈ 50°F (164 ft CC by CHHE-1A).</p> <p>2 ___ Select "PREROTATION VANES" switch to "AUTO".</p> <p>3 ___ SELECT "PURGE UNIT" Control Switch to "OFF".</p> <p>4 ___ Notify Control Room that CC chiller is loaded.</p> |
| <hr/>  |  |
| <p>17.25 ___ <b>EXIT</b> this enclosure.</p>   |  |

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONS

DETAILS

***STATUS***

- **CC chiller running.**
- **Ventilation trains have been shifted.**

**NOTE**

- **If both CC coolers are isolated, the CC chiller may trip on low chilled water flow rate.**
- **If both CC coolers are in service, the chilled water pump may trip on overcurrent.**

17.26 \_\_\_ IF AHF-18A is running,  
THEN ensure chilled water is properly aligned.

1 \_\_\_ Throttle CHV-2  
"CC COOLER B OUTLET ISO"  
10 turns closed.  
(164 ft CC by Ventilation Room door).

2 \_\_\_ Throttle CHV-4  
"CC COOLER A OUTLET ISO"  
2 turns open.  
(164 ft CC between AHHE-5A and AHHE-5B).

3 \_\_\_ Close CHV-2  
"CC COOLER B OUTLET ISO".

4 \_\_\_ Open CHV-4  
"CC COOLER A OUTLET ISO".

**ENCLOSURE 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING (CONT'D)**

ACTIONS

DETAILS

**NOTE**

- **If both CC coolers are isolated, the CC chiller may trip on low chilled water flow rate.**
- **If both CC coolers are in service, the chilled water pump may trip on overcurrent.**

17.27 \_\_\_ IF AHF-18B is running,  
THEN ensure chilled water is  
properly aligned.

- 1 \_\_\_ Throttle CHV-4  
"CC COOLER A OUTLET ISO"  
10 turn closed.  
(164 ft CC between AHHE-5A and  
AHHE-5B).
- 2 \_\_\_ Throttle CHV-2  
"CC COOLER B OUTLET ISO"  
2 turns open.  
(164 ft CC by Ventilation Room door).
- 3 \_\_\_ Close CHV-4  
"CC COOLER A OUTLET ISO".
- 4 \_\_\_ Open CHV-2  
"CC COOLER B OUTLET ISO".

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17.28 \_\_\_ **EXIT** this enclosure.

Facility: <b>Crystal River #3</b>		Scenario No.: <u>4 (NRC 2011)</u>		Op-Test No.: <u>1</u>	
Examiners:		K. Schaaf		Operators:	
		P. Capehart		M. Broussard	
		D. Bacon		J. Jernigan	
				J. Kretz	
<p><u>Initial Conditions:</u> The plant is at 60% power due to CDP-1B magnetic coupling replacement.</p> <p><u>Turnover:</u> The following equipment is OOS: RWP-1 (6 hours); SWP-1C, emergency use only. Severe thunderstorms are predicted for Citrus and Levy counties.</p>					
Event No.	Malf. No.	Event Type*	Event Description		
1	1	I (BOP) TS (SRO)	MS-113-PT fails low. (OP-450) SRO TS determination. (TS 3.3.11)		
2	2	C (RO)	PZR level controller fails high. Manual level control required. (AI-505/OPS-NGGC-1000)		
3	3	I (RO)	PORV opens due to low range setpoint failure. (AI-505/AP-520/OPS-NGGC-1000)		
4	4	C (BOP) TS (SRO) N (BOP)	SWP-1A shaft shears, SWP-1B fails to automatically start. [CT] (AI-500) SRO TS determination (TS 3.7.7) Restore letdown		
5	5	R (RO) N (BOP)	EHC fluid reservoir leak. Rapid power reduction and manual turbine trip required. (AP-510/AP-660)		
6	6	M (ALL)	"A" OTSG steam leak in the RB following the turbine trip. (EOP-2)		
7	7	I (BOP)	Manual MFLI required. [CT] (EOP-5)		
8	8	C (RO)	EFV-58 fails as is, EFV-14 fuse blows. [CT] (EOP-13, Rule 3)		

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

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

Event Description: (Examiner Cue) Shortly after turnover MS-113-PT, the "B" OTSG pressure transmitter for the "D" EFIC Channel, fails low resulting in a Half-Trip of both "A" and "B" EFIC Trains for EFW, MSLI and MFWI. TS 3.3.11 Condition A and D are entered per Table 3.3.11-1. The CNO/PPO should be directed to bypass the "C" EFIC cabinet and contingency actions should be formulated. Once the channel is bypassed the EFIC Half-Trip can be reset.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announces and responds to alarms               <ul style="list-style-type: none"> <li>○ (H-06-01) "Steam Gen B Main Steam Iso Actuated"</li> <li>○ (H-06-02) "Steam Gen B Feedwater Iso Actuated"</li> <li>○ (H-06-03) "Emerg FW Actuation"</li> <li>○ (H-06-08) "EFIC Not Bypassed"</li> <li>○ Reviews AR</li> </ul> </li> <li>• Verifies EFIC actuation is not valid</li> <li>• Verifies no EFW equipment started</li> <li>• Notifies SRO of instrument malfunction</li> <li>• Calls PPO to check status of EFIC Channels</li> <li>• Coordinates bypassing of the "D" EFIC Channel with the PPO per OP-450, Section 4.16, as directed by the SRO               <ul style="list-style-type: none"> <li>○ May have the PPO come to the Control Room for a pre-job brief on Bypassing "D" EFIC Channel</li> <li>○ Verifies no RPS Channels bypassed</li> <li>○ When PPO places "D" Channel in "Bypass", verifies:                   <ul style="list-style-type: none"> <li>• Annunciator H-06-06 'EFIC BYPASS' received</li> <li>• Channel D - Event point 2028</li> </ul> </li> <li>○ DEPRESS "Test Results/ Reset" pushbutton on MCB for associated EFIC trains</li> <li>○ ENSURE EFIC channel half trip has RESET</li> <li>○ Depress Channel D low pressure bypass button</li> </ul> </li> <li>• Participates in mini brief if held by SRO</li> </ul>

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

Event Description: (Examiner Cue) Shortly after turnover MS-113-PT, the "B" OTSG pressure transmitter for the "D" EFIC Channel, fails low resulting in a Half-Trip of both "A" and "B" EFIC Trains for EFW, MSLI and MFWI. TS 3.3.11 Condition A and D are entered per Table 3.3.11-1. The CNO/PPO should be directed to bypass the "C" EFIC cabinet and contingency actions should be formulated. Once the channel is bypassed the EFIC Half-Trip can be reset.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Ensures BOP/RO verify that the EFIC actuation is not valid</li> <li>• Assists the BOP in diagnosing failure</li> <li>• Directs the BOP to have the PPO check EFIC Channels and report status</li> <li>• Enters TS 3.3.11, Condition A, 1 hour to bypass</li> <li>• Enters TS 3.3.11, Condition D, 72 hours to fix</li> <li>• Directs the BOP to bypass "D" EFIC Channel per OP-450</li> <li>• Once "D" EFIC Channel is "Bypassed", should hold mini brief to discuss the consequences of the failed transmitter on an EFW actuation.               <ul style="list-style-type: none"> <li>○ Contacts Work Controls to initiate repair efforts (may request the SM or STA to perform this)</li> </ul> </li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Verifies the EFIC actuation is not valid</li> <li>• Assists BOP in diagnosing failure</li> <li>• Participates in mini brief if held by SRO</li> </ul>

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

Event Description: (Examiner Cue) Once EFIC is reset the PZR level controller will fail high. **(MALF)** This will require manual PZR level control for the remainder of the scenario.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Acknowledge alarms               <ul style="list-style-type: none"> <li>◦ (I-07-01) "Pressurizer Level High"</li> </ul> </li> <li>• PZR Spray valve may open</li> <li>• Notifies SRO of MUV-31 controller failure</li> <li>• Takes manual control and lowers makeup flow</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges failure and directs RO to take manual control of MUV-31</li> </ul>



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

Event Description: (Examiner Cue) When PZR manual level control is established the PORV Low Range setpoint malfunctions. **(MALF)** The PORV will open and the RO must either select the PORV closed or close the PORV block valve. AP-520, Loss of RCS Coolant or Pressure, may be entered at the discretion of the SRO.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>• Acknowledge alarms               <ul style="list-style-type: none"> <li>○ (I-05-01) "PORV Safety Valve Open"</li> <li>○ (I-06-01) "PORV Solenoid Energized"</li> <li>○ (I-07-05) "RCS Press High Temp Low"</li> <li>○ Reviews AR-501</li> </ul> </li> <li>• Diagnoses PORV setpoint failure               <ul style="list-style-type: none"> <li>○ Closes PORV or PORV Block valve</li> <li>○ Monitors RCS pressure</li> </ul> </li> <li>• Informs SRO of failure</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assist in diagnosing PORV setpoint failure</li> <li>• Directs RO to close PORV or PORV Block valve</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Assists RO in diagnosing failure</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Evaluates TS for applicability               <ul style="list-style-type: none"> <li>○ TS 3.4.10 may be referenced (not required)</li> </ul> </li> <li>• Contacts work controls to initiate repair efforts</li> </ul>

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

Event Description: (Examiner Cue) Once the plant has stabilized SWP-1A shaft shears and SWP-1B fails to automatically start. **(MALF)** SWP-1B or SWP-1C must be manually started **[CT]**. TS 3.7.7, Condition A, should be entered. Letdown may isolate if an SW pump is not started expeditiously. If so OP-402 will be used to re-establish letdown.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (I-01-03) (I-02-03) (I-03-03) (I-04-03) "RC Pump Clg Wtr Flow Low"</li> <li>○ (C-02-05) "SW System Press Low"</li> </ul> </li> <li>• Note SW pressure and SW pump amps low</li> <li>• Diagnose sheared shaft on SWP-1A</li> <li>• Notifies SRO of failure</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• <b>Starts SWP-1B or SWP-1C within 5 minutes. [CT]</b></li> <li>• Stops SWP-1A</li> <li>• Letdown will probably be lost due to a high temperature isolation               <ul style="list-style-type: none"> <li>○ OP-402, Section 4.15, is attached if letdown recovery needed</li> </ul> </li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists RO/BOP with diagnosis of sheared shaft</li> <li>• Enters TS 3.7.7, Condition A, 72 hours, for one SW Pump inoperable</li> <li>• Contacts work controls to initiate repair efforts</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Reviews AR-303 and AR-501</li> <li>• Monitors temperatures of SW cooled components</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 5 Rev.: 0

Event Description: (Examiner Cue) After an SW pump is started and the TS actions addressed the EHC fluid reservoir will experience a leak. **(MALF)** The leak is slow enough to allow time to reduce power and trip the turbine without automatically tripping the reactor.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Announces and responds to alarms               <ul style="list-style-type: none"> <li>○ (N-06-03) "EH Fluid Tank Level Low"</li> <li>○ Reviews AR-602</li> </ul> </li> <li>• Direct SPO to investigate low EHC reservoir</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Assists BOP in diagnosing alarm</li> <li>• Once report from SPO is received will enter AP-510 and direct a power reduction to below the turbine trip setpoint.</li> <li>• Once power is low enough enters AP-660, Turbine Trip</li> </ul>
	RO	<ul style="list-style-type: none"> <li>• Performs actions of AP-510:               <ul style="list-style-type: none"> <li>○ Adjust ICS Load Rate as directed</li> <li>○ Adjust "Unit Load Master" to "10"</li> <li>○ Stops rapid power reduction when all Turbine Trip Bypass alarms are received.                   <ul style="list-style-type: none"> <li>▪ Selects "SG/RX Demand" to Hand and back to Auto</li> </ul> </li> <li>○ Maintains PZR level (Rule 7, attached)</li> <li>○ Verifies Imbalance within limits</li> <li>○ Maintain DFT level between 9 ft and 11 ft 6 in</li> <li>○ Selects "MAN" and "Close" on MBVs</li> </ul> </li> <li>• Performs actions of AP-660:               <ul style="list-style-type: none"> <li>○ Ensure RCS pressure is stable</li> <li>○ Ensure ICS runback is in progress</li> <li>○ Ensure TBVs and ADVs controlling header pressure</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 5 Rev.: 0

Event Description: (Examiner Cue) After an SW pump is started and the TS actions addressed the EHC fluid reservoir will experience a leak. (**MALF**) The leak is slow enough to allow time to reduce power and trip the turbine without automatically tripping the reactor.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Performs actions of AP-510:               <ul style="list-style-type: none"> <li>○ Notifies personnel</li> <li>○ Notifies Chemistry</li> <li>○ Notify SPO to isolate MSR Shell Drain Heat Exchangers</li> <li>○ Verifies Aux Transformer is not supplying any bus</li> </ul> </li> <li>• Performs actions of AP-660:               <ul style="list-style-type: none"> <li>○ Depress Main Turbine Trip push button</li> <li>○ Ensure TVs and GVs are closed</li> <li>○ Notify plant personnel</li> </ul> </li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 6/7 Rev.: 0

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"> <li>• Recognize indications of a steam leak in the RB               <ul style="list-style-type: none"> <li>○ Alarms</li> <li>○ RB pressure and temperature rising</li> <li>○ No RM-A6 rise</li> <li>○ No loss of RCS inventory</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Announce/acknowledge alarms               <ul style="list-style-type: none"> <li>○ (B-02-05) "RB Fan A Condensate High"</li> <li>○ (E-02-05) "RB Fan B Condensate High"</li> <li>○ (E-03-02) "Reactor Bldg Temp High"</li> </ul> </li> <li>• Monitors RB pressure, temperature and sump level</li> <li>• Verifies no rise in RM-A6</li> <li>• Verifies no loss of RCS inventory</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 6/7 Rev.: 0

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

Op-Test No.: 1 Scenario No.: 4 Event No.: 6/7 Rev.: 0

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

Op-Test No.: 1 Scenario No.: 4 Event No.: 8 Rev.: 0

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



Op-Test No.: 1 Scenario No.: 4 Event No.: 8 Rev.: 0

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"> <li>• Performs Rule 3, EFW/AFW Control</li> <li>• Attempts to close EFV-58</li> <li>• Determines that EFW flow is not controlled and depresses "Manual Permissive" on both channels</li> <li>• Selects close EFV-14</li> <li>• Recognizes that EFV-14 did not fully close               <ul style="list-style-type: none"> <li>○ Amber light only</li> <li>○ Flow indication on EF-25-FI1</li> </ul> </li> <li>• Requests permission from SRO to secure EFP-3</li> <li>• <b>Secures EFP-3 (CT) prior to violating the NDT curve or lowering RCS temp to &lt; 441° F (core lift concern).</b></li> <li>• Ensure ES equipment is properly aligned               <ul style="list-style-type: none"> <li>○ If RBIC has actuated and adequate SCM exists, then stop all RCPs</li> </ul> </li> <li>• Maintain PZR level (Rule 7, attached)</li> <li>• Notifies personnel of entry into EOP-5</li> <li>• If RCS temp remains &lt; 532° F then start RCS boration</li> <li>• Ensures proper MSLI and MFLI</li> <li>• Notify Chemistry to sample for tube leakage</li> <li>• Verify proper CC cooling</li> <li>• Minimizes RCS temperature changes</li> <li>• Minimizes RCS pressure changes</li> <li>• Verifies OTSG tube leakage ≤ 1 gpm</li> <li>• Ensures MSR HP bundle isolation valves are closed</li> <li>• Maintains minimum adequate SCM               <ul style="list-style-type: none"> <li>○ PZR Spray</li> <li>○ PORV</li> </ul> </li> </ul>

**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 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:  
  

<u>    </u> MUV-53	<u>    </u> MUV-257
--------------------	---------------------
    - IF recirc to RB sump is desired,  
THEN open HPI recirc to sump valves:  
  

<u>    </u> MUV-543	<u>    </u> MUV-544
<u>    </u> MUV-545	<u>    </u> 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:
    - \_\_\_ T<sub>in</sub>core < 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

Rx Power	> 25%	≤ 25%	Rx Shutdown
PZR Level Band	200 in – 240 in	120 in – 200 in	50 in – 120 in

- \_\_\_ Control PZR level using normal makeup and letdown flow.
- \_\_\_ Control letdown and MU flow
- \_\_\_ Cycle BWST to MUP valve as required to maintain MUT level ≥ 55 in.

## NOTE

The Rx shall be tripped when an RCS leak exceeds the capacity of normal makeup and a SGTR is not in progress.

- \_\_\_ IF PZR level cannot be controlled ≥ minimum level THEN establish HPI flow.
  - 1 \_\_\_ Close MUV-49
  - 2 \_\_\_ IF PZR level does NOT recover, THEN open MUV-24.
  - 3 \_\_\_ Notify SM to evaluate EP entry.
  - 4 \_\_\_ IF PZR level does NOT recover, THEN start second MUP and required cooling pumps.
- [Rule 5, Diesel Load Control]
- 5 \_\_\_ IF PZR level does NOT recover, THEN open additional HPI valves.
  - 6 \_\_\_ IF PZR level does NOT recover, THEN close MUP to MUT recircs.

- 
- \_\_\_ IF PZR level is ≥ minimum level, AND adequate SCM exists THEN restore normal PZR conditions.
  - \_\_\_ IF letdown restoration is desired, THEN CONCURRENTLY PERFORM EOP-14, Enclosure 4, Letdown Recovery (if accessible).

Section 4.15 Recovery From Letdown Isolation (Reference) [NOCS 000209]

IF recovery is due to high temperature THEN PROCEED to next step .....

IF NOT THEN GO TO Step 0 .....

IF MUDM-1A is in service, THEN PERFORM the following:

ENSURE CLOSED the following:

- MUV-133 MUDM-1B Inlet ..... 
MUV-201 1A to 1B Series ..... 
MUV-116 MUDM-1A Outlet.....

ENSURE OPEN the following:

- MUV-124 MUDM-1A Inlet ..... 
MUV-200 1B to 1A Series ..... 
MUV-117 MUDM-1B Outlet.....

IF MUDM-1B is in service, THEN PERFORM the following:

ENSURE CLOSED the following:

- MUV-124 MUDM-1A Inlet ..... 
MUV-200 1B to 1A Series ..... 
MUV-117 MUDM-1B Outlet.....

ENSURE OPEN the following:

- MUV-133 MUDM-1B Inlet ..... 
MUV-201 1A to 1B Series ..... 
MUV-116 MUDM-1A Outlet.....

ENSURE Block Orifice Isolation and Orifice Bypass are CLOSED:

ENSURE CLOSED the following:

- MUV-50 Block Orifice Isolation ..... 
MUV-51 Block Orifice Bypass .....

ENSURE two Letdown Coolers are being supplied by SW,  
AND Valve Alignment is arranged to cool letdown:

- MUHE-1A or MUHE-1C:
  - ENSURE OPEN SWV-47 .....
  - ENSURE OPEN SWV-50 .....
- MUHE-1B:
  - ENSURE OPEN SWV-48 .....
  - ENSURE OPEN SWV-49 .....

ENSURE a letdown flow path exists:

- ENSURE at least 1 prefilter in service .....
- OR
- MUV-194 is OPEN .....
- ENSURE at least 1 MU demin in service .....
- OR
- MUV-126 is OPEN .....
- OR
- Bypassed per Step 4.15.2 .....
- OR
- Bypassed per Step 4.15.3 .....
- ENSURE at least 1 Post-Filter in service .....
- OR
- MUV-100 is OPEN .....

ENSURE letdown isolation valves are OPEN:

- IF recovering from high temp,  
THEN SELECT "MUV-49 HIGH TEMP BYPASS" switch to  
"BYPASS" .....
- OPEN MUV-49 .....
- ENSURE OPEN MUV-567 .....



**NOTES**

- Letdown (LD) Cooler 1C is NOT normally aligned for service whenever Coolers 1A and 1B are both available. Normally LD Cooler “1C” will have its SW outlet closed (SWV-691, RB entry required for opening) and its primary inlet (MUV-498) closed with electrical power removed.
- Restoration of Letdown Coolers can be classified as a R2 Reactivity Manipulation or a R3 Reactivity Related Activity based on the expected reactivity impact due to component boron concentration.

**BEGIN R2/R3 REACTIVITY EVOLUTION**

IF it is desired to place “A” Letdown Cooler (MUHE-1A) in service,  
THEN PERFORM the following:

ENSURE OPEN the following:

- SWV-47, SW Inlet .....
- SWV-50, SW Outlet .....

OPEN MUV-38, Cooler Inlet .....

OPEN MUV-40, Cooler Outlet .....

IF it is desired to place “B” Letdown Cooler (MUHE-1B) in service,  
THEN PERFORM the following:

ENSURE OPEN the following:

- SWV-48, SW Inlet .....
- SWV-49, SW Outlet .....

OPEN MUV-39, Cooler Inlet .....

OPEN MUV-41, Cooler Outlet .....

**NOTE:** SW flow to Letdown (LD) Cooler 1C is set lower than LD Coolers 1A and 1B, therefore, letdown flow adjustments may be necessary to prevent high SW outlet temperatures.

IF either Letdown Cooler “A” or “B” can NOT be aligned for service,  
OR it is required to remove Letdown Cooler “A” or “B” from service,  
THEN PLACE Letdown Cooler “C” (MUHE-1C) in service as required:

THROTTLE OPEN SWV-691 1/2 turn .....

ENSURE OPEN the following:

- SWV-47, SW Inlet .....
- SWV-50, SW Outlet .....

CLOSE breaker for MUV-498, Reactor MCC 3A1, Bkr.D .....

OPEN MUV-498, Cooler Inlet .....

ENSURE OPEN MUV-505, Cooler Outlet .....

ESTABLISH desired letdown flow:

THROTTLE OPEN MUV-51 to 25 gpm and RAISE letdown flow 15 to 20 gpm each minute until desired flow is reached.....

OPEN MUV-50, Block Orifice Isolation.....

ADJUST MUV-51 for desired Letdown flow.....

WHEN letdown temperature is < 130°F,  
THEN SELECT "MUV-49 HIGH TEMP BYPASS" to "NORMAL" .....

IF MUDM-1A is to be returned to service,  
THEN PERFORM the following:

ENSURE OPEN the following:

- MUV-124 MUDM-1A Inlet .....
- MUV-116 MUDM-1A Outlet .....

ENSURE CLOSED the following:

- MUV-133 MUDM-1B Inlet .....
- MUV-117 MUDM-1B Outlet .....
- MUV-200 1B to 1A Series .....
- MUV-201 1A to 1B Series .....
- MUV-126 MU Demin Bypass Valve .....

IF MUDM-1B is to be returned to service,  
THEN PERFORM the following:

ENSURE OPEN the following:

- MUV-133 MUDM-1B Inlet .....
- MUV-117 MUDM-1B Outlet .....

ENSURE CLOSED the following:

- MUV-124 MUDM-1A Inlet .....
- MUV-116 MUDM-1A Outlet .....
- MUV-200 1B to 1A Series .....
- MUV-201 1A to 1B Series .....
- MUV-126 MU Demin Bypass Valve .....

**END R2/R3 REACTIVITY EVOLUTION**

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END OF SECTION