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

Examiners: _____ Operators: _____
_____ _____
_____ _____

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	4	C (RO)	FWV-40 malfunction requiring reactor trip. (AI-505)
6	5	C (RO)	Turbine fails to trip. **[CT]** (EOP-02)
7	6	M (ALL)	EFP-3 fails to start and ASV-5 fails to open. (EOP-13, Rule 3 & EOP-04)
8	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	• Recognize computer alarm o FWP thrust bearing temperature high (computer alarm does not come in until approximately 2 minutes after the failure is input) o Monitor rising thrust bearing temperature o (L-1-2) "FWP A Vibration High" o (L-3-4) "FWP Brg Oil Drain Temp High" o (L-3-5) "FWP Oil Clr Outlet Temp High" • Notifies the CRS of FWP computer and annunciator alarms
	SRO	• Evaluates FWP alarms • Makes determination to secure FWP-2A • Directs RO/BOP actions IAW AP-510 and/or AP-545 • Contacts work controls to initiate repair efforts

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
	BOP	• AP-510 actions: o Notifies plant personnel o Notifies Chemistry of power change o Verifies Imbalance within limits o Notifies SPO to isolate MSR Shell Drain Heat Exchangers (N/A) o When Rx power < 80% notifies SPO to ensure MS is supplying AS (N/A) o Notify PPO to align EFIC MFW isolation switches o Maintains DFT level between 9 and 11 feet 6 in o Ensures AUX transformer not supplying any bus ▪ Transfers loads to Startup transformer ▪ Performs EOP-14, Enclosure 23, Shutdown Electrical Lineup (attached) • AP-545 actions: o Notifies plant personnel o Notifies Chemistry of power change o Ensure regulating rod index is within limits o Notify PPO to align EFIC MFW isolation switches o Verifies Imbalance within limits

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	• AP-510 actions: o Adjusts load rate per CRS instructions o Adjusts Unit Load Master to 10 o Maintains PZR level (Rule 7, attached) o Ensures MBVs remain closed • Monitors plant parameters • AP-545 actions: o Ensure plant runback is in progress o Ensure proper FW valve positions • FWV-28 open • FWV-30 closed • FWV-29 closed o Ensure reactor power is less than maximum • Manually lowers power to <1174 MWt o Ensure vital plant parameters are approaching stability o Verify rods with ± 6.5% of group average • Monitors plant parameters

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	• Acknowledge alarms o (A-8-3) "SW RW Pump A Motor Overload" o (C-3-5) "SW RW System Pressure Low" o (A-8-2) "SW RW Pump B Trip" o Reviews AR-304 • Checks for common cause failure prior to starting RWP-2B • Notifies SRO of RWP-2A failure
	SRO	• Evaluates possible common cause failure concerns
	BOP	• Directs PPO to check RWP-2A and report back • Informs SRO of SW leak • Directs PPO to isolate SW to RWP-2A • Places RWP-2A in PTL or directs PPO to open DC knife switch • Starts RWP-2B
	SRO	• Directs BOP to start RWP-2B • Directs isolation of SW to RWP-2A • Directs BOP to secure RWP-2A • Evaluates TS for applicability o TS 3.7.9, Condition A o TS 3.8.1, Required Action B2, is applicable • Contacts work controls to initiate repair efforts

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-1BA. 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	• Announces and responds to alarms associated with the loss of the "B" ES 4160V bus • Performs the followup actions of AP-770 as directed o Ensures letdown flow path o Notifies plant personnel o Ensures an SWP is running o Ensures RWP-1 is running o Verifies a MUP running o Verifies MUP cooling pumps running o Performs EOP-14, Enclosure 4, Letdown Recovery (attached) if letdown restoration is desired (N/A) o Verifies 4160V Reactor Aux Bus 3 is energized o Ensures ES MCC 3AB is energized o Verifies proper CC cooling ▪ Performs EOP-14, Enclosure 17 (not required, "A" train ventilation in service) o Ensure RB cooling in service ▪ Closes SWV-151, 152 & 355 ▪ Opens SWV-353 & 354 o Additional actions as directed
	RO	• Maintains reactor power $\leq$ 100% • Monitors plant parameters

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-1BA. 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
	SRO	• Enters AP-770 and directs followup actions • Directs BOP to start RWP-1 and have PPO monitor its operation • Evaluates TS for applicability o TS 3.8.9, Condition A o TS 3.0.3, plant shutdown required due to loss of both safety related RWPs • Directs RO to start a plant shutdown per AP-510 • Contacts work controls to initiate repair efforts

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	• Starts power reduction o Adjusts load rate per CRS instructions o Adjusts Unit Load Master to 10 o Maintains PZR level (Rule 7 attached) • Monitors plant parameters
	SRO	• Directs RO/BOP actions IAW AP-510

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-1BA. 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	• Performs actions as directed o Notifies plant personnel o Notifies Chemistry of power change o Verifies Imbalance within limits o Notifies SPO to isolate MSR Shell Drain Heat Exchangers o When Rx power < 80% notifies SPO to ensure MS is supplying AS (N/A) o Maintains DFT level between 9 and 11 feet 6 in o Ensures AUX transformer not supplying any bus ▪ Transfers loads to Startup transformer ▪ Performs EOP-14, Enclosure 23, Shutdown Electrical Lineup (attached)

Op-Test No.: 1 Scenario No.: 1 Event No.: 5 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	• Recognize lower MFW flow o SU flow lowering o Valve position indication o LLBV closing • May attempt to raise flow with the FWV-40 control station • May attempt to open FWV-31 • Notifies CRS of feedwater flow malfunction
	SRO	• Assists in diagnosing lowering FW flow • Directs the RO to trip the reactor and perform EOP-02 actions
	BOP	• Assists in diagnosing lowering FW flow
	RO	• Manually trips the reactor when directed o Depresses Rx trip push button o Verifies CRD groups 1 through 7 are fully inserted o Verifies Nis indicate the Rx is shutdown o Verifies SPDS is available

Op-Test No.: 1 Scenario No.: 1 Event No.: 6 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	• Performs Immediate Actions of EOP-2 o Depresses Main Turbine trip push button o Verifies TVs and GVs are closed ▪ **Closes MSIVs when turbine does not trip (CT)**
	SRO	• Directs the BOP to ensure EFW is operating • Enters EOP-2 and verifies Immediate Actions are complete
	BOP	• Verifies EFW is operating o EOP-13, Rule 3
	ALL	• Perform symptom scan

Op-Test No.: 1 Scenario No.: 1 Event No.: 7/8 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	• Respond to important alarms • Diagnoses EFP-3 failure o Attempts to start EFP-3 • Diagnoses EFP-2 failure o (H-7-3) "EF Pump 2 Start Failure" • Attempts to open ASV-5 (prompt and prudent action) • May attempt to open ASV-204 • Reports failures to SRO • Performs actions as directed from EOP-4 o Notify personnel o **Start EFP-1 per EOP-14, Enclosure 7 (CT)** (Enclosure 7 attached) • Notifies PPO to perform EOP-14, Enclosure 2 • Maintain PZR level o Adjust MUV-31 to 100 inches (Rule 7 attached) o Record Tincore temp o Minimize RCS pressure rise o Secure RCP-1A if adequate SCM exists
	SRO	• Assists in diagnosing EF pump failures • Directs RO/BOP to open ASV-204 • Evaluates loss of all feedwater o May enter EOP-04 at this time, or o May wait until symptoms are apparent • Direct actions of EOP-04 o Directs RO/BOP to perform EOP-14, Enclosure 7 (attached)

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:

___ 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_{incore} < 400°F,
  AND cooldown rate exceeds ITS limit

  ___ RCPs off,
  AND HPI flow exists

  THEN perform required PTS actions.

- ___ Throttle HPI flow to minimize adequate SCM.
- ___ Throttle LPI flow to minimize adequate SCM.
- ___ PTS is applicable until an Engineering evaluation has been completed.

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

STATUS

EFP-3 not running.

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 ≤ 200 psig, AND adequate primary to secondary heat transfer exists, THEN stop RCS cooldown.

- Control OTSG PRESS using TBVs and ADVs.

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

STATUS
EFP-1 available.

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 ≤ 12½ 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	≤ 390 gpm
No RCPs running	≤ 200 gpm

• ___ IF adequate SCM exists, AND OTSG level is > 12½ 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)

ACTIONS DETAILS

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 > 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)

ACTIONS	DETAILS
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 ≤ 12½ 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: ≤ 390 gpm No RCPs running: ≤ 200 gpm ___ Maintain total AFW flow < 600 gpm • ___ IF adequate SCM exists, AND OTSG level is > 12½ 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

ACTIONS	DETAILS
23.1 ___ IF Bkr 3101 is closed, THEN transfer A 6900V BUS to the START UP transformer.	1 ___ Select "AUTO TRANSFER 3103" to "MAN". 2 ___ Close Bkr 3103 3 ___ Open Bkr 3101
23.2 ___ IF Bkr 3201 is closed, THEN 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
23.3 ___ IF Bkr 3102 is closed, THEN transfer B 6900V BUS to the START UP transformer.	1 ___ Select "AUTO TRANSFER 3104" to "MAN". 2 ___ Close Bkr 3104 3 ___ Open Bkr 3102
23.4 ___ IF Bkr 3202 is closed, THEN 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

23.5 ___ **EXIT** this enclosure.

Facility: **Crystal River Unit #3** Scenario No.: 2 (NRC – 2011) Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: The plant is at 75% power due to CWP-1D bearing replacement.

Turnover: The following equipment is degraded: RWP-1, emergency use only. Severe thunder storms predicted for Citrus and Levy counties.

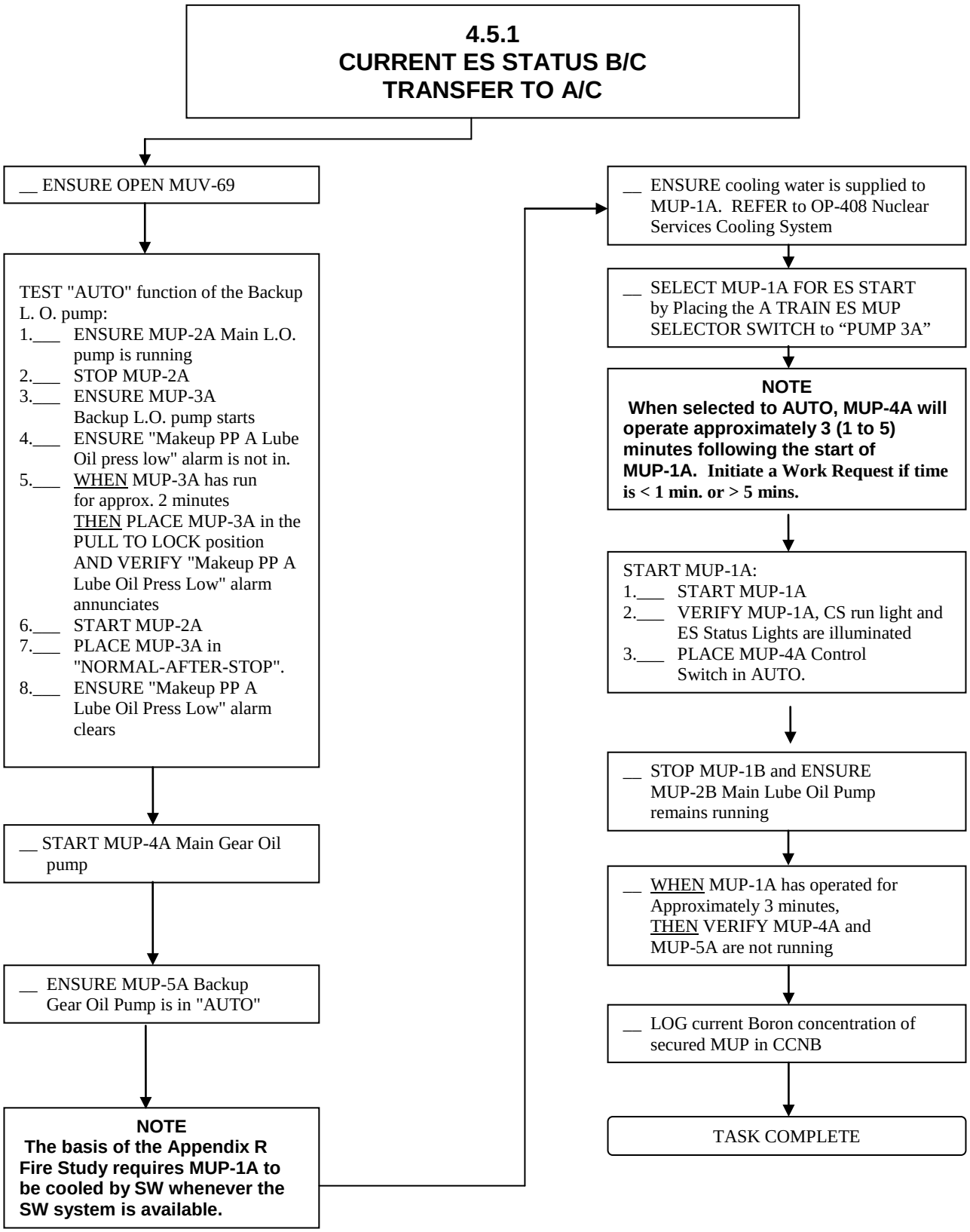
Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N (BOP)	Start MUP-1A, secure MUP-1B. (OP-402)
2	1	TS (SRO)	Dropped rod. (AP-545) SRO TS determination. (TS 3.1.4 & 3.1.5)
3	2	TS (SRO)	"A" SPDS monitor fails. SRO TS determination. (TS 3.3.17)
4	3	C (BOP)	SWV-80 (SW inlet to RCP-1A) fails closed. RCP must be secured within 5 minutes. **[CT]** (OP-302, AP-545)
5	4	C (RO)	"A" FW main block valve fails to close when RCP-1A is secured. (AI-500)
6	N/A	R (RO)	Manually reduce power to 45%. (AP-545)
7	5	M (ALL)	PZR steam space leak. (AP-520)
8	6	I (RO)	RPS fails to actuate. **[CT]** (EOP-02)
9	N/A	C (BOP)	Loss of SCM. Trip all RCPs within 1 minute. **[CT]** (EOP-3, EOP-13)
10	7	C (BOP)	MUV-27 failure to close. (EOP-3)

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

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

Event Description: (Per turnover sheet) Shortly after turnover is complete the BOP will start MUP-1A and secure MUP-1B per engineering request.

Time	Position	Applicant's Actions or Behavior
	BOP	• Start MUP-1A and secure MUP-1B IAW OP-402, Section 4.5.1 **(next page)**
	RO	• Peer check BOP manipulations


4.5.1
CURRENT ES STATUS B/C
TRANSFER TO A/C
__ ENSURE OPEN MUV-69
TEST "AUTO" function of the Backup L. O. pump:
1.___ ENSURE MUP-2A Main L.O. pump is running
2.___ STOP MUP-2A
3.___ ENSURE MUP-3A Backup L.O. pump starts
4.___ ENSURE "Makeup PP A Lube Oil press low" alarm is not in.
5.___ WHEN MUP-3A has run for approx. 2 minutes THEN PLACE MUP-3A in the PULL TO LOCK position AND VERIFY "Makeup PP A Lube Oil Press Low" alarm annunciates
6.___ START MUP-2A
7.___ PLACE MUP-3A in "NORMAL-AFTER-STOP".
8.___ ENSURE "Makeup PP A Lube Oil Press Low" alarm clears
__ START MUP-4A Main Gear Oil pump
__ ENSURE MUP-5A Backup Gear Oil Pump is in "AUTO"
NOTE
The basis of the Appendix R Fire Study requires MUP-1A to be cooled by SW whenever the SW system is available.
__ ENSURE cooling water is supplied to MUP-1A. REFER to OP-408 Nuclear Services Cooling System
__ SELECT MUP-1A FOR ES START by Placing the A TRAIN ES MUP SELECTOR SWITCH to "PUMP 3A"
NOTE
When selected to AUTO, MUP-4A will operate approximately 3 (1 to 5) minutes following the start of MUP-1A. Initiate a Work Request if time is < 1 min. or > 5 mins.
START MUP-1A:
1.___ START MUP-1A
2.___ VERIFY MUP-1A, CS run light and ES Status Lights are illuminated
3.___ PLACE MUP-4A Control Switch in AUTO.
__ STOP MUP-1B and ENSURE MUP-2B Main Lube Oil Pump remains running
__ WHEN MUP-1A has operated for Approximately 3 minutes, THEN VERIFY MUP-4A and MUP-5A are not running
__ LOG current Boron concentration of secured MUP in CCNB
TASK COMPLETE

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

Event Description: (Examiner Cue) When MUP-1A has been started a safety rod will drop. **(MALF)** AP-545 will be entered but no actions need to be taken. SRO TS determination only. TS 3.1.4 and 3.1.5 will be entered.

Time	Position	Applicant's Actions or Behavior
	RO	• Recognizes dropped control rod • Acknowledges alarms o (J-2-3) CRD Out Inhibit o (J-2-4) CRD Asymmetric Alarm o (K-4-2) Asymmetric Rod Runback o Reviews AR-502 • Notifies CRS
	SRO	• Enter AP-545 and direct RO/BOP actions • Enter TS 3.1.4 and 3.1.5
	RO	• Performs the actions of AP-545 o Ensures plant runback in progress o Ensures stable RCS pressure o Ensures maximum power based on RCPs ▪ 1565 MWt o Ensures stable vital plant parameters ▪ PZR level ▪ Tave ▪ Main Steam header pressure
	BOP	• Perform actions as directed by the SRO o Notify plant personnel o Notifies Reactor Engineer o Verifies QPT limits o Notifies Chemistry o Ensures regulating rod index within limits o Verifies adequate SDM o Verifies imbalance within limits

Op-Test No.: 1 Scenario No.: 2 Event No.: 3 Rev.: 00

Event Description: (Examiner Cue) After the plant is stable the "A" SPDS monitor fails. **(MALF)** SRO TS call only. Plant control is not affected.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	• Notifies CRS of SPDS monitor failure
	SRO	• Evaluates TS for applicability o Enters TS 3.3.17, Condition A for Function 21

Op-Test No.: 1 Scenario No.: 2 Event No.: 4 Rev.: 00

Event Description: (Examiner Cue) After TS actions are addressed SWV-80 will fail closed. **(MALF)** RCP-1A must be secured within 5 minutes. **[CT]**

Time	Position	Applicant's Actions or Behavior
	RO	• Acknowledges alarm o (I-1-3) "RCP A Clg Wtr Flow Low" o Reviews AR-501 • Discusses expected plant response when RCP-1A is secured o FWV-30 closure o Approximately double the amount of FW flow on the "B" Train vs "A" Train o "A" MFWP swap to delta P control
	SRO	• Directs BOP to trip RCP-1A • Enter AP-545 and direct RO/BOP actions
	BOP	• Assist in diagnosing alarms • Attempts to open SWV-80 • **Trips RCP-1A within 5 minutes of SWV-80 closure [CT]** • Perform actions as directed by the SRO o Notify plant personnel o Ensure narrow range Tc correctly selected ▪ Selects RC-5A-MS2 to TT3 o Notifies Chemistry o Checks rod index o Verifies imbalance within limits

Op-Test No.: 1 Scenario No.: 2 Event No.: 4 Rev.: 00

Event Description: (Examiner Cue) After TS actions are addressed SWV-80 will fail closed. **(MALF)** RCP-1A must be secured within 5 minutes. **[CT]**

Time	Position	Applicant's Actions or Behavior
	RO	• Performs actions as directed IAW AP-545 o Ensure plant runback in progress o Ensure MFW flows re-ratioing o Ensure RCS pressure is stable o Ensure maximum power less than 45% o Ensure narrow range Tc correctly selected ▪ Selects RC-5A-MS2 to TT3 o Ensure delta Tc stabilizes o Ensure vital plant parameters approaching stability o Ensures lift oil pump running o Verifies rods within 6.5% of group average

Op-Test No.: 1 Scenario No.: 2 Event No.: 5 Rev.: 00

Event Description: (Conditional failure) When RCP-1A is secured the "A" FW train main block valve (FWV-30) will not close automatically. **(MALF)** The OAC will select the MBV toggle switch to manual and close the block valve. The plant should be stabilized at approximately the initial power level.

Time	Position	Applicant's Actions or Behavior
	RO	• Recognizes FWV-30 failure to close • Notifies CRS • Closes FWV-30 manually o Ensures "A" MFWP swap to delta P control • Stabilizes plant parameters
	SRO	• Assist RO in diagnosing MFW valve problem • Directs RO to stabilize plant parameters • Should perform crew briefing prior to closing FWV-30
	BOP	• Assists RO with MFW valve failure

Op-Test No.: 1 Scenario No.: 2 Event No.: 6 Rev.: 00

Event Description: Power must be manually reduced to 45% power due the dropped rod coincident with the loss of RCP-1A.

Time	Position	Applicant's Actions or Behavior
	RO	• Lowers power to $\leq$ 1174 MWt
	SRO	• Direct power reduction to $\leq$ 1174 MWt

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

Event Description: (Examiner Cue) Following the manual power reduction 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]**.

Time	Position	Applicant's Actions or Behavior
	RO	• Diagnose RCS leak o RCS pressure lowering o All heaters energized o (H-1-1) "Gamma Radiation High" o (H-1-2) "Gamma Monitor Warning" o (H-2-1) "Atmospheric Radiation High" o (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** o **The reactor must be tripped within 1 minute of exceeding an RPS trip setpoint [CT]** • When the Rx is tripped, performs EOP-02 Immediate Actions o Depress Rx Trip pushbutton o Verifies CRD groups 1 thru 7 fully inserted o Verifies NIs indicate Rx is shutdown o Verifies SPDS is available o Depress Turbine Trip pushbutton o 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.: 7/8 Rev.: 0

Event Description: (Examiner Cue) Following the manual power reduction 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]**.

Time	Position	Applicant's Actions or Behavior
	SRO	• 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 (reduce leakage to within limits in $\leq$ 4 hours) • 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 o Check for Station Black Out o Check for Inadequate Sub Cooling Margin o Check for Inadequate Heat Transfer o Check for Excessive Heat Transfer o Check for OTSG Tube Rupture

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

Event Description: (Examiner Cue) Following the manual power reduction 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]**.

Time	Position	Applicant's Actions or Behavior
	BOP	• Attempts to quantify leak rate • Perform actions of AP-520 as directed by SRO o Notify Personnel ▪ PA announcement ▪ SPO/PPO contacted via radio o Verify OTSG leakage has not increased ▪ Checks RM-A12 (Condenser Vacuum Pump Exhaust Monitor) ▪ Checks RM-G25, RM-G26, RM-G27, & RM-G28 for increase (OTSG RAD Monitors) o Concurs significant increase in RCS leakage exists o 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.: 2 Event No.: 9/10 Rev.: 00

Event Description: The PZR steam space leak will eventually cause a loss of adequate SCM event and EOP-03 will be entered. The RCPs must be secured within one minute [**CT**].

Time	Position	Applicant's Actions or Behavior
	RO/BOP	• Recognizes when SCM is lost • Notifies SRO • Performs Rule 1, Loss of SCM (attached) ▪ **Trips all RCPs within 1 minute (CT)** o Manually actuate ES ▪ Depresses HPI MAN ACT push buttons on both trains ▪ Depresses RB ISO MAN ACTUATION push buttons on both trains o Depresses ISCM push buttons for EFIC channels A and B o Ensures Tincore is selected on SPDS • Verify ES actuations o MUV-27 did not close as expected ▪ Close MUV-27 • Performs follow-up actions of EOP-03 as directed. • Respond to important alarms
	SRO	• Enters EOP-3, Loss of SCM • Directs RO/BOP to perform Rule 1 & Rule 3 • Directs RO/BOP through followup actions of EOP-3

This scenario may be terminated when EOP Rules 1 and 3 are implemented and verified.

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:

___ 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:

  ___ Tincore < 400°F,
  AND cooldown rate exceeds ITS limit

  ___ RCPs off,
  AND HPI flow exists

  THEN perform required PTS actions.

- ___ Throttle HPI flow to minimize adequate SCM.
- ___ Throttle LPI flow to minimize adequate SCM.
- ___ PTS is applicable until an Engineering evaluation has been completed.

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).

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

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: The plant is in Mode 2 at ≈ 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 Gas fails low. 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-6)
6	6	C (RO)	Manual Rx trip pushbutton failure. **[CT]** (EOP-6)
7	7	C (BOP)	"B" MUP bearing degradation and pump trip. **[CT]** (EOP-6, 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	• Announce/acknowledge alarms o (K-03-02) "SASS Mismatch" (RC Press mismatch) o (J-03-01) "RCS Press High" o Reviews AR-502 • PZR Spray valve opens o PZR Spray or Block valve will be closed • PZR PORV opens o PORV or PORV block valve will be closed • Verifies the plant is stable • Notifies SRO of failure
	SRO	• Assists the RO in diagnosing the failed pressure transmitter • Enters TS 3.3.1, Condition A, for RPS Channel A • May enter AP-520 to verify correct prompt and prudent actions taken • Direct selection of alternate pressure transmitter IAW OP-501 • Direct bypassing RPS Channel A IAW OP-507 • Contacts work controls to initiate repair efforts

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	• Assists RO in diagnosing the failed pressure transmitter • Assists RO in verifying the plant is stable • Reviews alarms • Selects alternate pressure transmitter IAW OP-501 o PZR heaters to Hand o RCV-14 to manual o RCV-10 closed o RC Pressure signal select switch to RPS-B position o PZR heaters to Auto o RCV-14 to Auto o RCV-10 to Auto • Bypasses RPS Channel A IAW OP-507 o Reposition channel bypass key switch in RPS Channel A o Verify J-05-03 annunciated o Verify EP 0965

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

Event Description: (Examiner Cue) Once the RPS channel is bypassed RM-A6 Gas monitor fails low. The SRO should evaluate TS 3.4.14. No TS actions are required as long as RM-A6 Particulate monitor is operable.

Time	Position	Applicant's Actions or Behavior
	BOP	• Acknowledge alarm o (H-02-02) "Atmospheric Monitor Warning" o Review AR • Inform SRO of RM-A6 Gas failure
	SRO	• TS 3.4.14, RCS Leak Detection, will be evaluated for applicability. No TS actions are required as long as the particulate monitor remains operable.

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 1st and 2nd 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	• Announce/acknowledge alarms o (H-04-05) "RCP Seal Bleed Off High" • Recognizes MUV-260 has closed • Reports failure to SRO • Reviews AR-403 o Maximum of 5 minutes to reopen the valve • Requests permission to open the valve • Opens MUV-260
	SRO	• Assists BOP in diagnosing the failure • Directs BOP to open MUV-260
	RO/BOP	• Announce/acknowledge alarms o (I-04-04) "RCP Seal Upper Stage Temp High" • Reviews AR-501 • Notifies SRO of failure

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 1st and 2nd 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	• 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: o Monitor RCP seal conditions o Verify proper service water, seal injection flows and temperatures o Ensure CBO valve for affected pump is open • Determines to immediately trip RCP-1C due to high seal stage temperature and differential pressure $\geq$ 2100 psig • Directs the RO/BOP to trip RCP-1C
	BOP	• 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	• Enters AP-545, Plant Runback, and directs RO/BOP actions

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 1st and 2nd 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	• Perform actions as directed by the SRO o Ensure MFW flows are re-ratioing (very little change due to low power level) o Ensure RCS pressure is stable o Ensure Rx power is less than maximum based on FWPs o Ensure narrow range Tc is selected to RCP-1D • Selects TT3 on RC-5B-MS2 o Ensure delta Tc stabilizes o Ensure vital plant parameters are approaching stability • Verifies PZR level, Tave and MS Hdr Pressure are normal (Rule 7, PZR Level Control, attached) o Verify rods are within 6.5% of their group average height o Maintain imbalance within limits
	BOP	• Perform actions as directed by the SRO o Notify personnel of entry into AP-545 o Ensure narrow range RCS pressure control is selected to "B" RCS loop • Verifies RCS pressure control is selected to "B" loop in SASS cabinets o Ensure lift oil pump running • Verifies RCP-3C is running o Ensure regulating rod index is within insertion limits • Refers to OP-103D

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	• Direct RO/BOP actions per EOP-6, OTSG Tube Rupture • Direct BOP to determine leak rate • May evaluate Emergency Plan entry

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
	RO/BOP	• Execute EOP actions in accordance with SRO directions o Maintain PZR level per Rule 7 (attached) o Notify personnel o Determine affected OTSG • "B" is affected OTSG o Close MSV-56 o Maintain DFT level between 9 and 11 ft 6 in o Concurrently perform EOP-14, Enclosure 17, attached o Notify SPO to concurrently perform EOP-14, Enclosure 6 o Notify SPO to concurrently perform EOP-14, Enclosure 1 o Trip the reactor • Adjust MS Hdr Pressure setpoint to 46 • Manual Rx trip pushbutton will fail • **Breakers 3305 and 3312 must be opened [CT]** o Verify control rod groups inserted o Verify NIs indicate Rx is shutdown • Monitor PR and IR NIs o Verify MSSVs are closed • Checks steam safety valve monitor o Verify CC cooling running in emergency mode o Verify MUV-31 setpoint at 100 inches o Select PZR heaters to off o Bypass ES when any bypass permit exists o Maintain adequate SCM • Start RCS depressurization • Fully open Spray valve • Control HPI • Rule 2 & Rule 7 (attached) o Start RCS boration • 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.: 3 Event No.: 7 Rev.: 0

Event Description: (Examiner Cue) After HPI is bypassed MUP-1B will experience a bearing failure and eventually trip **[MALF].** MUP-1C and its cooling water pumps must be started **[CT].**

Time	Position	Applicant's Actions or Behavior
	SRO	• Direct RO/BOP actions for loss of running MUP • Rule 7, PZR Level control (attached) o Close MUV-49 o Ensure MUV-58 open o Start required cooling water pumps for affected MUP o Start ES selected MUP • May use OP-402, Section 4.6 to start MUP-1C (either way is acceptable)
	RO/BOP	• Execute EOP actions in accordance with SRO directions • Rule 7, PZR Level control (attached) o Ensure MUV-58 open o Check closed MUV-49 o Start required cooling water pumps for affected MUP • Starts RWP-3B • Starts DCP-1B o **Start ES selected MUP prior to PZR emptying [CT]** • Starts MUP-1C o Maintain PZR level

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 ≤ 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:

  ___ Tincore < 400°F,
  AND cooldown rate exceeds ITS limit

  ___ RCPs off,
  AND HPI flow exists

  THEN perform required PTS actions.

- ___ Throttle HPI flow to minimize adequate SCM.
- ___ Throttle LPI flow to minimize adequate SCM.
- ___ PTS is applicable until an Engineering evaluation has been completed.

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 17 CONTROL COMPLEX EMERGENCY VENTILATION AND COOLING

ACTIONS	DETAILS
0.1 ___ 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 ≤ 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.

0.2 ___ 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
0.3	___ Align CC ventilation in recirc.	• Select "CONTROL COMPLEX HVAC ISOLATE/RESET" switches to "ISO": ___ A Train ___ B Train

---

0.4	___ 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)

ACTIONS	DETAILS
0.5 ___ 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.

0.6 ___ 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
0.7 ___ 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
0.8 ___ 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

0.9 ___ 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.

0.10 ___ 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
0.11	___ Ensure at least 1 CC chiller Bkr is closed.	___ CHHE-1A ___ CHHE-1B
0.12	___ Notify PPO to **PERFORM** the remainder of this enclosure.	
0.13	___ IF a CC chiller is running, THEN **GO TO** Step 0.26 in this enclosure.	

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

ACTIONS	DETAILS

STATUS

CC chiller not running.

0.14 ___ 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).

0.15 ___ 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.

0.16 ___ Notify Control Room to determine CC chiller to be started.

___ CHHE-1A
___ CHHE-1B

0.17 ___ 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.

0.18 ___ 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
0.19 ___ 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)

ACTIONS	DETAILS
0.20 ___ 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)

ACTIONS	DETAILS
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.	
0.21 ___ 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 ≈ 35 psig above prestart "OIL PRESSURE" and record: _____ psig 5 ___ Verify compressor auto starts after ≈ 30 sec time delay. 6 ___ Record CC chiller start time: _____

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

ACTIONS	DETAILS
0.22 ___ 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 ≈ 3 min after compressor starts • ___ All other lights off

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

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

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.**

0.26 ___ 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.**

0.27 ___ 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".

0.28 ___ **EXIT** this enclosure.

Facility: **Crystal River #3** Scenario No.: 4 (NRC 2011) Op-Test No.: 1

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: The plant is at 60% power due to CDP-1B magnetic coupling replacement.

Turnover: The following equipment is OOS: RWP-1 (6 hours); SWP-1C, emergency use only. Severe thunderstorms are predicted for Citrus and Levy counties.

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-500)
3	3	I (RO)	PORV opens due to low range setpoint failure. (AI-500/AP-520)
4	4	C (BOP) TS (SRO)	SWP-1A shaft shears, SWP-1B fails to automatically start. **[CT]** (AI-500) SRO TS determination (TS 3.7.7)
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	• Announces and responds to alarms o (H-06-01) "Steam Gen B Main Steam Iso Actuated" o (H-06-02) "Steam Gen B Feedwater Iso Actuated" o (H-06-03) "Emerg FW Actuation" o (H-06-08) "EFIC Not Bypassed" o Reviews AR • Verifies EFIC actuation is not valid • Verifies no EFW equipment started • Notifies SRO of instrument malfunction • Calls PPO to check status of EFIC Channels • Coordinates bypassing of the "D" EFIC Channel with the PPO per OP-450, Section 4.16, as directed by the SRO o May have the PPO come to the Control Room for a pre-job brief on Bypassing "D" EFIC Channel o Verifies no RPS Channels bypassed o When PPO places "D" Channel in "Bypass", verifies: • Annunciator H-06-06 'EFIC BYPASS' received • Channel C - Event point 2025 o DEPRESS "Test Results/ Reset" pushbutton on MCB for associated EFIC trains o ENSURE EFIC channel half trip has RESET o Depress Channel D low pressure bypass button • Participates in mini brief if held by SRO

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	• Ensures BOP/RO verify that the EFIC actuation is not valid • Assists the BOP in diagnosing failure • Directs the BOP to have the PPO check EFIC Channels and report status • When MS-113-PT is reported, evaluates TS for applicability. Enters TS 3.3.11 Conditions "A" and "D" • Directs the BOP to bypass "D" EFIC Channel per OP-450 • Once "D" EFIC Channel is "Bypassed", should hold mini brief to discuss the consequences of the failed transmitter on an EFW actuation. o Contacts Work Controls to initiate repair efforts (may request the SM or STA to perform this)
	RO	• Verifies the EFIC actuation is not valid • Assists BOP in diagnosing failure • Participates in mini brief if held by SRO

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	• Acknowledge alarms o (I-07-01) "Pressurizer Level High" • PZR Spray valve may open • Notifies SRO of MUV-31 controller failure • Takes manual control and lowers makeup flow
	SRO	• Acknowledges failure and directs RO to take manual control of MUV-31

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	• Acknowledge alarms o (I-05-01) PORV Safety Valve Open o (I-07-05) RCS Press High Temp Low o Reviews AR-501 • Diagnoses PORV setpoint failure o Closes PORV or PORV Block valve o Monitors RCS pressure • Informs SRO of failure
	SRO	• Assist in diagnosing PORV setpoint failure • Directs RO to close PORV or PORV Block valve
	BOP	• Assists RO in diagnosing failure
	SRO	• Evaluates TS for applicability o TS 3.4.10 may be referenced (not required) • Contacts work controls to initiate repair efforts

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	• Announce/acknowledge alarms o (I-01-03) (I-02-03) (I-03-03) (I-04-03) RC Pump Clg Wtr Flow Low o (C-02-05) SW System Press Low • Note SW pressure and SW pump amps low • Diagnose sheared shaft on SWP-1A • Notifies SRO of failure
	BOP	• Starts SWP-1B or SWP-1C within 5 minutes using 'prompt and prudent' **[CT]** • Stops SWP-1A • Letdown will probably be lost due to a high temperature isolation o OP-402, Section 4.15, is attached if letdown recovery needed
	SRO	• Assists RO/BOP with diagnosis of sheared shaft • Enters TS 3.7.7, Condition A, for one SW Pump inoperable • Contacts work controls to initiate repair efforts
	BOP	• Reviews AR-303 and AR-501 • Monitors temperatures of SW cooled components

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	• Announces and responds to alarms o (N-06-03) "EH Fluid Tank Level Low" o Reviews AR-602 • Direct SPO to investigate low EHC reservoir
	SRO	• Assists BOP in diagnosing alarm • Once report from SPO is received will enter AP-510 and direct a power reduction to below the turbine trip setpoint. • One power is low enough enters AP-660, Turbine Trip
	RO	• Performs actions of AP-510: o Adjust ICS Load Rate as directed o Adjust "Unit Load Master" to "10" o Stops rapid power reduction when all Turbine Trip Bypass alarms are received. ▪ Selects "SG/RX Demand" to Hand and back to Auto o Maintains PZR level (Rule 7, attached) o Verifies Imbalance within limits o Maintain DFT level between 9 ft and 11 ft 6 in o Selects "MAN" and "Close" on MBVs • Performs actions of AP-660: o Ensure RCS pressure is stable o Ensure ICS runback is in progress o Ensure TBVs and ADVs controlling header pressure

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	• Performs actions of AP-510: o Notifies personnel o Notifies Chemistry o Notify SPO to isolate MSR Shell Drain Heat Exchangers o Verify Aux Transformer is not supplying any bus ▪ Perform EOP-14, Enclosure 23, attached • Performs actions of AP-660: o Depress Main Turbine Trip push button o Ensure TVs and GVs are closed o Notify plant personnel

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	• Recognize indications of a steam leak in the RB o Alarms o RB pressure and temperature rising o No RM-A6 rise o No loss of RCS inventory
	BOP	• Announce/acknowledge alarms o (B-02-05) RB Fan A Condensate High o (E-02-05) RB Fan B Condensate High o (E-03-02) Reactor Bldg Temp High • Monitors RB pressure, temperature and sump level • Verifies no rise in RM-A6 • Verifies no loss of RCS inventory

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	• 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 o Depress the Rx trip pushbutton o Verify CRD groups 1 through 7 are fully inserted o Verify NIs indicate Rx is shutdown o Verify SPDS is available o Depress Main Turbine trip pushbutton o Verify TVs and GVs are closed • Direct formal Symptom Scan with RO and BOP o Check for Station Black Out o Check for Adequate Sub Cooling Margin o Check for Inadequate Heat Transfer o Check for Excessive Heat Transfer o Check for OTSG Tube Rupture • Directs BOP to determine faulted OTSG and isolate
	RO	• When the Rx is tripped, performs EOP-2, Immediate Actions, from memory o Depresses Rx Trip pushbutton o Verifies Groups 1 thru 7 rod inserted o Verifies NIs indicate Rx is shutdown o Verifies SPDS available o Depress Turbine Trip pushbutton o 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.: 6/7 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	• Perform symptom scan o Station Blackout o Inadequate SCM o Inadequate Heat Transfer o Excessive Heat Transfer o 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	• Depresses Global Silence pushbutton • **Isolates the "A" OTSG (CT)** o **(stopping MFW flow completes this critical task)** • Recognizes that MFLI did not occur and performs the following: o Selects close FWV-31 o Selects close FWV-30 o Selects close FWV-36 o Selects close FWV-28 o Selects close FWV-14 o Trips FWP-2A • Notifies SRO of MFLI automatic isolation failure

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	• Enters EOP-5, Excessive Heat Transfer • Direct RO/BOP actions per EOP-5 o Isolate affected OTSGs ▪ 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. o Ensure ES equipment is properly aligned ▪ If RBIC has actuated and adequate SCM exists, then stop all RCPs o Maintain PZR level (Rule 7, attached) o Notify personnel of entry into EOP-5 o If RCS temp remains < 532° F then start RCS boration o Ensure proper MSLI and MFLI o Notify Chemistry to sample for tube leakage o Verify proper CC cooling o Ensure level in available OTSG trending to correct level o Minimize RCS temperature changes o Minimize RCS pressure changes o Verify OTSG tube leakage $\leq$ 1 gpm o Ensure MSR HP bundle isolation valves are closed o Bypass ES if permit exists o Maintain minimum adequate SCM

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	• 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 o Amber light only o Flow indication on EF-25-FI1 • Requests permission from SRO to secure EFP-3 • **Secures EFP-3 (CT)** • Ensure ES equipment is properly aligned o 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 $\leq$ 1 gpm • Ensures MSR HP bundle isolation valves are closed • Maintains minimum adequate SCM o PZR Spray o PORV

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:

___ 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_{incore} < 400°F,
  AND cooldown rate exceeds ITS limit

  ___ RCPs off,
  AND HPI flow exists

  THEN perform required PTS actions.

- ___ Throttle HPI flow to minimize adequate SCM.
- ___ Throttle LPI flow to minimize adequate SCM.
- ___ PTS is applicable until an Engineering evaluation has been completed.

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

END OF SECTION

ENCLOSURE 23 SHUTDOWN ELECTRICAL LINEUP

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