

Draft Submittal

(Pink Paper)

CRYSTAL RIVER OCTOBER 2005 EXAM

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Operating Test Simulator Scenarios

Facility: Crystal River #3		Scenario No.: <u>#1 (NRC)</u>	Op-Test No.: <u>1</u>
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
Initial Conditions: The plant is at 100% power.			
Turnover: The following equipment is OOS: MUP-1B (12 hours); EFP-1 (6 hours); RWP-2A (12 hours). All required surveillances have been completed. Thunderstorms are predicted for Citrus and Levy counties.			
Event No.	Malf. No.	Event Type*	Event Description
1	1	I (BOP) I (SRO)	NI-5 Summing Amp fails high. (OP-507) SRO TS determination. (TS 3.3.1)
2	2	C (BOP) C (SRO)	55 gpm RCS leak inside Reactor Building. (AP-520) SRO TS determination. (TS 3.4.12)
3	3	C (RO)	"A" loop FW demand fails as is.
4	N/A	R (RO) R (SRO)	Manual power decrease required. (AP-510/OP-204)
5	4	C (RO)	Safety rod drops causing RCS leak rate to increase to 300 gpm. (AP-545)
6	5	M (ALL)	Manual Reactor Trip – MSV-9 (TBV) fails open following trip. (EOP-2, EOP-5)
7	6	C (BOP)	MSLI fails on "A" OTSG. [CT] (EOP-5)
8	7	C (RO or BOP)	EFV-11 and EFV-56 fail as is. [CT] (EOP-5, EOP-13, Rule 3)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

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

Event Description: (Examiner Cue) Shortly after the crew takes the watch the summing amplifier for NI-5 fails high [MALF]. Since this is the non-selected instrument no plant transient should occur. TS requires the "A" RPS Channel be placed into a tripped or bypassed condition within one hour.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (J-5-1) "RPS Channel "A" Trip" ○ (J-5-4) "RPS Channel "A" Trouble" ○ (K-3-2) "SASS Mismatch" ○ (K-3-3) "SASS Transfer" ○ Reviews AR-503 • Diagnoses NI-5 output failure "high" on NI-5-NI • Verifies the plant is stable • Notifies SRO of NI-5 failure
	SRO	<ul style="list-style-type: none"> • Assists the RO/BOP in diagnosing the failed NI • Enters TS 3.3.1, Condition A, for one channel of RPS inoperable • Contacts work controls to initiate repair efforts
	BOP	<ul style="list-style-type: none"> • Assists RO in diagnosing the failed NI • Assists RO in verifying the plant is stable • Reviews alarms
	SRO	<ul style="list-style-type: none"> • Directs the BOP to bypass the "A" RPS Channel per OP-507 <ul style="list-style-type: none"> ○ No other RPS channel bypassed ○ No other EFIC channels bypassed ○ Reposition the manual bypass key switch on the RTM and verify the following: <ul style="list-style-type: none"> ▪ Manual bypass light illuminates brightly ▪ Annunciator alarm "RPS Channel A Bypassed" ▪ Event point 0965 received
	BOP	<ul style="list-style-type: none"> • Executes actions per SRO and OP-507 to bypass RPS Channel

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

Event Description: (Examiner Cue) Shortly after the crew takes the watch the summing amplifier for NI-5 fails high [MALF]. Since this is the non-selected instrument no plant transient should occur. TS requires the "A" RPS Channel be placed into a tripped or bypassed condition within one hour.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Directs the BOP to clear the SASS Transfer alarm per OP-501 <ul style="list-style-type: none"> ○ Verify failed channel ○ Depress reset pushbutton to clear "SASS Transfer" alarm ○ Generate a work request ○ Notify Reactor Engineer to consider impact on plant heat balance ○ May review SRO checklist for unplanned equipment status change
	BOP	<ul style="list-style-type: none"> • Executes actions per SRO and OP-501 to clear "SASS Transfer" alarm

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

Event Description: (Examiner Cue) After the "SASS Transfer" has been cleared a 55 gpm RCS leak [MALF] occurs in the reactor building. AP-520, Loss of RCS Coolant or Pressure, will be entered and a leak rate analysis performed. TS 3.4.12, Condition A, will apply. An Unusual Event will be entered based on unidentified leakage ≥ 10 gpm. TS and E-Plan not required to be entered at this time due to the transient in progress.

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> • Recognize indications for an RCS leak in the RB <ul style="list-style-type: none"> ○ PZR level decreasing ○ MUV-31 demand increasing ○ Makeup flow increasing ○ RB sump level indication (WD-222-LI and/or BS-93-PIR trends) ○ RM-A6 trending up ○ RB Sump Pump Trouble alarms ○ RB Fan Condensate High alarms
	SRO	<ul style="list-style-type: none"> • Direct RO/BOP actions per AP-520 <ul style="list-style-type: none"> ○ Notify personnel ○ Verify tube leakage has not increased ○ Control PZR level ○ Isolate letdown if required ○ Maintain MUT level ○ Start leak rate determination ○ Isolate possible leak paths ○ Isolate RB sump ○ Ensure emergency RB cooling is in service ○ Commence a plant shutdown • Recognize TS entry required • Recognize Emergency Plan entry required (Unusual Event)
	RO/BOP	<ul style="list-style-type: none"> • Execute AP actions in accordance with SRO directions

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

Event Description: (Examiner Cue) After the "SASS Transfer" has been cleared a 55 gpm RCS leak [MALF] occurs in the reactor building. AP-520, Loss of RCS Coolant or Pressure, will be entered and a leak rate analysis performed. TS 3.4.12, Condition A, will apply. An Unusual Event will be entered based on unidentified leakage ≥ 10 gpm. TS and E-Plan not required to be entered at this time due to the transient in progress.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Direct RO/BOP actions per AP-510, Rapid Power Reduction <ul style="list-style-type: none"> ○ Adjust ICS Load Rate ○ Set Unit Load Demand ○ Notify plant personnel ○ Notify dispatcher ○ Maintain MUT level ○ Maintain Imbalance
	RO	<ul style="list-style-type: none"> • Initiates power decrease per SRO instructions
	BOP	<ul style="list-style-type: none"> • Execute actions per SRO instructions

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

Event Description: (Automatic Parameter Cue) When the power reduction is started "A" loop FW demand will fail 'as is' [MALF]. Within a few percent power the RO will recognize this malfunction and transfer appropriate stations to Hand. The power decrease will continue in manual.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Recognize FW flow mismatch <ul style="list-style-type: none"> ○ "A" FW flow higher than "B" ○ "A" OTSG level higher than "B" ○ ΔT_c mismatch ("B" hotter than "A") • If failure not recognized at this time the following alarms will soon alert the crew: <ul style="list-style-type: none"> ○ (K-5-1) "RCS ΔT_c High" ○ (K-3-2) "SASS Mismatch" ○ (K-7-3) "Steam Gen A BTU Condition" ○ (K-4-3) "Reactor Limited by Feedwater" ○ Reviews AR-503 • Diagnoses alarms <ul style="list-style-type: none"> ○ Recognizes FW flow mismatch • Requests permission to place the FW Loop Demands to Manual <ul style="list-style-type: none"> ○ May also request permission to place the Diamond and Reactor Demand stations to Manual • Continues power decrease per NGGC-1306, Reactivity Management Program, if Diamond taken to Manual
	SRO	<ul style="list-style-type: none"> • Assist RO in diagnosing alarms <ul style="list-style-type: none"> ○ Directs RO to place ICS stations in Manual ○ Directs RO to recover ΔT_c • Directs RO to continue power decrease <ul style="list-style-type: none"> ○ Approves control rod manipulations, if required
	BOP	<ul style="list-style-type: none"> • Assist in diagnosing alarms • Perform actions as directed by the SRO

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

Event Description: (Examiner Cue) After about a 5% power decrease in manual a control rod will drop into the core [MALF]. AP-545, Plant Runback, will be entered. Due to this transient the RCS leak rate will increase to about 200 gpm. This increased leak rate will be somewhat masked by the Tave decrease associated with the dropped rod. Once the increased leak rate is diagnosed a manual reactor trip will be directed by the SRO. The plant now meets the criteria to enter an "Alert" condition.

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> • Recognize dropped rod alarms & indications <ul style="list-style-type: none"> ○ (K-4-2) "Asymmetric Rod Runback" ○ (J-2-4) "CRD Asymmetric Fault" ○ (J-2-3) "CRD Out Inhibit" • PI Panel indication <ul style="list-style-type: none"> ○ Group 2 Asymmetric fault lights on ○ API for rod 2-1 indicates 0%
	SRO	<ul style="list-style-type: none"> • Directs RO/BOP actions per AP-545, Plant Runback <ul style="list-style-type: none"> ○ Ensure plant runback is in progress ○ Notify plant personnel ○ Notify system dispatcher ○ Ensure RCS pressure is stable ○ Ensure maximum power of 60% ○ Ensure vital plant parameters are approaching stability • TS 3.1.4 & 3.1.5 are now applicable (not required to enter at this time due to the transient in progress) <p>NOTE: Dependent on the timeliness of the increased leak rate being diagnosed some of the actions above may not be performed.</p>
	RO/BOP	<ul style="list-style-type: none"> • Execute AP actions in accordance with SRO directions

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

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Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> • Recognize indications for an increased RCS leak rate <ul style="list-style-type: none"> ○ (J-4-2) "RCS Pressure Low" ○ (I-8-1) "PZR Level Low" ○ PZR level indication on SPDS and recorders
	SRO	<ul style="list-style-type: none"> • Recognize the criteria to enter an "Alert" condition is now met • Direct a manual reactor trip prior to reaching an RPS trip setpoint
	RO	<ul style="list-style-type: none"> • Manually trip the reactor with SRO direction/concurrence

Op-Test No.: 1 Scenario No.: 1 Event No.: 6/7/8 Rev.: 00

Event Description: (Automatic Parameter Cue) Following the reactor trip MSV-9 (TBV on "A" OTSG) will fail as is, open [MT]. When the overcooling is diagnosed the "A" OTSG will be isolated. MSLI will not work [MALF]. The MSIVs must be closed manually [CT]. Entry into EOP-5, Excessive Heat Transfer, will be required. EFIC will be actuated by HPI and/or low OTSG level. The EFIC control and block valves from EFP-2 to the "A" OTSG will fail [MALF]. EFP-2 must be manually secured [CT].

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Direct RO actions per EOP-2 <ul style="list-style-type: none"> ○ Depress the Rx trip pushbutton ○ Verify CRD groups 1 through 7 are fully inserted ○ Verify NIs indicate Rx is shutdown ○ Depress Main Turbine trip pushbutton ○ Verify TVs and GVs are closed
	RO	<ul style="list-style-type: none"> • Perform first pass of EOP-2 Immediate Actions from memory • Perform second pass of EOP-2 Immediate Actions with SRO direction
	BOP	<ul style="list-style-type: none"> • Depress Global Silence pushbutton • Review alarms and assess plant parameters
	CREW	<ul style="list-style-type: none"> • Perform symptom scan <ul style="list-style-type: none"> ○ Station Blackout ○ Inadequate SCM ○ Inadequate Heat Transfer ○ Excessive Heat Transfer ○ SG Tube Rupture • Determine that an Excessive Heat Transfer event is in progress. <ul style="list-style-type: none"> ○ Tave lower than normal post-trip value ○ "A" OTSG pressure lower than "B" OTSG • Enter EOP-5, Excessive Heat Transfer

Op-Test No.: 1 Scenario No.: 1 Event No.: 6/7/8 Rev.: 00

Event Description: (Automatic Parameter Cue) Following the reactor trip MSV-9 (TBV on "A" OTSG) will fail as is, open [MT]. When the overcooling is diagnosed the "A" OTSG will be isolated. MSLI will not work [MALF]. The MSIVs must be closed manually [CT]. Entry into EOP-5, Excessive Heat Transfer, will be required. EFIC will be actuated by HPI and/or low OTSG level. The EFIC control and block valves from EFP-2 to the "A" OTSG will fail [MALF]. EFP-2 must be manually secured [CT].

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Direct RO/BOP actions per EOP-5 <ul style="list-style-type: none"> ○ Isolate affected OTSGs <ul style="list-style-type: none"> ▪ Close MSIVs with individual control switches ○ Close EFIC control valves on affected OTSGs <ul style="list-style-type: none"> ▪ Secure EFP-2 ○ Close MS supply valve to EFP-2 from affected OTSG ○ Ensure both ADVs are closed ○ Ensure both OTSG blowdown valves are closed ○ Restore PZR level if < 50 inches ○ Ensure proper MSLI and MFLI ○ Minimize RCS temperature changes ○ Notify plant personnel ○ Adjust MUV-31 setpoint to 100 inches ○ Ensure ES equipment is properly aligned ○ Maintain MUT level \geq 55 inches ○ Stop 1 MUP if not required ○ Control RCS pressure

Op-Test No.: 1 Scenario No.: 1 Event No.: 6/7/8 Rev.: 00

Event Description: (Automatic Parameter Cue) Following the reactor trip MSV-9 (TBV on "A" OTSG) will fail as is, open [MT]. When the overcooling is diagnosed the "A" OTSG will be isolated. MSLI will not work [MALF]. The MSIVs must be closed manually [CT]. Entry into EOP-5, Excessive Heat Transfer, will be required. EFIC will be actuated by HPI and/or low OTSG level. The EFIC control and block valves from EFP-2 to the "A" OTSG will fail [MALF]. EFP-2 must be manually secured [CT].

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Execute EOP actions in accordance with SRO directions • Isolate affected OTSGs [CT] <ul style="list-style-type: none"> ○ MSLI isolation is faulted <ul style="list-style-type: none"> ▪ MSIVs must be closed manually ▪ MSV-412 can be closed from the TGF panel (normal) ▪ MSV-411 must be closed using the Test/Reset switch located on the PSA panel • Close EFIC control valves on affected OTSG [CT] <ul style="list-style-type: none"> ○ EFV-56 (control valve) failed open <ul style="list-style-type: none"> ▪ EFV-11 (block valve) must be closed ▪ EFV-11 torques out mid-stroke ▪ Discuss with SRO and decision must be made to secure EFP-2
<p><i>Scenario may be terminated when the plant is stable and a controlled plant cooldown is initiated.</i></p>		

Facility: Crystal River #3		Scenario No.: #2 (NRC)	Op-Test No.: 1
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
<u>Initial Conditions:</u> The plant is at 100% power.			
<u>Turnover:</u> The following equipment is OOS: MUP-1B (12 hours); FWP-7 (4 hours); MSV-55 (8 hours). "A" RPS channel in bypass due to the failure high of RC-4A-TE2.			
Event No.	Malf. No.	Event Type*	Event Description
1	1	C (BOP) C (SRO)	AHF-1A high vibration, then trip. (OP-417) SRO TS determination. (TS 3.6.6)
2	2	I (SRO)	CF-2-LI4 fails low (CFT level transmitter). SRO TS determination. (TS 3.5.1)
3	3	C (RO)	CDP-1A magnetic coupling failure. (OP-603)
4	4	R (RO) C (BOP)	Power decrease to approximately 65%. Turbine automatic control failure at \approx 80%. (AP-510)
5	5	M (ALL)	"B" OTSG steam leak. (EOP-2, AI-505)
6	6	C (BOP)	MFLI trips both MFWPs. (EOP-13)
7	7	C (BOP)	DCP-1B fails to start. (AI-505) [CT]
8	8	C (RO or BOP)	Loss of all feedwater. Initiate HPI/PORV cooling. (EOP-4) [CT]
9	N/A	N (RO or BOP)	EFW restored with FWP-7. (EOP-4)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

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

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

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (B-2-4) "RB Fan A Vibration High" ○ Reviews AR-302 • Notifies SRO of malfunction • Attempts to reset alarm • Recommends securing fan
	SRO	<ul style="list-style-type: none"> • Directs BOP to secure AHF-1A • Directs BOP to start AHF-1C using OP-417 • Enters TS 3.6.6, Condition C, for one required containment cooling train inoperable • Contacts Work Control to initiate repair efforts.
	BOP	<ul style="list-style-type: none"> • Uses OP-417, Section 4.5.1, to perform the following: <ul style="list-style-type: none"> ○ Notifies PPO to seal closed SWV-36 ○ Selects AHF-1C using the "RB Fan ES A Select" switch in ES Act Relay Cabinet 4D ○ Notifies SRO to review TS 3.6.6 ○ Notifies PPO to seal open SWV-105 ○ Ensures open SWV-39 and SWV-45 ○ Starts AHF-1C

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

Event Description: (Examiner Cue) After AHF-1C has been started CF-2-LI4 (CFT level transmitter) fails low [MALF]. TS 3.5.1, CFT Operability, will be referred to but the SRO should determine that the other CFT level instrument satisfies the TS requirement.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarm <ul style="list-style-type: none"> ○ (E-8-4) "CF Tank B Level High/Low" • Refers to AR-305 • Notifies SRO of level transmitter failure
	SRO	<ul style="list-style-type: none"> • Assists the BOP in diagnosing the failed level transmitter • May review TS 3.5.1 <ul style="list-style-type: none"> ○ Determines alternate level instruments satisfies this TS requirement • Contacts work controls to initiate repair efforts

Op-Test No.: 1 Scenario No.: 2 Event No.: 3/4 Rev.: 00

Event Description: (Examiner Cue) After the CFT instrument failure is resolved the magnetic coupling on CDP-1A experiences a control circuit failure [MALF]. Power must be decreased quickly so that MFW booster pump suction is not lost. AP-510, Rapid Power Reduction, will be entered and power reduced to about 60%. At about 80% power automatic control of the turbine will be lost [MALF]. The crew must recognize this failure and take manual control of the turbine for the remainder of the power decrease.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarm <ul style="list-style-type: none"> ○ (N-2-2) "Cond Pump A Uncoupled" ○ (N-1-5) "Hotwell Level High/Low" • Diagnoses failure <ul style="list-style-type: none"> ○ Large decrease in condensate flow ○ DFT level lowering ○ Low motor current on CDP-1A • May attempt to increase demand but will see demand is already at 100% • Reviews AR-602 • Notifies SRO of malfunction • Recommends reducing power
	SRO	<ul style="list-style-type: none"> • Assists RO/BOP in diagnosing failure • Enters AP-510, Rapid Power Reduction • Direct RO/BOP actions per AP-510 <ul style="list-style-type: none"> ○ Adjust Load Rate to desired setpoint ○ Set Unit Load Demand to "10" ○ Notify personnel of entry into AP-510 ○ Maintain MUT level \geq 55 inches ○ Notify Chemistry of power change ○ Maintain Imbalance within limits ○ When power is < 80% notify SPO to ensure MS is supplying AS ○ Maintain DFT level between 10 and 13 feet
	RO/BOP	<ul style="list-style-type: none"> • Perform actions as directed by the SRO

Op-Test No.: 1 Scenario No.: 2 Event No.: 3/4 Rev.: 00

Event Description: (Examiner Cue) After the CFT instrument failure is resolved the magnetic coupling on CDP-1A experiences a control circuit failure [MALF]. Power must be decreased quickly so that MFW booster pump suction is not lost. AP-510, Rapid Power Reduction, will be entered and power reduced to about 60%. At about 80% power automatic control of the turbine will be lost [MALF]. The crew must recognize this failure and take manual control of the turbine for the remainder of the power decrease.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Recognize turbine failure to lower demand • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (N-6-4) "Turb EHC on Manual" • Manually reduces turbine to maintain header pressure • Continues manual control until power reduction is completed (approximately 60%) • Stabilizes plant parameters
	RO	<ul style="list-style-type: none"> • Continues plant runback with the SG/RX Master station in Manual • Stops plant runback at 55% to 65% power • Monitors DFT level • Stabilizes plant parameters

Op-Test No.: 1 Scenario No.: 2 Event No.: 5/6 Rev.: 00

Event Description: (Examiner Cue) When the plant is stabilized the "B" OTSG develops a steam leak [MT]. Plant shutdown is started with the Turbine and SG/Rx Master stations in manual. The reactor should be manually tripped prior to RB pressure reaching 4 psig. After the reactor is tripped the steam leak increases and "B" OTSG is isolated. When MFLI is actuated both the "A" and "B" MFWPs will trip due to a failure of the EFIC FWP trip logic circuitry [MALF].

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (B-3-5) "RB Fan C Condensate High" ○ (E-2-5) "RB Fan B Condensate High" • Reviews AR-403 and AR-501 • Notifies SRO of failure • Monitors RB pressure, temperature and sump level
	SRO	<ul style="list-style-type: none"> • Assists the RO/BOP in diagnosing the failure • Enters AP-510, Rapid Power Reduction • Direct RO/BOP actions per AP-510 <ul style="list-style-type: none"> ○ Adjust Load Rate to desired setpoint ○ Set Unit Load Demand to "10" ○ Notify personnel of entry into AP-510 ○ Maintain MUT level \geq 55 inches ○ Notify Chemistry of power change ○ Maintain Imbalance within limits ○ When power is $<$ 80% notify SPO to ensure MS is supplying AS • Maintain DFT level between 10 and 13 feet • Directs the RO to trip the reactor prior to 4 psig RB pressure
	RO	<ul style="list-style-type: none"> • Assist in diagnosing alarms • Starts plant shutdown with SG/Rx station in Manual • Perform additional actions as directed by the SRO
	BOP	<ul style="list-style-type: none"> • Maintains header pressure with Turbine in Manual • Perform additional actions as directed by the SRO

Op-Test No.: 1 Scenario No.: 2 Event No.: 5/6 Rev.: 00

Event Description: (Examiner Cue) When the plant is stabilized the "B" OTSG develops a steam leak [MT]. Plant shutdown is started with the Turbine and SG/Rx Master stations in manual. The reactor should be manually tripped prior to RB pressure reaching 4 psig. After the reactor is tripped the steam leak increases and "B" OTSG is isolated. When MFLI is actuated both the "A" and "B" MFWPs will trip due to a failure of the EFIC FWP trip logic circuitry [MALF].

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Trips the reactor at pre-determined RB pressure value • Perform first pass of EOP-2 Immediate Actions from memory • Perform second pass of EOP-2 Immediate Actions with SRO direction
	SRO	<ul style="list-style-type: none"> • Direct RO actions per EOP-2 <ul style="list-style-type: none"> ○ Depress the Rx trip pushbutton ○ Verify CRD groups 1 through 7 are fully inserted ○ Verify NIs indicate Rx is shutdown ○ Depress Main Turbine trip pushbutton ○ Verify TVs and GVs are closed • Directs BOP to determine failed OTSG and isolate
	BOP	<ul style="list-style-type: none"> • Depresses Global Silence pushbutton • Isolates the "B" OTSG • Recognizes that both MFWPs tripped when MFLI was actuated • Notifies SRO of loss of both MFWPs
	CREW	<ul style="list-style-type: none"> • Perform symptom scan <ul style="list-style-type: none"> ○ Station Blackout ○ Inadequate SCM ○ Inadequate Heat Transfer ○ Excessive Heat Transfer ○ SG Tube Rupture • Determine that no symptoms are evident, continue in EOP-2 • Recognize that Rule 2, HPI Control and Rule 3, EFW Control are in effect

Op-Test No.: 1 Scenario No.: 2 Event No.: 5/6 Rev.: 00

Event Description: (Examiner Cue) When the plant is stabilized the "B" OTSG develops a steam leak [MT]. Plant shutdown is started with the Turbine and SG/Rx Master stations in manual. The reactor should be manually tripped prior to RB pressure reaching 4 psig. After the reactor is tripped the steam leak increases and "B" OTSG is isolated. When MFLI is actuated both the "A" and "B" MFWPs will trip due to a failure of the EFIC FWP trip logic circuitry [MALF].

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none">• Perform actions as directed by the SRO

Op-Test No.: 1 Scenario No.: 2 Event No.: 7 Rev.: 00

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

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Perform Rule 2, HPI Control <ul style="list-style-type: none"> ○ Bypass or Reset ES actuation ○ Open MUP recirc valves prior to throttling < 200 gom/pump • Determine that DCP-1B failed to start <ul style="list-style-type: none"> ○ (D-5-6) "BS/DH Pump B DC Flow Low" ○ Amber light remains on for DCP-1B on "B" ES Status Panel • Attempt to start DCP-1B • Notify SRO of failure <ul style="list-style-type: none"> ○ Secures MUP-1C or places on SW cooling [CT] ○ May secure RWP-3B and DHP-1B • Notes time when RCPs must be secured
	SRO	<ul style="list-style-type: none"> • Directs BOP to: <ul style="list-style-type: none"> ○ Attempt start of DCP-1B ○ Secure DC cooled equipment ○ Shutdown MUP-1C or place on SW ○ Stop RCPs within 30 minutes due to loss of CBO flow

Op-Test No.: 1 Scenario No.: 2 Event No.: 8/9 Rev.: 00

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

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Perform Rule 3, EFW Control • Recognize EFP-2 flow decrease (isolation of "B" OTSG) • Recognize loss of EFP-3 <ul style="list-style-type: none"> ○ (H-8-3) "EFP 3 Start Failure" ○ No EFW flow ○ Green light on control handle • Notifies SRO of malfunction
	SRO	<ul style="list-style-type: none"> • Enters EOP-4 and directs RO/BOP actions <ul style="list-style-type: none"> ○ Notify personnel ○ Verify EFW or AFW pumps running <ul style="list-style-type: none"> ▪ Directs RO or BOP to concurrently perform EOP-14, Enclosure 7 ○ Perform steps 3.4 thru 3.12 ○ Determines HPI/PORV cooling is required ○ Cycle PORV if NDT limit approached ○ Actuate HPI <ul style="list-style-type: none"> ▪ If MUP-1C cooling water has not been swapped to SW then MUP-1C must be secured ○ Verify proper HPI flowpath exists ○ Ensure at least 1 HPI train properly aligned ○ Ensure at least 1 letdown isolation valve is closed ○ When at least 1 train of HPI flow is established then open PORV [CT]

Op-Test No.: 1 Scenario No.: 2 Event No.: 8/9 Rev.: 00

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

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Notifies SRO of EFP-1 failure to start per Enclosure 7 • Reminds SRO that FWP-7 is available for use. Only the breaker is racked out and the clearance has not been accepted. • Notifies CNO/SPO to pull the red tags and rack in breaker for FWP-7
	SRO	<ul style="list-style-type: none"> • Directs RO/BOP to have the tags pulled and the breaker racked in for FWP-7 • Continues in EOP-4
	RO/BOP	<ul style="list-style-type: none"> • After FWP-7 breaker is racked in then continue in Enclosure 7 • Feeds the dry OTSG ("A") at < 300 gpm
<p><i>Scenario may be terminated when AFW flow is established.</i></p>		

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

Examiners: _____ Operators: _____

Initial Conditions: The plant is at 55% power continuing to 100% power. Down power was required for work on FWP-2B governor which is now repaired.

Turnover: The following equipment is OOS: MUP-1B (12 hours); FWP-7 (4 hours). Continue power increase to full power.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N (RO)	Power increase through MBVs. (OP-204)
2	1	I (BOP) I (SRO)	SP-26-LT ("B" EFIC Channel, "A" OTSG) fail low. (OP-450) SRO TS determination. (TS 3.3.11 & TS 3.3.17)
3	2	C (BOP) C (SRO)	OPT major alarm. (OP-703) SRO TS determination. (TS 3.8.1)
4	3	C (RO) C (BOP)	RCP-1A seal failure. (OP-302, AP-545)
5	4	C (RO)	"A" MBV fails to auto-close when RCP shutdown. (AI-500)
6	5	C (ALL)	Small PZR steam space leak. (AP-520)
7	6	M (ALL)	Large PZR steam space leak, RPS fails to actuate, RCS leak due to Rx trip. (EOP-2, EOP-3, EOP-13 Rules 1 & 3) [CT]
8	7	C (RO or BOP)	MUV-586 (HPI cross-tie valve) fails closed, MUV-25 (normal HPI injection valve fails to open). (EOP-3) [CT]
9	8	C (RO or BOP)	DHV-110 auto-control failure. (EOP-3) [CT]

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

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

Event Description: After the crew reviews OP-204, Power Operations, the RO will increase power through the MFW Block valves.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Selects Unit Load Master and Load Rate for steady load increase through the MFW Block valves • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (K-7-5) "Verify FWV-30 on Auto" ○ (K-8-5) "Verify FWV-29 on Auto" ○ May review AR-503 • Verifies stable plant parameters • Verifies SU flow decreases to zero when MBVs are full open • Announce/acknowledge alarms clearing
	BOP	<ul style="list-style-type: none"> • Assists RO with OP-204 • Reviews alarms
	SRO	<ul style="list-style-type: none"> • General oversight only. RO and BOP should execute the power increase.

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

Event Description: (Examiner Cue) Shortly after the power increase through the MBVs SP-26-LT ("B" EFIC Channel, "A" OTSG, Lo Range level) fails low [MALF]. This will cause a half-trip of EFIC. The channel should be bypassed per OP-450, Emergency Feedwater System, and TS 3.3.11 and 3.3.17 entered. TS require the "B" EFIC Channel be placed into a tripped or bypassed condition within one hour.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarm <ul style="list-style-type: none"> ○ (H-6-3) "Emerg FW Actuation" • Diagnoses SP-26-LT failure "low" <ul style="list-style-type: none"> ○ SP-26-LI1 indicating 0 ○ Bus 1 tripped on "A" EFW train ○ Bus 2 tripped on "B" EFW train • Reviews AR-403 • Notifies SRO of level transmitter failure
	SRO	<ul style="list-style-type: none"> • Assists the RO/BOP in diagnosing the failed level transmitter • Enters TS 3.3.11, Condition A, for one EFIC channel inoperable • Enters TS 3.3.17, Condition A, for one PAM function channel inoperable • May check TS 3.3.18 for applicability (not addressed) • Discusses with crew the implications of this failure if an EFIC actuation were to occur <ul style="list-style-type: none"> ○ "B" Train EFW will feed the "A" OTSG until the control valve is closed • Contacts work controls to initiate repair efforts
	RO	<ul style="list-style-type: none"> • Assists BOP in diagnosing the failed transmitter • Verifies the plant is stable • Reviews alarms

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

Event Description: (Examiner Cue) Shortly after the power increase through the MBVs SP-26-LT ("B" EFIC Channel, "A" OTSG, Lo Range level) fails low [**MALF**]. This will cause a half-trip of EFIC. The channel should be bypassed per OP-450, Emergency Feedwater System, and TS 3.3.11 and 3.3.17 entered. TS require the "B" EFIC Channel be placed into a tripped or bypassed condition within one hour.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Directs the BOP to bypass the "B" EFIC Channel per OP-450 <ul style="list-style-type: none"> ○ Determines which channel to bypass (Enclosure 14) ○ No RPS channels bypassed, or ○ Only corresponding RPS channel bypassed ○ Reposition the Maintenance Bypass key switch and verify the following: <ul style="list-style-type: none"> ▪ Maintenance Bypass light flashing ▪ Annunciator alarm "EFIC Bypass" received ▪ Event point 2020 received ○ Reset the EFIC channel half-trip
	BOP	<ul style="list-style-type: none"> • Executes actions per SRO and OP-450 to bypass EFIC Channel <ul style="list-style-type: none"> ○ This action is performed outside the control room. The BOP will go to the control booth and request the booth operator to bypass the EFIC channel. ○ Once the channel is bypassed the BOP will verify the correct alarms are received. ○ Depresses the "Test Results/Reset" pushbutton and verifies EFIC has reset

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

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

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

Op-Test No.: 1 Scenario No.: 3 Event No.: 4/5 Rev.: 00

Event Description: (Examiner Cue) After the ES bus has been transferred to the BEST RCP-1A will experience 1st and 2nd stage seal failures [MALF]. OP-302, RCP Operation, will direct securing the RCP. When the RCP is secured the "A" OTSG MBV will not receive an automatic signal to close [MALF].

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (H-4-5) "RCP Seal Bleed Off High" ○ (I-4-4) "RCP Seal Upper Stage Temp High" • Reviews AR-403 and AR-501 • Notifies SRO of failure
	SRO	<ul style="list-style-type: none"> • Assists the RO/BOP in diagnosing the failure • Directs the BOP to check the RCP Seal Data recorders • Enters OP-302, RCP Operation • Directs the BOP to: <ul style="list-style-type: none"> ○ Monitor RCP seal conditions ○ Verify proper service water, seal injection flows and temperatures ○ Ensure CBO valve for affected pump is open • Determines to immediately trip RCP-1A due to high seal stage temperature and differential pressure ≥ 2100 psig • Directs the RO/BOP to trip RCP-1A
	BOP	<ul style="list-style-type: none"> • Assist in diagnosing alarms • Determines that seal outlet temperatures are > 200 degrees and seal differential pressure is > 2100 psig • Perform additional actions as directed by the SRO

Op-Test No.: 1 Scenario No.: 3 Event No.: 4/5 Rev.: 00

Event Description: (Examiner Cue) After the ES bus has been transferred to the BEST RCP-1A will experience 1st and 2nd stage seal failures [MALF]. OP-302, RCP Operation, will direct securing the RCP. When the RCP is secured the "A" OTSG MBV will not receive an automatic signal to close [MALF].

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> • Enters AP-545, Plant Runback <ul style="list-style-type: none"> ○ Directs the BOP to: <ul style="list-style-type: none"> • Notify personnel of entry into AP-545 • Ensure lift oil pump running • Ensure narrow range Tc is selected to RCP-1B • Ensure narrow range RCS pressure control is selected to "A" RCS loop • Ensure regulating rod index is within insertion limits ○ Directs the RO to: <ul style="list-style-type: none"> • Ensure MFW flows are re-ratioing • Ensure RCS pressure is stable • Ensure Rx power is less than maximum based on FWPs • Ensure delta Tc stabilizes • Ensure vital plant parameters are approaching stability • Maintain imbalance within limits • Verify rods are within 6.5% of their group average height • Directs RO to close MBV
	RO	<ul style="list-style-type: none"> • Recognize MBV not closing • Discuss with SRO and take MBV to manual and close • Notify SRO of failure • Perform actions as directed by the SRO
	BOP	<ul style="list-style-type: none"> • Assist the RO with stabilizing the plant • Perform actions as directed by the SRO

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

Event Description: (Examiner Cue) Once the plant is stable a small PZR steam space leak occurs [MALF]. The RCS pressure decrease will stop after all the PZR heaters are on. AP-520, Loss of RCS Coolant or Pressure, will be entered. Once the leak rate is diagnosed TS 3.4.12, Unidentified Leakage, will be applicable. An Unusual Event may be entered if leak rate is determined to be > 10 gpm.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (K-3-2) "SASS Mismatch" • Ensure failed PZR level transmitter not selected for control
	CREW	<ul style="list-style-type: none"> • Recognize indications of a PZR steam space leak <ul style="list-style-type: none"> ○ RCS pressure slowly degrading ○ Increased PZR heater demand ○ RB pressure slowly rises ○ RB sump level slowly rises ○ RM-A6 radiation level slowly rising
	SRO	<ul style="list-style-type: none"> • Direct RO/BOP actions per AP-520 <ul style="list-style-type: none"> ○ Notify personnel ○ Verify tube leakage has not increased ○ Control PZR level ○ Isolate letdown if required ○ Maintain MUT level ○ Start leak rate determination ○ Isolate possible leak paths ○ Isolate RB sump ○ Ensure emergency RB cooling is in service ○ Commence a plant shutdown • Recognize TS entry required <ul style="list-style-type: none"> ○ TS 3.4.12, Condition A, Unidentified Leakage \geq 1 gpm • Recognize Emergency Plan entry may be required based on estimated leak rate
	RO/BOP	<ul style="list-style-type: none"> • Execute AP actions in accordance with SRO directions

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

Event Description: (Examiner Cue) Once the plant is stable a small PZR steam space leak occurs [MALF]. The RCS pressure decrease will stop after all the PZR heaters are on. AP-520, Loss of RCS Coolant or Pressure, will be entered. Once the leak rate is diagnosed TS 3.4.12, Unidentified Leakage, will be applicable. An Unusual Event may be entered if leak rate is determined to be > 10 gpm.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none">• Direct the RO to trip the reactor at a specific RCS pressure

Op-Test No.: 1 Scenario No.: 3 Event No.: 7/8/9 Rev.: 00

Event Description: (Examiner Cue) During the performance of AP-520 the steam space leak increases [MT]. RPS will not actuate on low pressure and the RO must manually trip the reactor [Possible CT]. The reactor trip will cause a larger leak that will lead to an ISCM event. RCPs must be tripped within 1 minute [CT]. MUV-25 normal source power failure occurs. Alternate power source must be selected [CT]. DHV-110 fails to control in automatic. Manual control must be initiated [CT].

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Recognizes increase in RCS pressure reduction • Announce/acknowledge alarms <ul style="list-style-type: none"> ○ (J-4-2) "RCS Press Low" ○ (H-5-7) "RC Pump Seal Flows High/Low" • Manually trips reactor when selected manual trip trigger value is reached
	RO	<ul style="list-style-type: none"> • Perform first pass of EOP-2 Immediate Actions from memory • Perform second pass of EOP-2 Immediate Actions with SRO direction
	SRO	<ul style="list-style-type: none"> • Direct RO actions per EOP-2 <ul style="list-style-type: none"> ○ Depress the Rx trip pushbutton ○ Verify CRD groups 1 through 7 are fully inserted ○ Verify NIs indicate Rx is shutdown ○ Depress Main Turbine trip pushbutton ○ Verify TVs and GVs are closed
	BOP	<ul style="list-style-type: none"> • Depress Global Silence pushbutton • Review alarms and assess plant parameters

Op-Test No.: 1 Scenario No.: 3 Event No.: 7/8/9 Rev.: 00

Event Description: (Examiner Cue) During the performance of AP-520 the steam space leak increases [MT]. RPS will not actuate on low pressure and the RO must manually trip the reactor [Possible CT]. The reactor trip will cause a larger leak that will lead to an ISCM event. RCPs must be tripped within 1 minute [CT]. MUV-25 normal source power failure occurs. Alternate power source must be selected [CT]. DHV-110 fails to control in automatic. Manual control must be initiated [CT].

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> • Perform symptom scan <ul style="list-style-type: none"> ○ Station Blackout ○ Inadequate SCM ○ Inadequate Heat Transfer ○ Excessive Heat Transfer ○ SG Tube Rupture • Determine that an Inadequate SCM condition exists • Enter EOP-3, ISCM
	SRO	<ul style="list-style-type: none"> • Direct RO/BOP actions per EOP-3 <ul style="list-style-type: none"> ○ Perform Rule 1 <ul style="list-style-type: none"> ▪ Stop all RCPs within 1 minute [CT] ▪ Manually actuate ES ▪ Depress "ISCM" pushbuttons for EFIC channels ▪ Ensure Tincore is selected on SPDS ○ Notify personnel of entry into EOP-3 ○ Verify proper HPI discharge flowpath exists <ul style="list-style-type: none"> ▪ Select the "B" source for MUV-25 to ON [CT] ○ Ensure at least 1 HPI train is properly aligned ○ Ensure at least 1 letdown isolation valve is closed ○ Ensure DHV-3 is closed ○ Verify EFW is operating and flow is controlled <ul style="list-style-type: none"> ▪ <i>Due to the earlier EFIC transmitter failure EFV-56 must be taken to manual and closed</i> ○ Ensure ES systems are properly aligned <ul style="list-style-type: none"> ▪ DHP-1B failed to start ▪ DHV-110 not controlling flow in automatic ▪ Manually control flow at \approx 3000 gpm [CT] • Recognizes entry into an Alert condition due to Loss of Adequate SCM

Op-Test No.: 1 Scenario No.: 3 Event No.: 7/8/9 Rev.: 00

Event Description: (Examiner Cue) During the performance of AP-520 the steam space leak increases [MT]. RPS will not actuate on low pressure and the RO must manually trip the reactor [Possible CT]. The reactor trip will cause a larger leak that will lead to an ISCM event. RCPs must be tripped within 1 minute [CT]. MUV-25 normal source power failure occurs. Alternate power source must be selected [CT]. DHV-110 fails to control in automatic. Manual control must be initiated [CT].

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<ul style="list-style-type: none"> • Execute EOP actions in accordance with SRO directions • Perform Rule 1 (<i>secure RCPs</i>) • Perform Rule 3 (<i>close EFV-56</i>) <ul style="list-style-type: none"> ○ <i>Report failure to SRO</i> • Recognize MUV-25 and MUV-586 did not open <ul style="list-style-type: none"> ○ <i>Attempt to open and report failure to SRO</i> • Recognize DHP-1B did not start <ul style="list-style-type: none"> ○ <i>Attempt to start and report failure to SRO</i> • Recognize DHV-110 not controlling correctly <ul style="list-style-type: none"> ○ <i>Take manual control and report failure to SRO</i>
<p><i>Scenario may be terminated when LPI flow has been restored and transition to EOP-8 is announced.</i></p>		