

Facility: <u>Wolf Creek</u> Scenario No.: <u>1</u> Op-Test No.: _____			
Examiners: _____ Operators: _____ _____ _____			
Initial Conditions: <u>100% power, EOL</u>			
Turnover: EDG “B” out of service for Maintenance PM’s – expected back in six hours. TS 3.8.1 conditions A & B entered; STS NB-005, Breaker Alignment Verification has been completed – due in seven hours.			
MDAFW pump “B” tagged out/out of service due to Emergent work (SM Concern). Expected return is six hours. TS 3.7.5 condition B entered.			
Event No.	Malf. No.	Event Type*	Event Description
1 t+2	mBB22 A	I -- ATC, SRO	PZR level channel BB LI-459A failure high. OFN SB-008, Instrument Malfunctions, Attachment J
2 t+8	bkrDPA D01A	R – ATC C – BOP, SRO	Condensate pump “A” trip OFN AF-025, Unit Limitations, Attachment A OFN MA-038, Rapid Plant Shutdown
3 t+25	mSG01 mSF15A mSF15B	M - All	Seismic event followed by a Reactor trip occurs. EMG E-0, Reactor Trip or Safety Injection This event series sets up the scenario for the Major event EMG FR-H1, Response to Loss of Secondary Heat Sink.

4 t+25	mNB01 mNB02 mNE02 A	C -- ATC, SRO	<p>(Post Reactor trip) NB01 & NB02 trip</p> <p>(Post reactor trip) EDG “A” autostart feature disabled – manual available</p> <p>(CT – start EDG “A” in order to energize NB01 bus)</p> <p>Recall NB02 bus unavailable because EDG “B” out of service as part of Turnover item.</p>
5 t+25	mAL02 mtrDPA L01A mBG13 A	M – All	<p>TDAFW pump trip (broken linkage)</p> <p>MDAFW pump “A” trip (shaft seizure)</p> <p>CCP “A” trips due to overcurrent</p> <p>Loss of all Auxiliary Feedwater EMG FR-H1, Response to Loss of Secondary Heat Sink</p> <p>(CT - Establish RCS bleed and feed before Steam Generators dry out)</p>
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario summary:

Plant is at 100% power, End of life (EOL). Emergency Diesel Generator (EDG) “B” is tagged out/out of service for Maintenance – Preventative Maintenance (PM). Expected return is six hours. Technical Specifications (TS) 3.8.1 condition A & B entered. STS NB-005, Breaker Alignment Verification, complete (due in seven hours).

Motor Drive Auxiliary Feedwater Pump (MDAFWP) “B” is tagged out/out of service due to Emergent work (SM Concern). Expected return is six hours. Technical Specification 3.7.5 condition B entered.

Pressurizer (PZR) controlling level channel BB LI-459A fails high. Crew responds using OFN SB-008, Instrument Malfunctions, Attachment J.

- Attachment J: Select an alternate level channel as the controlling channel.
- Crew stabilizes the plant.

Condensate pump “A” trips. The crew responds by entering OFN AF-025, Unit Limitations. Attachment A will require a downpower evolution.

Downpower guidance per OFN AF-025: If one condensate pump is lost, reduce power as necessary to maintain Main Feed Pump (MFP) suction pressure greater than 340 psig on AEP0006 for “A” MFP and AEP0005 for “B” MFP.

- Crew responds by performing a downpower.
- Crew stabilizes the plant.

A seismic event occurs resulting in an inadvertent reactor trip. EMG E-0, Reactor Trip or Safety Injection is entered. (Major event)

Post trip, both NB01 and NB02 busses trip. Due to the Maintenance PM’s (see Turnover item), Emergency Diesel Generator “B” will not start and load onto NB02 bus. The Control Room must manually start Emergency Diesel Generator “A” and then it will load onto NB01 bus.

As the scenario progresses, the Turbine Driven Auxiliary Feedwater Pump (TDAFWP) trips due to broken linkage and the Motor Driven Auxiliary Feedwater Pump “A” will trip due to shaft seizure and BOTH cannot be restarted. Motor Driven Auxiliary Feedwater Pump “B” cannot be started (see Turnover item). No Auxiliary Feedwater (AFW) to the Steam Generators is available. Note that the running CCP (CCP “A”) trips off due to overcurrent.

The crew enters EMG FR-H1, Response to Loss of Secondary Heat Sink (Major event).

Mitigation strategy: the crew uses the Foldout page of EMG FR-H1, Bleed and Feed.

EMG FR-H1, Response to Loss of Secondary Heat Sink, Major Actions:

- Attempt restoration of RCS bleed and feed flow to the S/Gs
- Initiation of RCS bleed and feed heat removal
- Restore and verify secondary heat sink

- Termination of RCS bleed and feed heat removal

Scenario has two Critical Tasks (CT):

1. Starting the EDG “A” to re-energize NB01 bus before placing safeguards equipment in pull-to-lock or prior to any needless Orange or Red path entry conditions.
2. Establish RCS bleed and feed before Steam Generators (SG) dry out establishing a heat sink for the core.

Probabilistic Risk Analysis for this scenario includes:

Top 10 Human Action Failures by the Importance Measure Rankings

(Reference PSA-07-0001)

F-V Rank	RRW Rank	Total Rank	Event Name	Description	Point Est.	F-V	RAW	RRW	Birnbaum
1	8	34	OPA-OD1-EXE	FAILURE OF RCS COOL DOWN & DEPRESSURIZE - SGR EVENT - EXE	4.89E-03	2.61E-02	6.32	1.027	9.64E-05
2		39	OPA-OD2-EXE	FAILURE OF RCS COOL DOWN & DEPRESSURIZE AFTER OVERFIL-EXE	5.00E-02	2.49E-02	1.47	1.026	8.97E-06
3	9	40	OPA-RR11-EXE	FAILURE TO ALIGN & START 1 SI OR CCP PUMP - EXE	4.68E-03	2.45E-02	6.2	1.025	9.43E-05
4		41	OPA-OFB-EXE	FAILURE TO ESTABLISH FEED & BLEED COOLING - EXE	2.97E-02	2.40E-02	1.78	1.025	1.46E-05

Technical Specifications exercised:

Event 1: TS 3.3.1, Reactor Trip System Instrumentation, Table 3.3.1-1 FU 9

Cond A: Required function inoperable – enter condition per Table (immediately)

Cond M: One channel inoperable – place channel in trip (72 hours)

TS 3.3.4, Remote Shutdown Instruments, Table 3.3.4-1 FU 12

Minimum channels met – no action required

TS 3.3.3. Accident Monitoring Instrumentation, Table 3.3.3-1, FU 11

Minimum channels met – no action required

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Event Description: <u>PZR level channel BB LI-459 failure high</u>			
BOOTH INSTRUCTIONS: Set up simulator in IC 49, RBU at 229, CWP enabled, Blue placard on "B" CCP. Run files etc. When directed, INITIATE Event 1 by activating KEY 1.			
INDICATIONS: Meter BB LI-459 indication high Main Control Board alarms: 00-032D, PZR HI LEV DEV HTRS ON 00-083C, RX PARTIAL TRIP Bistable PZR HI WTR LEV LB459A			
Time	Position	Applicant's Actions or Behavior	
	CREW	Respond to Main Control Board (MCB) alarms and board indications. Actions taken prior to procedure entry may include: Identifies BB LI-459 failure, Select MANUAL on PZR LEVEL CONTROLLER (BB LK-459)	
	CREW	ENTER OFN SB-008, rev 25, Instrument Malfunctions	
	CREW	1. Check if Secondary System instrument channel is malfunctioning. a. Determine appropriate attachment for malfunctioning channel or controller <i>a. RNO: If secondary system channel is NOT malfunctioning, then go to step 2.</i>	

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Event
 Description: PZR level channel BB LI-459 failure high

Time	Position	Applicant's Actions or Behavior
	CREW	2. Check if RCS instrument channel or controller is malfunctioning a. Determine appropriate attachment for malfunctioning channel or controller From Table determine: BB LI-459, Go to Att. J, PZR Level Channel Malfunction b. Go to appropriate attachment for malfunctioning RCS channel or controller
	CRS	ENTER Attachment J, PZR Level Channel Malfunction
	RO	J1. Identify failed instrument channel a. Compare Pressurizer level indications to confirm a Pressurizer level channel failure: <ul style="list-style-type: none"> ○ BB LI-459A
	RO	J2. Check failed Pressurizer level channel selected on PZR level control Selector switch. <ul style="list-style-type: none"> ○ BB LS-459D
	RO	J3. Select alternate Pressurizer level channel for level control. <ul style="list-style-type: none"> ○ BB LS-459D switch Selection options: L461/L460 or L459/L460 or L459/L461 RO should select L461/L460

Op-Test No.:	Scenario No.:	Event No.:	Page 7 of 29
	1	1	
Event Description: <u>PZR level channel BB LI-459 failure high</u>			
Time	Position	Applicant's Actions or Behavior	
NOTE			
Letdown flow is isolated and Pressurizer control heaters are deenergized if the controlling level falls below 17%. Both must be manually realigned once level control is re-established.			
	RO	J4. Check letdown flow – ESTABLISHED	
	RO	J5. Manually control charging and letdown to stabilize Pressurizer level at level appropriate for plant power.	
	RO	J6. Ensure PZR control heaters – ON	
	RO	J7. Place charging/letdown flow control in automatic	
	RO	J8. Monitor PZR level response to ensure proper control	
	CRS	J9. Check failed PZR level channel – NOT USED FOR RECORDER	

Op-Test No.:	Scenario No.:	Event No.:	Page 8 of 29
	1	1	
Event Description: <u>PZR level channel BB LI-459 failure high</u>			
Time	Position	Applicant's Actions or Behavior	
	CRS	J10. Monitor the following Technical Specification LCO's and comply with Action Statements as appropriate: TS 3.3.1, Reactor Trip System Instrumentation, Table 3.3.1-1 FU 9 Cond A: Required function inoperable – enter condition per Table (immediately) Cond M: One channel inoperable – place channel in trip (72 hours) (FYI: TS 3.3.4, Remote Shutdown Instruments, Table 3.3.4-1 FU 12; Minimum channels met – no action required TS 3.3.3. Accident Monitoring Instrumentation, Table 3.3.3-1, FU 11; Minimum channels met – no action required)	
Lead Examiner may direct initiation of the next event at his discretion			

Op-Test No.:	Scenario No.:	Event No.:	1	2	Page <u>9</u> of <u>29</u>
Event Description: Condensate pump "A" trip.					
BOOTH INSTRUCTIONS: When directed, INITIATE Event 2 by activating KEY 2.					
INDICATIONS: AD HIS-1, CNDS Pump A, light indication change from RED to GREEN and AMBER (pump stopped / tripped) AD FIK-7B, CNDS Pump A Recirc CTRL, from AUTO to MAN (0 % output to 100% output) AD ZL-7B, CNDS Pump A Recirc Valve, light indication from GREEN to RED AD PI-25, CNDS Pumps Disch Press, indicates decreasing pressure Main Control Board alarms: ALR 00-107C, CNDS PMP SUCT STR ΔP HI ALRs 00-120B / 123B, MFP A/B SUCT PRESS LO					
Time	Position	Applicant's Actions or Behavior			
	CREW	Responds to MCB alarms and board indications. Identify "A" Condensate pump is tripped.			
	CREW	ENTER OFN AF-025, rev 28, Unit Limitations			
	CRS	1. Determine applicable step: a. Check Stator Cooling Water System - NORMAL b. Check Generator Hydrogen System – NORMAL c. Check Main Transformers – NORMAL d. Check all the following transformers - NORMAL <ul style="list-style-type: none"> ○ Start-up transformer ○ XNB01 transformer ○ XNB02 transformer ○ Unit Auxiliary transformer e. Check Condenser Vacuum - NORMAL f. Go to step 7.			

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Event Description:		Condensate pump "A" trip	
Time	Position	Applicant's Actions or Behavior	
	CRS	7. Check Westar Transmission Services (WETS) has reported an actual or predicted switchyard voltage degradation -- NO <i>RNO: go to step 9</i>	
	CRS	9. Check for conditions requiring Unit Load reduction: a. Determine maximum unit load using Attachment A, Unit Load Limits b. Reduce unit load, as necessary, to satisfy load limits using the appropriate procedure * GEN 00-004, Power Operation OR * GEN 00-005, Minimum Load to Hot Standby OR * OFN MA-038, Rapid Plant Shutdown OR * Attachment D, Turbine/Generator Load Decrease using Steam Dumps	
	CRS	Attachment A, Unit Load Limits, Feed & Condensate section: <u>Condition requiring load reduction</u> <u>Maximum Unit Load</u> One Condensate pump out of service → see NOTE (2) Note 2: If one condensate pump is lost, reduce power as necessary to maintain MFP suction pressure greater than 340 psig on AEP0006 for A MFP and AEP0005 for B MFP.	

Op-Test No.: _____	Scenario No.: _____	Event No.: <u>1</u>	Event No.: <u>2</u>	Page <u>11</u> of <u>29</u>
Event Description: <u>Condensate pump "A" trip</u>				
Time	Position	Applicant's Actions or Behavior		
BOOTH Cue: Call as Shift Manager or Call Superintendent to direct use of OFN MA-038, Rapid Plant Shutdown.				
If contacted as System OPS Generation or System Transmission, acknowledge Wolf Creek Turbine/Generator load reduction.				
	CREW	ENTER OFN MA-038 rev 11, Rapid Plant Shutdown		
NOTES				
<ul style="list-style-type: none"> ○ Foldout page shall be monitored throughout this procedure. ○ Steps 1-4 may be performed in any order. ○ Load reduction at greater than 5% / minute will arm condenser steam dumps. ○ When reducing load with Decrease Loading Rate on, the difference between load set and actual load should be less than 200MW. Prior to depressing the Hold or Off pushbuttons or establishing Load Limit control, ensure the At Set Load light is on to prevent an uncontrolled load decrease. 				

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Event Description:		<u>Condensate pump "A" trip</u>	

Time	Position	Applicant's Actions or Behavior
	CRS/BOP	1. (ρ) Reduce turbine load <ul style="list-style-type: none"> a. Check desired unloading rate – $\leq 5\%$ / minute b. Place control valves in their operating range as necessary by slowly decreasing load limit pot until a 1-2 MWe load decrease is noted c. Slowly decrease Load Set MW until AT SET LOAD light is on and LOAD LIMIT LIMITING light extinguishes d. Raise Load Limit pot slightly e. Set Loading/Unloading Rate Limit to desired value and adjust as necessary during decrease to maintain desired rate f. Select Decrease Loading Rate – ON g. Decrease Load Set MW toward desired load h. Continue with this procedure while reducing turbine load
BOOTH Cue: If called as Work Week Manager (WWM), acknowledge request to repair "A" Condensate Pump & will form a team for the repairs. If asked, repairs shouldn't take more than a few hours.		
	CRS/RO	2. (ρ) Borate RCS and adjust control rods as necessary to maintain the following: <ul style="list-style-type: none"> ○ Target Tavg/Tref temperature error between 0°F and +5°F ○ Control rods above the rod insertion limits

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Event

Description: Condensate pump "A" trip – RO actions to Borate (Operator Aid)

Time	Position	Applicant's Actions or Behavior
	RO	<p>SYS BG-200 rev 35, Attachment B, Boration for Temperature Adjustment in Mode 1 and 2</p> <p style="text-align: center;">NOTE</p> <p>A licensed operator shall peer check reactivity manipulations.</p> <p>B.1 Setup to borate the RCS:</p> <p>B.1.1 (p) Turn on PZR HTR B/U GROUP A & B, as directed by CRS, to mix Reactor Coolant System with Pressurizer water</p> <ul style="list-style-type: none"> * BB HIS-51A for group A - ON * BB HIS-52A for group B – ON <p>B.1.2 BG HS-26 to Normal-After-Stop</p> <p>B.1.3 BG HS-25 to Borate</p> <p>B.1.4 BG FK-110 in Auto at desired rate</p> <p>B.1.5 BG FY-110B, BA counter, set to desired gallons</p> <p>B.2 Commence Boration</p> <p>B.2.1 BG HS-26 to Normal-After-Run</p> <p>B.2.2. Verify:</p> <ol style="list-style-type: none"> 1. One BORIC ACID TRANSFER PUMP running 2. BG HIS-110B open 3. BG HIS-110A throttles open 4. BG FR-110 red pen at proper flowrate <p>B.3 Ensure boration stops at BG FY-110B setpoint</p> <p style="text-align: center;">NOTE</p> <p>Pressurizer Backup Heaters are normally placed in auto.</p> <p>B.4 As directed by CRS, place PZR HTR B/U GROUP A & B in desired position after sufficient time for mixing as elapsed.</p> <ul style="list-style-type: none"> o BB HIS-51A for group A - _____ o BB HIS-51B for group B - _____ <p>B.5 Realign for auto operation:</p> <p>B.5.1 BG HS-26 to Normal-After-Stop</p> <p>B.5.2 BG HS-25 to Auto</p> <p>B.5.3 BG FK-110 set for Auto makeup</p> <p>B.5.4 BG HS-26 to Normal-After-Run</p> <p>B.5.5 If desired, then perform Attachment C, Boric Acid Potentiometer Adjustment</p>

Op-Test No.: _____	Scenario No.: <u>1</u>	Event No.: <u>2</u>	Page <u>14</u> of <u>29</u>
Event Description: <u>Condensate pump "A" trip</u>			
<u>(OFN MA-038 procedure steps continued)</u>			
Time	Position	Applicant's Actions or Behavior	
	RO	3. Energize PZR backup heaters <ul style="list-style-type: none"> ○ BB HIS-51A ○ BB HIS-52A 	
	BOP	4. (ρ) Check AE HV-38 - Open <ul style="list-style-type: none"> ○ AE HIS-38 CLOSED 	
	RO	5. Check PZR PORVs: <ul style="list-style-type: none"> a. RCS pressure - < 2335 psig b. PZR PORVs – CLOSED c. RCS pressure - > 2185 psig d. PORV block valves - OPEN 	
	RO	6. Check PZR pressure – stable at or trending to 2235 psig	
	RO	7. Check PZR level – stable at or trending to program level	
	BOP	8. Check SG levels – controlling between 45% and 55%	

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Event Description: <u>Condensate pump "A" trip</u>			
Time	Position	Applicant's Actions or Behavior	
	CRS	9. Check reactor power – less than 60% -- NO, perform RNO <i>RNO:</i> <i>a. If final desired power level is greater than or equal to 60% then go to step 35</i> <i>b. If final desired power level is less than 60% then do not continue until reactor power is less than 60%</i>	
Lead Examiner may direct initiation of the next event at his discretion.			

Op-Test No.: _____	Scenario No.: _____	Event No.: <u>1</u>	Event No.: <u>3</u>	Page <u>16</u> of <u>29</u>
Event Description: <u>Seismic event and reactor trip</u>				
BOOTH INSTRUCTIONS: When directed, INITIATE Event 3 by activating KEY 3, inserting seismic event and inadvertent reactor trip.				
INDICATIONS: Main Control Board alarms: 98D, OBE 98B, SSE Reactor trip occurs – DRPI indicates all rods on bottom, MCB alarms annunciate				
Time	Position	Applicant's Actions or Behavior		
	CREW	Respond to MCB indications.		
	CRS	ENTER and Direct OFN SG-003 rev 16, Natural Events.		
	CRS	1. Determine appropriate attachment for Natural Event: Attachment A, Earthquake Response		
	CRS	2. Go to appropriate attachment		
	CRS	Directs Attachment A, Earthquake Response		
BOOTH Cue: Report as Security that an Earthquake has been felt.				
	CRS	A1. Check EQ magnitude – GREAT ENOUGH TO START SEISMIC RECORDER		
	CRS/CREW	<u>A2</u> . Stabilize Plant Conditions		

Op-Test No.:	Scenario No.:	Event No.:	Page <u>17</u> of <u>29</u>
Event Description:		Seismic event and reactor trip	
Time	Position	Applicant's Actions or Behavior	
	CREW	ENTER EMG E-0, rev 22, Reactor trip or Safety Injection	
FOLDOUT PAGE FOR EMG E-0			
<p>1. RCP TRIP CRITERIA IF all conditions listed below occur, THEN trip all RCPs:</p> <ul style="list-style-type: none"> ○ RCS pressure - LESS THAN 1400 PSIG ○ CCPs or SI pumps - AT LEAST ONE RUNNING ○ Operator controlled cooldown - NOT IN PROGRESS <p>2. SI ACTUATION CRITERIA IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:</p> <ul style="list-style-type: none"> * RCS subcooling - LESS THAN 30°F [45°F] <p>OR</p> <ul style="list-style-type: none"> * Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6% [33%] <p>3. FAULTED S/G ISOLATION CRITERIA IF any S/G pressure decreasing in an uncontrolled manner OR any S/G completely depressurized, THEN the following may be performed:</p> <ul style="list-style-type: none"> a. Close main steam isolation valves. b. Isolate feed flow to faulted S/G(s). c. Maintain total feed flow greater than 270,000 lbm/hr until narrow range level in at least one S/G is greater than 6% [29%]. <p>4. RUPTURED S/G ISOLATION CRITERIA IF any S/G level increases in an uncontrolled manner OR any S/G has abnormal radiation, AND narrow range level in affected S/G(s) is greater than 6% [29%], THEN the following may be performed.</p> <ul style="list-style-type: none"> a. Close ruptured S/G AFW flow control valves. b. IF any ruptured S/G AFW flow control valve cannot be closed AND total AFW flow to intact S/Gs can be maintained greater than 270,000 lbm/hr without associated AFW Pump, THEN perform the following: <ol style="list-style-type: none"> 1) Stop associated MD AFWP and place in PTL OR decrease TDAFWP speed to 2000 rpm. 2) Dispatch an Operator to locally isolate affected AFW flow control valve. 3) WHEN affected AFW flow control valve is isolated, THEN restart MD AFWP OR Restore TD AFWP speed as necessary. <p>5. COLD LEG RECIRCULATION CRITERIA IF RWST level decreases to less than 36%, THEN go to EMG ES-12, TRANSFER TO COLD LEG RECIRCULATION, Step 1.</p> <p>6. AFW SUPPLY SWITCHOVER CRITERIA IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.</p>			
CAUTION:			
Accident conditions can cause higher than normal radiation levels. Health Physics monitoring may be required while performing local operator actions.			
NOTES			
<ul style="list-style-type: none"> ○ Steps 1 through 4 are immediate action steps. ○ Foldout page shall be monitored throughout this procedure. 			

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		1 4	
Event Description: <u>NB01 & NB02 trip. EDG A autostart feature disabled – manual start available.</u>			
Time	Position	Applicant's Actions or Behavior	
BOOTH INSTRUCTIONS: Event 4 is preloaded (EDG A autostart feature disabled).			
INDICATIONS: Various MCB alarms No WHITE light LIT, NB ZL-5, 4.16 KV bus NB01 No WHITE light LIT, NB ZL-6, 4.16 KV bus NB02			
	CRS	ENTER EMG E-0, rev 22, Reactor Trip or Safety Injection	
	RO	1. Verify Rx trip. a. Check all rod bottom lights lit b. Ensure reactor trip breakers and bypass breakers open c. Check neutron flux decreasing	
	BOP	2. Verify turbine trip. a. Check the following: * Main Stop valves – all closed OR * Turbine auto stop bistable light – at least two lit	
	RO	3. Check AC emergency busses – at least one energized; NO , perform RNO * NB01 voltage- normal * NB02 voltage – normal	

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	1	4	
Event Description: NB01 & NB02 trip. EDG A autostart feature disabled – manual start available.			
Time	Position	Applicant's Actions or Behavior	
NB01 & NB02 trip. EDG A autostart feature disabled – manual start available			
Recall: NB02 bus unavailable because EDG “B” out of service as part of Turnover item			
	RO	<p><u>3.RNO</u> Perform the following: (CT)</p> <p>CT: Starting the EDG “A” to re-energize NB01 bus before placing safeguards equipment in pull-to-lock or prior to any needless Orange or Red path entry conditions.</p> <p>Success: Start EDG A using KJ HS-8A</p> <p><i>a. Depress the Start/reset pushbutton for any stopped Diesel Generator</i></p> <ul style="list-style-type: none"> ○ KJ HS-8A for EDG A ○ KJ HS-108A for EDG B <p><i>b. If at least one AC emergency bus is now energized, then go to step 4.</i></p> <p><i>c. Direct operator to monitor Critical Safety Functions for information only using</i></p> <p><i>EMG F-0, Critical Safety Function Status Trees (CSFST).</i></p> <p><i>d. Go to EMG C-0, Loss of all AC Power, step 1</i></p>	
NOTE: Bus NB01 is energized by the EDG “A” once the Control Room starts the EDG.			

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Event Description: <u>Seismic event, Reactor trip, EDG A autostart feature disabled (started From Control Room)</u>				
Time	Position	Applicant's Actions or Behavior		
	RO	4. Check if Safety Injection is actuated: a. Check any indication SI is actuated – lit <ul style="list-style-type: none"> * Ann. 00-030A/00-0031A, NF039A/B LOCA SEQ ACTUATED – lit OR * ESFAS status panel SIS section – any white lights lit OR * Partial trip status Permissive / Block status panel – SI red light lit b. Check both trains of SI actuated <ul style="list-style-type: none"> o Ann. 00-030A/00-031A, NF039A/B LOCA SEQ ACTUATED – lit <i>RNO Perform the following:</i> <ol style="list-style-type: none"> 1. Check SI required: <ul style="list-style-type: none"> * $RCS\ pressure \leq 1830\ psig\ OR$ * $Any\ SG \leq 615\ psig\ OR$ * $CTMT\ pressure \geq 3.5\ psig\ OR$ * $RCS\ subcooling < 30\ ^\circ F\ OR$ * $PZR\ level < 6\%$ 		

[illegible]

Op-Test No.:	Scenario No.:	Event No.:	Page <u>22</u> of <u>29</u>
	1	5	
Event Description: <u>Loss of all Auxiliary Feedwater</u> <u>TDAFW pump trip (broken linkage), MDAFW pump "A" trip (shaft seizure) and CCP "A" pump trip.</u>			
Time	Position	Applicant's Actions or Behavior	
BOOTH INSTRUCTIONS: Event 5 failures are preloaded			
BOOTH Cue: If contacted as Building watches to investigate pump trips, respond: I will investigate.			
INDICATIONS:			
Main Control Board alarms:			
00-128A, AFP DISCH PRESS LO; 00-128E, TDAFP SPD HILO; 00-129A, MDAFP A TROUBLE; 00-042E, CHARGING PMP TROUBLE			
	CRS	ENTER and Direct EMG FR-H1, rev 20, Response to Loss of Secondary Heat Sink	
CAUTIONS			
<ul style="list-style-type: none"> ○ If total feed flow is less than 270,000 lbm/hr due to operator action, this procedure shall not be performed. ○ If a non-faulted S/G is available, feed flow shall not be reestablished to any faulted S/G. 			
NOTE:			
Foldout page shall be monitored throughout this procedure.			

Op-Test No.:	Scenario No.:	Event No.:	5	Page <u>23</u> of <u>29</u>
Event Description: <u>Loss of all Auxiliary Feedwater</u> <u>TDAFW pump trip (broken linkage), MDAFW pump "A" trip (shaft seizure) and CCP "A" pump trip.</u>				
Time	Position	Applicant's Actions or Behavior		
FOLDOUT PAGE FOR EMG FR-H1				
1. BLEED AND FEED CRITERIA IF RCS bleed and feed has NOT been established AND RCS pressure is greater than any non-faulted S/G pressure AND any condition listed below occurs, THEN OBSERVE CAUTION PRIOR TO STEP 29 and go to Step 29. * Wide range level in any 3 S/Gs - LESS THAN 26% [47%] OR * RCS pressure - GREATER THAN 2335 PSIG DUE TO LOSS OF SECONDARY HEAT SINK OR * CCPs - NONE AVAILABLE				
2. COLD LEG RECIRCULATION CRITERIA IF RWST level decreases to less than 36%, THEN go to EMG ES-12, TRANSFER TO COLD LEG RECIRCULATION, Step 1.				
3. AFW SUPPLY SWITCHOVER CRITERIA IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.				
Examiner Note: Crew diagnoses No CCPs available and goes to step 29.				

Op-Test No.:	Scenario No.:	Event No.:	Page <u>24</u> of <u>29</u>
	1	5	
Event Description: <u>Loss of Auxiliary Feedwater (AFW)</u>			
Time	Position	Applicant's Actions or Behavior	
BOOTH Cue: If dispatched to investigate CCP "A pump trip, report: I will investigate. If dispatched to CCP pump breaker, report an Overcurrent flag is dropped.			
	CRS	1. Check if Secondary heat sink is required a. RCS pressure - > any non-faulted S/G pressure b. RCS hot leg temp - > 350°F	
	CREW	2. Verify RCS Bleed and Feed – not required a. Check WR level in all S/Gs - ≥ 26% [47%] b. Check RCS press - ≤ 2335 psig	
	RO	3. Check CCP status – at least one available (NO, perform RNO) <i>RNO: Observe CAUTION prior to step 29 and go to step 29</i>	

Op-Test No.:	Scenario No.:	Event No.:	Page <u>25</u> of <u>29</u>
Event Description:		<u>Loss of Auxiliary Feedwater.</u>	

Time	Position	Applicant's Actions or Behavior
CAUTION: Steps 29 through 33 must be performed quickly in order to establish heat removal by RCS bleed and feed.		
CT: Establish RCS bleed and feed before Steam Generators dry out establishing a heat sink for the core.		
Success: SI actuated and PORV Block valves OPEN		
	RO	29. Reduce heat input to RCS a. Stop all RCPs <ul style="list-style-type: none"> ○ BB HIS-37 for RCP A ○ BB HIS-38 for RCP B ○ BB HIS-39 for RCP C ○ BB HIS-40 for RCP D b. Turn off all PZR heaters <ul style="list-style-type: none"> ○ BB HIS-50 ○ BB HIS-51A ○ BB HIS-52A
	RO	30. Actuate SI (CT – see above) <ul style="list-style-type: none"> ○ SB HS-27 ○ SB HS-28

Op-Test No.:	Scenario No.:	Event No.:	Page <u>26</u> of <u>29</u>
Event Description:		Loss of Auxiliary Feedwater	

Time	Position	Applicant's Actions or Behavior
	CRS	31. Verify ECCS feed path a. Check high pressure ECCS pumps <ul style="list-style-type: none"> * CCPs – at least one running OR * SI pumps – at least one running b. Verify SI feed path alignment: <ul style="list-style-type: none"> * Check CCP to BIT flow meters – flow indicated OR <ul style="list-style-type: none"> ○ EM FI-917A ○ EM FI-917B * Check SI pump discharge flow meters – flow indicated OR <ul style="list-style-type: none"> ○ EM FI-918 ○ EM FI-922 * Check ESFAS status SIS section – System level white lights all lit <ul style="list-style-type: none"> ○ Red train ○ Yellow train

Op-Test No.:	Scenario No.:	Event No.:	Page <u>27</u> of <u>29</u>
Event Description:		<u>Loss of Auxiliary Feedwater</u>	
Time	Position	Applicant's Actions or Behavior	
	CREW	32. Establish RCS bleed path: <ul style="list-style-type: none"> a. Check power to block valves – AVAILABLE <ul style="list-style-type: none"> ○ BB HIS-8000A ○ BB HIS-8000B b. Place both cold overpressure Block/Arm switch in ARM position <ul style="list-style-type: none"> ○ BB HS-8000A ○ BB HS-8000B c. Check PZR PORV block valves – BOTH OPEN (CT – see page 27) <p style="margin-left: 40px;"><i>RNO: OPEN both block valves</i></p> <ul style="list-style-type: none"> ○ BB HIS-8000A ○ BB HIS-8000B d. Open both PZR PORVs <ul style="list-style-type: none"> ○ BB HIS-455A ○ BB HIS-456A 	
	CREW	33. Verify adequate RCS bleed path: <ul style="list-style-type: none"> ○ PZR PORV block valves – both open ○ PZR PORV's – both open 	
	CRS	34. Perform steps 1-7 of EMG E-0, Reactor Trip or Safety Injection, while continuing with this procedure.	

Op-Test No.: _____	Scenario No.: <u>1</u>	Event No.: <u>5</u>	Page <u>28</u> of <u>29</u>
Event Description: <u>Loss of Auxiliary Feedwater</u>			
Time	Position	Applicant's Actions or Behavior	
	CRS	35. Maintain RCS heat removal: <ul style="list-style-type: none"> ○ Maintain ECCS flow to RCS ○ Maintain PZR PORVs – Both OPEN 	
CAUTION: If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.			
	RO	36. Reset SI <ul style="list-style-type: none"> ○ SB HS-42A ○ SB HS-43A 	
	RO	37. Reset Containment Isolation Phase A and Phase B <ul style="list-style-type: none"> ○ SB HS-56 for phase A ○ SB HS-53 for phase A ○ SB HS-55 for phase B ○ SB HS-52 for phase B 	
	BOP	38. Establish Instrument Air to Containment	

Op-Test No.:	Scenario No.:	Event No.:	Page <u>29</u> of <u>29</u>
	1	5	
Event Description: <u>Loss of Auxiliary Feedwater</u>			
Time	Position	Applicant's Actions or Behavior	
	CRS	39. Continue attempts to establish Secondary heat sink in at least one SG	
When Bleed and Feed is established, Lead Examiner may terminate scenario at his discretion.			

Facility: Wolf Creek Scenario No.: 2 Op-Test No.: _____

Examiners: _____ Operators: _____

Initial Conditions: 65% power

Turnover: Load reduction in progress per GEN 00-004, Power Operations, section 6.2, in order to remove “A” Main Feed pump from service due to high vibration. Main Feed Pump “A” is not expected to be out of service very long.

Use SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown.

Event No.	Malf. No.	Event Type*	Event Description
1 t+1		R – ATC N – BOP, SRO	Reduce power using GEN 00-004, Power Operations and remove “A” Main Feed Pump from service using SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown (crew may reference / enter OFN AF-025, Unit Limitations, also)
2 t+15	mBB01 D	I – ATC, SRO	Primary Loop D Thavg (BB TI-441) high failure OFN SB-008, Instrument Malfunctions, Attachment L
3 t+20	mAE15 C4	I – BOP, SRO	S/G C level AE LI-553 failure high OFN SB-008, Instrument Malfunctions, Attachment F ALR 00-110C, SG C Flow Mismatch ALR 00-110B, SG C Lev Dev ALR 00-110A, SG C Lev Hi/Lo

4 t+27	mBG13 C	C – ATC, SRO	<p>Normal Charging Pump (NCP) trip; a Centrifugal Charging Pump must be started, letdown restored etc</p> <p>ALR 00-042A, Charging Line Flow HiLo (SYS BG-120, CVCS Startup or SYS BG-201, Shifting Charging Pumps – either may be used to restore letdown)</p> <p>ALR 00-042E, Charging Pump Trouble (Step 7 re-establishes letdown)</p>
5 t+35	mBB02 B	M – All	500 gpm Steam Generator Tube Rupture on S/G A OFN BB-07A, Steam Generator Tube Leakage (eventually EMG E-0, Reactor Trip or Safety Injection & EMG E-3, Steam Generator Tube Rupture)
5			<p>EMG E-3, Steam Generator Tube Rupture actions:</p> <p>CT – Isolate feed flow to the ruptured SG before Steam Generator overfills.</p> <p>CT – Cooldown & Depressurize RCS to minimize RCS inventory leakage into the ruptured Steam Generator.</p>
6 t+43	mSA27 EM01 and mSA27 EM02	C – ATC, SRO	<p>Post trip: BIT outlet valves (EM HIS-8801A and EM HIS-8801B) do not open. Manual open available</p> <p>CT - Open BIT outlet valves (EM HIS-8801A and EM HIS-8801B) before the end of the scenario or before needless Red or Orange path occurs.</p> <p>EMG E-0, Reactor Trip or Safety Injection, Attachment F or allowed post Immediate Action completion</p>
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario summary

Plant is at 65% power with a load reduction in progress to remove “A” Main Feed Pump (MFP) from service due to high vibration. GEN 00-004, Power Operations, section 6.2 in progress for load reduction. Crew will use SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown, to remove “A” MFP from service.

Crew reduces power per GEN 00-004, Power Operations, section 6.2, Power Decrease. Crew may reference OFN AF-025, Unit Limitations, Attachment A (one main feedwater pump from service requires plant at 62% power). Crew removes “A” MFP from service using SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown (see step 6.2.12 of GEN 00-004).

- Crew stabilizes unit at lower power and removes pump from service.

Primary Loop D Thavg failure high – BB TI-441 fails high. Control rods begin to step inward. Crew responds by placing rods into manual control and performing OFN SB-008, Instrument Malfunctions.

- OFN SB-008, Instrument Malfunctions, Attachment L.
- Crew stabilizes the plant.

Steam Generator (S/G) C level channel AE LI-553 failure high. Crew responds by performing OFN SB-008, Instrument Malfunctions, Attachment F. An alternate level channel is selected for control.

- ALR 00-110A, SG C Lev Hi/Lo, may be used prior to entry of OFN SB-008, Instrument Malfunctions.
- Crew stabilizes the plant.

Normal Charging Pump (NCP) trip. Crew responds using ALR guidance. A Centrifugal Charging Pump is started. Normal letdown must be restored.

- ALR 00-042A, Charging Line Flow HiLo
- ALR 00-042E, Charging Pump Trouble
- Crew stabilizes the plant.

Major event: A 500 gpm Steam Generator Tube Rupture (SGTR) on S/G A is diagnosed per OFN BB-07A, Steam Generator Tube Leakage.

SGTR requiring a manual Reactor trip and Safety Injection Signal actuation per Foldout page criteria of OFN BB-07A. Mitigation procedure will be EMG E-3, Steam Generator Tube Rupture.

1. Crew responds using OFN BB-07A, Steam Generator Tube Leakage.
2. Crew responds using EMG E-0, Reactor Trip or Safety Injection.
3. Crew responds using EMG E-3, Steam Generator Tube Rupture.

EMG E-3, Steam Generator Tube Rupture, Major Actions:

- Identify and isolate ruptured S/Gs
- Cooldown and establish RCS subcooling margin
- Depressurize RCS to restore inventory
- Terminate SI to stop primary to secondary leakage
- Prepare for cooldown to cold shutdown

Scenario has three Critical Tasks (CT):

1. Open BIT outlet valves (EM HIS-8801A and EM HIS-8801B) before the end of the scenario or before needless Red or Orange path occurs.
2. Isolate feed flow to ruptured Steam Generator before Steam Generator overfills.
3. Cooldown & Depressurize RCS to minimize RCS inventory leakage into the ruptured Steam Generator.

Probabilistic Risk Analysis for this scenario includes:

Top 10 Human Action Failures by the Importance Measure Rankings

F-V Rank	RRW Rank	Total Rank	Event Name	Description	Point Est.	F-V	RAW	RRW	Birnbaum
1	8	34	OPA-OD1-EXE	FAILURE OF RCS COOL DOWN & DEPRESSURIZE - SGR EVENT - EXE	4.89E-03	2.61E-02	6.32	1.027	9.64E-05

Core Damage Frequency by Initiating Event and by Event Tree

Event Tree	Core Damage Frequency (/yr)	Percent Contribution
Station Blackout	6.46E-06	35.79%
Small LOCA	5.35E-06	29.65%
Interfacing Systems LOCA	1.93E-06	10.68%
Very Small LOCA	1.27E-06	7.05%
Steam Generator Tube Rupture	8.77E-07	4.86%

Technical Specifications exercised:

Event 2 TS 3.3.1, Reactor Trip System Instrumentation, Table 3.3.1-1, FU 6 and 7

Cond. A: Function / channel inoperable – enter condition per table (immediately)

Cond. E: One channel inoperable – place channel in trip (72 hours)

Event 3 TS 3.3.1, Reactor Trip System Instrumentation, Table 3.3.1-1, FU 14

Cond A: Function / channel inoperable – enter condition per table (immediately)

Cond E: One channel inoperable – place channel in trip (72 hours)

TS 3.3.2, Engineered Safety Features Actuation System Instrumentation, Table 3.3.2-1, FU 5c and 6d

Cond A: Function / channel inoperable – enter condition per table (immediately)

Cond D: One channel inoperable – place channel in trip (72 hours)

Cond I: One channel inoperable – place channel in trip (72 hours)

NOTE: Event 4 TR 3.1.9, Boron Injection System – Operating -- may be looked at

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

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Event Description: Reduce power using GEN 00-004, Power Operations and remove “A” Main Feed Pump from service using SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown

Time	Position	Applicant's Actions or Behavior
	CREW	Using Gen 00-004, rev 61, Power Operations, section 6.2.2.2, continue power reduction. Examiner Note: These steps have already been performed, the crew may review them to ensure completeness and begin at 6.2.12.2
	BOP	6.2.2.2 If MTC is negative or zero, then perform the following: <ul style="list-style-type: none"> a. If automatic Turbine unloading is desired, then control turbine load using automatic turbine-generator unloading selected to ½% per minute OR as directed by SM/CRS. b. If automatic Turbine unloading is NOT desired, then perform Turbine load decrease using load limit potentiometer or the standby potentiometer in a slow controlled manner. c. (ρ) Adjust control rods as necessary to maintain Tavg within 1.5°F of Tref.
	CRS/RO	6.2.3 (ρ) During power reduction, use boration, dilution, or control rods, as necessary, to maintain the axial flux difference within the target band and control rods above the rod insertion limit. <i>RO uses Operator Aid for Boration – see next page.</i>
	CRS/RO	6.2.4 Ensure AE HV-38, HP FW HEATERS BYPASS VALVE, is closed using SYS AE-125, HP FW HEATER BYPASS THROTTLING OPERATIONS.
	CRS/RO	6.2.5 Ensure one set of PZR backup heaters is energized.

NOTE: 6.2.6 is N/A. Crew determines which method to use for Turbine unloading.

Appendix D

Required Operator Actions

[Form ES-D-2](#)

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

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Event Description: RO actions for Boration using Operator Aid, SYS BG-200, rev 35,
Attachment B, Boration for Temperature Adjustment in Mode 1 and 2

Time	Position	Applicant's Actions or Behavior
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	RO	<p style="text-align: center;">NOTE</p> <p>A licensed operator shall peer check reactivity manipulations.</p> <p>B.1 Setup to borate the RCS:</p> <p>B.1.1 (ρ) Turn on PZR HTR B/U GROUP A & B, as directed by CRS, to mix Reactor Coolant System with Pressurizer water</p> <ul style="list-style-type: none"> * BB HIS-51A for group A - ON * BB HIS-52A for group B – ON <p>B.1.2 BG HS-26 to Normal-After-Stop</p> <p>B.1.3 BG HS-25 to Borate</p> <p>B.1.4 BG FK-110 in Auto at desired rate</p> <p>B.1.5 BG FY-110B, BA counter, set to desired gallons</p> <p>B.2 Commence Boration</p> <p>B.2.1 BG HS-26 to Normal-After-Run</p> <p>B.2.2. Verify:</p> <ol style="list-style-type: none"> 1. One BORIC ACID TRANSFER PUMP running 2. BG HIS-110B open 3. BG HIS-110A throttles open 4. BG FR-110 red pen at proper flowrate <p>B.3 Ensure boration stops at BG FY-110B setpoint</p> <p style="text-align: center;">NOTE</p> <p>Pressurizer Backup Heaters are normally placed in auto.</p> <p>B.4 As directed by CRS, place PZR HTR B/U GROUP A & B in desired position after sufficient time for mixing as elapsed.</p> <ul style="list-style-type: none"> ○ BB HIS-51A for group A - _____ ○ BB HIS-51B for group B - _____ <p>B.5 Realign for auto operation:</p> <p>B.5.1 BG HS-26 to Normal-After-Stop</p> <p>B.5.2 BG HS-25 to Auto</p> <p>B.5.3 BG FK-110 set for Auto makeup</p> <p>B.5.4 BG HS-26 to Normal-After-Run</p> <p>B.5.5 If desired, then perform Attachment C, Boric Acid Potentiometer Adjustment</p>
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Op-Test No.: _____ Scenario No.: 2 Event No.: 1

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Event Description: Reduce power using GEN 00-004, Power Operations and remove "A" Main Feed Pump from service using SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown

Time	Position	Applicant's Actions or Behavior
	CRS/BOP	<p>6.2.7 If automatic Turbine unloading is desired, then place EHC control on load set as follows:</p> <ol style="list-style-type: none"> 1. (ρ) If desired to position Control Valves in their controlling range, then slowly decrease load limit pot until a 1-2 MWe load decrease is noted. 2. Slowly decrease load set MW until the following conditions are met: <ul style="list-style-type: none"> ○ At set load light – LIT AND ○ Load limit limiting light – NOT LIT 3. Raise load limit pot slightly. 4. Select ½% / minute loading rate. 5. Select decrease loading rate – ON
	CRS/BOP	6.2.8 (ρ) Decrease Turbine load as desired while continuing with this procedure
	CRS	6.2.9 Ensure Chemistry is promptly notified of each power change that is greater than or equal to 15% RTP within a 1 hour period so that RCS DEI can be verified to satisfy SR 3.4.16.2.
	CRS	6.2.10 When SM or CRS desires to stop one heater drain pump, THEN stop one heater drain pump using SYS AF-121, HEATER DRAIN PUMP OPERATION. NA – not desired to remove a Heater Drain Tank pump.
	CRS	6.2.11 If operating with a positive MTC and reactor power is less than 65%, then open Steam Dumps as follows: <i>NA – operating with a negative MTC</i>

Op-Test No.: _____ Scenario No.: <u> 2 </u> Event No.: <u> 1 </u>		Page <u> 9 </u> of <u> 57 </u>
Event Description: Reduce power using GEN 00-004, Power Operations and remove “A” Main Feed Pump from service using SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown		
Time	Position	Applicant’s Actions or Behavior
Examiner Note: Unit Limitations OFN allows one MFP to be secured at 62 % power. Turnover item: continue power reduction in order to remove the Main Feed Pump.		
	CRS	6.2.12.2. If two Main Feedwater Pumps are running, then secure one using SYS AE-320, Turbine Driven Main feedwater Pump Shutdown
	CRS/CREW	Direct SYS AE-320, (rev 21), Turbine Driven Main feedwater Pump Shutdown, section 6.1
CAUTION: If a secondary cooldown is in progress, ensure a flowpath for feed to SGs can be maintained. NOTE: At 62% power, two MFPs at 4400 rpm will equate to one MFP at 5400 rpm.		
	BOP	6.1.1 Place MFP turb A speed control in manual. ○ FC SK-509B – MANUAL
CAUTION: Monitor feedwater flow and SG levels, during performance of the following steps.		
	BOP	6.1.2 Place MFP A recirc ctrl valve in manual and open ○ AE FIC-2B – MANUAL AND ○ AE FIC-2B – OPEN

Op-Test No.: _____ Scenario No.: 2 Event No.: 1 Page 10 of 57

Event Description: Remove “A” Main Feed Pump from service using SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown

Time	Position	Applicant's Actions or Behavior
	BOP	6.1.3 Slowly decrease MFP turb A speed ctrl to 3800 rpm <ul style="list-style-type: none"> ○ FC SK-509C – OUTPUT DECREASED ○ FC SI-33 – 3800 rpm
	BOP	6.1.4 Adjust MFP turb A man speed ctrl pot, to achieve a zero indication on MFP Turb A man/auto sig match indicator <ul style="list-style-type: none"> ○ FC HK-88 – SETTING ADJUSTED ○ FC EI-88 - ZERO
	BOP	6.1.5 Depress MFP turb A speed ctrl transfer switch manual pushbutton <ul style="list-style-type: none"> ○ FC HIS-88 – manual
	BOP	6.1.6 Slowly decrease MFP turb A man speed ctrl pot to 1100 rpm <ul style="list-style-type: none"> ○ FC HK-88 – SETTING DECREASED ○ FC SI-33 – 1100 rpm
NOTE: ESFAS should not be blocked, unless both Main feedwater pumps are being secured.		

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

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Event Description: Remove "A" Main Feed Pump from service using SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown

Time	Position	Applicant's Actions or Behavior
	BOP	6.1.7. To prevent a spurious AFW system actuation, ensure one of the following conditions is met: <ul style="list-style-type: none"> * MFP turb B trip/test switch is reset <ul style="list-style-type: none"> ○ FC HIS-118 – RESET * Ensure AFP ESFAS block train A & B switches are in the block position <ul style="list-style-type: none"> ○ FC HS-25 – BLOCK ○ FC HS-26 – BLOCK
	BOP	6.1.8 Depress MFP turb A trip/reset switch trip pushbutton <ul style="list-style-type: none"> ○ FC HIS-18 – TRIPPED
	BOP	6.1.9 Ensure MFP A disch vlv closes <ul style="list-style-type: none"> ○ AE HIS-16 – CLOSED
	BOP	6.1.10 Close MFP A recirc ctrl valve <ul style="list-style-type: none"> ○ AE FIC-2B - CLOSED
	BOP	6.1.11 When MFP A coasts down to zero speed, then ensure MFP turb A Turn gear engage light illuminated <ul style="list-style-type: none"> ○ FC ZL-82A - LIT

Op-Test No.: _____ Scenario No.: 2 Event No.: 1Page 12 of 57

Event Description: Remove "A" Main Feed Pump from service using SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown

Time	Position	Applicant's Actions or Behavior
	BOP	6.1.12 Open the following MFP turbine A drains: 1. MFP turb A 1 st stg S/U drn vlv ○ FC HIS-71 – OPEN 2. MFP turb A HPSV above seat drn valve ○ FC HIS-4 – OPEN 3. MFP turb A HPSV below seat drn valve ○ FC HIS-7 - OPEN
	BOP	6.1.13 Open MFP A disch valve ○ AE HIS-16 – OPEN
	BOP	6.1.14 If MFP A will be shutdown for a prolonged period, then close the following valves, to prevent seal water flow from overfilling the Miscellaneous Condensate Drain Tank: 1. SG FWP A seal water supply reg vlv PDV-58 inlet iso vlv ○ AE-V995 - CLOSED 2. SG FWP A seal water supply reg vlv PDV-58 bypass vlv ○ AE-V994 – CLOSED
BOOTH CUE: If called as building watch to close valves AE-V995 and AE-V994, report back in ~ four minutes that the valves are closed. These valves are not modeled.		
	BOP	6.1.15 If desired to secure MFP A lube oil system, then perform section 6.3, Shutdown of MFP A lube oil system. <i>NA – not required</i>

[illegible]

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

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Event Description: Primary Loop D Thavg (BB TI-441) high failure.

Time	Position	Applicant's Actions or Behavior
<p>INDICATIONS: Main Control Board alarms: 65C, 65E, 66B, 66D, 67B, 67D, 68B, 68D, 81C, 81D, 82B, 82C, 83C</p> <p>Partial Trip Status Panel (SB069): bistable lights TB 441C (OTΔT L4) and TB441G (OPΔT L4) are illuminated</p> <p>Control rods step in.</p> <p>Loop 4 ΔT meter BB TI-441 is pegged high.</p>		
	CRS/CREW	Actions may be taken before procedure entry: Once no runback/load rejection is determined, the Control rods are taken to manual.
	CREW	ENTER OFN SB-008, rev 25, Instrument Malfunctions
	CRS	<p>1. Check if Secondary system instrument channel is malfunctioning</p> <p>a. Determine appropriate attachment for malfunctioning channel from table below; NO perform RNO</p> <p><i>RNOa. If secondary system channel is not malfunctioning, then go to step 2</i></p>
	CRS/RO	<p>2. Check if RCS instrument channel or controller is malfunctioning:</p> <p>a. Determine appropriate attachment for malfunctioning channel or controller from table below:</p>
Variable	Channels	Attachment
RCS temperature (BB)	T-411, T-421, T-431, T-441	Attachment L
		b. Go to appropriate attachment for malfunctioning RCS system channel or controller

Op-Test No.: _____ Scenario No.: 2 Event No.: 2Page 15 of 57

Event Description: Primary Loop D Tavg (BB TI-441) high failure.

Time	Position	Applicant's Actions or Behavior
	CREW	Performs OFN SB-008, Attachment L, Narrow Range RTD Malfunctions
	BOP	L1. Check load rejection – NOT in progress <ul style="list-style-type: none"> ○ Generator load MW - STABLE ○ Generator load set MW - STABLE
	RO	L2. Switch rod control bank selector switch (SE HS-9) to - MANUAL
	BOP	L3. Check steam dumps <ul style="list-style-type: none"> a. Check steam dumps in Tavg mode (handswitch AB US-500Z) b. Check steam dumps – CLOSED (meter AB ZL-34/35)
	RO	L4. Identify failed instrument <ul style="list-style-type: none"> a. Compare loop Tavg and ΔT indications to confirm a Narrow Range RTD failure <i>RO identifies Loop 4 failure (BB TI-441A, BB TI-442)</i>

Op-Test No.: _____ Scenario No.: 2 Event No.: 2Page 16 of 57

Event Description: Primary Loop D Tavg (BB TI-441) high failure.

Time	Position	Applicant's Actions or Behavior
	RO	L5. Remove failed temperature channel from Tavg and ΔT auctioneering circuits, using Tavg and ΔT defeat switches <ul style="list-style-type: none"> ○ BB TS-411F ○ BB TS-412T Examiner Note: MCB alarms clear and 69A and 69C actuate.
	RO	L6. Check (Tavg/Tref) error signal within 1°F; NO , perform RNO <i>RNO: (ρ) Manually adjust control rod position, to maintain Tavg within 1 °F of Tref.</i>
NOTES <ul style="list-style-type: none"> ○ Several minutes must be allowed for power and temperature rate circuitry outputs to return to normal before switching back to automatic rod control. ○ Control Rods should be restored to their parked position when plant conditions allow at the direction of the CRS. 		
	RO	L7. Switch rod control bank selector switch to – AUTO <ul style="list-style-type: none"> ○ SE HS-9
	RO	L8. Monitor Rod Control System response to ensure proper control
	RO	L9. Check C-7 Loss of Load Interlock – NOT LIT

Op-Test No.: _____ Scenario No.: 2 Event No.: 2Page 17 of 57

Event Description: Primary Loop D Thavg (BB TI-441) high failure.

Time	Position	Applicant's Actions or Behavior
	BOP	L10. Check Steam Dump Bypass Interlock switches in – ON (AB HS-63 and AB HS-64)
	BOP	L11. Monitor steam dump control system to ensure proper operation
	RO	L12. Check failed temperature channel not used for OPΔT and OTΔT recorders <i>RNO: Select alternate temperature channel for OPΔT and OTΔT recorders (SC TS-411E)</i>
	CRS	L13. Monitor the following Technical Specification LCOs and comply with Action Statements as appropriate: <ul style="list-style-type: none"> ○ 3.3.1, Reactor Trip System Instrumentation, Table 3.3.1.-1, function 6 and 7 Cond. A: Function / channel inoperable – enter condition per table (immediately) Cond. E: One channel inoperable – place channel in trip (72 hours)
Once Technical Specifications are identified and at Lead Examiner discretion, initiate Event 3 by activating KEY 3.		

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Event Description: S/G C level AE LI-553 failure high.

Time	Position	Applicant's Actions or Behavior
BOOTH INSTRUCTIONS: At Lead Examiner discretion, activate Event 3 by inserting KEY 3.		
INDICATIONS: Meter indication AE LI-553 increasing, Main Control Board alarms: 00-110C, SG C Flow Mismatch; 00-110B, SG C Lev Dev; 00-110A, SG C Lev Hi/Lo		
	CRS/BOP	Actions may be taken before procedure entry: Identify failed instrument, AE LI-533 failure; Place MFW Reg Valve in Manual (AE FK-530) and match steam and feed flow.
	CREW	May enter ALR 00-110A rev 5, or go directly to OFN SB-008, rev 25, Instrument Malfunctions
	CRS/CREW	ENTER ALR 00-110A, rev 5, SG C Lev Hi/Lo 1. Check SG C controlling level channel * Less than 30% OR * Greater than 70%

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Event Description: S/G C level AE LI-553 failure high.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>2. Check for Instrument failure:</p> <ul style="list-style-type: none"> ○ SG C controlling level channel – WITHIN 7% OF REMAINING SG C LEVEL CHANNELS -- NO * AE LI-539 * AE LI-553 <p><i>RNO: Perform the following:</i></p> <p><i>a. Place Feedwater Reg Valve (FRV) or Feedwater Reg Bypass Control Valve (FRBV) in manual</i></p> <ul style="list-style-type: none"> * AE FK-530 * AE LK-570 <p><i>b. Adjust FRV or FRBV as necessary to establish SG level at program value</i></p> <ul style="list-style-type: none"> * AE FK-530 * AE LK-570 <p><i>c. Select alternate channel for control</i></p> <ul style="list-style-type: none"> * AE LS-539C <p><i>d. Return FRV or FRBV to automatic</i></p> <ul style="list-style-type: none"> * AE FK-530 * AB LK-570 <p><i>e. Go to OFN SB-008, Instrument Malfunctions step 1,</i></p>

Op-Test No.: _____ Scenario No.: <u> 2 </u> Event No.: <u> 3 </u>		Page <u>20</u> of <u>57</u>			
Event Description: S/G C level AE LI-553 failure high.					
Time	Position	Applicant's Actions or Behavior			
	CRS/CREW	ENTER OFN SB-008, Instrument Malfunctions (rev 25)			
	BOP	1. Check if Secondary System instrument channel is malfunctioning: a. Determine appropriate attachment for malfunctioning channel from table below:			
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%; text-align: center;">VARIABLE Steam level (AE)</td> <td style="width: 33%; text-align: center;">CHANNELS L-553</td> <td style="width: 33%; text-align: center;">ATTACHMENT Attachment F</td> </tr> </table>			VARIABLE Steam level (AE)	CHANNELS L-553	ATTACHMENT Attachment F
VARIABLE Steam level (AE)	CHANNELS L-553	ATTACHMENT Attachment F			
	CRS	Directs Attachment F, SG Level Channel Malfunction			
NOTE: If crew performed the ALR first, it may alter how they proceed through the OFN attachment.					
	BOP	F1. Identify failed narrow range SG level instrument channel: a. Compare narrow range SG level indication to confirm a narrow range SG level channel failure <ul style="list-style-type: none"> ○ SG "C": <ul style="list-style-type: none"> • AE-LI-537 • AE LI-538 • AE LI-539 • AE LI-553 			

Op-Test No.: _____ Scenario No.: 2 Event No.: 3Page 21 of 57

Event Description: S/G C level AE LI-553 failure high.

Time	Position	Applicant's Actions or Behavior
	BOP	F2. Check failed SG level channel selected on level selector switch * AE LS-539C (others are also listed in the procedure), <i>RNO</i> <i>F2. Go to Step F7</i>
	BOP	F3. Place affected SG feed reg control valve – in MANUAL * AE FK-530 (other FRVs are listed in the procedure)
	BOP	F4. Adjust affected feedwater reg valve, as necessary, to establish SG level at program (AE FK-530)
	BOP	F5. Select alternate SG level channel for feedwater control * AE LS-539C
	CRS	F6. Restore affected SG feed reg valve controller to – AUTO
BOOTH Cue: If called as Call Sup /WWM, respond: I will assemble a team.		

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Event Description: S/G C level AE LI-553 failure high.

Time	Position	Applicant's Actions or Behavior
	CRS	<p>F7. Monitor the following TS for LCO's and comply with appropriate Action Statements as appropriate:</p> <p>TS 3.3.1, Reactor Trip System Instrumentation, Table 3.3.1-1, FU 14</p> <p>Cond A: Function / channel inoperable – enter condition per table (immediately)</p> <p>Cond E: One channel inoperable – place channel in trip (72 hours)</p> <p>TS 3.3.2, Engineered Safety Features Actuation System Instrumentation, Table 3.3.2-1, FU 5c and 6d</p> <p>Cond A: Function / channel inoperable – enter condition per table (immediately)</p> <p>Cond D: One channel inoperable – place channel in trip (72 hours)</p> <p>Cond I: One channel inoperable – place channel in trip (72 hours)</p>
BOOTH INSTRUCTIONS: At Lead Examiner discretion, initiate Event 4 by activating KEY 4.		

Op-Test No.: _____ Scenario No.: <u> 2 </u> Event No.: <u> 4 </u>		Page <u>23</u> of <u>57</u>
Event Description: Normal Charging Pump (NCP) trip. (ALR 00-042A, rev 14, CHG LINE FLOW HILO)		
Time	Position	Applicant's Actions or Behavior
INDICATIONS: NCP indication (BG HIS-3) goes from Red light LIT to Green light LIT Various MCB Alarms: 00-042A, Charging Line Flow HiLo and 00-042E, Charging Pump trouble 00-041A, Seal Inj to RCP Flow Lo and 00-038A, LTDN Regen HX Temp Hi		
BOOTH Cue: If dispatched to investigate NCP trip, respond: I will investigate. If dispatched to NCP breaker, respond: Overcurrent flag is tripped. If contacted as WWM, respond : I will assemble a team. If contacted as Electrical Maintenance (MTN): I will assemble a team....overcurrent flag is dropped.		
	CRS	ENTER and directs ALR 00-042A, rev 014, Charging Line Flow HiLo
	CRS/RO	1. Check charging header flow - > 150 gpm ○ BG FI-121A, <i>RNO1. Go to step 5.</i>
	CRS/RO	5. Check charging header flow - < 45 gpm ○ BG FI-121A
CAUTION: If gas binding or pumps is suspected, performance of OFN BG-045, Gas Binding of CCPs or SI Pumps, should be considered.		

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Event Description: Normal Charging Pump (NCP) trip. (ALR 00-042A, rev 14, CHG LINE FLOW HILO)

Time	Position	Applicant's Actions or Behavior
	CRS/RO	<p>6. Check charging pumps – ANY RUNNING</p> <ul style="list-style-type: none"> * BG HIS-1A for CCP A * BG HIS-2A for CCP B * BG HIS-3 for NCP <p><i>RNO6. Perform the following:</i></p> <p><i>6RNOa. Close letdown orifice isolation valves</i></p> <ul style="list-style-type: none"> ○ BG HIS-8149AA ○ BG HIS-8149BA ○ BG HIS-8149CA <p><i>6RNOb. Start any available charging pump</i></p> <ul style="list-style-type: none"> * BG HIS-1A for CCP A * BG HIS-2A for CCP B * BG HIS-3 for NCP
	RO	<p>7. Check PZR level – at program value</p> <ul style="list-style-type: none"> ○ BB LR-459 <p><i>RNO7. Perform the following:</i></p> <p><i>a. Place running charging pump flow controller in manual and adjust charging flow as necessary to establish PZR level at program value.</i></p> <ul style="list-style-type: none"> * BG FK-121 for CCP * BG FK-462 for NCP

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Event Description: Normal Charging Pump (NCP) trip.

Time	Position	Applicant's Actions or Behavior
	RO	8. Check letdown isolated
	RO	9. Reestablish letdown <ul style="list-style-type: none"> a. Check RCS letdown to regen HX valves open. <ul style="list-style-type: none"> ○ BG HIS-459 ○ BG HIS-460 b. Place Letdown HX outlet pressure control in manual <ul style="list-style-type: none"> ○ BG PK-131 c. Open Letdown HX outlet pressure control between 90% and 100% <ul style="list-style-type: none"> ○ BG PK-131 d. Open desired Letdown orifice isolation valve(s) <ul style="list-style-type: none"> * BG HIS-8149AA * BG HIS-8149BA * BG HIS-8149CA e. Adjust Letdown HX outlet pressure control to establish Letdown HX outlet pressure between 340 psig and 360 psig <ul style="list-style-type: none"> ○ BG PI-131 f. Place letdown HX outlet pressure control in auto <ul style="list-style-type: none"> ○ BG PK-131
	RO	10. Check letdown heat exchanger outlet temperature - < 130°F <ul style="list-style-type: none"> ○ BG TI-130

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Event Description: Normal Charging Pump (NCP) trip.

Time	Position	Applicant's Actions or Behavior
	RO	11. Check charging header flow and letdown flow – BALANCED <i>RNO11. Adjust charging & letdown as necessary to maintain PZR level at program</i>
<p style="text-align: center;">CAUTION:</p> <p>Total pump flow should be maintained above 175 gpm to minimize the effects of low flow cavitation.</p>		
	RO	12. Verify CCP adequate flow: a. Check CCPs – ANY RUNNING * BG HIS-1A for CCP A * BG HIS-2A for CCP B b. Check CCP recirc valve – OPEN * BG-HIS-8110 for CCP A * BG HIS-8111 for CCP B
	CRS	13. Return to procedure and step in effect.

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Event Description: Normal Charging Pump (NCP) trip.

Time	Position	Applicant's Actions or Behavior
	CRS	ENTER and directs ALR 00-042E, rev 10, Charging Pump Trouble
	RO	1. Check previously running charging pump - tripped <ul style="list-style-type: none"> ○ BG HIS-1A for CCP A ○ BG HIS-2A for CCP B ○ BG HIS-3 for NCP
	CRS	2. Contact Electrical Maintenance to determine cause of pump trip
BOOTH Cue: If dispatched as building watch to investigate NCP trip, respond: I will investigate. If dispatched to NCP breaker, respond: Overcurrent flag is tripped. If contacted as WWM, respond: I will assemble a team. If contacted as Electrical MTN: I will assemble a team....overcurrent flag is dropped.		
	RO	3. Check charging pumps – none running <ul style="list-style-type: none"> ○ BG HIS-1A for CCP A ○ BG HIS-2A for CCP B ○ BG HIS-3 for NCP
	RO	4. Close letdown orifice isolation valves. <ul style="list-style-type: none"> ○ BG HIS-8149AA ○ BG HIS-8149BA ○ BG HIS-8149CA
CAUTION: If gas binding of pumps is suspected, performance of OFN BG-045, Gas Binding of CCPs or SI Pumps, should be performed.		

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Event Description: Normal Charging Pump (NCP) trip.

Time	Position	Applicant's Actions or Behavior
	RO	5. Establish charging flow a. Check RCS temperature - > 350°F b. Start CCP aligned for normal charging. * BG HIS-1A for CCP A * BG HIS-2A for CCP B 5c. Go to step 6
	RO	6. Ensure RCP seal injection – between 8 gpm and 13 gpm to each RCP ○ BG FR-157 for RCP A ○ BG FR-156 for RCP B ○ BG FR-155 for RCP C ○ BG FR-154 for RCP D
		(Step 7 on next page.)

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Event Description: Normal Charging Pump (NCP) trip.

Time	Position	Applicant's Actions or Behavior
	RO	<p>7. Reestablish letdown</p> <p>a. Check RCS letdown to regen HX valves open</p> <ul style="list-style-type: none"> ○ BG HIS-459 ○ BG HIS-460 <p>b. Place letdown HX outlet pressure control in manual</p> <ul style="list-style-type: none"> ○ BG PK-131 <p>c. Open letdown HX outlet pressure control between 90% and 100%</p> <ul style="list-style-type: none"> ○ BG PK-131 <p>d. Open desired letdown orifice isolation valve(s).</p> <ul style="list-style-type: none"> * BG HIS-8149AA * BG HIS-8149BA * BG HIS-8149CA <p>e. Adjust letdown HX outlet pressure control to establish letdown HX outlet pressure between 340 psig and 360 psig</p> <ul style="list-style-type: none"> ○ BG PI-131 <p>f. Place letdown HX outlet pressure control in auto</p> <ul style="list-style-type: none"> ○ BG PK-131
	RO	<p>8. Check charging header flow and letdown flow – BALANCED</p> <p><i>RNO8. Adjust charging & letdown as necessary to maintain PZR level at program value.</i></p>

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Event Description: Normal Charging Pump (NCP) trip.

Time	Position	Applicant's Actions or Behavior
NOTE		
Total pump flow should be maintained above 175 gpm to minimize the effects of low flow		
	RO	9. Verify CCP adequate flow: a. Check CCPs – any running * BG HIS-1A for CCP A * BG HIS-2A for CCP B b. Check CCP recirc valve - open * BG HIS-8110 for CCP A * BG HIS-8111 for CCP B
	CRS	10. Ensure compliance with Technical Specifications and TRM: a. Check plant – in Modes 1, 2, or 3 b. Refer to TR 3.1.9 and Technical Specification 3.5.2
	CRS/CREW	11. Return to procedure and step in effect.
BOOTH INSTRUCTIONS: At Lead Examiner discretion, initiate Event 5 by activating KEY 5.		

Op-Test No.: _____ Scenario No.: 2 Event No.: 5 Page 31 of 57

Event Description: 500 gpm Steam Generator Tube Rupture on Steam Generator A (OFN BB-07A, Steam Generator Tube Leakage)

Time	Position	Applicant's Actions or Behavior
INDICATIONS: Decreasing level PZR MCB annunciators 00-061B, Process Rad Hi, followed by 00-061A, Process Rad HiHi RM-11R (SP056A) shows and alarms increasing radiation on process radiation monitor GE RE-92, Condenser Air Discharge Monitor		
	CREW/CRS	Begin diagnostics for Steam Generator Tube Rupture (SGTR) and ENTER OFN BB-07A, rev 9, Steam Generator Tube Leakage
<p style="text-align: center;">FOLDOUT PAGE FOR OFN BB-07A</p> <p>1. SI ACTUATION CRITERIA</p> <p>IF any condition listed occurs, THEN trip the reactor, actuate SI, and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION Step 1.</p> <ul style="list-style-type: none"> * RCS subcooling based on subcooling monitor - LESS THAN 30°F SUBCOOLING WITH REACTOR TRIPPED <li style="text-align: center;">OR * Pressurizer pressure - CANNOT BE MAINTAINED <li style="text-align: center;">OR * Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6% <li style="text-align: center;">OR * All of the following conditions exist: <ul style="list-style-type: none"> ○ Normal charging is maximized from one pump. <li style="text-align: center;">AND ○ Letdown is isolated. <li style="text-align: center;">AND ○ Pressurizer level is decreasing. 		
<p style="text-align: center;">CAUTION</p> <p>If reactor trip or safety injection actuates during this procedure, go to EMG E-0, Reactor Trip or Safety Injection, step 1.</p>		

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

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Event Description: 500 gpm Steam Generator Tube Rupture on Steam Generator A

Time	Position	Applicant's Actions or Behavior
	RO	1. Check PZR level - > 6%
	RO	<u>2.</u> Check PZR level - > 17%
	RO	<u>3.</u> Check PZR level – stable or increasing -- NO <i>RNO3 If PZR level < program, then perform the following:</i> <i>a. Control charging flow as necessary to maintain PZR level</i> <i>b. If PZR level cannot be maintained, then close letdown orifice isolation valves as necessary to stabilize PZR level</i> * BG HIS-8149AA * BG HIS-8149BA * BG HIS-8149CA
	CREW	4. Try to identify the leaking SG * Unexpected increase in any SG narrow range level OR * Radiation from any SG steam line radiation monitor OR * Radiation from any SG steam line survey OR * Radiation from any SG sample <i>RNO4. Try to identify leaking SG:</i> <i>a. Direct HP to survey steamlines & blowdown lines as necessary to determine leaking SG</i>
BOOTH Cue: Respond as HP: I will survey the steam lines & blowdown lines.		

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Time	Position	Applicant's Actions or Behavior
NOTES		
		<ul style="list-style-type: none"> ○ If VCT level cannot be maintained, the Rx is tripped since after swapover to the RWST the high boron injection flowrate makes an orderly shutdown difficult. ○ If the leak rate is still within the capacity of a charging pump, after swapover to the RWST, it is not desirable to actuate SI and go to EMG E-3.

[illegible]

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Event Description: 500 gpm Steam Generator Tube Rupture on Steam Generator A (EMG E-0, Reactor Trip or Safety Injection)

Time	Position	Applicant's Actions or Behavior
FOLDOUT PAGE FOR EMG E-0		
<p>1. RCP TRIP CRITERIA IF all conditions listed below occur, THEN trip all RCPs:</p> <ul style="list-style-type: none"> ○ RCS pressure - LESS THAN 1400 PSIG ○ CCPs or SI pumps - AT LEAST ONE RUNNING ○ Operator controlled cooldown - NOT IN PROGRESS 		
<p>2. SI ACTUATION CRITERIA IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:</p> <ul style="list-style-type: none"> * RCS subcooling - LESS THAN 30°F [45°F] <p>OR</p> <ul style="list-style-type: none"> * Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6% [33%] 		
<p>3. FAULTED S/G ISOLATION CRITERIA IF any S/G pressure decreasing in an uncontrolled manner OR any S/G completely depressurized, THEN the following may be performed:</p> <ol style="list-style-type: none"> a. Close main steam isolation valves. b. Isolate feed flow to faulted S/G(s). c. Maintain total feed flow greater than 270,000 lbm/hr until narrow range level in at least one S/G is greater than 6% [29%]. 		
<p>4. RUPTURED S/G ISOLATION CRITERIA IF any S/G level increases in an uncontrolled manner OR any S/G has abnormal radiation, AND narrow range level in affected S/G(s) is greater than 6% [29%], THEN the following may be performed.</p> <ol style="list-style-type: none"> a. Close ruptured S/G AFW flow control valves. b. IF any ruptured S/G AFW flow control valve cannot be closed AND total AFW flow to intact S/Gs can be maintained greater than 270,000 lbm/hr without associated AFW Pump, THEN perform the following: <ol style="list-style-type: none"> 1) Stop associated MD AFWP and place in PTL OR decrease TDAFWP speed to 2000 rpm. 2) Dispatch an Operator to locally isolate affected AFW flow control valve. 3) WHEN affected AFW flow control valve is isolated, THEN restart MD AFWP OR Restore TD AFWP speed as necessary. 		
<p>5. COLD LEG RECIRCULATION CRITERIA IF RWST level decreases to less than 36%, THEN go to EMG ES-12, TRANSFER TO COLD LEG RECIRCULATION, Step 1.</p>		
<p>6. AFW SUPPLY SWITCHOVER CRITERIA IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.</p>		

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Event Description: 500 gpm SGTR, EMG E-0, rev 22, Reactor Trip or Safety Injection

Time	Position	Applicant's Actions or Behavior
<p style="text-align: center;">CAUTION</p> <p>Accident conditions can cause higher than normal radiation levels. Health Physics monitoring may be required while performing local operator actions.</p> <p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> ○ Steps 1 through 4 are immediate action steps. ○ Foldout page shall be monitored throughout this procedure. 		
	RO/CRS	1. Verify reactor trip a. Check all rod bottom lights – LIT b. Ensure reactor trip & bypass breakers – OPEN c. Check IR neutron flux – DECREASING
	BOP/CRS	2. Verify turbine trip a. Check the following: <ul style="list-style-type: none"> * Main stop valves – ALL CLOSED OR * Turbine auto stop bistables – AT LEAST TWO LIT
	RO/CRS	3. Check AC emergency busses – at least one energized <ul style="list-style-type: none"> * NB01 voltage – NORMAL * NB02 voltage – NORMAL

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Event Description: 500 gpm SGTR, EMG E-0, rev 22, Reactor Trip or Safety Injection

Time	Position	Applicant's Actions or Behavior
	RO/CRS	4. Check if Safety Injection is Actuated: a. Check any indication SI is actuated – LIT <ul style="list-style-type: none"> * 00-030A, NF039A LOCA Seq Actuated – LIT OR * 00-031A, NF039B LOCA Seq Actuated – LIT OR * ESFAS status panel SIS section – any white lights LIT OR * Partial Trip Status Permissives/Block status panel – SI red light lit b. Check both trains of SI actuated <ul style="list-style-type: none"> o 00-030A, NF039A LOCA Seq Actuated – LIT o 00-031A, NF039B LOCA Seq Actuated – LIT
CAUTION		
If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		
	CRS	5. Check if SI is required: <ul style="list-style-type: none"> * SI was manually actuated AND was required OR * RCS pressure is currently or has been - ≤ 1830 psig OR * Any SG pressure is currently or has been - ≤ 615 psig OR * Containment pressure is currently or has been - ≥ 3.5 psig OR * RCS subcooling is currently or has been - $< 30^{\circ}\text{F}$ [45°F] OR * PZR level is currently or has been - $< 6\%$ [33%]

Op-Test No.: _____ Scenario No.: <u>2</u> Event No.: <u>5</u>			Page <u>37</u> of <u>57</u>
Event Description: 500 gpm SGTR, EMG E-0, rev 22, Reactor Trip or Safety Injection			
Time	Position	Applicant's Actions or Behavior	
	BOP	6. Check Main Generator Breakers & Exciter Breaker – open <ul style="list-style-type: none"> ○ MA ZL-3A ○ MA ZL-4A ○ MB ZL-2 	
	CRS	7. Verify Automatic Actions using Attachment F, Automatic Signal Verification	
		Attachment F, Automatic Signal Verification	
	RO/BOP	F1. Verify Feedwater Isolation F2. Verify Containment Isolation Phase A F3. Verify AFW Pumps running F4. Verify ECCS pumps running F5. Verify CCW alignment F6. Check ESW pumps – both running F7. Check Containment fan coolers – running in slow speed F8. Verify Containment purge isolation F9. Verify both trains of Control Room ventilation isolation F10. Verify Main Steamline isolation not required <u>F11.</u> Verify Containment Spray not required	

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Event Description: BIT outlet valves EM HIS-8801A & EM HIS-8801B do not open upon SI actuation – manual open available.

Time	Position	Applicant's Actions or Behavior
INDICATION: No ECCS flow indication on EM FI-917A or EM FI-917B. BIT outlet valves EM HIS-8801A/B indicate closed (Green lights are LIT).		
	RO/BOP	Determine BIT outlet valves EM HIS-8801A and EM HIS-8801B are not open. (EMG E-0, Att F, step F12)
	RO/BOP	<p>CT: Open BIT outlet valves (EM HIS-8801A and EM HIS-8801B) before the end of the scenario or before needless Red or Orange path occurs.</p> <p>Success: Opens BIT outlet valves EM HIS-8801A and EM HIS-8801B after completion of Immediate Action steps OR they may be opened using Attachment F of EMG E-0 (F12).</p>
	RO/BOP	<p>F12. Verify ECCS flow: (CT)</p> <p>a. Check CCP to BIT flow meters – NO flow indicated</p> <ul style="list-style-type: none"> ○ EM FI-917A ○ EM FI-917B <p><i>RNOa. Perform the following</i></p> <p><i>1) If BIT valves have not been closed by operator action then manually start pumps and align valves</i></p> <p><i>NOTE: EM HIS 8801A and EM HIS-8801B are depressed OPEN, Red lights LIT, flow indicated on EM FI-917A/B</i></p> <p><i>2) If BIT valves are closed by operator action, then go to step 13</i></p>

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Event Description: 500 gpm SGTR, EMG E-0, rev 22, Reactor Trip or Safety Injection

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Event Description: 500 gpm SGTR, EMG E-0, rev 22, Reactor Trip or Safety Injection

Time	Position	Applicant's Actions or Behavior
<p align="center">FOLDOUT PAGE ITEM</p> <p>4.: RUPTURED S/G ISOLATION CRITERIA IF any S/G level increases in an uncontrolled manner OR any S/G has abnormal radiation, AND narrow range level in affected S/G(s) is greater than 6% [29%], THEN the following may be performed.</p> <p>a. Close ruptured S/G AFW flow control valves. (CT – see below)</p> <p>b. IF any ruptured S/G AFW flow control valve cannot be closed AND total AFW flow to intact S/Gs can be maintained greater than 270,000 lbm/hr without associated AFW Pump, THEN perform the following:</p> <ol style="list-style-type: none"> 1) Stop associated MD AFWP and place in PTL OR decrease TDAFWP speed to 2000 rpm. 2) Dispatch an Operator to locally isolate affected AFW flow control valve. 3) WHEN affected AFW flow control valve is isolated, THEN restart MD AFWP OR Restore TD AFWP speed as necessary. 		
	CRS/BOP	Directs Foldout Item #4, Ruptured SG Isolation Criteria when level in ruptured SG > 6% [29%] CT: Isolate feed flow to ruptured Steam Generator before Steam Generator overfills. Success: Close ruptured steam generator AFW flow control valves, AL HK-8A and AL HK-7A.

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Event Description: 500 gpm SGTR, EMG E-0, rev 22, Reactor Trip or Safety Injection

Time	Position	Applicant's Actions or Behavior
	RO	<p><u>9.</u> Check RCS cold leg temperatures</p> <ul style="list-style-type: none"> * Stable at or trending to 557°F for condenser steam dumps, NO * Stable at or trending to 561°F for SG ARVs <p><i>RNO9. Perform the following:</i></p> <p><i>a. If temp. is < setpoint and decreasing, then perform the following:</i></p> <ol style="list-style-type: none"> 1) Stop dumping steam 2) If any MSIV is open, then close Main Turbine Stop & Control Valves Startup Drains (AC HIS-134) 3) If cooldown continues then control total feed flow to limit RCS cooldown. Maintain total feed flow > 270,000 lbm/hr until NR level > 6% [29%] in at least one SG 4) If cooldown continues due to excessive steam flow, then close MSIVs, bypass valves and drain valves <p><i>b. If temperature is > setpoint and increasing, then perform one of the following:</i></p> <ul style="list-style-type: none"> * Dump steam to condenser * Dump steam using SG ARVs

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Event Description: 500 gpm SGTR, EMG E-0, rev 22, Reactor Trip or Safety Injection

Time	Position	Applicant's Actions or Behavior
	BOP	10. Establish SG pressure control <ul style="list-style-type: none"> a. Check condenser - AVAILABLE <ul style="list-style-type: none"> ○ C-9 lit ○ MSIV – OPEN ○ Circ water pumps – RUNNING b. Place steam header pressure control in manual <ul style="list-style-type: none"> ○ AB PK-507 c. Manually set steam header pressure control output to zero <ul style="list-style-type: none"> ○ AB PK-507 d. Place steam dump select switch to STEAM PRESS position <ul style="list-style-type: none"> ○ AB US-500Z e. Place steam header pressure control in Automatic <ul style="list-style-type: none"> ○ AB PK-507
	RO	11. Check PZR PORVs <ul style="list-style-type: none"> a. Check PZR PORVs – CLOSED <ul style="list-style-type: none"> ○ BB HIS-455A ○ BB HIS-455B b. Power to block valves- AVAILABLE c. RCS pressure - < 2185 psig
	RO	12. Check normal PZR spray valves – CLOSED <ul style="list-style-type: none"> ○ BB ZL-455B ○ BB ZL-455C

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Event Description: 500 gpm SGTR, EMG E-0, rev 22, Reactor Trip or Safety Injection

Time	Position	Applicant's Actions or Behavior
	RO	13. Check PZR safety valves – CLOSED <ul style="list-style-type: none"> ○ BB ZL-8010A ○ BB ZL-8010B ○ BB ZL-8010C
NOTE: Seal injection flow shall be maintained to all RCPs.		
	RO	14. Check if RCPs should be stopped: <ul style="list-style-type: none"> a. Check RCPs – any running b. Check RCS pressure - < 1400 psig <i>RNOB. Go to step 15</i> c. Check ECCS pumps - at least one running <ul style="list-style-type: none"> * CCP or * SI pump d. Check operator controlled cooldown – not in progress e. Stop all RCPs
	CRS	15. Direct Operator to monitor Critical Safety Functions using EMG F-0, Critical Safety Function Status trees (CSFST)

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Event Description: 500 gpm SGTR, EMG E-0, rev 22, Reactor Trip or Safety Injection

Time	Position	Applicant's Actions or Behavior
	BOP	16. Check if SGs are not faulted: a. Check pressures in all SGs - <ul style="list-style-type: none"> ○ No SG pressure decreasing in an uncontrolled manner ○ No SG completely depressurized
	BOP	17. Check if SG tubes are intact: <ul style="list-style-type: none"> * Direct HP to survey steamlines in Area 5 of the Aux Building * Condenser air discharge radiation – Normal before isolation <ul style="list-style-type: none"> ○ GEG 925 – NO, perform RNO <i>RNO17. Perform the following:</i> a. Ensure BIT inlet and outlet valves are open <ul style="list-style-type: none"> ○ EM HIS-8803A ○ EM HIS-8803B ○ EM HIS-8801A ○ EM HIS-8801B b. Go to EMG E-3, Steam Generator Tube Rupture, step 1
BOOTH Cue: Respond as HP: I will survey the steam lines in Area 5. Later, call back with a report of higher than normal radiation on SG “A” mainsteam line.		

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)

Time	Position	Applicant's Actions or Behavior
	CRS	Crew transitions from EMG E-0 to EMG E-3
	CREW	ENTER and Direct EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)

FOLDOUT PAGE FOR EMG E-3**1. SI REINITIATION CRITERIA**

IF following performance of Step 31, either condition listed below occurs, THEN start ECCS pumps as necessary to reestablish RCS subcooling and PZR level and go to EMG C-31, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

* RCS subcooling - LESS THAN 30°F [45°F]

OR

* Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6% [33%]

2. SECONDARY INTEGRITY CRITERIA

IF all conditions listed below are satisfied, THEN go to EMG E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1:

- Any S/G pressure is decreasing in an uncontrolled manner OR any S/G has completely depressurized
- Affected S/G has NOT been isolated using EMG E-2, FAULTED STEAM GENERATOR ISOLATION
- Affected S/G is NOT needed for RCS cooldown

3. MULTIPLE TUBE RUPTURE CRITERIA

IF any intact S/G level increases in an uncontrolled manner OR any intact S/G has abnormal radiation, THEN stop any RCS cooldown and depressurization in progress, stabilize the plant, and go to EMG E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

4. COLD LEG RECIRCULATION CRITERIA

IF RWST level decreases to less than 36%, THEN go to EMG ES-12, TRANSFER TO COLD LEG RECIRCULATION, Step 1.

5. AFW SUPPLY SWITCHOVER CRITERIA

IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)		
Time	Position	Applicant's Actions or Behavior
NOTES		
<ul style="list-style-type: none"> ○ Foldout page shall be monitored throughout this procedure. ○ Personnel should be available for sampling during this procedure. ○ Seal injection flow shall be maintained to all RCPs. 		
	CRS	<u>1.</u> Check if RCPs should be stopped: <ul style="list-style-type: none"> a. Check RCPs - ANY RUNNING b. Check RCS pressure - < 1400 psig; NO, perform RNO c. Check ECCS pumps – AT LEAST ONE RUNNING <ul style="list-style-type: none"> * CCP or * SI pump d. Check operator controlled cooldown – NOT IN PROGRESS e. Stop all RCPs <i>RNO for a-d: Observe CAUTION prior to step 2 and go to step 2</i>
CAUTION		
If steamlines are not intact, extreme caution will be necessary when performing local surveys.		
	CRS	<u>2.</u> Identify ruptured SGs: <ul style="list-style-type: none"> * Level increasing in an uncontrolled manner OR * High turbine driven AFW exhaust radiation OR * High radiation from any SG steamline radiation monitor OR * High radiation from any SG steamline survey OR * High radiation from any SG sample

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)		
Time	Position	Applicant's Actions or Behavior
BOOTH CUE: If contacted as HP to survey steam lines in Area 5: respond I will perform the survey.		
CAUTION		
If the turbine driven AFW pump is the only available source of feed flow, steam supply to the turbine driven AFW pump must be maintained from at least one S/G.		
	RO/BOP	3. Isolate flow from ruptured SGs: a. Adjust ruptured SG ARV controller setpoint to 1160 psig b. Check ruptured SG ARV – CLOSED c. Locally close steam supply to turbine driven AFW pump from ruptured SG(s) <i>NA for SG A</i> * AB-V085 for SG B * AB-V087 for SG C d. Locally isolate main steamline low point drain valve from ruptured SG(s) * Close AB-V062 for SG A * Close AB-V072 for SG B * Close AB-V082 for SG C * Close AB-V052 for SG D
BOOTH INSTRUCTION: AB-V062 not modeled; wait ~ two minutes and report that AB-V062 is closed.		

[illegible]

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)

Time	Position	Applicant's Actions or Behavior
	CRS	5. Isolate steamline on ruptured SGs: a. Close main steamline isolation valve * AB HIS-14 for SG A * AB HIS-17 for SG B * AB HIS-20 for SG C * AB HIS-11 for SG D b. Ensure main steamline isolation bypass valves – CLOSED ○ AB ZL-15A for SG A ○ AB ZL-18A for SG B ○ AB ZL-21A for SG C ○ AB ZL-12A for SG D
CAUTION		
If any ruptured S/G is also faulted and the affected S/G is not needed for RCS cooldown, feed flow to that S/G shall remain isolated during subsequent recovery actions.		
	BOP	<u>6.</u> Check if feed flow should be isolated to ruptured SG(s): a. Check ruptured SG(s) narrow range level - >6% [29%]

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)

Time	Position	Applicant's Actions or Behavior
CT: Isolate feed flow to ruptured Steam Generator before Steam Generator overfills. Success: Close ruptured steam generator AFW flow control valves, AL HK-8A and AL HK-7A. (May have been performed using Foldout page criteria of EMG E-0)		
	BOP	<u>7.</u> Stop feed flow to ruptured SG(s) (CT) a. Close affected SG(s) MD AFP flow control valve(s) <ul style="list-style-type: none"> * AL HK-7A for SG A * AL HK-9A for SG B * AL HK-11A for SG C * AL HK-5A for SG D b. Close affected SG(s) TD AFWP flow control valve(s) <ul style="list-style-type: none"> * AL HK-8A for SG A * AL HK-10A for SG B * AL HK-12A for SG C * AL HK-6A for SG D
	BOP	8. Establish SG pressure control: <ul style="list-style-type: none"> a. Check condenser available b. Place steam header pressure control in manual c. Manually set steam header pressure control output to zero d. Place steam dump select switch in STEAM PRESS position e. Place steam header pressure control in automatic

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)

Time	Position	Applicant's Actions or Behavior
	CRS	9. Verify ruptured SG(s) isolation <ul style="list-style-type: none"> a. Check ruptured SG(s) – not needed for RCS cooldown b. Verify ruptured SG(s) steamline has been isolated from at least one intact SG: <ul style="list-style-type: none"> * Main steam isolation valve, bypass valve, and drain valve on ruptured SG – CLOSED OR * Attachment A, Main Steam header isolation – Control Room – completed c. Verify steam supply to turbine driven AFW pump from ruptured SG(s) – CLOSED <i>NA FOR SG A</i> <ul style="list-style-type: none"> * AB-V085 for SG B * AB-V087 for SG C
<p style="text-align: center;">CAUTION</p> <p>At EOL, if a control rod is stuck or SI flow is reduced, an inadvertent restart may occur. Symptoms for subcriticality red path and transition to EMG FR-S1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, shall be closely monitored during subsequent steps.</p>		
	CREW	10. Check ruptured SG(s) pressure - > 275 psig

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)

Time	Position	Applicant's Actions or Behavior	
NOTE			
If high steam pressure rate setpoint (100 psi/50 sec) is exceeded after low steamline pressure SI signal is blocked, main steamline isolation will occur.			
	RO	11. Check if low steamline pressure SI should be blocked: <ul style="list-style-type: none"> a. Check RCS pressure - <1970 psig <ul style="list-style-type: none"> ○ P-11 light – LIT b. Block low steamline pressure SI <ul style="list-style-type: none"> ○ SB HS-9 ○ SB HS-10 <p><i>RNOa. When RCS pressure is < 1970 psig then block low steamline pressure SI. Continue with step 12.</i></p>	
	CREW	12. Determine target plant conditions from table below:	
LOWEST RUPTURED S/G PRESSURE (PSIG)	TARGET CORE EXIT TEMPERATURE (°F)	TARGET INTACT S/G PRESSURE (PSIG)	TARGET CONDENSER STEAM DUMP CONTROLLER SETPOINT
>1200	519 [504]	791 [691]	5.27 [4.61]
1100 TO 1199	508 [493]	717 [624]	4.78 [4.16]
1000 TO 1099	496 [481]	642 [557]	4.28 [3.71]
900 TO 999	484 [469]	573 [495]	3.82 [3.30]
800 TO 899	470 [455]	500 [430]	3.33 [2.87]
700 TO 799	455 [440]	430 [367]	2.87 [2.45]
600 TO 699	438 [423]	359 [304]	2.39 [2.03]
500 TO 599	420 [405]	294 [247]	1.96 [1.65]
400 TO 499	398 [383]	227 [188]	1.51 [1.25]
300 TO 399	372 [357]	163 [133]	1.09 [0.89]
275 TO 299	364 [350]	147 [118]	0.98 [0.79]

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)

Time	Position	Applicant's Actions or Behavior
<p style="text-align: center;">CAUTION</p> <p>If RCPs are NOT running, the cooldown and depressurization steps may cause a red or orange path condition on the integrity status tree for the ruptured loop. Step 48 shall be completed before reevaluating the red or orange path condition and transition to EMG FR-P1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITIONS, if required.</p> <p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> ○ After operator initiated RCS cooldown has been started, RCP trip criteria no longer applies. ○ When RCS average temperature is less than 550°F, the condenser steam dump low temperature interlock must be bypassed to keep cooldown valves open. 		
<p>CT: Cooldown & Depressurize RCS to minimize RCS inventory leakage into the ruptured Steam Generator. Success: Initiate Maximum rate RCS Cooldown (see step 13)</p>		
	CRS	<p>13. Initiate RCS cooldown (CT)</p> <p>a. Dump steam to condenser at maximum rate:</p> <p>1) Ensure STM HDR PRESS CTRL in manual</p> <ul style="list-style-type: none"> ○ AB PK-507 <p>2) Set STM HDR PRESS CTRL potentiometer to target setpoint value</p> <ul style="list-style-type: none"> ○ AB PK-507 <p>3) Manually adjust STM HDR PRESS CTRL to slowly open a maximum of 3 cooldown valves</p> <ul style="list-style-type: none"> ○ AB PK-507 <p>4) When P-12 interlock actuates, then place both STEAM DUMP BYPASS INTERLOCK switches to BYP/INTLK</p> <ul style="list-style-type: none"> ○ AB HS-63 ○ AB HS-64 <p>5) Place STM HDR PRESS CTRL in auto to continue cooldown at maximum rate</p> <ul style="list-style-type: none"> ○ AB PK-507

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)		
Time	Position	Applicant's Actions or Behavior
	CREW	<u>14.</u> Check intact SG levels: a. Check NR level in at least one SG - > 6% [29%] b. Control feed flow to maintain NR level in all SGs between 29% [29%] and 50%
CAUTION		
If any PZR PORV opens because of high PZR pressure, the PORV shall be monitored to ensure it recloses after pressure decreases to less than 2335 psig.		
	CREW	<u>15.</u> Check PZR PORVs and block valves: a. Power to block valves – AVAILABLE ○ BB HIS-8000A ○ BB HIS-8000B b. PZR PORVs – CLOSED ○ BB HIS-455A ○ BB HIS-456A c. RCS pressure - < 2185 psig
	CREW	<u>16.</u> Check PZR Safety valves – CLOSED ○ BB ZL-8010A ○ BB ZL-8010B ○ BB ZL-8010C
Terminate scenario at Lead Examiner's discretion.		

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)			
Time	Position	Applicant's Actions or Behavior	
CAUTION			
If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.			
	RO	17. Reset SI <ul style="list-style-type: none"> ○ SB HS-42A ○ SB HS-43A 	
	RO	18. Reset Containment Isolation Phase A & Phase B <ul style="list-style-type: none"> ○ SB HS-56 for phase A ○ SB HS-53 for phase A ○ SB HS-55 for phase B ○ SB HS-52 for phase B 	
	CREW	19. Establish Instrument Air to Containment <ul style="list-style-type: none"> a. Ensure ESW to air compressor valves - OPEN <ul style="list-style-type: none"> ○ EF HIS-43 ○ EF HIS-44 b. Reset and close air compressor breaker reset switches <ul style="list-style-type: none"> ○ KA HIS-2C ○ KA HIS-3C c. Check instrument air pressure - > 105 psig <ul style="list-style-type: none"> ○ KA PI-40 d. Check PZR pressure master controller - < 50% output signal <ul style="list-style-type: none"> ○ BB PK-455A e. Open instrument air supply containment isolation valve <ul style="list-style-type: none"> ○ KA HIS-29 	

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)

Time	Position	Applicant's Actions or Behavior
CAUTION		
After RHR pumps have been stopped, RCS pressure shall be monitored for RHR pump restart criteria.		
	CRS	<p><u>20.</u> Check if RHR pumps should be stopped:</p> <ul style="list-style-type: none"> a. Check RHR pumps – any running b. Check RHR system – aligned for injection c. Check RCS pressure - > 325 psig d. Stop RHR pumps and place in standby <ul style="list-style-type: none"> ○ EJ HIS-1 ○ EJ HIS-2 e. Check RCS pressure > 325 psig during subsequent recovery actions <p><i>RNOe. If RCS pressure decreases in an uncontrolled manner to < 325 psig, then manually restart RHR pumps to provide injection to the RCS.</i></p>
	CREW	<p>21. Check if RCS cooldown should be stopped:</p> <ul style="list-style-type: none"> a. Check RCS temperatures - < target temperature <ul style="list-style-type: none"> * Core Exit TCs or * RCS hot leg RTDs b. Ensure steam dump valves - CLOSING <ul style="list-style-type: none"> ○ Condenser steam dumps ○ ARVs c. Adjust steam dump controllers, as necessary, to automatically maintain RCS temperature stable below target temperature <ul style="list-style-type: none"> * AB PK-507 or * Intact ARVs

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Event Description: 500 gpm SGTR, EMG E-3, rev 22, Steam Generator Tube Rupture (SGTR)		
Time	Position	Applicant's Actions or Behavior
	CREW	22. Check ruptured SG Pressure – stable or increasing
	CREW	23. Check RCS subcooling - > 50°F [65°F]
	CREW	24. Depressurize RCS using normal Spray to minimize break flow and refill PZR <ul style="list-style-type: none"> a. Verify normal PZR spray – available <ul style="list-style-type: none"> * RCP D running * RCPs A, B, and C running * All RCPs running b. Spray PZR with maximum available spray until any of the following conditions are satisfied: <ul style="list-style-type: none"> * PZR level - > 75% [61%] or * RCS subcooling - < 30°F [45°F] or * Both of the following <ul style="list-style-type: none"> 1) RCS pressure - < ruptured SGs pressure 2) PZR level - > 6% [33%] c. Close normal spray valves <ul style="list-style-type: none"> ○ BB PK-455B ○ BB PK-455C d. Observe CAUTION prior to step 30 and go to step 30
Terminate scenario at Lead Examiner's discretion.		

Facility: <u>Wolf Creek</u> Scenario No.: <u>3</u> Op-Test No.: _____ Examiners: _____ Operators: _____ _____ _____			
Initial Conditions: 100% power, Middle of Life Turnover: CCP "B" tagged out for preventative maintenance. TS 3.5.2 entered (Run file Tag B CCP)			
Event No.	Malf. No.	Event Type*	Event Description
1 t+2	mBB21B	I – ATC, SRO	Pressurizer pressure channel BB PI-457 failure low. OFN SB-008, Instrument Malfunctions, Attachment K, PZR Pressure Malfunction, entered.
2 t+10	mAB01A 1	I – BOP, SRO	Steam pressure detector on "A" loop high failure (AB PI-514A) OFN SB-008, Instrument Malfunctions, Attachment C, SG Pressure Channel Malfunction, entered.
3 t+23	mBB31D	C – All	RCP "D" develops frame vibration greater than 5 mils. RCP secured per OFN BB-005, RCP Malfunctions, Attachment B, RCP Shutdown. OFN BB-005, RCP Malfunctions, entered.
4 t+35	mBB05D	M - All	Loss of Coolant (LOCA) – 1 inch (~1200 gpm) on Hot Leg "D" loop EMG E-0, Reactor Trip or Safety Injection EMG ES-02, Reactor Trip Response EMG E-1, Loss of Reactor or Secondary Coolant EMG ES-11, Post LOCA Cooldown and Depressurization

5 t+35	mBG27A mEM01A mEM01B	C – ATC, SRO	<p>Autostart failure of CCP “A” upon receipt of Safety Injection Signal. Crew can start pump manually using handswitch BG HIS-1A.</p> <p>Upon Safety Injection Signal actuation, both Safety Injection pumps will trip. Recall CCP “B” is out of service – see Turnover.</p> <p>CT: Establish flow from at least one Centrifugal Charging Pump before a needless red or orange path condition exists OR before the end of the scenario.</p>
6 t+35	mSA23A mSA23B	C – ATC, SRO	<p>Upon actuation of Safety Injection Signal, the automatic actuation of Containment Purge Isolation Signal does not occur. Manual actuation from Control Room is successful.</p> <p>CT: Close Containment isolation valves such that at least one valve is closed on each critical phase-A penetration before the end of the scenario.</p>
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario Summary:

Plant is 100% MOL. Centrifugal Charging Pump “B” is out of service for preventative maintenance. Technical Specification 3.5.2 Condition A entered. Expected return is ten hours.

Pressurizer (PZR) pressure controlling channel BB PI-457 fails low. Crew responds using OFN SB-008, Instrument Malfunctions, Attachment K, PZR Pressure Malfunction.

- Attachment K: Select an alternate pressure channel as the controlling channel.
- Crew stabilizes the plant.

Steam Generator “A” controlling steam pressure channel (AB PI-514A) fails high. Crew responds using OFN SB-008, Instrument Malfunctions, Attachment C, Pressure Channel Malfunctions.

- ALR 00-108C, SG A Flow Mismatch, annunciates.
- Attachment C: Select an alternate pressure channel as the controlling channel.
- Crew stabilizes the plant.

Reactor Coolant Pump (RCP) “D” develops high frame vibration (greater than 5 mils). Crew responds by entering OFN BB-005, RCP Malfunctions. The crew determines that the Immediate Shutdown criteria for an RCP are met. Attachment B, RCP Shutdown, is performed.

- ALR 00-070B, RCP VIB/SYS Alert and ALR 00-070A, RCP VIB Danger, annunciate.
- From OFN BB-005, Attachment B, the Reactor is tripped and EMG E-0, Reactor Trip or Safety Injection, is entered.
- RCP “D” is secured.
- Crew stabilizes the plant.

EMG E-0, Reactor Trip or Safety Injection, is performed. Major actions of EMG E-0:

- Verify automatic actions as initiated by the protection and safeguard systems.
- Identify appropriate optimal recovery guideline.
- Shutdown unnecessary equipment and continue trying to identify optimal recovery guideline.

EMG ES-02, Reactor Trip Response, is entered from EMG E-0, Reactor Trip or Safety Injection, RNO step 4. Major Actions of EMG ES-02:

- Ensure the primary system stabilizes at no-load conditions
- Ensure the secondary system stabilizes at no load conditions
- Ensure the necessary component have power available
- Maintain/Establish forced circulation of the RCS
- Maintain the plant in a stable condition

Major event: As the crew proceeds through EMG ES-02, the one-inch LOCA occurs. RCS pressure begins to decrease and Pressurizer level will not be able to be maintained greater than 6% - this is important as EMG ES-02 Foldout page criteria #1 SI Actuation will be utilized to actuate Safety Injection and return to EMG E-0, Reactor Trip or Safety Injection.

- Unexpected Main Control Board alarms aid in diagnosing the LOCA.
 - ALR 00-032C, PZR LO LEV DEV
 - ALR 00-060F, CTMT SUMP C/D LEV HI
 - ALR 00-060E, CTMT SUMP A/B LEV HI
 - ALR 00-032B, PZR 17% HTRS OFF LTDN ISO
 - ALR 00-062B, AREA RAD HI

EMG E-0, Reactor Trip or Safety Injection is entered a second time. The LOCA has been diagnosed. All RCP's will be tripped. EMG E-1, Loss of Reactor Coolant, will be entered.

EMG E-1, Loss of Reactor or Secondary Coolant, is performed. Major actions of EMG E-1:

- Monitor plant equipment for optimal mode of operation
- Check for subsequent failure
- Determine optimal method of long term plant recovery

EMG ES-11, Post LOCA Cooldown and Depressurization, is performed as the procedure for optimal recovery. Major actions include:

- Prepare for and initiate RCS cooldown
- Depressurize RCS to refill PZR
- Start one RCP/Stop all but one RCP
- Reduce RCS injection flow
- Depressurize RCS to minimize RCS subcooling
- Perform other long term recovery actions

Scenario has two Critical Tasks (CT):

1. Establish flow from at least one Centrifugal Charging Pump before a needless red or orange path condition exists OR before the end of the scenario.
2. Close Containment isolation valves such that at least one valve is closed on each critical phase-A penetration before the end of the scenario

Probabilistic Risk Assessment for this scenario includes:

Core Damage Frequency (CDF) By Event Tree
(Reference PSA 08-0002)

Event Tree	Core Damage Frequency (/yr)	Percent Contribution
Station Blackout	6.46E-06	35.79%
Small LOCA	5.35E-06	29.65%

Core Damage Frequency By Initiating Event
(Reference PSA 08-0002)

Event Tree	Core Damage Frequency (/yr)	Percent Contribution
Station Blackout	6.46E-06	35.79%
Small LOCA	5.35E-06	29.65%
Interfacing Systems LOCA	1.93E-06	10.68%
Very Small LOCA	1.27E-06	7.05%

Top Ten Accident Sequences by CDF
(Reference PSA-07-0001)

<u>Number</u>	<u>Sequence Identifier</u>	<u>Sequence Frequency (/yr)</u>	<u>Percent Contribution</u>	<u>Sequence Description</u>
5	VLOS07	1.27E-06	7.05%	Very Small LOCA Initiating Event Occurs; High Pressure Safety Injection function fails; Auxiliary Feedwater Supply function is successful; RCS Cooldown and Depressurization function is successful; Low Pressure Safety Injection function fails.
6	SLOS13	9.37E-07	5.19%	Small LOCA Initiating Event occurs; High Pressure Safety Injection function fails; Auxiliary Feedwater Supply function is successful; RCS Cooldown and Depressurization function is successful; Low Pressure Safety Injection function fails.

Top 10 Human Action Failures by the Importance Measure Rankings
(Reference PSA-07-0001)

F-V Rank	RRW Rank	Total Rank	Event Name	Description	Point Est.	F-V	RAW	RRW	Birnbaum
3	9	40	OPA- RRI1- EXE	FAILURE TO ALIGN & START 1 SI OR CCP PUMP - EXE	4.68E- 03	2.45E-02	6.2	1.025	9.43E-05

Technical Specifications exercised:

Event 1

TS 3.3.1, Reactor Trip System Instrumentation (RTS), Table 3.3.1-1, FU 6 & 8 (Cond A and M – 72 hours to trip bistables)

TS 3.3.2, Engineered Safety Feature Actuation System Instrumentation (ESFAS), Table 3.3.2-1, FU 1d, 5d, 6e, 8b (Cond A, D, and L entered – 72 hours to trip bistables; 1 hour to verify P-11 in the correct state)

Others listed in Attachment K will be looked at, but no conditions apply.

Event 2

TS 3.3.2, Engineered Safety Feature Actuation System Instrumentation (ESFAS), Table 3.3.2-1, FU 1e and 4e (Cond A and D – 72 hours to trip bistables)

Others listed in Attachment C will be looked at, but no conditions apply.

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 1 </u> Page <u> 7 </u> of <u> 48 </u>			
Event Description: Pressurizer pressure channel BB PI-457 fails low			
Time	Position	Applicant's Actions or Behavior	

<p>BOOTH INSTRUCTIONS:</p> <p>IC 30; 100%, insert files, prepare simulator per Setup document.</p> <p style="text-align: center;">At Lead Examiner direction, activate Event 1 by inserting KEY 1.</p>		
<p>INDICATIONS:</p> <p>Pressure meter BB PI-457 decreases. PZR spray valves close. RCS pressure increases. Partial trip/bistable panel (SB069) bistables LIT: OTΔT L3 TB431C, PZR LP PB457D, PZR LP PB457C and PZR LP PORV BLOC PS457E</p> <p>At SC066W panel: OTΔT Ch III Input to C3 LIT</p> <p>Main Control Board alarm: 00-033C, PZR PRESS LO HTRS ON</p>		
	CREW	Respond to Main Control Board alarm and panel indications. Actions prior to procedure entry may include: Identifies BB PI-457 failure, select MANUAL on Master PZR Pressure Controller BB PK-455A.
	CREW	ENTER OFN SB-008, rev 25, Instrument Malfunctions
	CREW	<p>1. Check is Secondary System instrument channel is malfunctioning.</p> <p style="margin-left: 40px;">a. Determine appropriate attachment for malfunctioning channel or controller; NO, perform RNO</p> <p><i>Perform RNO: If Secondary System channel is NOT malfunctioning, then go to step 2.</i></p>
	CREW	<p>2. Check if Reactor Coolant System instrument channel of controller is malfunctioning.</p> <p style="margin-left: 40px;">a. Determine appropriate attachment for malfunctioning channel or controller from table</p> <p>From Table determine: BB PI-457, Attachment K, PZR</p>

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 1 </u> Page <u> 8 </u> of <u> 48 </u>		
Event Description: Pressurizer pressure channel BB PI-457 fails low		
Time	Position	Applicant's Actions or Behavior

		Pressure Malfunction b. Go to appropriate attachment for malfunctioning RCS channel of controller.
	CRS	ENTER Attachment K, PZR Pressure Malfunction
	RO	K1. Identify failed instrument channel a. Compare Pressurizer pressure indications to confirm a Pressurizer pressure channel failure <ul style="list-style-type: none"> ○ BB PI-455A ○ BB PI-456 ○ BB PI-457 ○ BB PI-458
	RO	K2. Check failed Pressurizer pressure channel selected on PZR Pressure Control Selector Switch <ul style="list-style-type: none"> ○ BB PS-455F
	RO	K3. Place Pressurizer pressure master controller in manual and control pressure <ul style="list-style-type: none"> ○ BB PK-455A
	RO	K4. Select alternate Pressurizer pressure channel for pressure control <ul style="list-style-type: none"> ○ BB PS-455F
	RO	K5. Take following actions, as appropriate to stop pressure control transient: <ul style="list-style-type: none"> a. Check Pressurizer spray valves – RESPONDING CORRECTLY b. Check PZR control heaters – OPERABLE c. Ensure PZR PORV - CLOSED

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 1 </u> Page <u> 9 </u> of <u> 48 </u>		
Event Description: Pressurizer pressure channel BB PI-457 fails low		
Time	Position	Applicant's Actions or Behavior

BOOTH CUE: If contacted as Work Week Manager, respond, "I will assemble a team." If contacted as Call Superintendent, respond by repeating back the information.		
	RO	K6. Return Pressurizer pressure control to automatic <ul style="list-style-type: none"> ○ Spray valves ○ Control heaters ○ Backup heaters ○ Open PORV block valves ○ Pressurizer pressure control
	RO	K7. Monitor Pressurizer pressure response to ensure proper control
	RO	K8. Check failed pressure channel not used for Pressurizer pressure recorder <ul style="list-style-type: none"> ○ BB PS-455G
	RO	K9. Check failed pressure channel not used for OPΔT / OTΔT temperature recorder <ul style="list-style-type: none"> ○ SC TS-411E Examiner Note: Loop one is already selected. No action required.
	CRS	K10. Monitor the following Technical Specification LCOs and comply with Action Statements, as appropriate: TS 3.3.1, Reactor Trip System Instrumentation (RTS), Table 3.3.1-1, FU 6 & 8 (Cond A and M – 72 hours to trip bistables) TS 3.3.2, Engineered Safety Feature Actuation System Instrumentation (ESFAS), Table 3.3.2-1, FU 1d, 5d, 6e, 8b

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 1 </u> Page <u> 10 </u> of <u> 48 </u>		
Event Description: Pressurizer pressure channel BB PI-457 fails low		
Time	Position	Applicant's Actions or Behavior

		(Cond A, D, and L entered – 72 hours to trip bistables; 1 hour to verify P-11 in the correct state) Others listed in Attachment K will be looked at, but no conditions apply.
At Lead Examiner's direction, activate Event 2 by inserting KEY 2.		

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 2 </u> Page <u> 11 </u> of <u> 48 </u>		
Event Description: Steam Generator pressure channel AB PI-514 fails high		
Time	Position	Applicant's Actions or Behavior

<p>BOOTH INSTRUCTIONS:</p> <p style="text-align: center;">At Lead Examiner's direction, activate Event 2 by inserting KEY 2.</p>		
<p>INDICATIONS:</p> <p>Steam Generator "A" pressure meter AB PI-514A increases</p> <p>Steam Generator "A" steam flow meter AB FI-512A increasing</p> <p>Main Control Board alarm: 00-108C, SG A FLOW MISMATCH</p>		
	CREW	<p>Respond to panel indications.</p> <p>Actions prior to procedure entry may include: Identifies AB PI-514A failure, select MANUAL on Steam Generator "A" Main Feed Reg Valve (AE FK-510) and match steam and feed flows.</p>
	CREW	ENTER OFN SB-008 rev 25, Instrument Malfunctions
	CREW	<p>1. Check is Secondary System instrument channel is malfunctioning.</p> <p style="padding-left: 20px;">a. Determine appropriate attachment for malfunctioning channel or controller</p> <p>Steam Generator Pressure / AB PI-514 failure → Attachment C</p> <p style="padding-left: 20px;">b. Go to appropriate attachment for malfunctioning secondary system channel.</p> <p>Go to Attachment C, SG Pressure Channel Malfunction</p> <p>Examiner Note: The crew may diagnose the instrument malfunction as being steam flow AB FI-512A. If this happens, Attachment A is entered. However, at step A5, steam generator</p>

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 2 </u> Page <u> 12 </u> of <u> 48 </u>		
Event Description: Steam Generator pressure channel AB PI-514 fails high		
Time	Position	Applicant's Actions or Behavior

		pressure is checked and the crew is redirected to Attachment C.						
	CRS	ENTER Attachment C, SG Pressure Channel Malfunction						
NOTE								
SG pressure is an input to the thermal power program. A failed steam generator pressure channel could cause the thermal power program to be inaccurate.								
	BOP	C1. Identify failed instrument channel: <ul style="list-style-type: none"> ○ Compare S/G pressure indications to confirm S/G pressure channel failure <ul style="list-style-type: none"> ○ AB PI-514A for S/G A ○ AB PI-515A for S/G A ○ AB PI-516A for S/G A (Indications are listed for other steam generators)						
	BOP	C2. Check if failed S/G pressure channel used for feedwater control: <ul style="list-style-type: none"> a. Identify steam flow channel compensated by failed pressure channel from table below: (only partial table) <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <tr> <th style="width: 10%;">S/G</th><th style="width: 40%;">Steam Pressure Channel</th><th style="width: 50%;">Associated Steam Flow Channel</th></tr> <tr> <td style="text-align: center;">A</td><td style="text-align: center;">P-514 P-515</td><td style="text-align: center;">F-512 F-513</td></tr> </table> <ul style="list-style-type: none"> b. Check steam flow channel associated with failed steam pressure channel selected on Steam Flow Selector Switch Examiner Note: Switch AB FS-512C has F512 selected as the controlling channel.	S/G	Steam Pressure Channel	Associated Steam Flow Channel	A	P-514 P-515	F-512 F-513
S/G	Steam Pressure Channel	Associated Steam Flow Channel						
A	P-514 P-515	F-512 F-513						

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 2 </u> Page <u> 13 </u> of <u> 48 </u>		
Event Description: Steam Generator pressure channel AB PI-514 fails high		
Time	Position	Applicant's Actions or Behavior

	BOP	C3. Place affected S/G feed reg control valves – MANUAL * AE FK-510
	BOP	C4. Adjust affected feed water reg valve, as necessary, to establish steam generator level at program: * AE FK-510
	BOP	C5. Select alternate steam flow channel for feedwater control: ○ AB FS-512C Examiner Note: F513 will be selected
	BOP	C6. Restore affected S/G feed reg valve controller (AE FK-510) to – AUTO
BOOTH CUE: If contacted as Work Week Manager, respond, “I will assemble a team.” If contacted as Call Superintendent, respond by repeating back the information.		
	CRS	C7. Monitor the following Technical Specification LCO's and comply with Action Statements, as appropriate: TS 3.3.2, Engineered Safety Feature Actuation System Instrumentation (ESFAS), Table 3.3.2-1, FU 1e and 4e (Cond A and D – 72 hours to trip bistables) Others listed in Attachment C will be looked at, but no conditions apply.

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 2 </u> Page <u> 14 </u> of <u> 48 </u>		
Event Description: Steam Generator pressure channel AB PI-514 fails high		
Time	Position	Applicant's Actions or Behavior

At Lead Examiner's direction, activate Event 3 by inserting KEY 3.

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 3 </u> Page <u> 15 </u> of <u> 48 </u>		
Event Description: RCP “D” frame vibration high		
Time	Position	Applicant’s Actions or Behavior

BOOTH INSTRUCTIONS: <p style="text-align: center;">At Lead Examiner’s direction, activate Event 3 by inserting KEY 3.</p>		
INDICATIONS: Increasing vibration displayed on Vibration Monitoring System for Reactor Coolant Pumps (BB YI-471) Main Control Board alarms: 00-070B, RCP VIB/SYS ALERT and 00-070A, RCP VIB DANGER		
	CREW	Determine RCP “D” high vibration.
	CRS	ENTER ALR 00-070A rev 9A, RCP VIB DANGER (or Crew may enter OFN BB-005 rev 16, RCP Malfunctions, directly)
	CRS/RO	1. Check RCP Vibration Monitor OK LEDs – ALL LIT
	RO	2. Check RCP frame and shaft vibration readings: * Any VERT or HORIZ frame vibration reading ≥ 5 mils OR * Any VERT or HORIZ shaft reading ≥ 20 mils Examiner Note: Vibration Monitoring System for Reactor Coolant Pumps (BB YI-471) will display ≥ 5 mils on RCP “D” frame vibration monitor. Both the ALERT and DANGER lights are RED LIT

Op Test No.: <u>NRC</u> Scenario # <u>3</u> Event # <u>3</u> Page <u>16</u> of <u>48</u>		
Event Description: RCP "D" frame vibration high		
Time	Position	Applicant's Actions or Behavior

	CRS	3. Go to OFN BB-005, RCP Malfunctions
	CRS	ENTER OFN BB-005 rev 16, RCP Malfunctions
FOLDOUT PAGE FOR OFN BB-005		
1. IMMEDIATE RCP SHUTDOWN CRITERIA IF any of the following occurs, THEN Immediately go to ATTACHMENT B, Step B1: <ul style="list-style-type: none"> * Number 1 seal and bearing water temperature - GREATER THAN 230°F <li style="text-align: center;">OR * RCP motor bearing temperature - GREATER THAN 195°F <li style="text-align: center;">OR * RCP motor stator winding temperature - GREATER THAN 299°F <li style="text-align: center;">OR * Frame vibration - GREATER THAN 5 MILS <li style="text-align: center;">OR * Shaft vibration - GREATER THAN 20 MILS <li style="text-align: center;">OR * A value for Number 1 seal leakoff OR total #1 seal leakoff on attachment E which directs you to go to Attachment B <li style="text-align: center;">OR * Number 1 seal leakoff - LESS THAN 0.8 GPM AND Number 1 seal inlet temperature - INCREASING <li style="text-align: center;">OR * Number 1 seal ΔP - LESS THAN 200 PSID 		
NOTE		
Foldout Page shall be monitored throughout this procedure.		
	CRS	1. Monitor RCP temperatures <ul style="list-style-type: none"> * Turn on Code BB3 on the NPIS computer <li style="text-align: center;">OR * BB TR-500
	CRS	2. Check if RCPs can remain running: <ul style="list-style-type: none"> a. Check number 1 seal and bearing water temperatures -

Op Test No.: <u> NRC </u> Scenario # <u> 3 </u> Event # <u> 3 </u> Page <u> 17 </u> of <u> 48 </u>		
Event Description: RCP "D" frame vibration high		
Time	Position	Applicant's Actions or Behavior

		<p style="margin-left: 40px;">< 230°F</p> <p style="margin-left: 40px;">b. Check motor bearing temperatures - < 195°F</p> <p style="margin-left: 80px;">○ Upper radial bearing</p> <p style="margin-left: 80px;">○ Upper thrust bearing</p> <p style="margin-left: 80px;">○ Lower radial bearing</p> <p style="margin-left: 80px;">○ Lower thrust bearing</p> <p style="margin-left: 40px;">c. Check motor stator winding temperatures - < 299°F</p> <p style="margin-left: 40px;">d. Frame vibration - < 5 mils.....NO, Perform RNO</p> <p style="margin-left: 40px;">e. Shaft vibration - < 20 mils</p> <p style="margin-left: 40px;"><i>Step 2 RNO: Go to Attachment B, Step B1</i></p>
<p>Examiner Note: Attachment B can be entered via #1 Immediate RCP Shutdown Criteria Foldout Page criteria or via Step 2RNO.</p>		
	CRS	ENTER Attachment B, RCP Shutdown
	CRS	<p>B1. Check if reactor should be tripped:</p> <p style="margin-left: 40px;">a. Check reactor – CRITICAL</p> <p style="margin-left: 40px;">b. Check RCP's running – ONLY ONE BEING SHUTDOWN</p> <p style="margin-left: 40px;">c. Check reactor power - > 48%</p>
<p>Examiner Note: CRS may delegate remainder of OFN BB-005 Attachment B and then direct performance of EMG E-0, Reactor Trip or Safety Injection.</p>		
	CRS/RO/B OP	B2. Manually trip reactor and stabilize plant using EMGs while continuing with this procedure.

Op Test No.: NRC Scenario # 3 Event # 3 Page 18 of 48

Event Description: RCP "D" frame vibration high

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>B3. Shutdown affected RCP(s):</p> <p>a. Check RCP A being stopped – NO, <i>RNO: Go to step B3.c.</i></p> <p>c. Check RCP B being stopped – NO, <i>RNO: Go to step B3.e.</i></p> <p>e. Defeat Tavg and ΔT for RCS loop with affected RCP</p> <ul style="list-style-type: none"> ○ BB TS-412T for Tavg ○ BB TS-411F for ΔT
		<p>f. Stop affected RCP(s) (RCP "D" only)</p> <p>g. Number 1 seal leakoff was < 6 gpm prior to securing RCP</p> <p>h. Number 1 seal leakoff was within the limits of FIGURE 1 and RCP number 1 seal inlet temperature was stable and within limits prior to securing RCP</p>
	RO/BOP	<p>B4. Check if plant shutdown is required:</p> <p>a. Check reactor – CRITICAL</p> <p>b. Refer to Technical Specification 3.4.4</p> <p>c. Place plant in Hot Standby within 6 hours using appropriate plant procedures:</p> <ul style="list-style-type: none"> * GEN 00-004, Power Operation * GEN 00-005, Minimum Load to Hot Standby
	RO/BOP	<p>B5. Return to procedure and step in effect.</p> <p>Examiner Note: RO/BOP is reintegrated into crew as performance of EMG E-0 continues.</p>
At Lead Examiner's direction, proceed to next Event.		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 19 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	CRS	ENTER EMG E-0 rev 22, Reactor Trip or Safety Injection Examiner Note: EMG E-0 first time through
FOLDOUT PAGE FOR EMG E-0		
<p>1. RCP TRIP CRITERIA IF all conditions listed below occur, THEN trip all RCPs:</p> <ul style="list-style-type: none"> ○ RCS pressure - LESS THAN 1400 PSIG ○ CCPs or SI pumps - AT LEAST ONE RUNNING ○ Operator controlled cooldown - NOT IN PROGRESS 		
<p>2. SI ACTUATION CRITERIA IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:</p> <ul style="list-style-type: none"> * RCS subcooling - LESS THAN 30°F [45°F] <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> * Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6% [33%] 		
<p>3. FAULTED S/G ISOLATION CRITERIA IF any S/G pressure decreasing in an uncontrolled manner OR any S/G completely depressurized, THEN the following may be performed:</p> <ul style="list-style-type: none"> a. Close main steam isolation valves. b. Isolate feed flow to faulted S/G(s). c. Maintain total feed flow greater than 270,000 lbm/hr until narrow range level in at least one S/G is greater than 6% [29%]. 		
<p>4. RUPTURED S/G ISOLATION CRITERIA IF any S/G level increases in an uncontrolled manner OR any S/G has abnormal radiation, AND narrow range level in affected S/G(s) is greater than 6% [29%], THEN the following may be performed.</p> <ul style="list-style-type: none"> a. Close ruptured S/G AFW flow control valves. b. IF any ruptured S/G AFW flow control valve cannot be closed AND total AFW flow to intact S/Gs can be maintained greater than 270,000 lbm/hr without associated AFW Pump, THEN perform the following: <ul style="list-style-type: none"> 1) Stop associated MD AFWP and place in PTL OR decrease TDAFWP speed to 2000 rpm. 2) Dispatch an Operator to locally isolate affected AFW flow control valve. 3) WHEN affected AFW flow control valve is isolated, THEN restart MD AFWP OR Restore TD AFWP speed as necessary. 		
<p>5. COLD LEG RECIRCULATION CRITERIA IF RWST level decreases to less than 36%, THEN go to EMG ES-12, TRANSFER TO COLD LEG RECIRCULATION, Step 1.</p>		
<p>6. AFW SUPPLY SWITCHOVER CRITERIA IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.</p>		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 20 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

CAUTION: Accident conditions can cause higher than normal radiation levels. Health Physics monitoring may be required while performing local operator actions.		
NOTES ○ Steps 1 through 4 are immediate action steps. ○ Foldout page shall be monitored throughout this procedure.		
	CREW	1. Verify Rx trip: a. Check all rod bottom lights - LIT b. Ensure reactor trip breakers and bypass breakers - OPEN c. Check neutron flux - DECREASING
	CREW	2. Verify turbine trip: a. Check the following: * Main Stop valves – ALL CLOSED OR * Turbine auto stop bistable light – AT LEAST TWO LIT
	CREW	3. Check AC emergency busses – AT LEAST ONE ENERGIZED * NB01 voltage- NORMAL * NB02 voltage - NORMAL
	CREW	4. Check if Safety Injection is actuated: a. Check any indication SI is actuated – LIT; NO , perform RNO * Annunciators 00-030A / 00-0031A, NF039A/B LOCA SEQ ACTUATED – LIT OR * ESFAS status panel SIS section – ANY WHITE LIGHTS LIT OR * Partial trip status Permissive / Block status panel – SI RED LIGHT LIT <i>4a RNO Perform the following:</i> 1. Check SI required: * RCS pressure ≤ 1830 psig OR

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 21 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

		<ul style="list-style-type: none"> * Any SG ≤ 615 psig OR * CTMT pressure ≥ 3.5 psig OR * RCS subcooling $< 30^\circ\text{F}$ OR * PZR level $< 6\%$ <p>2. If SI is required, then manually actuate SI and go to step 6.</p> <p>3. If SI is not required, then perform the following:</p> <ul style="list-style-type: none"> a. Direct operator to monitor CSF using EMG F-0, Critical Safety Function Status Trees. b. Go to EMG ES-02, Reactor Trip Response, step 1
Examiner Note: A Transition Brief should be led by the CRS prior to performance of EMG ES-02, Reactor Trip Response.		
	CRS	ENTER EMG ES-02 rev 18, Reactor Trip Response
FOLDOUT PAGE FOR EMG ES-02		
1. SI ACTUATION CRITERIA IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1: RCS subcooling - LESS THAN 30°F <div style="text-align: center; margin: 5px 0;">OR</div> Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6%		
2. AFW SUPPLY SWITCHOVER CRITERIA IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.		
NOTE		
Foldout page shall be monitored throughout this procedure.		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 22 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	RO	<u>1.</u> Check RCS cold leg temperatures * Stable at or trending to 557°F for condenser steam dumps * Stable at or trending to 561°F for SG ARV's
	RO	<u>2.</u> Check RCS cold leg temperatures - $\geq 550^{\circ}\text{F}$
	BOP	<u>3.</u> Check Main generator breakers and Exciter breaker - OPEN
BOOTH INSTRUCTIONS At Lead Examiner's direction, activate Event 4 by inserting KEY 4 at step 4 in EMG ES-02, Reactor Trip Response. EXAMINER NOTE: One inch (~1200 gpm) break inserted. INDICATIONS: As the crew proceeds through EMG ES-02, Containment pressure and humidity increase. Pressurizer level will decrease. RCS pressure will decrease. The Crew uses EMG ES-02 Foldout page #1 criteria, SI Actuation: PZR level cannot be maintained $> 6\%$ to actuate Safety Injection and return to EMG E-0, step 1. Main Control Board alarms: ALR 00-032C, PZR LO LEV DEV ALR 00-060F, CTMT SUMP C/D LEV HI ALR 00-060E, CTMT SUMP A/B LEV HI ALR 00-032B, PZR 17% HTRS OFF LTDN ISO ALR 00-062B, AREA RAD HI		
	BOP	<u>4.</u> Check feedwater status a. Check RCS average temperature - $< 564^{\circ}\text{F}$ b. Check main feedwater pumps - TRIPPED o 00-120A, MFP A TRIP – LIT o 00-123A, MFP B TRIP –LIT c. Check main feedwater isolation valves - CLOSED o AE HIS-39 for SG A o AE HIS-40 for SG B

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 23 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

		<ul style="list-style-type: none"> ○ AE HIS-41 for SG C ○ AE HIS-42 for SG D d. Check total feed flow to SGs - > 270,000 lbm/hr
	BOP	5. Verify Instrument Air to Containment a. Ensure ESW to air compressor valves - OPEN <ul style="list-style-type: none"> ○ EF HIS-43 ○ EF HIS-44 b. Check air compressor breaker reset switches - CLOSED <ul style="list-style-type: none"> ○ KA HIS-2C ○ KA HIS-3C c. Check Instrument air pressure - > 105 psig <ul style="list-style-type: none"> ○ KA PI-40 d. Check Instrument Air supply Containment isolation valve - OPEN <ul style="list-style-type: none"> ○ KA HIS-29
	RO	6. Check charging pumps – AT LEAST ONE RUNNING <ul style="list-style-type: none"> * CCP A or * CCP B or * NCP
	RO	7. Check Charging System aligned for normal injection a. Check CCPs – ANY RUNNING; NO , perform RNO <i>RNO a. Go to step 7.d.</i> 7.d. Check Charging pumps to regenerative heat exchanger Containment isolation valves – OPEN <ul style="list-style-type: none"> ○ BG HIS-8105 ○ BG HIS-8106 7.e. Check Regenerative heat exchanger to loop cold leg valves – ONLY ONE OPEN <ul style="list-style-type: none"> * BG HIS-8146 for loop 1 OR * BG HIS-8147 for loop 4

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 24 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	RO	8. Check charging flow – ESTABLISHED o BG FI-121A
	RO	9. Check all Control Rods – FULLY INSERTED
	RO	10. Check PZR level – GREATER THAN 17% Examiner's note: PZR level may be > 17% at this time, but it has been decreasing since insertion of the 1 inch break.
<p>Examiner's note: PZR level has been decreasing; RCS pressure has been decreasing; Containment pressure and humidity are increasing. Main Control Board alarms are actuating.</p> <p>ALR 00-032C, PZR LO LEV DEV ALR 00-060F, CTMT SUMP C/D LEV HI ALR 00-060E, CTMT SUMP A/B LEV HI ALR 00-032B, PZR 17% HTRS OFF LTDN ISO ALR 00-062B, AREA RAD HI</p> <p>Crew diagnoses a LOCA, and uses FOLDOUT PAGE FOR EMG ES-02</p> <p>1. SI ACTUATION CRITERIA</p> <p>IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:</p> <p>RCS subcooling - LESS THAN 30°F</p> <p style="text-align: center;">OR</p> <p>Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6%</p> <p>Crew actuates Safety Injection and transitions back to EMG E-0, Reactor Trip or Safety Injection, step 1.</p>		

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Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 25 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	CRS	<p>ENTER EMG E-0 rev 22, Reactor Trip or Safety Injection</p> <p>Examiner Note: EMG E-0 second time through, LOCA identified.</p>
FOLDOUT PAGE FOR EMG E-0		
<p>1. RCP TRIP CRITERIA IF all conditions listed below occur, THEN trip all RCPs:</p> <ul style="list-style-type: none"> ○ RCS pressure - LESS THAN 1400 PSIG ○ CCPs or SI pumps - AT LEAST ONE RUNNING ○ Operator controlled cooldown - NOT IN PROGRESS <p>2. SI ACTUATION CRITERIA IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:</p> <ul style="list-style-type: none"> * RCS subcooling - LESS THAN 30°F [45°F] <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> * Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6% [33%] <p>3. FAULTED S/G ISOLATION CRITERIA IF any S/G pressure decreasing in an uncontrolled manner OR any S/G completely depressurized, THEN the following may be performed:</p> <ul style="list-style-type: none"> d. Close main steam isolation valves. e. Isolate feed flow to faulted S/G(s). f. Maintain total feed flow greater than 270,000 lbm/hr until narrow range level in at least one S/G is greater than 6% [29%]. <p>4. RUPTURED S/G ISOLATION CRITERIA IF any S/G level increases in an uncontrolled manner OR any S/G has abnormal radiation, AND narrow range level in affected S/G(s) is greater than 6% [29%], THEN the following may be performed.</p> <ul style="list-style-type: none"> c. Close ruptured S/G AFW flow control valves. d. IF any ruptured S/G AFW flow control valve cannot be closed AND total AFW flow to intact S/Gs can be maintained greater than 270,000 lbm/hr without associated AFW Pump, THEN perform the following: <ul style="list-style-type: none"> 1) Stop associated MD AFWP and place in PTL OR decrease TDAFWP speed to 2000 rpm. 2) Dispatch an Operator to locally isolate affected AFW flow control valve. 3) WHEN affected AFW flow control valve is isolated, THEN restart MD AFWP OR Restore TD AFWP speed as necessary. <p>5. COLD LEG RECIRCULATION CRITERIA IF RWST level decreases to less than 36%, THEN go to EMG ES-12, TRANSFER TO COLD LEG RECIRCULATION, Step 1.</p> <p>6. AFW SUPPLY SWITCHOVER CRITERIA IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.</p>		

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Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 26 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

CAUTION: Accident conditions can cause higher than normal radiation levels. Health Physics monitoring may be required while performing local operator actions.		
NOTES ○ Steps 1 through 4 are immediate action steps. ○ Foldout page shall be monitored throughout this procedure.		
	CREW	1. Verify Rx trip: a. Check all rod bottom lights - LIT b. Ensure reactor trip breakers and bypass breakers - OPEN c. Check neutron flux - DECREASING
	CREW	2. Verify turbine trip: a. Check the following: * Main Stop valves – ALL CLOSED OR * Turbine auto stop bistable light – AT LEAST TWO LIT
	CREW	3. Check AC emergency busses – AT LEAST ONE ENERGIZED * NB01 voltage- NORMAL * NB02 voltage - NORMAL
	RO	4. Check if Safety Injection is actuated: a. Check any indication SI is actuated – LIT * Annunciators 00-030A / 00-0031A, NF039A/B LOCA SEQ ACTUATED – LIT OR * ESFAS status panel SIS section – ANY WHITE LIGHTS LIT OR * Partial trip status Permissive / Block status panel – SI RED LIGHT LIT b. Check both trains of SI actuated ○ 00-030A, NF039A LOCA SEQ ACTUATED – LIT ○ 00-031A, NF039B LOCA SEQ ACTUATED – LIT

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Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 27 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		
	CREW	5. Check if SI is required: * SI was manually actuated AND was required OR * RCS pressure is currently or has been ≤ 1830 psig OR * Any S/G pressure is currently or has been ≤ 615 psig OR * CTMT pressure is currently or has been ≥ 3.5 psig OR * RCS subcooling is currently or has been $< 30^{\circ}\text{F}$ * PZR level is currently or has been $< 6\%$
Examiner Note: As RCS pressure decreases to < 1400 psig, Foldout Page item #1, RCP Trip Criteria will be used to trip the running RCP's (A, B and C).		
	BOP	6. Check Main Generator breakers & Exciter breaker - OPEN ○ MA ZL-3A and 4A ○ MB ZL-2
	CRS	7. Verify automatic actions using Attachment F, Automatic Signal Verification
	CRS	Directs performance of EMG Attachment, F, Automatic Signal Verification
	RO/BOP	EMG Attachment, F, Automatic Signal Verification
	RO/BOP	F1. Verify feedwater isolation

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

Critical Task: Close Containment isolation valves such that at least one valve is closed on each critical phase-A penetration before the end of the scenario.

Success: Use of SB HS-47 and SB HS-48 to actuate CISA. ESFAS status panel CISA lights – WHITE LIGHTS LIT

	RO/BOP	<p>F2. Verify CISA (CT)</p> <p>a. Check ESFAS status panel CISA section – ALL WHITE LIGHTS LIT; NO, perform RNO</p> <ul style="list-style-type: none"> ○ Red train ○ Yellow train <p><i>RNO Perform the following:</i></p> <p>1.If Containment Isolation Phase A has not actuated, then manually actuated Containment Isolation Phase A.</p> <ul style="list-style-type: none"> ○ SB HS-47 ○ SB HS-48 <p>2. If any CISA valve not closed, then manually close valve. If valve(s) cannot be closed, then manually or locally isolate affected Containment penetration. Refer to Attachment B, Valves Closed by Containment Isolation Signal Phase A.</p>
	RO/BOP	F3. Verify AFW pumps running

Critical Task: Establish flow from at least one Centrifugal Charging Pump before a needless red or orange path condition exists OR before the end of the scenario.

Success: Recognize both SIPs have tripped. Recognize that CCP “A” is not running No BIT flow on meter EM FI-917A. There is no High Head /Intermediate Head ECCS injection. (Recall CCP “B” is not available.)

Using handswitch BG HIS-1A, start CPP “A”. Pumps starts and BIT flow can be verified on EM FI-917A.

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Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 29 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	RO/BOP	<p>F4. Verify ECCS pumps running (CT)</p> <p>a. Check CCPs – BOTH RUNNING; NO: Perform RNO F4a</p> <p><i>RNO F4a: Manually start pumps</i></p> <ul style="list-style-type: none"> ○ BG HIS-1A (CCP A handswitch) ○ BG HIS-2A (CCP B handswitch – currently in PTL) <p>b. Check SI pumps – BOTH RUNNING; NO, Perform RNO F4b</p> <p><i>RNO F4b: Manually start pumps. Determine pumps are tripped and unable to be started. Dispatch building watch to investigate.</i></p> <p>c. Check RHR pumps – BOTH RUNNING</p>
<p>BOOTH CUE: If dispatched as building watch to investigate SIP pumps, respond “I will investigate.”</p> <p>Additional cues: If dispatched to SIP breakers: At SIP breakers – an overcurrent flag is dropped.</p> <p>If contacted as WWM, respond, “I will assemble a team.”</p>		
	RO/BOP	F5. Verify CCW alignment
	RO/BOP	F6. Check ESW pumps both running
	RO/BOP	F7. Check CTMT fan coolers running in slow speed
	RO/BOP	F8. Verify CPIS
	RO/BOP	F9. Verify CRVIS
	RO/BOP	F10. Verify main steamline isolation not required
	RO/BOP	<u>F11</u> . Verify CTMT spray not required
	RO/BOP	F12. Verify ECCS flow

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	RO/BOP	F13. Verify AFW valve alignment.
	RO/BOP	F14. Verify SI valves Properly aligned
	RO/BOP	F15. Check if NCP should be stopped
	RO/BOP	F16. Return to procedure & step in effect
	BOP	8. Check total AFW flow - > 270,000 lbm/hr
	BOP	<p>9. Check RCS cold leg temperature</p> <ul style="list-style-type: none"> * Stable at or trending to 557°F for condenser steam dumps; NO, perform RNO * Stable at or trending to 561°F for SG ARVs <p><i>RNO</i></p> <p><i>a. If temperature is less than setpoint and decreasing, then perform the following:</i></p> <ol style="list-style-type: none"> 1. Stop dumping steam. 2. If any MSIV is open, then close Main Turbine Stop and Control Valves Startup Drains <ul style="list-style-type: none"> o AC HIS-134 3. If cooldown continues, then control total feed flow to limit RCS cooldown, maintain total feed flow > 270,000 lbm/hr until narrow range level > 6% [29%] in at least one SG. 4. If cooldown continues due to excessive steam flow then close main steamline isolation valves, bypass valves, and drain valves. <p><i>b. If temperature is greater than setpoint and increasing, then perform one of the following:</i></p> <ul style="list-style-type: none"> * Dump steam to condenser * Dump steam using S/G ARVs

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	RO/BOP	10. Establish SG pressure control a. Check condenser - AVAILABLE ○ C-9 – LIT ○ MSIV – OPEN ○ Circulating water pumps – RUNNING b. Place steam header pressure control in Manual ○ AB PK-507 c. Manually set steam header pressure control output to zero ○ AB PK-507 d. Place steam dump select switch in STEAM PRESS position ○ AB US-500Z e. Place steam header pressure control in Automatic ○ AB PK-507
	RO	11. Check PZR PORVs a. Check PZR PORVS - CLOSED ○ BB HIS-455A ○ BB HIS-456A b. Power to block valves - AVAILABLE ○ BB HIS-8000A ○ BB HIS-8000B c. RCS pressure - <2185 psig
	RO	12. Check normal PZR spray valves – CLOSED ○ BB ZL-455B ○ BB ZL-455C
	RO	13. Check PZR safety valves – CLOSED ○ BB ZL-8010A ○ BB ZL-8010B ○ BB ZL-8010C
NOTE		
Seal injection flow shall be maintained to all RCPs.		
	RO/BOP	14. Check is RCPs should be stopped:

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

		a. Check RCPs – ANY RUNNING, NO , perform RNO b. Check RCS pressure - < 1400psig c. Check ECCS pumps – AT LEAST ONE RUNNING * CCP or * SI pump d. Check operator controlled cooldown - NOT IN PROGRESS e. Stop all RCPs <i>RNO: Go to step 15</i>
	CRS	15. Direct operator to monitor Critical Safety Functions using EMG F-0, Critical Safety Function Status Trees (CSFST)
	BOP	16. Check if SG are not faulted: a. Check pressure in all SGs - o No SG pressure decreasing in an uncontrolled manner o No SG completely depressurized
	CREW	17. Check is SG tubes are intact: * Direct Health Physics to survey steamlines in Area 5 of the Auxiliary Building * Condenser air discharge radiation – NORMAL BEFORE ISOLATION o GEG 925 * SG blowdown and sample radiation – NORMAL BEFORE ISOLATION o BML 256 o SJL 026 * Turbine driven auxiliary feedwater pump exhaust radiation – NORMAL o FCT 381

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

		* SG steamline radiation – NORMAL <ul style="list-style-type: none"> ○ ABS 114 for SG A ○ ABS 113 for SG B ○ ABS 112 for SG C ○ ABS 111 for SG D
BOOTH CUE: If called to survey the steam lines in Area 5, respond: I will survey the steam lines in Area 5.		
	BOP	18. Check SG levels – INCREASING IN A CONTROLLED MANNER <ul style="list-style-type: none"> ○ Narrow range ○ Wide range
	CREW	19. Check if RCS is intact in Containment: <ul style="list-style-type: none"> a. Containment radiation – NORMAL BEFORE ISOLATION <ul style="list-style-type: none"> ○ GTP 311 ○ GTI 312 ○ GTG 313 ○ GTP 321 ○ GTI 322 ○ GTP 323 ○ GTA 591 ○ GTA 601 b. Containment pressure – NORMAL; NO, perform RNO <ul style="list-style-type: none"> ○ GN PI-934 ○ GN PI-935 ○ GN PI-936 ○ GN PI-937 ○ GT PDI-40 ○ GN PR-934 c. Containment sump level – NORMAL; NO, perform RNO <ul style="list-style-type: none"> ○ EJ LI-7 ○ EJ LI-8 ○ EJ LR-6 ○ LE LI-9 ○ LF LI-10

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

		<i>RNO, Perform the following:</i> <i>1. Ensure BIT inlet and outlet valves are open</i> <ul style="list-style-type: none"> ○ <i>EM HIS-8803A</i> ○ <i>EM HIS-8803B</i> ○ <i>EM HIS-8801A</i> ○ <i>EM HIS-8801B</i> <i>2. Go to EMG E-1, Loss of Reactor or Secondary Coolant, step 1.</i>
Examiner Note: A Transition Brief should be led by the CRS prior to performance of EMG E-1, Loss of Reactor or Secondary Coolant.		
	CRS	ENTER EMG E-1 rev 18A, Loss of Reactor or Secondary Coolant
		Examiner Note: EMG E-1 continued on next page.

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

FOLDOUT PAGE FOR EMG E-1		
1. SI REINITIATION CRITERIA IF either condition listed below occurs, THEN start ECCS pumps as necessary to reestablish RCS subcooling and PZR level. <ul style="list-style-type: none"> * RCS subcooling - LESS THAN 30°F [45°F] <li style="text-align: center;">OR * Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6% [33%] 		
2. RCP TRIP CRITERIA IF all conditions listed below occur, THEN trip all RCPs: <ul style="list-style-type: none"> ○ RCS pressure - LESS THAN 1400 PSIG ○ CCPs or SI pumps - AT LEAST ONE RUNNING ○ Operator controlled cooldown - NOT IN PROGRESS 		
3. SECONDARY INTEGRITY CRITERIA IF all conditions listed below are satisfied, THEN go to EMG E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1: <ul style="list-style-type: none"> ○ Any S/G pressure is decreasing in an uncontrolled manner OR any S/G has completely depressurized ○ Affected S/G has NOT been isolated using EMG E-2, FAULTED STEAM GENERATOR ISOLATION ○ Affected S/G is NOT needed for RCS cooldown 		
4. EMG E-3 TRANSITION CRITERIA IF any S/G level increases in an uncontrolled manner OR any S/G has abnormal radiation, THEN start ECCS pumps as necessary and go to EMG E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.		
5. COLD LEG RECIRCULATION CRITERIA IF RWST level decreases to less than 36%, THEN go to EMG ES-12, TRANSFER TO COLD LEG RECIRCULATION, Step 1.		
6. AFW SUPPLY SWITCHOVER CRITERIA IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.		
NOTES		
<ul style="list-style-type: none"> ○ Foldout page shall be monitored throughout this procedure. ○ Seal injection flow shall be maintained to all RCPs. 		
	RO	1. Check if RCP's should be stopped: a. Check RCPs – ANY RUNNING, NO , perform RNO <i>RNO: Go to step 2</i>

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	BOP	2. Check if SGs are not faulted: a. Check pressures in all SGs - <ul style="list-style-type: none"> ○ No SG pressure decreasing in an uncontrolled manner ○ No SG completely depressurized
	BOP	3. Check intact SG levels: a. Check narrow range level in at least one SG - > 6% [29%] b. Control feed flow to maintain narrow range level in all SGs between 6% [29] and 50%
CAUTION		
If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		
	RO	4. Reset SI <ul style="list-style-type: none"> ○ SB HS-42A ○ SB HS-43A
	RO	5. Reset Containment Isolation Phase A and B <ul style="list-style-type: none"> ○ SB HS-56 for phase A ○ SB HS-53 for phase A ○ SB HS-55 for phase B ○ SB HS-52 for phase B
CAUTION		
If steamlines in Area 5 of Auxiliary Building are not intact, extreme caution will be necessary when performing local surveys.		
	CREW	6. Determine secondary radiation levels: a. Direct Health Physics to survey steamlines in Area 5 of Aux Bldg b. Check SG sampling - ISOLATED c. Ensure SI - RESET d. Check instrument air header pressure - > 105 psig <ul style="list-style-type: none"> ○ KA PI-40 e. Open CCW to Radwaste System isolation valves <ul style="list-style-type: none"> ○ EG HS-69

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

		<ul style="list-style-type: none"> ○ EG HS-70 <p>d. Open all SG sample isolation valves</p> <ul style="list-style-type: none"> ○ BM HIS-65 for SG A ○ BM HIS-35 for SG A ○ BM HIS-66 for SG B ○ BM HIS-36 for SG B ○ BM HIS-67 for SG C ○ BM HIS-37 for SG C ○ BM HIS-68 for SG D ○ BM HIS-38 for SG D <p>g. Direct Chemistry to sample all SGs for activity</p>
BOOTH CUE: If called as Health Physics, respond I will survey the Area 5 steamlines.		
	CREW	<p>7. Check secondary radiation – NORMAL:</p> <p>a. Condenser air discharge radiation – NORMAL BEFORE ISOLATION</p> <ul style="list-style-type: none"> ○ GEG 925 <p>b. SG blowdown radiation – NORMAL BEFORE ISOLATION</p> <ul style="list-style-type: none"> ○ BML 256 <p>c. SG sample radiation</p> <ul style="list-style-type: none"> ○ SJL 026 ○ Sample results <p>d. Turbine driven auxiliary feedwater pump exhaust radiation - NORMAL</p> <ul style="list-style-type: none"> ○ FCT 381 <p>e. SG steamline radiation - NORMAL</p> <ul style="list-style-type: none"> ○ ABS 114 for SG A ○ ABS 113 for SG B ○ ABS 112 for SG C ○ ABS 111 for SG D ○ Local surveys

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

CAUTION If any PZR PORV opens because of high PZR pressure, the PORV shall be monitored to ensure it recloses after pressure decreases to less than 2335 psig.		
	RO	<u>8.</u> Check PZR PORVs and block valves: a. Power to block valves - AVAILABLE <ul style="list-style-type: none"> ○ BB HIS-8000A ○ BB HIS-8000B b. PZR PORVs - CLOSED <ul style="list-style-type: none"> ○ BB HIS-455A ○ BB HIS-456A c. RCS pressure – LESS THAN 2185 psig
	RO/BOP	<u>9.</u> Establish Instrument Air to Containment: a. Ensure ESW to air compressor valves - OPEN <ul style="list-style-type: none"> ○ EF HIS-43 ○ EF HIS-44 b. Reset and close air compressor breaker reset switches <ul style="list-style-type: none"> ○ KA HIS-2C ○ KA HIS-3C c. Check Instrument Air pressure - > 105 psig <ul style="list-style-type: none"> ○ KA PI-40 d. Check PZR pressure master controller - < 50% output signal <ul style="list-style-type: none"> ○ BB PK-455A e. Open Instrument Air supply Containment isolation valve <ul style="list-style-type: none"> ○ KA HIS-29
	RO	<u>10.</u> Check if ECCS flow should be reduced: a. RCS subcooling - > 30°F [45°F]; NO , perform RNO b. Secondary heat sink <ul style="list-style-type: none"> * Total feed flow to intact SGs - > 270, 000 lbm/hr OR * Narrow range level in at least one intact SG - > 6% [29%] c. RCS pressure – stable or increasing d. PZR level - > 6% [33%] <i>RNO d Perform the following:</i>

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

		1. Try to stabilize RCS pressure using normal PZR spray. 2. Go to step 11.
	RO	11. Check if Containment Spray should be stopped: a. Check spray pumps – ANY RUNNING; NO perform RNO <i>RNO a. Observe CAUTION prior to step 12 and go to step 12.</i>
CAUTION After RHR pumps have been stopped, RCS pressure shall be monitored for RHR pump restart criteria.		
	RO	12. Check if RHR pumps should be stopped: a. Check RHR pumps – ANY RUNNING b. Check RCS pressure: 1. Pressure - > 325 psig 2. Pressure – STABLE or INCREASING c. Check RHR system – ALIGNED FOR INJECTION d. Stop RHR pumps and place in standby ○ EJ HIS-1 ○ EJ HIS-2 e. Check RCS pressure >325 psig during subsequent recovery actions <i>RNO 12. a. Go to step 10</i> <i>RNO 12.b. 2 If RCS pressure is expected to decrease below 325 psig within 2.5 hours, then go to Step 10.</i> <i>RNO 12.e. If RCS pressure decreases in an uncontrolled manner to less than 325 psig, then manually restart RHR pumps to provide injection to the RCS.</i>

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Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	RO/BOP	13. Check RCS and SG pressures: a. Check RCS pressure – STABLE OR DECREASING b. Check pressure in all SGs – STABLE OR DECREASING
	RO/BOP	14. Check if Diesel Generators should be stopped: a. Check NB01 – ENERGIZED BY OFFSITE POWER b. Depress START/RESET pushbutton for diesel generator NE01 ○ KJ HS-8A c. Depress STOP pushbutton for diesel generator NE01 ○ KJ HS-8A d. Check NB02 – ENERGIZED BY OFFSITE POWER e. Depress START/RESET pushbutton for diesel generator NE02 ○ KJ HS-108A f. Depress STOP pushbutton for diesel generator NE02 ○ KJ HS-108A g. Place all previously running diesels in standby using SYS KJ-121, Diesel Generator NE01 and NE02 Lineup for Automatic Operation, while continuing with this procedure
BOOTH CUE: If contacted as building watch, respond “I will place diesels in standby using SYS KJ-121.” BOOTH INSTRUCTION: At KJ-121 Soft Panel for EDG “A”, acknowledge any local alarms. At NE107, depress ENGINE SHUTDOWN RESET pushbutton KJ HS-12. At KJ-12 Soft Panel for EDG “B”, acknowledge any local alarms. At NE106, depress ENGINE SHUTDOWN RESET pushbutton KJ HS-112. Report back to Control Room when tasks completed.		
	RO	15. Load equipment on energized AC emergency busses: a. Locally reset and close boric acid transfer pump breakers ○ NG01AHF4 for pump A ○ NG02AAF4 for pump B b. Locally reset and close emergency borate valve breaker

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 41 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

		<ul style="list-style-type: none"> ○ NG04CPF2 for BG HV-8104
BOOTH CUE / INSTRUCTION: CUE: Respond as building watches: “I will reset and close (boric acid and transfer pump breakers) NG01AHF4 and NG02AAF4. I will reset and close (emergency borate valve breaker) NG04CPF2.” INSTRUCTIONS: Insert Key 5 When actions completed, report to Control Room (breakers are reset etc)		
	RO/BOP	16. Close Non – Class 1E battery charger breakers <ul style="list-style-type: none"> ○ PK HIS-2 for PK-21 ○ PK HIS-3 for PK-22 ○ PK HIS-4 for PK-23 ○ PK HIS-5 for PK-24
	RO/BOP	17. Check all non-class 1E AC busses and load centers – ENERGIZED BY OFFSITE POWER
	RO/BOP	18. Place Hydrogen Analyzers in service: <ul style="list-style-type: none"> a. On RL011, place power lockout switches for Containment sample valves in NON-ISO position <ul style="list-style-type: none"> ○ GS HIS-40 ○ GS-HIS-41 ○ GS-HIS-42 ○ GS HIS-43 b. On RL011, open one Hydrogen Analyzer supply inner Containment isolation valve per train <ul style="list-style-type: none"> ○ GS HIS-13 or GS HIS-14 for red train ○ GS HIS-4 or GS HIS-5 for yellow train c. On RL011, open remaining Hydrogen Analyzer Containment isolation valves <ul style="list-style-type: none"> ○ GS HIS-12 ○ GS HIS-17 ○ GS HIS-18

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 42 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

		<ul style="list-style-type: none"> ○ GS HIS-3 ○ GS HIS-8 ○ GS HIS-9 d. On RL020, place Containment Hydrogen Analyzer control switches in ANALYZE position <ul style="list-style-type: none"> ○ GS HIS-16A ○ GS HIS-11A f. On RL020, monitor Containment Hydrogen concentration <ul style="list-style-type: none"> ○ GS AI-19 ○ GS AI-10
	RO	19. Verify Cold Leg Recirculation capability a. Check ESFAS status panel SIS section – NO AMBER LIGHTS LIT <ul style="list-style-type: none"> ○ Red train ○ Yellow train
	RO/BOP	20. Check Fuel/Auxiliary Building radiation – NORMAL a. Shift Fuel/Auxiliary Building exhaust sample to EMERGENCY <ul style="list-style-type: none"> ○ GG HIS-27 ○ GG HIS-28 b. Direct Health Physics to survey Fuel and Auxiliary Buildings with priority being pipe penetration areas and piping tunnels c. Check Fuel/Auxiliary Building radiation monitors – NONE ALARMING <ul style="list-style-type: none"> ○ GGP 271 ○ GGI 272 ○ GGG 273 ○ GGP 281 ○ GGI 282 ○ GGG 283 ○ GLP 604 ○ Area radiation monitors

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 43 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

BOOTH CUE: Respond as Health Physics, "I will survey Fuel and Auxiliary Buildings with priority being pipe penetration areas and piping tunnels."		
	CRS	21. Obtain samples: a. Request Chemistry to obtain boron and activity samples for the following: <ul style="list-style-type: none"> ○ RCS ○ PZR liquid space
BOOTH CUE: Respond as Chemistry, "I will obtain boron and activity samples for the RCS and PZR liquid space."		
	CRS	22. Initiate Evaluation of plant status: a. Evaluate plant equipment to ensure availability b. Start additional plant equipment as necessary to assist in recovery
BOOTH CUE: Call as Shift Manager and report that the Shift Manager will complete EMG E-1, step 22.		
	CRS	23. Check if RCS cooldown and Depressurization is required: a. Check RCS pressure - > 325 psig b. Go to EMG ES-11, Post LOCA Cooldown and Depressurization, step 1
Examiner Note: A Transition Brief should be led by the CRS prior to performance of EMG ES-11, Post LOCA Cooldown and Depressurization.		
	CRS	ENTER EMG ES-11, rev 17, Post LOCA Cooldown and Depressurization

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 44 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

FOLDOUT PAGE FOR EMG ES-11		
1. SI REINITIATION CRITERIA		
IF either condition listed below occurs, THEN start ECCS pumps as necessary to reestablish RCS subcooling and PZR level.		
* RCS subcooling - LESS THAN 30°F [45°F]		
OR		
* Pressurizer level - CANNOT BE MAINTAINED GREATER THAN 6% [33%]		
2. SECONDARY INTEGRITY CRITERIA		
IF all conditions listed below are satisfied, THEN go to EMG E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1:		
<ul style="list-style-type: none"> ○ Any S/G pressure is decreasing in an uncontrolled manner OR any S/G has completely depressurized ○ Affected S/G has NOT been isolated using EMG E-2, FAULTED STEAM GENERATOR ISOLATION ○ Affected S/G is NOT needed for RCS cooldown 		
3. EMG E-3 TRANSITION CRITERIA		
IF any S/G level increases in an uncontrolled manner OR any S/G has abnormal radiation, THEN start ECCS pumps as necessary and go to EMG E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.		
4. COLD LEG RECIRCULATION CRITERIA		
IF RWST level decreases to less than 36%, THEN go to EMG ES-12, TRANSFER TO COLD LEG RECIRCULATION, Step 1.		
5. AFW SUPPLY SWITCHOVER CRITERIA		
IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.		
CAUTION		
If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		
NOTE		
Foldout page shall be monitored throughout this procedure.		
	CRS	1. Reset SI, <i>step previously performed</i>
	CRS	2. Reset Containment Isolation Phase A and B, <i>step previously performed</i>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 45 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	CRS	3. Establish Instrument Air to Containment, <i>step previously performed</i>
	CRS	4. Check if Diesel Generators should be stopped, <i>step previously performed</i>
CAUTION PZR heaters shall not be energized until PZR water level indicates greater than minimum recommended by the TSC to ensure heaters are covered.		
	CRS/RO	5. Align PZR heaters: a. Place PZR B/U heater switches in trip and PZR CTRL heaters in PTL position <ul style="list-style-type: none"> ○ BB HIS-51A ○ BB HIS-52A ○ BB HIS-50 b. Close supply breaker for PG 21 <ul style="list-style-type: none"> ○ PG HIS-19 c. Close supply breaker for PG 22 <ul style="list-style-type: none"> ○ PG HIS-21 d. Direct TSC to determine minimum PZR water level that will ensure heaters are covered.
BOOTH CUE: If contacted as Shift Manager or TSC, respond, "Direct the TSC to determine the minimum PZR water level that will ensure the PZR heaters are covered."		
	CRS	6. Load equipment on energized AC emergency busses, <i>step previously performed</i>
	CRS	7. Close Non-Class 1E battery charger breakers, <i>step previously performed</i>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>NRC</u> Scenario # <u>1</u> Event # <u>NA</u> Page <u>46</u> of <u>48</u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	CRS	<u>8.</u> Check all Non-Class 1E AC busses and load centers – ENERGIZED BY OFFSITE POWER, <i>step previously performed</i>
CAUTION After RHR pumps have been stopped, RCS pressure shall be monitored for RHR pump restart criteria		
	CRS	<u>9.</u> Check if RHR pumps should be stopped a. Check RHR pumps – ANY RUNNING b. Check RCS pressure: 1. Pressure - > 325 psig 2. Pressure – STABLE or INCREASING c. Check RHR system – ALIGNED FOR INJECTION d. Stop RHR pumps and place in standby o EJ HIS-1 o EJ HIS-2 e. Check RCS pressure >325 psig during subsequent recovery actions <i>RNO 9. a. Go to step 10</i> <i>RNO 9.b. 2 If RCS pressure is expected to decrease below 325 psig within 2.5 hours, then go to Step 10.</i> <i>RNO 9.e If RCS pressure decreases in an uncontrolled manner to less than 325 psig, then manually restart RHR pumps to provide injection to the RCS.</i>
	CRS	<u>10.</u> Check intact SG levels, <i>step previously performed</i>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 47 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

	CREW	<p>11. Check if Condenser Air Removal should be returned to normal:</p> <p>a. Check the following:</p> <ul style="list-style-type: none"> ○ Main steamline isolation valves – AT LEAST ONE OPEN ○ Condensate pumps – AT LEAST ONE RUNNING ○ Circulating water pumps – AT LEAST ONE RUNNING ○ Condenser vacuum – ESTABLISHED <p>b. Open Condenser Air Removal fan discharge dampers</p> <ul style="list-style-type: none"> ○ GE HIS-103 ○ GE HIS-104 <p>c. Start desired number of Condenser Vacuum Pumps</p> <ul style="list-style-type: none"> * CG HIS-1 * CG HIS-2 * CG HIS-3 <p>d. Open Condenser Air Removal Filtration System supply dampers</p> <ul style="list-style-type: none"> ○ GE HIS-101 ○ GE HIS-102 <p>e. Ensure one Condenser Air Removal fan is running</p> <ul style="list-style-type: none"> * GE HIS-82 * GE HIS-83
		NOTE
		If high steam pressure rate setpoint (100psi / 50sec) is exceeded after low steamline pressure SI signal is blocked, main steamline isolation will occur.
	RO	<p>12. Check if low steamline pressure SI should be blocked:</p> <p>a. Check RCS pressure - < 1970 psig</p> <ul style="list-style-type: none"> ○ P-11 light – LIT <p>b. Block low steamline pressure SI</p> <ul style="list-style-type: none"> ○ SB HS-9 ○ SB HS-10

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> NA </u> Page <u> 48 </u> of <u> 48 </u>		
Event Description: Automatic Signal Verification		
Time	Position	Applicant's Actions or Behavior

NOTE		
Shutdown margin shall be monitored during RCS cooldown.		
	RO	<p>13. Initiate RCS cooldown to Cold Shutdown:</p> <p style="margin-left: 20px;">a. Maintain cooldown rate in RCS cold legs - < 100°F/ hr</p> <p style="margin-left: 20px;">b. Check RHR system – IN SHUTDOWN COOLING MODE; NO, perform RNO 13b</p> <p style="text-align: center; margin-left: 40px;"><i>RNO 13b. Go to step 13.d</i></p> <p>13.d. Dump steam to condenser from intact SG (If NO, perform RNO 13.d.)</p> <p style="text-align: center; margin-left: 40px;"><i>RNO 13.d. Dump steam using intact SG ARVs</i></p> <p>13.d.1. Ensure STM HDR PRESS CRTL in manual</p> <p style="margin-left: 40px;">○ AB PK-507</p> <p>13.d.2. Adjust STM HDR PRESS CRTL to achieve desired cooldown rate</p> <p style="margin-left: 40px;">○ AB PK-507</p> <p>13.d.3. Check P-12 interlock – ACTUATED (If NO, perform RNO)</p> <p style="text-align: center; margin-left: 40px;"><i>RNO13.d.3. When P-12 interlock actuates, then do step 13.d.4. Continue with step 14.</i></p> <p>13.d.4. Place both STEAM DUMP BYPASS INTERLOCK switches to BYP/INTLK</p> <p style="margin-left: 40px;">○ AB HS-63</p> <p style="margin-left: 40px;">○ AB HS-64</p>
Terminate scenario once Cooldown is started or at Lead Examiner's direction.		

Facility:		Wolf Creek		Date of Exam:		12-15-09		Operating Test No.:									
A P P L I C A N T	E V E N T T Y P E	Scenarios												T O T A L	M I N I M U M (*)		
		1			2			3 (Backup)			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P				
														R	I	U	
RO <input type="checkbox"/>	RX		2		0			0	0	0				1	1	1	0
SRO-I <input checked="" type="checkbox"/>	NOR		0		1			0	0	0				1	1	1	1
SRO-U <input type="checkbox"/>	I/C		14		2346			1235 6	1356	23				6	4	4	2
	MAJ		35		5			4	4	4				3	2	2	1
	TS		0		23			12	0	0				2	0	2	2
RO <input type="checkbox"/>	RX														1	1	0
SRO-I <input type="checkbox"/>	NOR														1	1	1
SRO-U <input type="checkbox"/>	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2
RO <input type="checkbox"/>	RX														1	1	0
SRO-I <input type="checkbox"/>	NOR														1	1	1
SRO-U <input type="checkbox"/>	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2
RO <input type="checkbox"/>	RX														1	1	0
SRO-I <input type="checkbox"/>	NOR														1	1	1
SRO-U <input type="checkbox"/>	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.
3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

Facility: Wolf Creek		Date of Examination: 12-15-09		Operating Test No.												
Competencies	APPLICANTS															
	RO (ATC) <input checked="" type="checkbox"/>				RO <input type="checkbox"/> SRO-I (CRS) <input checked="" type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>			
	SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				SRO-U <input type="checkbox"/>											
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions	1	245 6	145 6		all	all	all									
Comply With and Use Procedures (1)	12	124	134 56		all	all	all									
Operate Control Boards (2)	123 45	124 6	145 6													
Communicate and Interact	123 5	124 56	134 56		all	all	all									
Demonstrate Supervisory Ability (3)					all	all	all									
Comply With and Use Tech. Specs. (3)					1	23	12									
Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs.																

Instructions:

Check the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.