Draft Submittal

(Pink Paper)

SIMULATOR SCENARIOS

HARRIS JAN./FEB. 2006 EXAM

05000400/2006301

JANUARY 23 - FEBRUARY 2, 2006
FEBRUARY 6, 2006 (WRITTEN)

2/9/06

HARRIS INIITIAL LICENSE EXAM MATERIAL

January 2006 RO and SRO Exams

SIMULATOR SCENARIO BINDER

Facility:	Shearon Harris	Scenario No.:	1	Op Test No.:	2006 NRC
Examiners:		Operators:			

Initial Conditions:
- IC-11 – 90% power (MOL).
- Exception to IC-11 Fact Sheet: Inform crew that RCS Boron is 864 ppm.
- RHR Pump "B" is inoperable while a possible oil leak is investigated (RHR023_RACK OUT). OWP-RH-02 is in effect. 60 hours remain on TSAS 3.5.2.a.

Turnover: Raise power to 100% at a loading rate of 2 DEH Units/minute.

The Power Range Heat Balance is SAT.

GP-005, Step 137.b is complete.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP, SRO R-RO	Raise power.
2	TT:144	I-RO, SRO	Letdown temperature control transmitter fails LOW.
3	XD1I121	C-BOP, SRO TS-SRO	MCC 1A34 Feeder Breaker trip: Loss of both fans on Containment Fan Cooler AH-3.
4	LT:476	I-BOP, SRO TS-SRO	Controlling level channel on a SG fails HIGH.
5	PT:444	I-RO, SRO	PT-444, PZR Pressure instrument fails HIGH.
6	RCS09C	M-ALL	Steadily rising vibration on RCP "C".
7	RPS01B	C-ALL	ATWS
8	PRS04A	M-ALL	PZR Safety valve fails OPEN.
9	EPS05A DSG04A	C-ALL	Electrical fault on vital bus with running CSIP "A". EDG B Load Sequencer failure.

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

SHNPP 2006 NRC ES-D-1 SCENARIO 1 SUMMARY DESCRIPTION

The crew assumes the watch with the unit at 90% power and directions to raise power at 10% per hour in accordance with GP-005, POWER OPERATIONS. Prior to entering the simulator the crew will hold a "pre-brief" on the power change to reduce planning/discussion time. RHR Pump "B" is inoperable while a possible oil leak is investigated. This will not be a factor in the scenario until the termination point.

On cue from the Lead Evaluator the letdown temperature transmitter fails low, causing the temperature control valve to close. The crew should respond in accordance with alarm response procedure APP-ALB-007, 3-2, DEMIN FLOW DIVERSION HIGH TEMP. The operator should take manual control of the temperature control valve to restore temperature. Depending on the progress of the scenario, the crew may restore the normal letdown flowpath.

On cue from the Lead Evaluator, the feeder breaker to both fans on Containment Fan Cooler AH-3 will open. The crew should initially respond in accordance with alarm response procedure APP-ALB-001, 6-5, ESF SYS TRAIN A BYP OR INOP. They should determine that AH-3 lost power due to the feeder breaker trip. The SRO should enter the action statement for an inoperable Containment Fan Cooler. As containment temperature and pressure begin to rise, the crew should start a standby unit.

On cue from the Lead Evaluator the controlling level channel on SG "A" fails HI. The crew should respond in accordance with APP-ALB-014, 1-1B, SG A NR LVL/SP HI/LO DEV and then enter AOP-010, FEEDWATER MALFUNCTIONS. The operator should determine the channel has failed and take manual control of the associated feedwater regulating valve. The SRO should enter the required instrumentation technical specifications. The channel does not have to be removed from service to continue with the scenario. Anytime after the SG level technical specification has been entered the Lead Evaluator can cue the PZR pressure instrument failure. The crew should respond to ALB-9 alarms and enter AOP-019, MALFUNCTION OF RCS PRESSURE CONTROL. The operator should perform the immediate actions from memory. The crew should then work through the procedure and restore RCS pressure to normal. The Lead Evaluator can cue the next event before the technical specification call or the channel is removed from service.

On cue from the Lead Evaluator, RCP "C" vibration will begin to rise. The crew will respond to alarms and/or indications and enter AOP-018, REACTOR COOLANT PUMP ABNORMAL CONDITIONS. The SRO should direct a manual reactor trip when the vibration limits are exceeded. Attempts to trip the reactor from the control room will fail. During the ensuing transient a PZR Safety Valve will fail open. The bus with the operating CSIP will trip on electrical fault and the sequencer on the opposite train fails to actuate. The crew should enter PATH-1, transition to FRP-S1, and then return to PATH-1 to mitigate the LOCA. Among other high-level actions, the crew should direct actions to make the reactor sub-critical, start one train of ECCS equipment and stop the RCP's. The scenario will terminate at the transition to EPP-012, LOSS OF EMERGENCY COOLANT RECIRCULATION.

IC-11, 89% power, EOL

Rack out B RHR pump (initial condition)
irf rhr023 (n 00:00:00 00:00:00) RACK_OUT

Auto and manual reactor trip failure (initial condition)
imf rps01b (n 00:00:00 00:00:00) 3 3

#Conditional Triggers (for Rx trip and SI respectively)
TRG 7 "JPPLP4"
TRG 8 "JPPLSI"

Letdown temperature control failure (TE-144 fails low)
imf tt:144 (1 00:00:00 00:00:00) 50.0 00:03:00 –

MCC 1A34 feeder bkr trip; loss of both AH-3 fans
idi xdli121 (2 00:00:00 00:00:00) TRIP

A SG controlling level channel failure
imf 1t:476 (3 00:00:00 00:00:00) 100.0 00:01:00

PRZ master press controller input failure
imf pt:444 (4 00:00:00 00:00:00) 2500.0 00:05:00 –

C RCP vibration increase to trip level
imf rcs09c (5 00:00:00 00:00:00) 30.0 00:03:00 –

# Delete Rx Trip failure
trg= 6 dmf rps01b

PRZ safety valve fails open (on Rx Trip)
imf prs04a (7 00:00:00 00:00:00) 100 00:00:00 0

Loss of 1A-SA (on SIAS)
imf eps05a (8 00:00:00 00:00:00) true
imf dsg03 (8 0 0) A

B sequencer failure (on SIAS)
imf dsg04a (8 00:00:00 00:00:00) 1 2

Op Test No.: 1	Scenario # 1	Event # 1	Page 4 of 29
Event Description:	Power Increase		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
Evaluator Note:		**The Lead Evaluator can cue initiation of Event 2 (Letdown Temperature Control Transmitter Failure) whenever the evaluating team members have completed their evaluation of Event 1.**
	SRO	Provides direction per GP-005, Step 137.c
	BOP	Depresses Load Rate MW/MIN pushbutton.
	BOP	Enters/verifies desired load rate in DEMAND display then depresses ENTER.
	BOP	Depresses REF pushbutton, enters or verifies 960 in DEMAND display.
	BOP	Informs RO/SRO that turbine load increase is being initiated.
	BOP	Depresses GO pushbutton.
	BOP	Monitors turbine and feedwater system response.
	SRO	Direct Radwaste Control Room to supply Auxiliary Steam from Extraction Steam per OP-130.01 Section 8.5 or Section 8.6.
Simulator Operator:		**Respond as Radwaste Operator but no simulator actions are required.**

Op Test No.: 1	Scenario # 1	Event # 1	Page 5 of 29
Event Description:	Power Increase		

Time	Position	Applicant's Actions or Behavior
Evaluator's Note:		**The crew may elect to start a dilution before the power change is initiated.**
Evaluator's Note:		**OP-107 is a "Reference Use" procedure.**
	RO	DETERMINE the volume of makeup water to be added. This may be done by experience or via the reactivity plan associated with the Simulator IC.
	RO	SETS FIS-114, TOTAL MAKEUP WTR BATCH COUNTER, to obtain the desired quantity.
	RO	SET total makeup flow as follows:
		• IF performing DIL in Step 8, **THEN SET** controller 1CS-151, FK-114 RWMU FLOW, for less than or equal to 90 gpm.
		• IF performing ALT DIL in Step 8, **THEN SET** controller 1CS-151, FK-114 RWMU FLOW, for the desired flow rate.
	RO	VERIFY the RMW CONTROL switch has been placed in the STOP position.
	RO	VERIFY the RMW CONTROL switch green light is lit.
	RO	PLACE the control switch RMW MODE SELECTOR to the DIL **OR** the ALT DIL position.

Op Test No.: 1	Scenario # 1	Event # 1	Page 6 of 29
Event Description:	Power Increase		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**When PRZ backup heaters are energized in manual, PK-444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and the RCS boron concentration to less than 10 ppm.
Note:		**SRO concurrence should be obtained prior to energizing the BUH in MANUAL.**
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the red indicator light is lit.
	RO	VERIFY Tavg and rod motion responds as desired.
	RO	VERIFY dilution automatically terminates when the desired quantity has been added.
	RO	PLACE Reactor Makeup in Auto per Section 5.1.

Op Test No.: 1	Scenario # 1	Event # 1	Page 7 of 29
Event Description:	Power Increase		

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY the RMW CONTROL switch:
		• Is in the STOP position.
		• The green light is lit.
	RO	PLACE the RMW MODE SELECTOR to AUTO.
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the red indicator light is lit.

Op Test No.: 1	Scenario # 1	Event # 2	Page 8 of 29
Event Description:	Letdown Temperature Control Xmtr Fails LOW.		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	Responds to alarm ALB-007-3-2.
	SRO	Enters APP-ALB-007-3-2 and directs actions accordingly.
	RO	CONFIRM alarm using TI-143, LP Letdown Temperature.
	RO	VERIFY Automatic Functions:
		• 1CS-50, Letdown to VCT/Demin, divert flow to the VCT, bypassing the BTRS and Purification Demineralizers.
	RO	PERFORM Corrective actions:
		• VERIFY that 1CS-50 diverts flow to the VCT, bypassing the BTRS and Purification Demineralizers.
		• PERFORM the following as needed to lower letdown temperature:
		• VERIFY proper charging flow is established. (YES)
		• LOWER letdown flow. (N/A – CCW Problem)
		• IF CCW flow to the Letdown Heat Exchanger appears low, THEN:
		• TAKE manual control of TK-144.
		• OPEN 1CC-337, to raise CCW flow.
	SRO	Contacts Work Control for assistance.
Evaluator's Note:		**The SRO may initiate an Equipment Failure Checklist for any failure.**

Op Test No.: 1	Scenario # 1	Event # 2	Page 9 of 29
Event Description:	Letdown Temperature Control Xmtr Fails LOW.		

Time	Position	Applicant's Actions or Behavior

Simulator Operator Note: **Initiate Event 3 (MCC 1A34 Feeder Breaker trip) with concurrence from the Lead Evaluator.**

Op Test No.: 1	Scenario # 1	Event # 3	Page 10 of 29
Event Description: MCC 1A34 Feeder Breaker Trip			

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	Responds to alarm ALB-001-6-5, Engineering Safeguard Features System Train A Bypassed or Inoperable.
	SRO	Enters APP-ALB-001-6-5 and APP-ESF-A-4-1.
	RO	Reports alarm condition(s) on Engineered Safeguard Feature Bypass Panel A.
	RO	Refer to APP-ESF-A-4-1 for the window indicated in alarm on ESF Bypass Panel A.
	RO/BOP	Reports Containment Fan Cooler AH-3 tripped.
	BOP	Reports no power to 1A34.
	SRO	Dispatches AO to investigate.
Simulator Operator Note: Report 1A34 feeder breaker is open.		
	SRO	Directs start of a standby Containment Fan Cooler.
	BOP	Enters OP-169, Section 5.0.
	BOP	Verifies Initial Conditions.
	BOP	Places control switch for both fans in the selected cooler to LO-SPD.

Op Test No.: 1	Scenario # 1	Event # 3	Page 11 of 29
Event Description:	MCC 1A34 Feeder Breaker Trip		

Time	Position	Applicant's Actions or Behavior
Evaluator's Note:		**Procedure Note indicates the next two steps must be completed without delay to avoid coastdown.**
	BOP	Place control switch for selected fan cooler to STOP.
	BOP	Place control switch for selected fan cooler to HI-SPD.
	BOP	Restores normal containment purge:
		• Opens normal inlet/discharge CP9/CP5
		• Opens normal inlet/discharge CP6/CP3
		Places switch for Normal Purge Supply Fan to START.
Note:		**Controls are now aligned for the fan to auto start if/when CNMT pressure reaches the negative value setpoint.**
	SRO	Contacts Work Control for assistance.
	SRO	Enters TS 3.6.2.3 Action a.
Simulator Operator Note:		**Ensure the BOP Operator is available to respond to Event 4. Initiate Event 4 (SG A Controlling Level Channel Fails HI) with concurrence from the Lead Evaluator.**

Op Test No.: 1 Scenario # 1 Event # 4 Page 12 of 29

Event Description: SG "A" Controlling Level Channel Fails HI

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	Responds to alarms ALB-014-1-1B and 4-3B.
	SRO	Enters and directs actions of APP-ALB-014-1-1B and/or 4-3B.
Evaluator's Note:		**The APP-ALB-014-1-B and 4-3B actions are similar.** **In accordance with OMM-1, the operator may take MANUAL control of a malfunctioning controller before being directed by a procedure.**
	BOP	CONFIRM alarm using LI-474 SA, LI-475 SB, or LI-476 SA, Steam Generator A level indicators. Reports LI-476 reading or failed high.
	BOP	VERIFY Automatic Functions: NONE
	BOP	PERFORM Corrective Actions:
		• CHECK Steam Flow (FI-474, FI-475) AND Feed Flow (FI-476, 477) for deviation. (YES)
		• IF FCV-478, SG A auto level controller, is NOT sufficiently correcting level, THEN: (YES)
		• SWITCH to MANUAL.
		• RESTORE level to normal (57% NR).
	SRO	**The SRO may enter AOP-010 based on the flow transient. If so, the outcome will be the same – the associated FRV in MANUAL.**
	SRO	Refer to OWP-RP-05 to remove channel from service.

Op Test No.: 1	Scenario # 1	Event # 4	Page 13 of 29
Event Description:	SG "A" Controlling Level Channel Fails HI		

Time	Position	Applicant's Actions or Behavior
	SRO	Contacts I&C to have channel removed from service.
Evaluator's Note:		**Channel does NOT have to be removed from service to continue the scenario. Cue Event 5 (PRZ Pressure Instrument Failure) after SG level is under control and the TS has been identified.**
	SRO	Enters Instrumentation TS 3.3.1 Action 6 and 3.3.2 Action 19.

Op Test No.: 1 Scenario # All Event # 5 Page 14 of 29

Event Description: PZR Pressure Instrument Fails HI

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	Responds to multiple ALB-09 alarms.
	RO	Reports channel failure or malfunction of RCS Pressure control.
	SRO	Enters AOP-019.
	RO	Perform AOP-019.
	RO	Perform AOP-019 Immediate Actions.
Immediate Action	RO	CHECK that a bubble exists in the PRZ. (YES)
Immediate Action	RO	VERIFY ALL PRZ PORVs AND associated block valves properly positioned for current PRZ pressure and plant conditions. (YES)
Immediate Action	RO	CHECK Both PRZ spray valves properly positioned for current PRZ pressure and plant conditions. (NO)
Immediate Action	RO	CONTROL PRZ spray valves in MANUAL using ONE of the following (listed in order of preference):
Immediate Action		• PK-444A, Master Pressure Controller
		OR
Immediate Action		• Both individual spray valve controllers
	SRO	GO TO Section 3.1, Pressure Control Malfunctions While Operating With a Pressurizer Bubble.

Op Test No.: 1 Scenario # All Event # 5 Page 15 of 29

Event Description: PZR Pressure Instrument Fails HI

Time	Position	Applicant's Actions or Behavior
	SRO	Inform SSO to REFER to PEP-110, Emergency Classification and Protective Action Recommendations, AND ENTER the EAL Network at entry point X.
	RO	MONITOR PRZ pressure by observing other reliable indication.
	SRO	CHECK plant in MODE 1 OR 2. (YES)
	RO	CHECK PRZ pressure CONTROLLED. (YES)
	RO	CHECK PRZ pressure 2335 PSIG OR LESS. (YES)
	RO	CHECK ALL of the following PRZ PORV block valves OPEN:
		• 1RC-117 (for PCV-445A SA) (YES)
		• 1RC-115 (for PCV-445B) (YES)
		• 1RC-113 (for PCV-44B SB) (YES)
	RO	CHECK that a malfunction of one or more of the following has occurred:
		• PT-444 (YES)
		• PK-444A
		• PRZ heater(s)
		• PRZ spray valve(s) or controller(s)
	RO	CHECK PK-444A controlling properly in AUTO. (NO)
	RO	PERFORM the following:
		• VERIFY PK-444A in MANUAL.
		• ADJUST PK-444A output as necessary, to attempt to restore and maintain PRZ pressure.

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Event Description: PZR Pressure Instrument Fails HI

Time	Position	Applicant's Actions or Behavior
	RO	CONTROL PRZ pressure as follows:
Note:		**If individual spray valve controllers are already in MAN, do NOT return to AUTO.**
	RO	• CHECK BOTH PRZ spray valve controllers in AUTO AND BOTH spray valves operating as desired. (YES)
	RO	CHECK ALL PRZ heaters operating as desired. (YES)
		• Manually OPERATE control switches for heater groups as necessary to control PRZ pressure. (N/A)
	RO	CHECK at least one of the following conditions present:
		• PRZ pressure is UNCONTROLLED (NO)
		• Status of a normal spray valve or a PRZ heater bank is UNCONTROLLED (NO)
	SRO	REFER TO Tech Spec 3.2.5 AND IMPLEMENT action where appropriate.
Simulator Operator's Note:		**Insert Event 6 (Rising vibration on RCP C) on cue from the Lead Evaluator or after TS 3.2.5 is evaluated.**

Op Test No.: 1	Scenario # 1	Event # 6	Page 17 of 29
Event Description:	Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	Responds to alarm ALB-010-1-5.
Evaluator's Note:		**Crew may enter ALB-010-1-5 but will likely go directly to AOP-018 when high vibration is recognized.**
	SRO	Enters and directs actions of AOP-018.
Immediate Action	RO	Perform Immediate Action
		• Verifies one CSIP running. (YES)
	SRO	Inform SSO to refer to PEP-110, Emergency Classification and Protective Action Recommendations.
	SRO	Proceeds to Section 3.2.
	SRO	Check all RCP's operating within limits of Attachment 1.
Evaluator's Note:		**The answer may be YES at this time but the limit will be exceeded in short order.**
	SRO	Check reactor power > P-8. (YES)
	SRO	Directs RO to initiate a Reactor trip and then stop RCP "C".
	RO	Attempts to initiate a MANUAL reactor trip and reports failure.
	SRO	Enters PATH-1.

Op Test No.: 1	Scenario # 1	Event # 6	Page 18 of 29
Event Description:	Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.		

Time	Position	Applicant's Actions or Behavior
	SRO	Transitions to FRP-S.1 and directs RO to perform immediate actions of the procedure.
Immediate Action	RO	Verify Reactor Trip:
		• Check for all of the following:
		• Check for any of the following:
		• Trip breakers RTA AND BYA – OPEN (NO)
		• Trip breakers RTB AND BYB – OPEN (NO)
		• Rod bottom lights – LIT (NO)
		• Neutron flux – DECREASING (NO)
Immediate Action		IF the reactor will NOT trip (automatically OR using either manual trip switch), THEN verify negative reactivity inserted by any of the following while continuing with this procedure:
		• Manually insert control rods.
		• Verify control rods inserting in automatic. (YES)
Immediate Action	BOP	Verify Turbine Trip:
		• Check for any of the following:
		• All turbine throttle valves – SHUT (NO)
		• All turbine governor valves – SHUT (NO)
		Manually trip turbine from MCB. (YES)
Immediate Action	BOP	Verify All AFW Pumps – RUNNING. (YES)
Immediate Action	RO	Check Reactor Trip Status:
		• Check reactor – TRIPPED (NO)

Op Test No.: 1	Scenario # 1	Event # 6	Page 19 of 29
Event Description:	Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.		

Time	Position	Applicant's Actions or Behavior
Immediate Action	RO/SRO	Direct an NLO to contact OR report to the main control room (to receive instructions to locally trip the reactor).
Simulator Operator's Note:		**If the announcement is made in the step above then delete RPS01B after Emergency Boration is initiated.**
	SRO	Perform the following:
		• Inform STA to initiate monitoring the Critical Safety Function Status Trees.
		• Inform SSO to Evaluate EAL Network using entry point X (Refer to PEP-110).
	RO	Initiate Emergency Boration of RCS:
		• Check SI flow – GREATER THAN 200 GPM. (NO)
		• Emergency borate from the BAT:
		• Start a boric acid pump.
		• Perform any of the following (listed in order of preference):
		• Open Emergency Boric Acid Addition valve:
		1CS-278
		• Open normal boration valves:
		FCV-113A
		FCV-113B
		• Verify boric acid flow to CSIP suction – AT LEAST 30 GPM.
		• Verify CSIP flow to RCS – AT LEAST 30 GPM.
	RO	• Check PRZ Pressure – LESS THAN 2335 PSIG. (YES)

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Event Description: Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.

Time	Position	Applicant's Actions or Behavior
Evaluator's Note:		**A PRZ Safety Valve will fail open when the reactor trips.**
	BOP	Isolate CNMT Ventilation:
		• Stop the following fans: (If running)
		• AH-82A NORMAL PURGE SUPPLY FAN
		• AH-82B NORMAL PURGE SUPPLY FAN
		• E-5A CNMT PRE-ENTRY PURGE EXHAUST FAN
		• E-5B CNMT PRE-ENTRY PURGE EXHAUST FAN
		• Verify the valves and dampers listed in the table – SHUT.

TRAIN A Components	TRAIN B Components
1CB-2 SA VACUUM RELIEF	1CB-6 SB VACUUM RELIEF
CB-D51 SA VACUUM RELIEF	CB-D52 SB VACUUM RELIEF
1CP-9 SA NORMAL PURGE INLET	1CP-6 SB NORMAL PURGE INLET
1CP-5 SA NORMAL PURGE DISCH	1CP-3 SB NORMAL PURGE DISCH
1CP-10 SA PRE-ENTRY PURGE INLET	1CP-7 SB PRE-ENTRY PURGE INLET
1CP-4 SA ENTRY PURGE DISCH	1CP-1 SB PRE-ENTRY PURGE DISCH

	RO	Check Trip Status:
		• Check reactor – TRIPPED (YES)
Evaluator's Note:		**The crew may stop RCP "C" at any time after the reactor trip is verified.**
	BOP	Check turbine – TRIPPED (YES)
Critical Task:		
Evaluator's Note:		**Critical task is to meet both "Check Reactor Subcritical" criteria before exiting FRP-S.1.**
	RO	Check Reactor Subcritical:
		• Check for both of the following:

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Event Description: Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.

Time	Position	Applicant's Actions or Behavior
		• Power range channels – LESS THAN 5% (YES)
		• Intermediate range startup rate channels – NEGATIVE (YES)
	SRO	Implement Function Restoration Procedures As Required.
	SRO	RETURN TO PATH-1.
	RO	AUTO or MANUAL reactor trip successful. (YES)
	RO/BOP	Verify Turbine Trip. (YES)
	BOP	1A-SA and 1B-SB Buses energized by off-site power or EDGs (NO)
	BOP	1A-SA or 1B-SB energized (YES-1B)
	SRO	CONTINUOUS ACTION: As time allows restore power to de-energized emergency bus while continuing with EOP implementation.
		Dispatches an NLO to investigate 1A-SA bus failure.
Simulator Operator's Note:		**Report lockout relay operation. Request maintenance assistance.**
	RO	SI actuated (YES – may report symptoms/indications)
	SRO	Perform the following:
		• Initiate monitoring the Critical Safety Function Status Trees.

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Event Description: Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.

Time	Position	Applicant's Actions or Behavior
		• Inform SSO to evaluate EAL Network using entry point X (Refer to PEP-110).
	SRO	Foldout A applies.
Note:		**The crew may review the foldout criteria.**
	RO	Verify ALL CSIPs AND RHR pumps – RUNNING.
Critical Task		• **Starts CSIP "B"**
Note:		**The CSIP must be started by no later than the completion of GUIDE 1, Attachment 6.**
		• Reports no RHR Pumps running (No power to "A", "B" inoperable)
	RO	Check SI Flow:
		SI flow – GREATER THAN 200 GPM. (YES)
	RO	Informs SRO that Foldout A criteria met for stopping RCP's
Critical Task	RO	Stops any running RCP ("C" may have been stopped already).
	RO	Verifies CSIP miniflow valves closed (YES)
	RO	RCS pressure – GREATER THAN 230 PSIG. (YES)
	RO/BOP	Check Main Steam Isolation:
		Main steam isolation – ACTUATED. (NO)

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Event Description: Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.

Time	Position	Applicant's Actions or Behavior
	SRO	May direct manual Main Steam Isolation if the setpoint is being approached.
	RO	Check CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG. (YES)
	RO/BOP	Check AFW Status:
		AFW flow – AT LEAST 210 KPPH AVAILABLE. (YES)
Evaluator's Note for the following step: • **Equipment powered from Bus 1A-SA will be out of position (no power available).** • **Equipment normally started from Load Sequencer B must be started manually.**		
	BOP	Verify Alignment of Components From Actuation of ESFAS Signals Using Attachment 6, "Safeguards Actuation Verification", While Continuing with this Procedure.
		Starts:
		• CSIP "B" if not started previously
	RO	Control RCS Temperature:
		Control feed flow and steam dump to stabilize RCS temperature between 555°F AND 559°F using Table 1.

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Event Description: Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.

Time	Position	Applicant's Actions or Behavior
		TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP
		• Guidance is applicable until another procedure directs otherwise.
		• IF no RCPs running, THEN use wide range cold leg temperature.
		LESS THAN 557°F AND DECREASING: • Stop dumping steam • Control feed flow • Maintain total feed flow greater than 210 KPPH until level greater than 25% [40%] in at least one on intact SG GREATER THAN 557°F AND INCREASING: • IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser OR • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels STABLE AT OR TRENDING TO 557°F: • Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F
	BOP	Energize AC buses 1A1 AND 1B1. (No power available to 1A1)
	RO	Check PRZ PORVs – SHUT (YES)
	RO	Check PZR PORV block valves – AT LEAST ONE OPEN. (YES)
	RO	PRZ spray valves – SHUT. (YES)

Op Test No.: 1 Scenario # 1 Event # 6 Page 25 of 29

Event Description: Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Identify any faulted SG:
		Check for any of the following:
		• Any SG pressures – DECREASING IN AN UNCONTROLLED MANNER (NO)
		• Any SG – COMPLETELY DEPRESSURIZED. (NO)
	CREW	Check Secondary Radiation:
		Check for all of the following:
		• Condenser Vacuum Pump Effluent radiation – NORMAL. (YES)
		• SG Blowdown radiation – NORMAL. (YES)
		• Main Steamline radiation – NORMAL. (YES)
	SRO	Check RCS Intact:
		Check for all of the following:
		• CNMT pressure – NORMAL. (NO)
		Proceeds TO Step 44.
	SRO	CONTINUOUS ACTION: Implement Function Restoration Procedures As Required. (None required)
	SRO	CONTINUOUS ACTION: Foldouts A and B Apply.
Note:		**The crew may review foldout criteria.**
	RO	Maintain RCP Seal Injection flow between 8 GPM AND 13 GPM.
	BOP	Check Intact SG Levels:
		Any level – GREATER THAN 25% [40%]. (YES)

Op Test No.: 1 Scenario # 1 Event # 6 Page 26 of 29

Event Description: Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.

Time	Position	Applicant's Actions or Behavior
	BOP	Control feed flow to maintain all intact levels between 25% AND 50% [40% AND 50%].
	BOP	Verify AC buses 1A1 AND 1B1 – ENERGIZED. (NO, only 1B1)
	RO	Check PRZ PORVs – SHUT. (YES)
	RO	Check PZR PORV block valves – AT LEAST ONE OPEN. (YES)
	SRO	CONTINUOUS ACTION: IF a PRZ PORV opens on high pressure, THEN verify it shuts after pressure decreases to less than opening setpoint.
	RO	Check SI Termination Criteria:
		RCS subcooling – GREATER THAN (NO)
		10°F [40°F] – C
		20°F [50°F] – M
	SRO	WHEN the SI termination criteria are met, THEN GO TO EPP-008, "SI TERMINATION", Step 1.
	RO	Check CNMT Spray Status:
		Check any CMT Spray Pump – RUNNING. (NO)
	SRO	CONTINUOUS ACTION: WHEN directed by plant operations staff, THEN place the Containment Spray system in standby alignment.

Op Test No.: 1	Scenario # 1	Event # 6	Page 27 of 29
Event Description:	Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.		

Time	Position	Applicant's Actions or Behavior
	RO	Check Source Range Detector Status:
		Intermediate range flux – LESS THAN $5x10^{-11}$ AMPS.
		• Verify source range detectors – ENERGIZED.
		• Transfer nuclear recorder to source range scale.
	RO	RCS Pressure greater than 230 PSIG (YES)
Evaluator's Note:		**The evaluation/trend of RCS pressure in the next several steps is dependent on how long it took the crew to reach these steps (decay heat/break flow/ECCS flow).**
	RO	RCS pressure – STABLE OR INCREASING. (NO)
	RO	Check for both of the following:
		• All SG Pressures – STABLE OR INCREASING. (YES)
		• RCS pressure – STABLE OR DECREASING. (YES)
Evaluator's Note:		**If the crew gets into a repetitious loop because RCS Pressure is stable or increasing at this point then terminate the scenario. If not, then continue until the transition to EPP-012.**
	RO	For each running CCW pump, open the associated CCW Return From RHR HX valve:
		• Train A: 1CC-147 (Train A not running)
		• Train B: 1CC-167 (OPENs)
	RO	If CCW flow is established to both RHR HX's, shut one train of non-essential header supply and return valves. (NO-flow only on Train B)

Op Test No.: 1 Scenario # 1 Event # 6 Page 28 of 29

Event Description: Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.

Time	Position	Applicant's Actions or Behavior
	BOP	Check AC emergency buses 1A-SA AND 1B-SB – ENERGIZED BY OFFSITE POWER (NO)
		• Verify AC buses 1A1 AND 1B1 – ENERGIZED (NO-Only 1BI)
		• Verify compressors 1A AND 1B – RUNNING (NO, only 1B)
		• Load the following equipment:
		• One train of CRDM fans. (Train B)
		• Turbine Normal Bearing Oil Pump. (No power)
		• WHEN Turbine Normal Bearing Oil Pump running, THEN stop the DC Bearing Oil Pump.
		• Restore offsite power to AC emergency buses using OP-156.02, "AC Electrical Distribution", Section 8.17.
	BOP	Check any EDG – RUNNING UNLOADED. (YES-Both)
	RO	Reset SI.
	BOP	Shutdown any unloaded EDGs using OP-155, "Diesel Generator Emergency Power System", Section 7.0.
	SRO	RHR system – CAPABLE OF COLD LEG RECIRCULATION.
		(NO-no RHR Pump available).
	SRO	GO TO EPP-012, "Loss of Emergency Coolant Recirculation", Step 1.
		Terminate the scenario at the transition to EPP-012.

Op Test No.: 1	Scenario # 1	Event # 6	Page 29 of 29
Event Description:	Rising Vibration On RCP "C"/Rx Trip Failure/PRZ Safety Fails OPEN/1A Bus and 1B Sequencer failure.		

Time	Position	Applicant's Actions or Behavior

CRITICAL TASK DESCRIPTION:

Meet both "Check Reactor Subcritical" criteria before step 16.c RNO "Allow RCS to heat up" is implemented or a transition is made to any other procedure.

- Power range channels – LESS THAN 5%
- Intermediate range startup rate channels – NEGATIVE

Start CSIP "B" to establish HHSI flow by no later than the completion of GUIDE 1, Attachment 6 - Safeguards Actuation Verification.

Stop any running RCP after Foldout A criteria is met and before the transition to EPP-012.

Facility:	Shearon Harris	Scenario No.:	2	Op Test No.:	**2006 NRC**
Examiners:		Operators:			

Initial Conditions:

- IC-13 – 15% power, EOL
- Recovering from a trip that occurred 79 hours ago.
- Main Turbine is rolling at 1800 RPM.
- The motor has been replaced on 1B Circulator. It is available and will be started at the 30% chemistry hold point.

Turnover:

Continue the startup at GP-005, POWER OPERATION, Step 100 – Main Generator synchronization. A HOLD on the turbine at 5% load is NOT required. The desired load rate is 4 DEH Units/minute.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP, SRO R-RO	Raise power.
2	LT:115 CVC23A XN24C01	I-RO, SRO TS-SRO	VCT level channel LT-115 fails LOW. Boric Acid Pump trips one minute after auto makeup initiates.
3	PRS06B	C-RO, SRO TS-SRO	Leaking PZR PORV.
4	CWS01A XB20O69B	C-BOP, SRO	Circulating Water Pump 1A trips and the discharge valve fails to close on interlock.
5	CFW16A FCW16B	M-ALL	MFW Pump "A" trip. MFW Pump "B" fails to AUTO start.
6	MSS01C	M-ALL	MSLB inside CNTMT.
7	ZRPK528A ZRPK528B	C-BOP, SRO	SG "C" AUTO AFW isolation fails to actuate.
8	ZRPK630A ZRPK630B	C-BOP	Phase A valves controlled by a Train A slave relay and the counter-part in Train B fails to close either series valve in the respective lines.

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

Shearon Harris 2006 NRC ES-D-1 SCENARIO 2 SUMMARY DESCRIPTION

The crew will assume the watch with the unit at 15% power and the turbine rolling at 1800 RPM. The unit is recovering from a reactor trip caused by a main turbine oil pressure problem approximately 79 hours ago. One MFW Pump is operating and Circulator 1B will be available for start. The crew will be directed to synchronize the main generator and then continue the power increase. Prior to entering the simulator the crew will hold a "pre-brief" on the power change to reduce planning/discussion time.

When the evaluation team is satisfied that the power change is under control, the Lead Evaluator can cue the VCT level channel failure. The crew should respond to alarms/indications in accordance with alarm response procedure APP-ALB-007, 4-3. Auto makeup will initiate when the channel fails. The Boric Acid Pump will trip approximately one minute after auto makeup initiates. The crew will be required to re-align valves and the SRO should enter the TS action statement for the failed Boric Acid Pump.

After the VCT is properly aligned and the TS action statement entered, the Lead Evaluator can cue the leaking PZR PORV. The leak will be maintained at less than reactor shutdown criteria. The crew should respond to indications/alarms in accordance with alarm response procedure APP-ALB-009, 8-2, and may also enter AOP-016, EXCESSIVE PRIMARY LEAKAGE. The crew should take actions to determine which PORV is leaking and to isolate it. The SRO should identify the correct TS action statement.

After the PORV TS action statement is entered, the Lead Evaluator can cue the circulating water pump trip. The crew should respond in accordance with alarm response procedure APP-ALB-021, 4-4, and may enter AOP-012, PARTIAL LOSS OF CONDENSER VACUUM, although the vacuum change is minimal. The crew should dispatch an AO to close the discharge valve that failed to close on interlock. Circulating Water Pump 1B should be started after that discharge valve has been closed. The evaluating team can move to the next event after the pump has been started.

The Lead Evaluator can cue the MFW Pump trip. Start of the standby MFW Pump is blocked. The crew should respond in accordance with AOP-010, FEEDWATER MALFUNCTIONS. AFW flow will be insufficient to maintain SG levels and the SRO should direct a manual reactor trip. The crew should enter PATH-1 and then transition to EPP-4, REACTOR TRIP. The main steamline break inside containment will be inserted while the crew is executing EPP-4. Manual actions are required to close at least one Phase "A" Isolation valve in several lines and to isolate AFW to the faulted SG. The crew will return to PATH-1 and transition to EPP-14, FAULTED STEAM GENERATOR ISOLATION. The scenario can be terminated when the normal charging lineup has been restored.

Initialize to IC-13 and secure B Circ Water Pump

Lower the DEH GV Limiter to 14%.

 # Malfunctions inserted at T=0

B MFP fails to start
imf cfw16B (n 00:00:00 00:00:00) TRUE

C SG AFWIS fails to auto actuate (manual valve closure required)
imf zrpk528a (n00:00:00 00:00:00) FAIL_ASIS
imf zrpk528b (n00:00:00 00:00:00) FAIL_ASIS

#A train Phase A valves fail to close
imf zrpk630a (n 00:00:00 00:00:00) FAIL_ASIS

#B train Phase A valves fail to close
imf zrpk630b (n 00:00:00 00:00:00) FAIL_ASIS

 # Malfunctions inserted using triggers

VCT level fails low and A Boric Acid pump trips after 60 sec. time delay
imf lt:115 (1 00:00:00 00:00:00) 0.0 0:00:00
imf cvc23a (1 00:01:00 00:00:00) TRUE
ilo xa2o174 (1 00:01:00 00:00:00) OFF

PRZ PORV 445B leaking
imf prs06b (2 00:00:00 00:00:00) 5 00:00:00

#A CWP trip; discharge valve fails to close (indication only)
imf cws01a (3 00:00:00 00:00:00)
ilo xb2o069b (3 0 0) ON
ilo xb2o069a (3 0 0) OFF

# Actions to simulate NLO locally closing A CWP discharge valve over 4 minutes
trg= 4 dlo xb2o069a (4 0 0) OFF
trg= 4 mlo xb2o069b (4 0 240) ON

A MFP trip
imf cfw16a (5 00:00:00 00:00:00)

C MSL break in CNMT
imf mss01c (6 00:00:00 00:00:00) 4e+006 00:00:00

Op Test No.: 1	Scenario # 2	Event # 1	Page 4 of 31
Event Description:	Power Increase		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	SRO	GP-005 Step 100 directs to OP-153.01, Section 5.2
	BOP	AT ERFIS, check that the difference between all stator winding temperatures (by observing generator gas temperatures) is less than 7.2EF. (ERFIS points TTC0581 through TTC0592).
	BOP	CLOSE the Generator EXCITER FIELD BREAKER.
Procedure Caution:		**Due to its delayed response, voltage should be raised slowly so as not to exceed 23.1 kv (on all three phases) preventing over-excitation of the generator. If exceeded, generator excitation will be controlled by a limiter.**
	BOP	WITH the GENERATOR BASE ADJUSTER switch, slowly raise the generator phase voltage to 22 kv.
	BOP	PLACE the GENERATOR VOLTAGE REGULATOR switch in the TEST position and observe that the amber light energizes.
Procedure Note:		**The REG OUTPUT BAL VOLT meter should be maintained at zero to ensure a smooth transfer to manual if the automatic regulator fails.**
	BOP	ZERO the REG OUTPUT BAL VOLT meter, EI-542, using the GENERATOR VOLTAGE ADJUSTER switch.
	BOP	PLACE the GENERATOR VOLTAGE REGULATOR switch in the ON position and observe that the amber light de-energizes and red light energizes.

Op Test No.: 1	Scenario # 2	Event # 1	Page 5 of 31
Event Description:	Power Increase		

Time	Position	Applicant's Actions or Behavior
	BOP	VERIFY the GENERATOR BREAKERS 52-7 & 52-9 EMERGENCY CLOSE key switch is in the NORM SYNCH position.
Procedure Caution:		**Either the North or the South Bus can be energized first. Instructions for energizing the North Bus first are in parentheses.**
	BOP	PLACE the GENERATOR BREAKERS SYNCHRONIZER switch in the BKR 52-7 (52-9) position.
	BOP	USING the GENERATOR VOLTAGE ADJUSTER switch, adjust the generator SYNC DIFF VOLT meter, EI-524 to between -1.0V and 0V.
Procedure Note:		**The synchroscope should rotate one revolution in approximately 30 to 60 seconds during sychronization to minimize Generator stator degradation as described in CR 98-02844. It has been recognized that this may not be achievable depending on the system conditions. Generator synchronization should continue if this condition can not be met.**
	BOP	ADJUST the turbine speed to a point where the synchroscope is rotating slowly in the fast direction (clockwise).
Procedure Caution:		**When the first generator output breaker is closed, the reference and demand windows will display a value in megawatts which will automatically position the governor valves at a position equivalent to 5% load. It is necessary to verify the generator picks up some load to prevent it from motorizing.**

Op Test No.: 1	Scenario # 2	Event # 1	Page 6 of 31
Event Description:	Power Increase		

Time	Position	Applicant's Actions or Behavior
	BOP	WHEN the synchroscope indicator is at the two minutes till twelve o'clock position, close GENERATOR TO SOUTH BUS BREAKER 52-7 (GENERATOR TO NORTH BUS BREAKER 52-9).
	BOP	CHECK breaker 52-7 (52-9) is closed.
	BOP	PLACE the GENERATOR BREAKERS SYNCHRONIZER switch in the BKR 52-9 (52-7) position.
	BOP	WITH the synchroscope at the twelve o'clock position, close breaker 52-9 (52-7).
	BOP	CHECK breaker 52-9 (52-7) is closed.
	BOP	PLACE the GENERATOR BREAKER SYNCHRONIZER switch in the OFF position.
	BOP	ADJUST TK-951, EXCITER AIR COOLER OUTLET TEMP CONT (1SW-554), to maintain 113-122EF as read on TI-850, GEN EXCITER AIR IN TEMP meter.
	BOP	ADJUST TK-950, GENERATOR HYDROGEN COLD GAS TEMP CONT (1SW-617), to maintain less than 118EF as read on TI-810, GEN H_2 COLD GAS TEMP meter.
Procedure Note:		**The MVAR output should be monitored and action taken, in conjunction with the bulk power supply dispatcher recommendations, to ensure that the unit operates within the stated limits of Precaution and Limitation 4.0.18.**
	BOP	ADJUST 230 kv bus voltage as necessary using the GENERATOR VOLTAGE ADJUSTER switch.

Op Test No.: 1	Scenario # 2	Event # 1	Page 7 of 31
Event Description: Power Increase			

Time	Position	Applicant's Actions or Behavior
	SRO	RETURN to GP-005.
	SRO	RECORD the times that Breakers 52-7 and 52-9 are closed.
	BOP	DE-ENERGIZE Exciter Space Heaters per OP-153.01 Section 5.4.
	BOP	RAISE the Valve Position Limiter to 115%.
	BOP	RESTORE the Steam Dump Pressure automatic setpoint as follows:
		• VERIFY the steam dumps indicate closed.
		• RESTORE the Steam Dump Pressure automatic setpoint to 84% (1092 psig).
	BOP	ENTER the Desired Loading Rate determined in Step 15 in the DEMAND display.
Procedure Note:		**Without Feedback Loops in service, the REFERENCE display may not indicate actual MWe. An accurate indication of Main Generator output can be obtained from ERFIS point JEE1568B (Gross MWe).**
	SRO	IF a HOLD period at 5% Main Turbine load was identified in Step 15 **(N/A)**, THEN VERIFY that the DEH Controller automatically raised load to 48 MWe.
	BOP	DEPRESS the REF pushbutton.

Op Test No.: 1	Scenario # 2	Event # 1	Page 8 of 31
Event Description:	Power Increase		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**Feedback Loops are normally maintained out of service, except when transferring from Single Valve to Sequential Valve, or when performing Turbine Valve Testing. With the Impulse and MW feedback loops out, the MW indication in the REFERENCE display will not reflect actual MW output.**
Procedure Note:		**With the feedback loops out of service, the megawatts indicated in the REFERENCE display will not equal true megawatt output. A number higher or lower than the number entered in the Step below may need may need to be entered as the plant approaches 100% power.**
	BOP	ENTER 960 DEH units in the DEMAND display.
	BOP	DEPRESS the GO pushbutton.
	BOP	WHEN at least 100 MWe has been obtained, as indicated by computer point JEE1568B or recorder ER-568, THEN PERFORM the following:
		• PLACE the Turbine in HOLD.
Evaluator's Note:		**When the evaluating Crew has completed evaluating the normal and reactivity control activities AND RMW is in AUTO, the Lead Evaluator can cue Event 2 (PP Channel Failure).**
	RO	Adjusts Control Bank D position and/or initiates dilution to maintain Tavg.
		The following steps are actions for initiating a dilution.
Procedure Note:		**OP-107 is a "Reference Use" procedure.**
	RO	DETERMINE the volume of makeup water to be added.

Op Test No.: 1	Scenario # 2	Event # 1	Page 9 of 31
Event Description:	Power Increase		

Time	Position	Applicant's Actions or Behavior
Evaluator's Note:		**This may be done by experience or via the reactivity plan associated with the Simulator IC.**
	RO	SETs FIS-114, TOTAL MAKEUP WTR BATCH COUNTER, to obtain the desired quantity.
	RO	SET total makeup flow as follows:
		• IF performing DIL in Step 8, **THEN SET** controller 1CS-151, FK-114 RWMU FLOW, for less than or equal to 90 gpm.
		• IF performing ALT DIL in Step 8, **THEN SET** controller 1CS-151, FK-114 RWMU FLOW, for the desired flow rate.
	RO	VERIFY the RMW CONTROL switch has been placed in the STOP position.
	RO	VERIFY the RMW CONTROL switch green light is lit
	RO	PLACE the control switch RMW MODE SELECTOR to the DIL OR the ALT DIL position.
Procedure Note:		**When PRZ backup heaters are energized in manual, PK-444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**

Op Test No.: 1 Scenario # 2 Event # 1 Page 10 of 31

Event Description: Power Increase

Time	Position	Applicant's Actions or Behavior
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and the RCS boron concentration to less than 10 ppm.
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the red indicator light is lit.
	RO	VERIFY Tavg and rod motion responds as desired.
	RO	VERIFY dilution automatically terminates when the desired quantity has been added.
	RO	PLACE Reactor Makeup in AUTO per Section 5.1.
	RO	VERIFY the RMW CONTROL switch:
		• Is in the STOP position.
		• The green light is lit.
	RO	PLACE the RMW MODE SELECTOR to AUTO.
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the red indicator light is lit

Op Test No.: 1	Scenario # 2	Event # 2	Page 11 of 31
Event Description:	VCT Level Channel Failure/BA Pump Trip		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	RESPONDS to alarm ALB-007-4-3.
	SRO	ENTERS and directs actions of APP-ALB-007-4-3.
Evaluator Note:		**The SRO may elect to go directly to AOP-003. If so, those actions begin on Scenario Guide pg. 13.**
	RO	CONFIRM alarm using LI-115-1, Vol Control Tank Level (MCB-1A2).
	RO	DETERMINES LT-115 failed LOW.
	RO	VERIFY Automatic Functions:
		• AT 5% VCT level, the following occurs: (N/A)
		• 1CS-291, Suction from RWST (LCV-115B) opens.
		• 1CS-292, Suction from RWST (LCV-115D) opens
		• 1CS-165, VCT Outlet/Dilution (LCV-115C) shuts
		• 1CS-166, VCT Outlet/Dilution (LCV-115E) shuts
		• AT 20% VCT level, auto makeup from the Reactor Makeup System starts. (YES)
		• AT 40% VCT level, auto makeup from the Reactor Makeup System stops. (N/A)
		• AT 80% VCT level, 1CS-120, VCT Level Control Vlv, fully diverts letdown flow to the RHT. (N/A)
	RO	PERFORM Corrective Actions:
Procedure Caution: Low VCT level is a precursor to gas binding the CSIPs.		

Op Test No.: 1 Scenario # 2 Event # 2 Page 12 of 31

Event Description: VCT Level Channel Failure/BA Pump Trip

Time	Position	Applicant's Actions or Behavior
	RO	• MATCH charging and letdown flows.
		• IF charging flow is lost, (NO) THEN GO TO AOP-018, Reactor Coolant Pump Abnormal Conditions.
Procedure Note:		**If either LT-112 or LT-115 fails high, the automatic CSIP suction swapover from the VCT to the RWST will not function if required.**
	SRO	IF EITHER of the following occurs:
		• VCT level is less than 20% AND automatic makeup is NOT in progress
		• VCT level is greater than 40% AND automatic makeup is still in progress THEN GO TO AOP-003, Malfunction of Reactor Makeup Control.
Evaluator's Note:		**The Boric Acid Pump will trip one minute after AUTO makeup starts. The SRO should prioritize response.**
	RO	RESPONDS to alarm ALB-006-8-4.
	SRO	ENTERS and directs actions of APP-ALB-006-8-4
	SRO	DISPATCHES an AO to investigate BA Pump trip.
Simulator Operator's Note:		**Several minutes after being contacted as AO, report smell of burned electrical insulation in vicinity of BA Pump and the breaker tripped on MCC 1A35.**
	RO	CONFIRM alarm using both of the following:
		• BORIC Acid flow indication of FR-113 Pen 1.
		• BORIC Acid flow setpoint on FIS-113.

Op Test No.: 1 Scenario # 2 Event # 2 Page 13 of 31

Event Description: VCT Level Channel Failure/BA Pump Trip

Time	Position	Applicant's Actions or Behavior
	RO	REPORTS BA Pump tripped.
	RO	VERIFY Automatic Functions:
		• 1CS-155 (FCV-114A) shuts, if OPEN and in AUTO
		• 1CS-156 (FCV-113B) shuts, if OPEN and in AUTO
Evaluator's Note:		**There are other APP-ALB-006-8-4 actions that are inconsequential to the BA Pump trip.**
	SRO	ENTERS and directs actions of AOP-003.
	CREW	CHECK instrument air available. (YES)
	RO	CHECK BOTH LT-112 and LT-115 functioning properly. (NO)
	SRO	GO TO Section 3.1, LT-112 or LT-115 Malfunction.
	SRO	REFER TO Attachment 1, VCT Level Control Channels Operation, as necessary to assess the effects of an LT-112 or LT-115 malfunction.
Evaluator's Note:		**Crew may brief on Attachment 1.**
Procedure Note:		**An instrument malfunction may manifest itself as a slow drift rather than a "full high" or "full low" failure. Until the instrument has failed fully high or fully low, all steps should be reviewed for applicability periodically, even if not continuously applicable.**
	RO	CHECK that LT-115 is FAILING. (YES)

Op Test No.: 1 Scenario # 2 Event # 2 Page 14 of 31

Event Description: VCT Level Channel Failure/BA Pump Trip

Time	Position	Applicant's Actions or Behavior
	RO	MONITOR VCT level using either of the following:
		• ERFIS point LCS0112
		• LI-112 (local)
	RO	CHECK LT-115 FAILING LOW. (YES)
	RO	PLACE RMW CONTROL Switch in STOP.
Procedure Note:		**Normally, VCT level is maintained between 20 and 40% by auto makeup.**
	RO	CONTROL VCT level as follows:
		• MAINTAIN level BELOW 70%.
		• MAINTAIN level ABOVE 20% OR DESIRED MINIMUM.
	RO	MAINTAIN VCT level GREATER THAN 5%.
Procedure Note:		**Lifting leads in the following step will simulate a low-low level signal from the failed instrument. This allows a valid low-low level signal from the good instrument to initiate emergency makeup.**
	RO	CHECK the malfunctioning instrument FAILING LOW. (YES)
	SRO	DIRECT Maintenance to investigate and repair the instrument malfunction.
	SRO	CHECK that the instrument malfunction has been repaired.
	SRO	WAIT until repairs are complete before proceeding.

Op Test No.: 1	Scenario # 2	Event # 2	Page 15 of 31
Event Description:	VCT Level Channel Failure/BA Pump Trip		

Time	Position	Applicant's Actions or Behavior
Evaluator's Note:		**The Lead Evaluator can cue Event 3 (Leaking PORV) after the TS is identified and the crew is waiting for the instrument repair.**
	RO	Places BA Pump "A" in STOP and BA Pump "B" in AUTO.
	SRO	ENTERS TS 3.1.2.2 for the Boric Acid Pump as a "Tracking LCO".

Op Test No.: 1	Scenario # 2	Event # 3	Page 16 of 31
Event Description: Leaking PORV			

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	RESPONDS to alarms ALB-009-8-2.
	SRO	ENTERS and directs actions of APP-ALB-009-8-2.
Evaluator's Note:		**The SRO might elect to enter AOP-016, Excessive Primary Leakage. If so, then those actions begin on Page 17.**
	RO	CONFIRM alarm using:
		• PRZ PORV discharge line temperature TI-463.
		• PRESSURIZER relief tank level, pressure, and temperature LI-470.1, PI-472.1, and TI-471.1.
		• PRESSURIZER PORV position indication.
	RO	VERIFY Automatic Functions: (None)
	RO	PERFORM Corrective Actions:
		• IF a PORV is open (NO), THEN CHECK PRZ pressure using PI-444, PI-445.1, PI-456, and PI-457.
Procedure Note:		**For minor leakage, it may be necessary to have Engineering assistance to develop proper strategies.**
Procedure Caution:		**Any PORV isolations that are shut due to decreasing RCS Pressure should NOT be reopened without further evaluation.**
	SRO	IF all PORV's are closed and RCS pressure is normal, THEN DETERMINE which PORV is leaking and isolate it:
		• IF leakage is significant, THEN SHUT all PORV isolations. REOPEN one at a time to identify affected PORV.

Op Test No.: 1 Scenario # 2 Event # 3 Page 17 of 31

Event Description: Leaking PORV

Time	Position	Applicant's Actions or Behavior
	RO	Determines/reports PORV-445B leaking.
	SRO	ENTER TS 3.4.4.a.
Evaluator Note:		**Cue Event 4 (Circ Water Pump trip) after the leaking PORV is isolated and the TS is entered.**
Evaluator Note:		**If AOP-016 is entered, the crew will be directed to Attachment 5 for specific actions for a leaking PRZ PORV. Attachment 5 actions follow.**
	SRO	WHEN leakage location has been determined, THEN PERFORM the applicable Attachment (Attachment 5)
	RO	CHECK the PRZ PORVs SHUT. (YES)
	RO	CHECK that the leaking PORV has been identified. (NO)
	RO	SHUT the associated PORV Block Valve.
	RO	PERFORM ONE of the following based on severity of leak.
		• SHUT AND REOPEN ONE PORV Block Valve at a time to identify the affected PORV.
	SRO	Enter Tech Spec 3.4.4.a.
	SRO	VERIFY valve manipulated for leak isolation is documented per the following:
		• OMM-001, Operations – Conduct of Operations
		• OPS-NGGC-1303, Independent Verification.
	SRO	EXIT this procedure.

Op Test No.: 1 Scenario # 2 Event # 4 Page 18 of 31

Event Description: Circulating Water Pump Trip

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	RESPONDS to alarm ALB-021-4-4.
	SRO	ENTERS and directs actions of APP-ALB-021-4-4.
	BOP	CONFIRM alarm using:
		• Circ Wtr Pump A status lights (TRIPPED)
		• Circ Wtr Pump A discharge valve position (OPEN)
	BOP	VERIFY Automatic Functions:
		• CWP A trips (YES)
	BOP	PERFORM Corrective Actions:
		• IF Circulating Water Pump trips OR Condenser vacuum is degrading, THEN GO TO AOP-012, Partial Loss of Condenser Vacuum.
		• IF necessary, THEN START the standby CWP.
Evaluator/Simulator Operator's Note:		**Cue/initiate Event 5 (MFW Pump A Trip) after 1B Circulator is started.**
	SRO	DISPATCHES AO to investigate.
Simulator Operator Note:		**Wait several minutes and report the breaker tripped on overcurrent.**
	SRO	DISPATCHES AO to manually CLOSE discharge valve.

Op Test No.: 1 Scenario # 2 Event # 4 Page 19 of 31

Event Description: Circulating Water Pump Trip

Time	Position	Applicant's Actions or Behavior
Simulator Operator's Note:		**Approximately 5 minutes after dispatched: Trigger 4 to close the discharge valve.**
Evaluator Note:		**The SRO may elect to enter AOP-012. If so, then those steps are below.**
	SRO	CHECK Turbine – IN OPERATION (YES)
	BOP	CHECK Condenser pressure in both Zones less than:
		• 7.5 inches Hg absolute AND Turbine first stage pressure is greater than 60% TURBINE LOAD (YES)
		OR
		• 5 inches Hg absolute AND Turbine first stage pressure is less than 60% TURBINE LOAD (YES)
	SRO	REDUCE Turbine load as necessary to maintain Condenser vacuum. (NO action required.)
	BOP	CHECK Condenser Vacuum Pump – OPERATING. (YES)
	SRO	DISPATCH Operator(s) to locally perform actions of Attachment 1, Local Actions for a Loss of Condenser Vacuum. (N/A)
	BOP	VERIFY the following valves – SHUT:
		• 1CE-447, Condenser Vac Breaker (YES)
		• 1CE-475, Condenser Vac Breaker (YES)
	BOP	CHECK Circulating Water Pumps – ANY TRIPPED (YES)
	BOP	VERIFY associated pump discharge valve – SHUT. (NO)
		• DISPATCHES AO to CLOSE valve.

Op Test No.: 1 Scenario # 2 Event # 4 Page 20 of 31

Event Description: Circulating Water Pump Trip

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**If a Circulating Water Pump has tripped, it is not considered available until the cause of the trip has been identified and corrected.**
	SRO	CHECK ALL available Circulating Water Pumps – RUNNING. (NO)
	BOP	START ALL available Circulating Water Pumps per OP-138.01, Circulating Water System.
		• STARTS Circulating Water Pump 1B.

Op Test No.: 1 Scenario # 2 Event # 5 Page 21 of 31

Event Description: MFW Pump A Trip

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	RESPOND to multiple alarms/indication.
	BOP	REPORTS MFW Pump A trip, MFW Pump B failed to start.
	SRO	ENTERS and directs actions of AOP-010.
Evaluator Note:		**The SRO may direct a reactor trip without entering AOP-010.**
Immediate Action	BOP	CHECK ANY Main Feedwater Pump TRIPPED. (YES)
Immediate Action	RO	CHECK initial Reactor power less than 90%. (YES)
Immediate Action	RO	CHECK initial Reactor power less than 80%. (YES)
	RO	CHECK initial Reactor power less than 60%. (YES)
	BOP	CHECK DEH controlling Turbine Valves PROPERLY. (YES)
	SRO	MAINTAIN ALL of the following:
		• AT least ONE Main Feedwater Pump RUNNING. (NO)
	SRO	PERFORM the following:
		• IF ANY SG level drops to 30% THEN TRIP the Reactor AND GO TO EOP PATH-1.
	RO	Initiates a MANUAL Reactor Trip.

Op Test No.: 1 Scenario # 2 Event # 5 Page 22 of 31

Event Description: MFW Pump A Trip

Time	Position	Applicant's Actions or Behavior
	SRO	ENTERS and directs actions of PATH-1.
Immediate Action	RO	PERFORMS immediate actions of PATH-1:
		• VERIFY reactor trip. (YES)
		• VERIFY turbine trip. (YES)
		• VERIFY power to AC Emergency Buses. (YES)
		• CHECK SI Actuation. (NO)
	SRO	READS Steps 1 – 4 to verify immediate action performance.
	SRO	TRANSITIONS to EPP-004.
	SRO	INFORMS Crew that Foldout applies.
Evaluator's Note:		**Crew may brief on foldout criteria.**
	SRO	IMPLEMENT Function Restoration Procedures as required.
	SRO	INFORMS SSO to evaluate EAL Network using Entry Point X.
	BOP	CHECK RCS Temperature:
		• CHECK SG Blowdown isolation valves – SHUT. (YES
	BOP	STABILIZE AND maintain temperature between 555°F AND 559°F using Table 1.

Op Test No.: 1	Scenario # 2	Event # 5	Page 23 of 31
Event Description: MFW Pump A Trip			

Time	Position	Applicant's Actions or Behavior

TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP

- Guidance is applicable until another procedure directs otherwise.
- IF no RCPs running, THEN use wide range cold leg temperature.

	RCS TEMPERATURE TREND		
	LESS THAN 557°F AND DECREASING	GREATER THAN 557°F AND INCREASING	STABLE AT OR TRENDING TO 557°F
OPERATOR ACTION	• Stop dumping steam • Control feed flow • Maintain total feed flow greater than 210 KPPH until level greater than 25% at least one intact SG • IF cooldown continues, THEN, shut MSIVs AND BYPASS valves	• IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser OR • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels.	• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F.

	RO	CHECK RCP Status:
		• CHECK RCPs – AT LEAST ONE RUNNING. (YES – ALL RUNNING)
	RO	CHECK Feed System Status:
		• RCS Temperature – LESS THAN 564°F. (YES)
	BOP	• VERIFY feed freg valves – SHUT. (YES)
	BOP	• CHECK feed flow to SGs – GREATER THAN 210 KPPH. (YES)
Simulator Operator:		**Insert IMF MSS01C (Event 6) after AFW flow is verified.**

Op Test No.: 1 Scenario # 2 Event # 6 Page 24 of 31

Event Description: Main Steam Break

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	RESPONDS to alarms, reports SI actuation.
	SRO	TRANSITIONS to PATH-1, Entry Point A.
Evaluator's Note:		**The crew may recognize some Phase A valves indicate open and initiate a MANUAL Phase A actuation.**
	SRO	PERFORM the following:
		• Initiate monitoring the Critical Safety Function Status Trees.
		• DIRECTS SSO to evaluate EAL Network using entry Point X. (Refer to PEP-110)
	SRO	INFORMS crew that Foldout A applies.
Evaluator's Note:		**Crew may brief on foldout criteria. RCPs may be stopped at this time.**
	RO	VERIFY ALL CSIPs AND RHR pumps – RUNNING. (YES)
	RO	CHECK SI Flow:
		• SI flow – GREATER THAN 200 GPM. (YES)
	RO	RCS pressure – GREATER THAN 230 PSIG. (YES)
	BOP	CHECK Main Steam Isolation:
		• MAIN steam isolation – ACTUATED. (YES)

Op Test No.: 1 Scenario # 2 Event # 6 Page 25 of 31

Event Description: Main Steam Break

Time	Position	Applicant's Actions or Behavior
	BOP	VERIFY all MSIVs and bypass valves – SHUT. (YES)
	RO	CHECK CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG. (NO)
		PERFORM the following:
		• VERIFY CNMT Spray ACTUATED. (YES)
		• STOPS all RCPs. (RCPs may already be stopped)
	BOP	CHECK AFW Status:
		AFW flow – AT LEAST 210 KPPH AVAILABLE. (YES)
Evaluator Note:		**The crew may recognize that auto AFW isolation on the faulted SG has failed and manually close the required valves at this time. It is a critical task to close these by no later than the required step in EPP-14.**
		• 1AF-74
		• 1AF-149
	SRO	ASSIGNS BOP to perform the following:
		• VERIFY alignment of components from actuation of ESFAS Signals using PATH-1 GUIDE, Attachment 6.
Critical Task	BOP	**Closes at least one of the valves in each of the following combinations:**
		• **1SP-948/1SP-949, RCS LOOPS B&C HOT LEG CNMT ISOL**
		• **1ED-94/1ED-95, CNMT SUMP PUMP DISCHA**
		• **RGE**
		AND closes at least one set of the following:
		• **1SP-16/1SP-939, RCS LEAK DET SAMPLE ISOL**
		• **1SP-916/1SP-918, RCS LEAK DET SAMPLE ISOL**

Op Test No.: 1 Scenario # 2 Event # 6 Page 26 of 31

Event Description: Main Steam Break

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**Control Room actions for RCS temperature control will have no impact at this point in the scenario.**
	BOP	CONTROL RCS Temperature:
		• STABILIZE AND maintain temperature between 555°F AND 559°F using Table 1.
	BOP	VERIFY AC buses 1A1 AND 1B1 – ENERGIZED. (YES)
	RO	CHECK PRZ PORVs – SHUT. (YES)
	RO	CHECK PRZ PORV block valves – AT LEAST ONE OPEN. (YES)
	RO	PRZ spray valves – SHUT. (YES)
	RO/BOP	IDENTIFY any faulted SG:
		CHECK for any of the following:
		• ANY SG pressures – DECREASING IN AN UNCONTROLLED MANNER (YES)
		• ANY SG – COMPLETELY DEPRESSURIZED. (YES)
	SRO	GO TO EPP-014, "Faulted Steam Generator Isolation"
	SRO	IMPLEMENT Function Restoration Procedures as required.
	BOP	CHECK MSIVs AND Bypass Valves:
		• VERIFY all MSIVs – SHUT.
		• VERIFY all MSIV bypass valves – SHUT.

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Event Description: Main Steam Break

Time	Position	Applicant's Actions or Behavior
	BOP	CHECK Any SG NOT Faulted:
		• ANY SG pressure STABLE OR INCREASING. (YES)
	BOP	IDENTIFY Any Faulted SG:
		• CHECK for any of the following:
		• ANY SG pressure – DECREASING IN AN UNCONTROLLED MANNER. (YES-"C")
		• ANY SG – COMPLETELY DEPRESSURIZED. (YES - "C")
	BOP	ISOLATE Faulted SG(s):
		• VERIFY faulted SG(s) PORV – SHUT. (YES)
		• VERIFY Main FW isolation valves – SHUT. (YES)
		• VERIFY MDAFW AND TDAFW pump isolation valves to faulted SG(s) – SHUT. (NO, unless valves were closed earlier)
	BOP	Locally shut OR isolate valves.
Critical Task		• **CLOSES 1AF-74 and 1AF-149.**
	BOP	Shut faulted SG(s) to steam supply valve to TDAFW pump – SHUT.
		• SG C: 1MS-72
		VERIFY main steam drain isolation(s) before MSIVs – SHUT (YES)
		VERIFY SG Blowdown isolation valves – SHUT. (YES)
		VERIFY main steam analyzer isolation valves – SHUT. (YES)
	BOP	CHECK CST Level – GREATER THAN 10%. (YES)

Op Test No.: 1 Scenario # 2 Event # 6 Page 28 of 31

Event Description: Main Steam Break

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**A SG may be suspected to be ruptured if it fails to dry out following isolation of feed flow. Local checks for radiation can be used to confirm primary-to-secondary leakage.**
	SRO	CHECK Secondary Radiation:
		• CHECK for all of the following:
		• SG Blowdown radiation – NORMAL. (YES)
		• MAIN steamline radiation – NORMAL. (YES)
	RO	CHECK SG Levels:
		• ANY level – INCREASING IN AN UNCONTROLLED MANNER. (NO)
	RO	CHECK if SI has been terminated:
		• SI flow – GREATER THAN 200 GPM. (YES)
	RO	CHECK SI Termination Criteria:
		• CHECK Subcooling – GREATER THAN 10°F [40°F] – C 20°F [50°F] – M. (YES)
		• CHECK secondary heat sink by observing any of the following:
		• LEVEL in at least one intact SG – GREATER THAN 25% [40%]. (YES)
		• TOTAL feed flow to SGs – GREATER THAN 210 KPPH. (YES)
		• RCS pressure – STABLE OR INCREASING. (YES)
		• PRZ level – GREATER THAN 10% [30%]. (YES)
Evaluator's Note:		**Dependent on crew response time, PRZ level may be <10% at this point. If so, they will continue in PATH-1 until the SI termination criteria are met and then will go to EPP-008, SI TERMINATION.**

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Event Description: Main Steam Break

Time	Position	Applicant's Actions or Behavior
	RO	RESET SI.
	SRO	CONTINUOUS ACTION: MANUALLY realign Safeguards Equipment following a loss of offsite power.
	RO	STOP all but ONE CSIP.
	RO	CHECK RCS pressure – STABLE OR INCREASING. (YES)
	RO	ISOLATE High Head SI Flow:
		• CHECK CSIP suction – ALIGNED TO RWST. (YES)
		• OPEN normal miniflow isolation valves:
		• 1CS-182
		• 1CS-196
		• 1CS-210
		• 1CS-214
		• SHUT BIT outlet valves:
		• 1SI-3
		• 1SI-4
		• VERIFY cold leg AND hot leg injection valves – SHUT
		• 1SI-52
		• 1SI-86
		• 1SI-107
		• OBSERVE CAUTION prior to Step 19 AND GO TO Step 19.
Procedure Caution: High head SI flow should be isolated before continuing.		
		ESTABLISH Charging Lineup:
		• SHUT charging flow control valve:

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Event Description: Main Steam Break

Time	Position	Applicant's Actions or Behavior
		• FK-122.1
		• OPEN charging line isolation valves:
		• 1CS-235
		• 1CS-238
		Terminate Scenario when normal charging has been established.

CRITICAL TASK DESCRIPTION:

Closes at least one of the valves in each of the following combinations:

- 1SP-948/1SP-949, RCS LOOPS B&C HOT LEG CNMT ISOL
- 1ED-94/1ED-95, CNMT SUMP PUMP DISCHARGE

AND closes at least one set of the following:

- 1SP-16/1SP-939, RCS LEAK DET SAMPLE ISOL
- 1SP-916/1SP-918, RCS LEAK DET SAMPLE ISOL

by no later than the report (BOP to SRO) of completion of GUIDE-1, Attachment 6 – Safeguards Actuation verification.

Close the MDAFW AND TDAFW pump isolation valves to SG "C" by no later than the completion of EPP-014, Step 5 (Step concludes with: "VERIFY main steam analyzer isolation valves – SHUT").

- 1AF-74 and 1AF-149

Facility:	Shearon Harris	Scenario No.:	3	Op Test No.:	2006 NRC
Examiners:		Operators:			

Initial Conditions:

- IC-6 – 38% power, BOL.
- CSIP "B" motor must be replaced due to a ground in the windings. Twelve hours remain on Action Statement 3.1.2.4. OWP-CS-02 is in effect.
- MFW Pump "A" is in service.

Turnover:

- CSIP "B" motor cannot be replaced before the action statement expires. Continue the power reduction at 2 DEH Units/minute to take the unit off the line.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP, SRO R-RO	Reduce power.
2	CRF08	I-RO, SRO	Tref Processor fails HIGH.
3	CFW01C	TS-SRO	TDAFW Pump Trip and Throttle Valve trips closed.
4	PT:308A	I-BOP, SRO	SG PORV Pressure instrument fails HIGH.
5	LT:459	I-RO, SRO TS-SRO	Controlling PZR level channel fails HIGH.
6	CFW16A CFW16B	M-ALL	MFW Pump "A" trips. MFW Pump "B" fails to start.
7	CFW01A CFW01B	C-ALL	MDAFW Pump "A" fails to start. MDAFW Pump "B" trips in EPP-4.

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

Shearon Harris 2006 NRC ES-D-1 SCENARIO 3 SUMMARY DESCRIPTION

The crew will assume the watch with the unit at 38% power. The unit is being shutdown because CSIP B is not expected back before the action statement expires. Directions will be to continue the shutdown at 2 DEH Units/minute. Prior to entering the simulator the crew will hold a "pre-brief" on the power change to reduce planning/discussion time.

When the evaluation team is satisfied that the power change is under control, the Lead Evaluator can cue the failure of the Tref processor. The crew should respond to uncontrolled rod motion and enter AOP-001, MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM. The RO should terminate rod motion by placing rod control in MANUAL as part of the immediate actions. The crew will work through the procedure, diagnose the failure and restore Tavg within the band. The power reduction will continue with rod control in MANUAL.

On cue from the Lead Evaluator the TDAFW Pump trip valve will trip closed. The crew should respond to alarms/indication in accordance with alarm response procedure APP-ALB-017, 7-1. The SRO should dispatch an AO to investigate. The AO will report that the engagement pawl appears to be cracked and request maintenance assistance. If directed to attempt a reset, the AO will report that to be unsuccessful. The SRO should enter the correct TS action statement. The pump will remain unavailable throughout the remainder of the scenario.

After the TDAFW Pump action statement has been entered, the Lead Evaluator can cue failure of SG "C" PORV pressure transmitter, causing the valve to open. The crew should respond to indications of uncontrolled steam flow. The BOP operator should take MANUAL control and close the valve. The SRO should contact maintenance for assistance.

On cue from the Lead Evaluator the controlling PZR level instrument will fail. The crew should respond in accordance with alarm response procedure APP-ALB-009. The crew should maintain PZR level within the control band, restore backup heaters to normal alignment and shift control to an alternate channel. The SRO should enter the correct TS action statement(s).

On cue from the Lead Evaluator the running MFW Pump will trip and the standby pump will fail to start. An automatic reactor trip may occur or the SRO may direct a MANUAL reactor trip. Only one MDAFW Pump "B" will start when the reactor trips. The MDAFW Pump "A" cannot be started and the trip valve remains closed on the TDAFW Pump. The crew will enter PATH-1 and then transition to EPP-4, REACTOR TRIP RESPONSE. After the feedwater system status has been checked and SG levels are recovering (to avoid rapidly meeting RCS bleed and feed criteria), MDAFW Pump "B" will trip. The crew will transition to FRP-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, but will be unable to establish AFW or MFW flow. The crew should stop RCP's, reduce the pressure in one SG and establish feed using the condensate system. Depending on the speed of crew response, RCS bleed and feed criteria could be met but it is unlikely. The scenario can be terminated when flow is confirmed to the selected SG.

B CSIP racked out (initial condition)
irf cvc048 (n 00:00:00 00:00:00) OFF
irf cvc050 (n 00:00:00 00:00:00) RACK_OUT

B MFP fails to start
imf cfw16b (n 00:00:00 00:00:00) true

A MDAFW pump fails to start
imf cfw01a (n 00:00:00 00:00:00) true

Tref fails high
imf crf08 (1 00:00:00 00:00:00) 589.0 00:01:00 –

TD AFW pump T&T valves trips closed
imf cfw01c (2 00:00:00 00:00:00) true

A SG PORV pressure inst fails high
imf pt:308a (3 00:00:00 00:00:00) 1300.0 00:01:00 –

PRZ level controlling channel fails high
imf lt:459 (4 00:00:00 00:00:00) 100.0 00:01:00 –

A MFP trips
imf cfw16a (5 00:00:00 00:00:00) true

B MD AFW pump trips
imf cfw01b (6 00:00:00 00:00:00) true

Op Test No.: 1	Scenario # 3	Event # 1	Page 4 of 28
Event Description:	Power Reduction		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
		Evaluator Note: The Lead Evaluator can cue initiation of Event 2 (Tref Processor fails HI) whenever the evaluating team members have completed their evaluations of Event 1.
		GP-006, Step 16 has been completed.
	SRO	DIRECTS BOP to start power reduction and specifies a rate. May direct initiation of a boration before the power reduction begins.
	BOP	DEPRESS the LOAD RATE MW/MIN pushbutton.
	BOP	ENTER the desired rate, NOT to exceed 5 MW/MIN, in the DEMAND display.
	BOP	DEPRESS the ENTER pushbutton.
	BOP	DEPRESS the REF pushbutton.
	BOP	ENTER the desired load (120 MW if shutting down) in the DEMAND display.
	BOP	DEPRESS the ENTER pushbutton. The HOLD pushbutton should illuminate.

Op Test No.: 1	Scenario # 3	Event # 1	Page 5 of 28
Event Description:	Power Reduction		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**The unloading of the unit can be stopped at any time by depressing the HOLD push-button. The HOLD lamp will illuminate and the GO lamp will extinguish. The load reduction can be resumed by depressing the GO push-button. The HOLD lamp will extinguish and the GO lamp will illuminate.**
	BOP	DEPRESS the GO pushbutton to start the load reduction.
	BOP	VERIFY the number in the reference display decreases.
	RO	MONITORS primary systems response.
	RO	INITIATES boration, as necessary (with SRO concurrence).
Evaluator's Note:		**OP-107 is a "Reference Use" procedure.**
	RO	DETERMINE the reactor coolant boron concentration from chemistry OR the Main Control Room status board.
	RO	DETERMINE the magnitude of boron concentration increase required.
	RO	DETERMINE the volume of boric acid to be added using the reactivity plan associated with the IC.
Procedure Note:		**FIS-113, BORIC ACID BATCH COUNTER, has a tenths position.**
Procedure Caution:		**If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.**

Op Test No.: 1 Scenario # 3 Event # 1 Page 6 of 28

Event Description: Power Reduction

Time	Position	Applicant's Actions or Behavior
	RO	SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.
Procedure Note:		**Boration of the RCS will be dependent on charging and letdown flow rate. Placing additional letdown orifices in service will increase the boric acid delivery rate to the RCS.**
	RO	SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate.
	RO	VERIFY the RMW CONTROL switch has been placed in the STOP position.
	RO	VERIFY the RMW CONTROL switch green light is lit.
	RO	PLACE control switch RMW MODE SELECTOR to the BOR position.
Procedure Note:		**When PRZ backup heaters are energized in manual, PK 444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pre** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure**
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm.
	SRO/RO	FOR large boron changes, PERFORM the following:

Op Test No.: 1 Scenario # 3 Event # 1 Page 7 of 28

Event Description: Power Reduction

Time	Position	Applicant's Actions or Behavior
		• DIRECT Chemistry to sample the RCS for boron concentration.
		• MAKE boron concentration adjustments as dictated from sample results.
Procedure Note:		**Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP.**
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the red indicator light is lit.
Procedure Caution:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**
	RO	VERIFY Tavg responds as desired and the control rods are stepping out to the desired height.
	RO	VERIFY boration automatically terminates when the desired quantity of boron has been added.
	RO	PLACE Reactor Makeup in Auto per Section 5.1.
		VERIFY the RMW CONTROL switch:
		• IS in the STOP position.
		• THE green light is LIT.
		PLACE the RMW MODE SELECTOR to AUTO.
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the red indicator light is LIT.

Op Test No.: 1	Scenario # 3	Event # 2	Page 8 of 28
Event Description:	Tref Processor Fails HIGH		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	RESPONDS to uncontrolled rod motion.
		Evaluator Note: The BOP will probably stop the load change by pressing the HOLD button.
	SRO	ENTERS and directs actions of AOP-001.
	RO	PERFORMS immediate actions.
Immediate Action	RO	CHECK that LESS THAN TWO control rods are dropped. (YES)
Immediate Action	RO	POSITION Rod Bank Selector Switch to MAN.
Immediate Action	RO	CHECK Control Bank motion STOPPED.
	SRO	READS immediate actions and proceeds to Section 3.2.
	RO	CHECK that instrument channel failure has NOT OCCURRED by observing the following:
		• RCS Tavg (YES)
		• RCS Tref (NO)
	RO	PERFORM the following:
		• IF a power supply is lost, THEN GO TO AOP-024, Loss of Uninterruptible Power Supply. (NO)

Op Test No.: 1 Scenario # 3 Event # 2 Page 9 of 28

Event Description: Tref Processor Fails HIGH

Time	Position	Applicant's Actions or Behavior
		• IF an individual instrument failed, THEN MAINTAIN manual rod control until corrective action is complete.
		• IF a Power Range NI Channel failed, THEN BYPASS the failed channel using OWP-RP. (N/A)
	RO	MANUALLY OPERATE affected control bank to restore the following:
		• EQUILIBRIUM power and temperature conditions
		• RODS above the insertion limits of Tech Spec 3.1.3.6 and PLP-106, Technical Specification Equipment List Program and Core Operating Limits Report.
	RO	VERIFY proper operation of the following:
		• CVCS demineralizers (YES)
		• BTRS (N/A)
		• REACTOR Makeup Control System (YES)
	SRO	CHECK that this section was entered due to control banks MOVING OUT. (YES)
	RO	VERIFY CSIP suction aligned to the VCT: (YES)
		• CHECK VCT level greater than 5%. (YES)
		• VERIFY that the following valves are OPEN:
		• LCV-115C, VCT Outlet (YES)
		• LCV-115E, VCT Outlet (YES)
		• VERIFY that the following valves are SHUT
		• LCV-115B, Suction from RWST (YES)
		• LCV-115D, Suction from RWST (YES)
	RO	CHECK that NEITHER of the following OCCURRED:
		• Unexplained RCS boration (NO)

Op Test No.: 1 Scenario # 3 Event # 2 Page 10 of 28

Event Description: Tref Processor Fails HIGH

Time	Position	Applicant's Actions or Behavior
		• Unplanned RCS dilution (NO)
	SRO	CHECK that an automatic Rod Control malfunction OCCURRED. (NO. YES will also yield the same result – Rod Control in AUTO.)
	SRO/RO	MAINTAIN manual rod control until appropriate corrective action is complete.
	SRO	EXIT this procedure.
		• Contact Maintenance/Work Control for assistance.
Evaluator's Note:		**When Tavg is restored and AOP-001 exited, cue initiation of Event 3 (TDAFW Pump T&T Valve failure).**

Op Test No.: 1 Scenario # 3 Event # 3 Page 11 of 28

Event Description: TDAFWP Trip Valve Failure

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	RESPONDS to alarm ALB-017-7-4.
	SRO	Enters and directs actions of APP-ALB-017-7-4.
	BOP	REPORT Trip and Throttle valve indicates CLOSED on MCB and/or computer point ZAF1977.
Evaluator's Note:		**The SRO may elect to close 1MS-70 and 1MS-72 while the problem is being investigated.**
	BOP	IF TDAFW pump Turbine speed is unstable OR the pump has tripped, shut the following main steam supply valves:
		• 1MS-70 SA, Main Steam B to AUX FW Turbine.
		• 1MS-72 SB, Main Steam C to AUX FW Turbine.
	SRO	DISPATCH an operator to investigate at the turbine and the local control panel and report status.
	SRO	IF the Turbine Driven AFW pump is needed to feed the SGs, direct an operator to reset the overspeed trip per OP-137. (NO)
Simulator Operator:		**If an AO is directed to reset the valve, report that the valve will not remain reset. The pawl is slipping off of the seating surface. Request Maintenance assistance.**
	SRO	ENTERS TS 3.7.1.2.a.
Evaluator's Note:		**Cue Event 4 (SG PORV Fails Open) after the AO has reported back and the TS has been entered.**

Op Test No.: 1	Scenario # 3	Event # 4	Page 12 of 28
Event Description:	SG "A" PORV Pressure Instrument Fails HI		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	RESPONDS to alarm ALB-014-8-5.
	SRO	ENTERS and directs actions of APP-ALB-014-8-5.
	BOP	REPORTS ZMS1254A 1MS-60 SG B PORV NOT SHUT.
Evaluator's Note:		**In accordance with OMM-1, an operator may take manual control of a malfunctioning automatic controller before a procedure directs the action.**
	BOP	VERIFY Automatic Functions (NONE)
	BOP	PERFORM Corrective Actions:
Procedure Notes:		• **IF PBD8410 is determined to be the alarm input, Flash Tank Relief Valve operation may have occurred. Continuous Calorimetric results may be unacceptable due to non-conservative program inputs.** • **If the alarm input is a SG PORV, and that SG PORV fails to fully reset after operation, entry into the Emergency Plan would be required.** • **A SG Blowdown line break may require entry into the Emergency Plan.**
	BOP	CHECK instrumentation on MCB associated with the alarming point.

Op Test No.: 1 Scenario # 3 Event # 4 Page 13 of 28

Event Description: SG "A" PORV Pressure Instrument Fails HI

Time	Position	Applicant's Actions or Behavior
	SRO	IF EITHER of the following conditions exist - - - -
		• ANY SG PORV fails to fully reset after operation (N/A)
		• SG Blowdown line break (N/A)
	BOP	Places SG "A" PORV control in MANUAL and CLOSES.
	SRO	Contacts Work Control for assistance.
Evaluator's Note:		**Cue Event 5 (PRZ Level Channel Failure) when SG "A" PORV is closed and the plant is stabilized.**

Op Test No.: 1	Scenario # 3	Event # 5	Page 14 of 28
Event Description:	Controlling PZR Level Channel Fails HIGH		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	RESPONDS to alarms ALB-009-2-1, ALB-006-1-1, and ALB-007-3-3.
Evaluator's Note:		**Prompt operator response may preclude actuation of some alarms. Regardless of which procedure is entered the outcome should be the same: PRZ level control in MANUAL.**
	SRO	PRIORITIZES alarm response. (No order of performance required and all procedures may not be entered after the problem is diagnosed and/or isolated)
		ALB-009-2-1 Actions
	RO	CONFIRM alarm using:
		• Pressurizer level LI-459A1, LI-460.1
	RO	REPORTS LT-459 failed.
	RO	VERIFY Automatic Functions:
		• Pressurizer backup heaters energize. (Already in MANUAL)
	RO	PERFORM Corrective Actions:
		• IF level deviation is due to load changes, THEN verify that PRZ Level Control system is returning level to normal.
		• IF Tavg is stable, THEN adjust charging or letdown flow to bring PRZ level to normal per OP-107.
	SRO	• IF maintenance is to be performed, THEN refer to OWP-RP.

Op Test No.: 1 Scenario # 3 Event # 5 Page 15 of 28

Event Description: Controlling PZR Level Channel Fails HIGH

Time	Position	Applicant's Actions or Behavior
		ALB-006-1-1 Actions
	RO	CONFIRM alarm using FI-122A.1, Charging Header Flow.
	RO	VERIFY Automatic Functions: None
	RO	PERFORM Corrective Actions:
Note:		**Low VCT level is precursor to gas binding the CSIPs. (Reference 3).**
	RO	• CHECK flow path alignment AND CORRECT as necessary. (Normal)
	SRO	• REFER to Technical Specifications 3.1.2.3, 3.1.2.4, 3.5.2, and 3.5.3 AND INITIATE actions as appropriate. (N/A – not a Charging problem.)
	RO	• IF charging flow is lost, THEN ISOLATE letdown. (NO)
	RO	• IF charging flow is higher than letdown flow AND PRZ level is normal, THEN: (NO)
	RO	• IF charging header flow is high AND PRZ level shows a corresponding rise, THEN PLACE LK-459F, PRZ Level Controller, in manual AND RETURN PRZ to programmed level corresponding to current power.
	RO	• VERIFY water supply to charging pump suction.
		ALB-007-3-3
	RO	CONFIRM alarm using:
		• FI-122A.1, Chg Hdr Flow (MCB-1A2)
		• TI-140.1 Regen Hx Letdown Out Temp (MCB-1A2)
	RO	VERIFY Automatic Functions: None

Op Test No.: 1 Scenario # 3 Event # 5 Page 16 of 28

Event Description: Controlling PZR Level Channel Fails HIGH

Time	Position	Applicant's Actions or Behavior
	RO	PERFORM Corrective Actions:
		• CHECK for proper charging flow AND RAISE as necessary to lower letdown temperature.
		• IF necessary, THEN LOWER letdown flow to lower letdown temperature. (NO)
		• IF letdown temperature can NOT be lowered, (N/A) THEN REFER to OP-107, Chemical and Volume Control System.
		• IF charging low is lost, (NO) THEN GO TO AOP-018, Reactor Coolant Pump Abnormal Conditions.
	RO	ADJUSTS FK-122 to return PRZ level to normal band.
	RO	RESTORES PRZ BUH's to normal alignment for existing RCS pressure. (BUH's will remain in MANUAL)
	SRO	REFERS to OWP-RP-03 to remove channel from service.
	SRO	REQUEST Maintenance assistance to remove channel from service.
	SRO	ENTERS:
		• Most limiting TS is 3.3.1, Action 6
Evaluator's Note:		**Cue Event 6 (MFW Pump A Trips) after TS identification. The channel does not have to be removed from service to proceed with the scenario.**

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 17 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	RESPOND to multiple alarms/indications.
	BOP	REPORTS MFW Pump A tripped, MFW Pump B failed to start.
Simulator Operator:		**If contacted as AO, report MFW Pump breaker(s) tripped on overcurrent.**
	SRO	ENTERS and directs actions of AOP-010.
	BOP	CHECK ANY Main Feedwater Pump TRIPPED. (YES)
	RO	CHECK initial Reactor power less than 90%. (YES)
	RO	CHECK initial Reactor power less than 80%. (YES)
	RO	CHECK initial Reactor power less than 60%. (YES)
	BOP	CHECK DEH controlling Turbine Valves PROPERLY. (YES)
	SRO	MAINTAIN ALL of the following:
		• AT least ONE Main Feedwater Pump RUNNING. (NO)
	SRO	PERFORM the following:
		• IF ANY SG level drops to 30% THEN TRIP the Reactor AND GO TO EOP PATH-1.
	RO	• INITIATES a MANUAL Reactor Trip.

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 18 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
	SRO	ENTERS PATH-1.
	RO	Verify Reactor Trip:
		AUTO or MANUAL Reactor Trip successful:
		Check for any of the following:
		• Trip breakers RTA and BYA OPEN (YES)
		• Trip breakers RTB and BYB OPEN (YES)
		Rod Bottom lights LIT (YES)
		Neutron flux decreasing (YES)
	RO	Verify Turbine Trip:
		Check for any of the following:
		• All turbine throttle valves – SHUT (YES)
		• All turbine governor valves – SHUT (YES)
	RO	Verify power to AC Emergency Buses
		1A-SA and 1B-SB Buses energized by off-site power or EDG's (YES, off-site power)
	RO	Check SI Actuation:
		Check for any of the following – LIT: (NO)
		• SI Actuated bypass permissive light
		• ALB-11-2-2
		• ALB-11-5-1
		• ALB-11-5-3
		• ALB-12-1-4
	RO	SI actuation – REQUIRED (NO)

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 19 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
	SRO	GO TO EPP-4, "REACTOR TRIP RESPONSE", Step 1.
	SRO	IMPLEMENT Function Restoration Procedures as required.
	SRO	Informs SSO to EVALUATE EAL Network Using Entry Point X.
	BOP	CHECK RS Temperature:
		• CHECK SG Blowdown isolation valves – SHUT. (YES)

SG	(MLB-1A-SA)	(MLB-1B-SB)
A	1BD-11	1BD-1
B	1BD-30	1BD-20
C	1BD-49	1BD-39

• STABILIZE AND maintain temperature between 555°F AND 559°F using Table 1.

TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP

- Guidance is applicable until another procedure directs otherwise.
- IF no RCPs running, THEN use wide range cold leg temperature.

	RCS TEMPERATURE TREND		
	LESS THAN 557°F AND DECREASING	GREATER THAN 557°F AND INCREASING	STABLE AT OR TRENDING TO 557°F
OPERATOR ACTION	• Stop dumping steam • Control feed flow • Maintain total feed flow greater than 210 KPPH until level greater than 25% at least one intact SG	• IF condenser available THEN transfer steam dump to STEAM PRESSURE mode suing OP-126, Section 5.3 AND dump steam to condenser OR • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels	• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F and 559°F.

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 20 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
	RO	CHECK RCP Status:
		• CHECK RCPs – AT LEAST ONE RUNNING. (YES)
		CHECK Feed System Status:
	RO	• RCS Temperature – LESS THAN 564°F. (YES)
	BOP	• VERIFY feed reg valves – SHUT. (YES)
	BOP	• CHECK feed flow to SGs – GREATER THAN 210 KPPH. (YES-Reports only MDAFW Pump B running)
	RO	CHECK Control Rod Status:
		• CHECK DRPI – AVAILABLE. (YES)
	RO	• VERIFY all control rods – FULL INSERTED. (YES)
	RO	CHECK PRZ level – GREATER THAN 17%. (YES)
Simulator Operator:		**Insert IMF CFW01B (Event 7: MDAFWP Trip).**
Simulator Operator:		**If contacted as AO, report AFW Pump breaker(s) tripped on overcurrent.**
	SRO	TRANSITIONS to FRP-H1 after verification of RED Path.
	SRO	PERFORM the following:
		• IMPLEMENT function restoration procedures as required.
		• Informs SSO to EVALUATE EAL Network using entry Point X. (Refer to PEP-110)

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 21 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
	RO	CHECK Secondary Heat Sink Requirements:
		• RCS pressure – GREATER THAN ANY NON-FAULTED SG PRESSURE. (YES)
		• RCS temperature – GREATER THAN 350°F [330°F]. (YES)
		• STOP any running RHR pumps. (N/A)
	BOP	CHECK SG Blowdown and SG Sample Valves shut. (COMPLETED IN EPP-4)
	BOP/SRO	ESTABLISH AFW Flow to at least ONE SG:
		• OBSERVE MCB indications to determine cause of AFW failure:
		• CST level (NO)
		• MDAFW pump power supplies (NO)
		• TDAFW pump steam supply valves (YES)
		• TDAFW pump speed controller (NO)
		• TDAFW pump control power (NO)
		• AFW valve alignment (NO)
		• TRY to restore AFW flow at the MCB.
		(Refer to Attachment 1 for guidance of rate of feed flow.)
		(Refer to OP-137, "Auxiliary Feedwater System", for guidance regarding AFW pump operations, precautions and limitations and valve operation.)
		• TOTAL feed flow to SGs – GREATER THAN 210 KPPH. (NO)
	BOP/SRO	PERFORM the following:
		• CONTINUE attempts to restore AFW flow at the MCB.
	SRO	OBSERVE NOTE prior to Step 5 AND continue with Step 5.

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 22 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**After stopping all RCPs and placing steam dump in the steam pressure mode, RCS pressure and temperature will increase as natural circulation is established. A large loop ΔT prior to PRZ PORV opening confirms natural circulation. This must be considered while evaluating bleed and feed criteria.**
	RO	STOP Heat Input from RCP Operations:
Critical Task		• STOP ALL RCPs.
	BOP	• CHECK all of the following to determine if steam can be dumped to condenser:
		• CHECK any intact SG MSIV – OPEN. (YES)
		• CHECK condenser available (C-9) light (BPLB 3-3) – LIT. (YES)
		• STEAM dump control system – AVAILABLE. (YES)
Evaluator's Note:		**The following three substeps may VERIFY actions completed in EPP-4.**
		• PLACE steam dump pressure controller in manual AND decrease output to 0%.
		• PLACE steam dump mode select switch in STEAM PRESS.
		• ADJUST steam dump controller setpoint to 84% (1092 PSIG) AND place in auto.
Evaluator's Note:		**The crew may take the actions to attempt a start of MFW Pump "B" if an AO has not reported the status of the breaker.**
	BOP	ESTABLISH Main FW Flow to at least ONE SG:
		• CHECK condensate system – IN SERVICE. (YES)
		• SUPPORT condition for FW startup – AVAILABLE. (YES)
		• POWER to at least ONE main FW pump – AVAILABLE.

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 23 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
		• PP-1D212 – ENERGIZED.
	SRO	WHEN support conditions met, THEN do Step s 6c and d.
	SRO	OBSERVE CAUTION prior to Step 8 and GO TO Step 8.
Procedure Caution:		**Following block of automatic SI actuation, manual SI actuation may be required if conditions degrade. (Examples of degraded conditions are the inability to maintain or restore PRZ level, RVLIS indication or RCS subcooling.)**
Procedure Note:		**After the low steam pressure SI signal is blocked, main steam line isolation will occur if the high steam pressure rate setpoint is exceeded.**
	RO	DEPRESSURIZE RCS and block Low Steam Pressure SI:
		• CHECK SI – IN SERVICE. (NO)
	RO	• DEPRESSURIZE RCS to between 1900 PSIG and 1950 PSIG.
		• CHECK letdown – IN SERVICE. (YES)
		• DEPRESSURIZE using Auxiliary Spray.
Evaluator's Note:		**The crew may isolate normal charging to raise auxiliary spray flow and/or turn off the BUH's to increase the rate of depressurization.**
	RO/BOP	• BLOCK SI Signals:
		• LOW PRZ pressure
		• LOW steam pressure
	RO	• MAINTAIN pressure less than 1950 PSIG.

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 24 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
Procedure Notes:		• **Depressurizing only one SG minimizes the likelihood of reaching the "bleed and feed" criteria (due to lowering SG level) AND the likelihood of the appearance of degraded plant conditions that might require manual SI actuation.** • **The preferred SG to depressurize is the intact SG with the highest indicated wide range level.** • **A second SG may be depressurized if condensate flow cannot be established to the first SG depressurized.**
	SRO	DEPRESSURIZE ONE SG to LESS THAN 500 PSIG and establish Condensate Flow:
	SRO	• IDENTIFY the SG to be depressurized.
	BOP	• SHUT the following valves for the SGs that are NOT to be depressurized.
		• MSIVs
		• MSIV bypass valves
		• SG main steam drain isolations before MSIV:
		SG A: 1MS-231
		SG B: 1MS-266
		SG C: 1MS-301
Critical Task	BOP	• DUMP steam at maximum rate to depressurize the selected SG to 500 PSIG using any of the following (listed in order of preference):
		• Condenser steam dump
Evaluator's Note:		**It is likely that a main steam isolation will actuate during this action. If so, the depressurization should be continued using the respective SG PORV.**
	SRO	• ESTABLISH condensate flow using Attachment 3.

Op Test No.: 1	Scenario # 3	Event # 6 & 7	Page 25 of 28
Event Description:	MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4		

Time	Position	Applicant's Actions or Behavior
Evaluator's Note:		**Alignment actions will commence while the SG is being depressurized.**
Note:		• **This attachment provides instructions for establishing condensate flow to one SG to restore secondary heat sink. It may also be used as a reference for establishing condensate flow to SGs while implementing other EOPs.** • **The low steam pressure SI blocked, main steam line isolation will occur if the high steam pressure rate setpoint is exceeded.**
		• **If an action or its contingency in this attachment can NOT be accomplished, the operator should return to the step in effect, while continuing efforts to establish condensate flow.**
	RO	CHECK Primary and Secondary Conditions to allow Establishing Condensate Flow:
		• CHECK Low Steam SG pressure SI – BLOCKED. (YES)
		• CHECK SG pressure for SG to which condensate flow is to be established – LESS THAN 500 PSIG. (YES)
	BOP	CHECK Condensate System Status:
		• AT least one Condensate Pump – RUNNING. (YES)
		• AT least one Condensate Booster Pump – RUNNING. (YES)
Procedure Note:		**The main FW pump discharge valve control switches must be held in the OPEN position to open the valves with the Main FW pumps stopped.**
	BOP	OPEN the following valves:
		• Low pressure FW heater bypass valves:
		1CE-330
		1CE-359

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 26 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
		• High pressure FW heater bypass valves:
		1FW-110
		• Main FW pump discharge valves:
		1FW-29
		1FW-60
Evaluator's Note:		**Attachment 3, Steps 5-9 are N/A if SI is NOT actuated.**
	RO	RESET SI. (N/A)
	SRO	CONTINUOUS CAUTION: MANUALLY Realign Safeguards Equipment following a loss of Offsite Power (Refer to PATH-1 Guide, Attachment 2).
	BOP	RESET FW Isolation. (N/A)
	BOP	RESET AND OPEN Main FW isolation valve(s): (N/A)
		1FW-159 (A SG)
		1FW-277 (B SG)
		1FW-217 (C SG)
	BOP	SHUT Main FW Pump Recirc Valves:
		• 1FW-8
		• 1FW-39
	BOP	PLACE Condensate Booster Pump Controllers in MANUAL and Control Discharge Pressure at 600 PSIG.
Procedure Note:		**Local checks for flow noise may be used to confirm the presence of flow.**

Op Test No.: 1 Scenario # 3 Event # 6 & 7 Page 27 of 28

Event Description: MFW Pump "A" Trips, MFW Pump "B" Fails to Start; MDAFW Pump "A" Fails to Start; MDAFW Pump "B" Trips in EPP-4

Time	Position	Applicant's Actions or Behavior
	BOP	ESTABLISH Feed Flow to SG(s):
		(Refer to Attachment 1 while performing actions that restore feed flow.)
Critical Task		• ESTABLISH feed flow using the depressurized SG Feed Reg Bypass Valve.
		• FEED flow to SG(s) – ESTABLISHED.
		TERMINATE Scenario after feed flow is confirmed.

CRITICAL TASK DESCRIPTION:

Conserve existing SG inventory by stopping all RCP's before RCS feed and bleed criteria is exceeded.

Depressurize one SG to less than 500 psig and align the condensate/feedwater system to establish flow to one SG before implementation of RCS feed and bleed is required.

Facility: Shearon Harris Scenario No.: 4 Op Test No.: ***2006 NRC***

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions:

- IC-18, 100% power, BOL
- GP-006, Step 5.2.3 has been completed.

Turnover:

- Beginning at GP-006, Step 5.2.4, reduce power to ≤ 90% @ 4 DEH Units/minute to perform turbine valve testing this shift. The Load Dispatcher has been notified.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP, SRO R-RO	Controlled power reduction.
2	DSG-5A XN24A03	TS-SRO	EDG "A" alarm.
3	PT:446	I-RO, SRO TS-SRO	Controlling Turbine 1st Stage Pressure Channel fails LOW.
4	GEN01	C-BOP, SRO	AUTO Main Generator Voltage Regulator failure.
5	CVC07	C-RO, SRO	Letdown pressure control valve fails CLOSED.
6	FT:474	I-BOP, SRO	Controlling SF channel on SG "A" fails LOW.
7	EPS01 DSG06B	M-ALL	Loss of Off-site power. EDG B breaker fails to close.
8	Z1974TDI Z1975TDI	C-BOP, SRO	TDAFW Pump fails to start automatically.
9	SGN05B	M-ALL	Progressive SGTR on SG "B" after Bus 1B recovery.

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

Shearon Harris 2006 NRC ES-D-1 SCENARIO 4 SUMMARY DESCRIPTION

The crew will assume the watch with the unit at 100% power and directions to lower power to perform turbine valve testing. Prior to entering the simulator the crew will hold a "pre-brief" on the power change to reduce planning/discussion time.

When the evaluation team is satisfied that the power change is under control, the Lead Evaluator can cue the EDG alarm. The crew will respond to alarms/indications but control room actions are minimal. A report from the field will indicate a control air problem. The SRO should enter the correct TS action statement.

After the EDG action statement has been entered the Lead Evaluator can cue failure of the main turbine first stage pressure transmitter. The crew should respond to uncontrolled rod motion and enter AOP-001, MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM. The RO should terminate rod motion by placing rod control in MANUAL as part of the immediate actions. The crew will work through the procedure, diagnose the failure and restore Tavg within the band. The SRO should enter the correct TS instrumentation action statement(s). The scenario may proceed with rod control in MANUAL and the channel not tripped.

On cue from the Lead Evaluator main generator voltage regulator will fail. The crew should respond to indications/alarms in accordance with APP-ALB-022. The BOP operator should attempt to control voltage with the voltage regulator in MANUAL but this will fail and the base adjuster must be used. The SRO should contact maintenance for troubleshooting assistance.

On cue from the Lead Evaluator the letdown pressure control valve will fail closed in AUTO. The crew should respond in accordance with letdown relief line alarm procedure APP-ALB-007, 3-1 and/or 3-5, take MANUAL control of letdown line pressure and ensure the relief valve re-seats.

On cue from the Lead Evaluator the controlling steam flow channel on SG "A" will fail low. The crew should respond to in accordance with SF/FF mismatch alarm procedure APP-ALB-14, 4-1B. The BOP should take MANUAL control of the associated feedwater regulating valve, raise flow and restore SG level to the desired band. The crew may also enter AOP-010, FEEDWATER MALFUNCTION. When SG level is within or trending to the control band, the Lead Evaluator can cue the loss off-site power. Coupled with failure of EDG "B" breaker to close and the inoperable EDG "A", a station blackout will result. The crew will enter PATH-1, confirm the reactor/turbine trip and transition to EPP-1, LOSS OF POWER TO 1A-SA AND 1B-SB BUSES. In the early stages of EPP-1 the crew must start the TDAFW Pump and close in EDG "B" breaker to energize the bus. Depending on the path taken through EPP-001, the bus might be energized by restoring off-site power. After Bus 1B is energized, the crew will return to PATH-1 and a progressive SGTR on SG "B" will be initiated. The SGTR should be diagnosed in PATH-1 or via FOLDOUT B and the crew will transition to PATH-2. The scenario can be terminated when SG "B" PORV has been reset to 1145 PSIG.

IC-18

Place synch switch key in "B" EDG selector

TD AFW auto start failure (initial condition)
imf z1974tdi (n 00:00:00 00:00:00) FAIL_ASIS
imf z1975tdi (n 00:00:00 00:00:00) FAIL_ASIS

#a EDG trip circuit failure (w/alarm)
imf dsg05a (1 00:00:00 00:00:00) true
ian xn24a03 (1 00:00:00 00:00:00) ALARM_ON
ian xn24b03 (1 00:00:00 00:00:00) ALARM_ON

Turbine 1st stage pressure channel failure
imf pt:446 (2 00:00:00 00:00:00) 0.0 00:00:10 –

Generator voltage regulator failure
imf gen01 (3 00:00:00 00:00:00) 110.0 00:01:00

CVCS letdown press control failure
imf cvc07 (4 00:00:00 00:00:00) 0.0 00:01:00 –

A SG controlling steam flow channel failure
imf ft:474 (5 00:00:00 00:00:00) 0.0 00:01:00

Loss of off-site power with B EDG output breaker (126) failure to close
imf eps01 (6 00:00:00 00:00:30) W/O_DELAY
imf dsg06b (6 00:00:00 00:00:00) true

SGTR in B SG
imf sgn05b (7 00:00:00 00:00:00) 420 00:02:00 0

Provisional trigger (if needed) to simulate local manual closure of B EDG output breaker (106)
irf dsg41 (9 00:00:00 00:00:00) CLOSE

Op Test No.: 1	Scenario # 4	Event # 1	Page 4 of 30
Event Description:	Power Reduction		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	SRO	GP-006, Step 5.2.4.
Note:		**When PRZ backup heaters are energized in manual, PK-444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**
	RO	ENERGIZE all available Pressurizer Backup Heaters.
Procedure Note:		**Routine load changes should be coordinated with the Load Dispatcher to meet system load demands.**
	SRO	INFORMS Load Dispatcher that a load reduction to 90% will begin. (N/A, per Initial Conditions)

Op Test No.: 1	Scenario # 4	Event # 1	Page 5 of 30
Event Description:	Power Reduction		

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		**A failure of the Vidar in the DEH computer has resulted in a plant trip in the past. This failure would affect operation in Operator Auto, and can be detected in either of the following ways:** • **If OSI-PI is available, the process book PLANTSTATUS.PIW, DEH Trends function of the Plant Process Computer: DEH (menu) contains a point for DEH MEGAWATTS. With a failure of the Vidar, this point will not be updating.** • **If OSI-PI is NOT available, accessing the ANALOG INPUTS screen on the Graphics display computer (in the Termination Cabinet room near the ATWS panel) will show several points, most of which should be updating if the Vidar is functioning properly.**
	SRO	DIRECTS BOP to start power reduction and specifies a rate. May direct initiation of a boration before the power reduction begins.
	BOP	DEPRESS the LOAD RATE MW/MIN push-button.
	BOP	ENTER the desired rate, **NOT** to exceed 5 MW/MIN, in the DEMAND display.
	BOP	DEPRESS the ENTER push-button.
	BOP	DEPRESS the REF push-button.
	BOP	ENTER the desired load (120 MW if shutting down) in the DEMAND display.
	BOP	DEPRESS the ENTER push-button. The HOLD push-button should illuminate.

Op Test No.: 1	Scenario # 4	Event # 1	Page 6 of 30
Event Description:	Power Reduction		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**The unloading of the unit can be stopped at any time by depressing the HOLD push-button. The HOLD lamp will illuminate and the GO lamp will extinguish. The load reduction can be resumed by depressing the GO push-button. The HOLD lamp will extinguish and the GO lamp will illuminate.**
	BOP	DEPRESS the GO push-button to start the load reduction.
	BOP	VERIFY the number in the REFERENCE display decreases.
	BOP	VERIFY Generator load is decreasing.
	BOP	WHEN Turbine load is less than 95%, THEN VERIFY the 3A and 3B Feedwater Vents have been opened per OP-136, Section 7.2.
Simulator Operator:		**Acknowledge direction. No simulator response actions are required.**
	RO	MONITORS primary systems response.
	RO	INITIATES boration, as necessary (with SRO concurrence).
Note:		**OP-107 is a "Reference Use" procedure.**
	RO	DETERMINE the reactor coolant boron concentration from chemistry OR the Main Control Room status board.
	RO	DETERMINE the magnitude of boron concentration increase required.

Op Test No.: 1	Scenario # 4	Event # 1	Page 7 of 30
Event Description: Power Reduction			

Time	Position	Applicant's Actions or Behavior
	RO	DETERMINE the volume of boric acid to be added using the reactivity plan associated with the IC.
Note:		**FIS-113, BORIC ACID BATCH COUNTER, has a tenths position.**
Procedure Caution:		**If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.**
	RO	SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.
Note:		**Boration of the RCS will be dependent on charging and letdown flow rate. Placing additional letdown orifices in service will increase the boric acid delivery rate to the RCS.**
	RO	SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate.
	RO	VERIFY the RMW CONTROL switch has been placed in the STOP position.
	RO	VERIFY the RMW CONTROL switch green light is lit.
	RO	PLACE control switch RMW MODE SELECTOR to the BOR position.

Op Test No.: 1	Scenario # 4	Event # 1	Page 8 of 30
Event Description:	Power Reduction		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**When PRZ backup heaters are energized in manual, PK 444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure**
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm.
	SRO/RO	FOR large boron changes, PERFORM the following:
		• DIRECT Chemistry to sample the RCS for boron concentration.
		• MAKE boron concentration adjustments as dictated from sample results.
Procedure Note:		**Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP.**
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the RED indicator light is LIT.
Procedure Caution:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**

Op Test No.: 1 Scenario # 4 Event # 1 Page 9 of 30

Event Description: Power Reduction

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY Tavg responds as desired.
	RO	IF rod control is in AUTO, THEN VERIFY the control rods are stepping out to the desired height.
	RO	VERIFY boration automatically terminates when the desired quantity of boron has been added.
	RO	PLACE Reactor Makeup in Auto per Section 5.1.
		VERIFY the RMW CONTROL switch:
		• Is in the STOP position.
		• The GREEN light is LIT.
		PLACE the RMW MODE SELECTOR to AUTO.
		START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the RED indicator light is LIT.
Evaluator's Note:		**The Lead Evaluator can cue initiation of Event 2 (EDG "A" alarm) whenever the evaluating team members have completed their evaluations of Event 1.**

Op Test No.: 1	Scenario # 4	Event # 2	Page 10 of 30
Event Description: EDG "A" Alarm			

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	RESPONDS to alarms ALB-024-3-1 and 3-2.
	SRO	ENTERS and directs actions of APP-ALB-024-3-1 and/or 3-2.
Note:		**Both alarm response procedures dispatch an AO to the local panel.**
	SRO	DISPATCHES an AO to the local panel.
Simulator Operator's Note:		**As AO, report 86DG Lockout Relay actuated and local alarm G-1, Loss of Both GEN POT CKS Trip, is actuated. Request Maintenance assistance.**
	SRO	REFERS to OWP-DG.
	SRO	Directs Outside Operator to place EDG "A" in the LOCAL-MAINTENANCE mode per OP-155, Section 8.17.
Simulator Operator:		**If directed to place EDG "A" in the LOCAL-MAINTENANCE mode, use remote functions:** • **irf dsg005 LOCAL** • **rf dsg006 MAINTAIN**
	SRO	ENTERS TS 3.8.1.1.b.
Evaluator's Note:		**EDG "A" will remain unavailable for the remainder of the scenario. The Lead Evaluator can cue Event 3 (First Stage Pressure Fails LOW) after the EDG TS is identified.**

Op Test No.: 1	Scenario # 4	Event # 3	Page 11 of 30
Event Description:	Turbine 1st Stage Pressure Fails LOW		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	RESPONDS to uncontrolled rod motion.
	SRO	ENTERS and directs actions of AOP-001.
	RO	PERFORM immediate actions.
Immediate Actions	RO	CHECK that LESS THAN TWO control rods are dropped. (YES)
Immediate Actions	RO	POSITION Rod Bank Selector Switch to MAN.
Immediate Actions	RO	CHECK Control Bank motion STOPPED. (YES)
	SRO	READS immediate actions then proceeds to Section 3.2.
	RO	CHECK that instrument channel failure has NOT OCCURRED by observing the following: (NO)
		• TURBINE first stage pressure.
	RO	PERFORM the following:
		• IF a power supply is lost, THEN GO TO AOP-024, Loss of Uninterruptible Power Supply. (NO)
		• IF an individual instrument failed, THEN MAINTAIN manual rod control until corrective action is complete. (YES-Turbine 1st Stage Pressure)
		• IF a Power Range NI Channel failed. (NO)

Op Test No.: 1 Scenario # 4 Event # 3 Page 12 of 30

Event Description: Turbine 1st Stage Pressure Fails LOW

Time	Position	Applicant's Actions or Behavior
	RO	MANUALLY OPERATE affected control bank to restore the following:
		• EQUILIBRIUM power and temperature conditions.
		• RODS above the insertion limits of Tech Spec 3.1.3.6 and PLP-106, Technical Specification Equipment List Program and Core Operating Limits Report.
	RO	VERIFY proper operation of the following:
		• CVCS demineralizers (YES)
		• BTRS (N/A)
		• Reactor Makeup Control System (YES)
	SRO	CHECK that this section was entered due to control banks MOVING OUT. (NO)
		GO TO Step 6.
	RO	CHECK that NEITHER of the following OCCURRED: (YES)
		• UNEXPLAINED RCS boration
		• UNPLANNED RCS dilution
	RO	CHECK that an automatic Rod Control malfunction OCCURRED. (NO)
	RO	MAINTAIN manual rod control until appropriate corrective action is complete.
	SRO	EXIT this procedure.
	SRO	REFERS to OWP-RP-11. May direct one of the Operators to perform MCB actions.

Op Test No.: 1	Scenario # 4	Event # 3	Page 13 of 30
Event Description:	Turbine 1st Stage Pressure Fails LOW		

Time	Position	Applicant's Actions or Behavior
Evaluator's Note:		**Ensure OWP-RP-11 MCB actions are completed before moving to the next event. Completion of maintenance actions are not required.**
	BOP	Places Steam Dump Mode Selector in STM Press.
	RO	SELECTS 1st Stage Pressure Control Switch to 447 position.
Evaluator Note:		**Rod Control can be returned to AUTO after PT-447 is selected but there is no procedural step.**
	BOP	PLACES SG LVL ATWS PANEL BYPASS Switch to BYPASS.
	SRO	REQUEST Maintenance assistance to troubleshoot PT-446 and to complete OWP-RP-11 actions.
	SRO	ENTERS TS 3.3.1 Action 7.
Evaluator's Note:		**The Lead Evaluator can cue Event 4 (Main Generator Voltage Regulator Failure) after the OWP-RP-11 MCB actions are complete and the TS has been entered.**

Op Test No.: 1	Scenario # 4	Event # 4	Page 14 of 30
Event Description:	Main Generator Voltage Regulator Failure		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	RESPONDS to alarms ALB-022-4-3 and 9-4.
	SRO	ENTERS and directs actions of APP-ALB-022-4-3.
Evaluator's Note:		**Alarm ALB-022-9-4 is a computer alarm. ALB-022-4-3 will initiate corrective actions.**
	BOP	CONFIRM alarm using:
		• AT MCB:
		• EI-525, Generator Frequency.
		• EI-520, Generator Phase Volts. (YES-Reports voltage regulation problem)
		• EI-540, Gen Exciter Field Volts.
		• EI-541, Gen Exciter Field Current.
		• AT Gen Protective Relay Panel 1B, Gen Over Excitation Prot Backup Protection relay status flag:
		• AT Gen Protective Relay Panel 1B, Gen Over Excitation Prot Backup Protection relay status flag.
	BOP	VERIFY Automatic Functions:
		• VOLTAGE Regulator Limiter decreases Generator excitation.
		• IF Voltage Limiter is unable to control excitation increase, a Generator Lockout occurs.
	BOP	PERFORM Corrective Actions:
		• CHECK for the following at MCB:
		• EI-525, Generator Frequency, stable at 60 Hz. (YES)

Op Test No.: 1 Scenario # 4 Event # 4 Page 15 of 30

Event Description: Main Generator Voltage Regulator Failure

Time	Position	Applicant's Actions or Behavior
		• EI-520, Generator Phase Volts, stable at 22 KV. (NO)
		• EI-540, Gen Exciter Field Volts stable. (YES)
		• EI-541, Gen Exciter Field Current stable. (YES)
Note:		**An automatic transfer to manual Generator voltage control is indicated by GENERATOR VOLTAGE REGULATOR switch ON and the GREEN light LIT. Both the AMBER light and RED light will be OFF.**
		• OPERATE GENERATOR VOLTAGE ADJUSTER switch to restore Generator voltage to 22 KV and reduce MVARS.
		• IF GENERATOR VOLTAGE ADJUSTER switch is ineffective THEN PERFORM the following to transfer and maintain voltage manually:
		• OPERATE the GENERATOR VOLTAGE ADJUSTER to attempt to zero the REGULATOR OUTPUT BAL VOLT meter.
		• PLACE GENERATOR VOLTAGE REGULATOR switch in the TEST position and observe AMBER light LIT and RED light OFF.
		• OPERATE GENERATOR BASE ADJUSTER switch to restore Generator voltage to 22 KV.
	SRO	• REFERENCE AOP-028, Grid Instability. (N/A – the problem is not on the grid)
	BOP	• VERIFY Main Generator is operating per the Generator Capability Curve.
Evaluator's Note:		**When Main Gen Voltage is under control, cue Event 5 (Letdown Pressure Control Valve Fails Closed).**

Op Test No.: 1	Scenario # 4	Event # 5	Page 16 of 30
Event Description:	Letdown Pressure Control Valve Fails CLOSED		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	RESPONDS to alarm ALB-007-3-5.
	SRO	ENTERS and directs actions of APP-ALP-007-3-5.
	RO	CONFIRM alarm using PI-145, LP Ltdn Press. Report 1CS-38 CLOSED.
	RO	VERIFY Automatic Functions: (None)
	RO	PERFORM Corrective Actions:
		• IF necessary to lower letdown pressure, THEN: (YES – the crew may isolate letdown as an initial response)
		• REFER to OP-107, Chemical and Volume control System.
		• REMOVE or change in-service letdown orifices.
		• TAKE manual control of PK-145.1, Ltdn Pressure, AND ADJUST 1CS-38 to lower letdown pressure.
	SRO	Contact Work Control for assistance.
Evaluator's Note:		**When letdown pressure is being controlled or letdown is isolated, cue Event 6 (SG "A" SF Channel Fails LO).**

Op Test No.: 1	Scenario # 4	Event # 6	Page 17 of 30
Event Description: SG "A" SF Channel Fails LO			

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	RESPONDS to alarms ALB-014-4-1A and 1-1B.
	SRO	ENTERS and directs actions of ALB-014-4-1A and/or 1-1B.
Note:		**Both procedures accomplish the same action; MANUAL control of the associated FRV.**
	BOP	CONFIRM alarm using:
		• FI-476, FI-477, SG A Feed Flow.
		• FI-474, FI-475, SG A Steam Flow. (Reports FI-474 failed)
		• LI-474 SA, LI-475 S, LI-476 SA, Steam Generator A Narrow Range level indicators.
	BOP	VERIFY Automatic Functions. (None)
	BOP	PERFORM Corrective Actions:
		• IF FW-133, Feedwater Reg Valve, is NOT controlling SG level, THEN MANUALLY CONTROL FK-478 AND REDUCE feed flow.
Note:		**The SRO may enter AOP-010 based on the flow transient. If so, the outcome will be the same – the associated FRV in MANUAL.**
	SRO	REFERS to OWP-RP-08.

Op Test No.: 1	Scenario # 4	Event # 6	Page 18 of 30
Event Description:	SG "A" SF Channel Fails LO		

Time	Position	Applicant's Actions or Behavior
Evaluator's Note:		**It is NOT necessary to have the channel removed from service or to complete the TS evaluation to continue the scenario.** **When SG "A" level is in the desired band or trending to it, the Lead Evaluator can cue Event 7 (Loss of Off-site Power).**

Op Test No.: 1	Scenario # 4	Event # 7	Page 19 of 30
Event Description:	Loss of All AC Power / TDAFWP Fails to Start/ SGTR		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	RO	RESPONDS to reactor trip.
	RO	PERFORM immediate actions of PATH-1.
	RO	VERIFY Reactor Trip:
		AUTO or MANUAL Reactor Trip successful:
		CHECK for any of the following:
		• TRIP breakers RTA and BYA OPEN (YES)
		• TRIP breakers RTB and BYB OPEN (YES)
		ROD Bottom lights LIT (NO - No power)
		NEUTRON flux decreasing (YES)
	RO	VERIFY Turbine Trip:
		CHECK for any of the following:
		• ALL turbine throttle valves – SHUT (YES)
		• ALL turbine governor valves – SHUT (YES)
	RO	VERIFY power to AC Emergency Buses
		1A-SA and 1B-SB Buses energized by off-site power or EDG's (NO)
		1A-SA or 1B-SB energized (NO)
	SRO	ENTERS EPP-001.
	RO	VERIFY Reactor Trip (YES)
	RO	VERIFY Turbine Trip (YES)

Op Test No.: 1 Scenario # 4 Event # 7 Page 20 of 30

Event Description: Loss of All AC Power / TDAFWP Fails to Start/ SGTR

Time	Position	Applicant's Actions or Behavior
	RO	CHECK if RCS isolated:
		• CHECK PRZ PORVs – SHUT. (YES)
		• CLOSE letdown isolation valves.
		• 1CS-7, 1CS-8, 1CS-9
		• 1CS-1 (LCV-459)
		• 1CS-2 (LCV-460)
		• VERIFY excess letdown valves – SHUT. (YES)
		• 1CS-460
		• 1CS-461
	BOP	VERIFY AFW Flow and Control SG Levels:
		• VERIFY AFW Flow – GREATER THAN 210 KPPH. (NO)
		PERFORM the following:
Critical Task		• **STARTS TDAFW pump.**
		• ADJUST TDAFW pump speed controller as necessary to increase flow.
		• VERIFY TDAFW pump discharge pressure – GREATER THAN SG PRESSURE.
		• VERIFY AFW valves – PROPERLY ALIGNED.
	BOP	• ANY level – GREATER THAN 25% [40%]. (NO)
		• Maintain 210 KPPH until >25% in ≥1 SG.
	SRO	EVALUATE EAL Network using Entry Point X.

Op Test No.: 1 Scenario # 4 Event # 7 Page 21 of 30

Event Description: Loss of All AC Power / TDAFWP Fails to Start/ SGTR

Time	Position	Applicant's Actions or Behavior
	BOP	ENERGIZE AC Emergency Buses using EDGs:
		• CHECK EDGS 1A and 1B– AVAILABLE
		• EDG emergency trips CLEAR (NOT PRESENT). (1A-NO, 1B-YES)
		• EDG output breakers – NORMAL (NOT TRIPPED). (YES)
	SRO	DO NOT start EDG or close output breaker until problem corrected.
		EMERGENCY stop any running EDG with tripped output breaker. (1B Running – breaker not tripped.)
		IF NO EDG available, THEN GO TO Step 7.
	BOP	• CHECK any EDG – RUNNING. (YES)
	SRO	• GO TO Step 6e.
	BOP	• CHECK any AC emergency bus – ENERGIZED:
		• 1A-SA bus voltage (NO)
		• 1B-SB bus voltage (NO)
		Simulator Operator Note: If AO is contacted for local closure of B EDG output breaker 106 in the following step, perform promptly using Trigger 9.
	BOP	PERFORM the following:
		• MANUALLY close the output breaker of the running EDG at MCB OR locally perform at switchgear:
		• EDG B: Breaker 126

Op Test No.: 1 Scenario # 4 Event # 7 Page 22 of 30

Event Description: Loss of All AC Power / TDAFWP Fails to Start/ SGTR

Time	Position	Applicant's Actions or Behavior
Evaluator's Notes:		**The synch. switch must be turned on to close the breaker from the MCB even though the bus is not being paralleled.** **Re-energizing 1B-SB Bus from B EDG or off-site power and starting MDAFW Pump B is critical if the TDAFW Pump has NOT been started.**
	SRO	• GO TO Step 6h.
		Simulator Operator's Note: If the Load Dispatcher is contacted regarding the status of off-site power, respond that the fault has been isolated. Authorize re-energizing B SUT only from off-site power.
	BOP	CHECK any AC emergency bus – ENERGIZED:
		• 1A-SA bus voltage (NO)
		• 1B-SB bus voltage (YES) **Evaluator Note: If the answer to 1B-SB is NO then EPP-1 will direct the crew to restore off-site power using Attachment 1.**
	SRO	IMPLEMENT Function Restoration Procedures as required.
	SRO	Transitions to PATH-1, Step 4.
Simulator Operator's Note:		**Insert (Event 7) IMF SGN05B at the transition back to PATH-1.**

Op Test No.: 1 Scenario # 4 Event # 7 Page 23 of 30

Event Description: Loss of All AC Power / TDAFWP Fails to Start/ SGTR

Time	Position	Applicant's Actions or Behavior
	RO	CHECK SI Actuation:
		Check for any of the following – LIT: (NO)
		• SI Actuated bypass permissive light
		• ALB-11-2-2
		• ALB-11-5-1
		• ALB-11-5-3
		• ALB-12-1-4
	RO	CHECK SI actuation criteria by observing any of the following:
		• CNMT pressure – GREATER THAN 3.0 PSIG (NO)
		• PRZ pressure – LESS THAN 1850 PSIG (NO)
		• STEAM pressure – LESS THAN 601 PSIG (NO)
	RO	SI actuation – REQUIRED (NO)
	SRO	TRANSITIONS to EPP-004.
Evaluator's Note:		**The Crew should recognize the SGTR while performing EPP-4. Accordingly, a MANUAL or AUTO SI will occur. When it does, the SRO should return to PATH-1, Entry Point A, in accordance with the EPP-4 Foldout Criteria.**
	SRO	IMPLEMENT Function Restoration Procedures as required.
	SRO	EVALUATE EAL Network using Entry Point X.

Op Test No.: 1 Scenario # 4 Event # 7 Page 24 of 30

Event Description: Loss of All AC Power / TDAFWP Fails to Start/ SGTR

Time	Position	Applicant's Actions or Behavior
	BOP	CHECK RCS Temperature:
		• CHECK SG Blowdown isolation valves – SHUT. (YES)

SG	(MLB-1A-SA)	(MLB-1B-SB)
A	1BD-11	1BD-1
B	1BD-30	1BD-20
C	1BD-49	1BD-39

	BOP	• STABILIZE and maintain temperature between 555°F and 559°F using Table 1.
Evaluator Note:		**Steam Dump is already in the STM PRESS Mode.**

TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP

- Guidance is applicable until another procedure directs otherwise.
- IF no RCPs running, THEN use wide range cold leg temperature.

	RCS TEMPERATURE TREND		
	LESS THAN 557°F AND DECREASING	GREATER THAN 557°F AND INCREASING	STABLE AT OR TRENDING TO 557°F
OPERATOR ACTION	• Stop dumping steam • Control feed flow • Maintain total feed flow greater than 210 KPPH until level greater than 25% at least one intact SG • IF cooldown continues, THEN, shut MSIVs and Bypass valves	• IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser OR • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels	• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F and 559°F

Op Test No.: 1 Scenario # 4 Event # 7 Page 25 of 30

Event Description: Loss of All AC Power / TDAFWP Fails to Start/ SGTR

Time	Position	Applicant's Actions or Behavior
	RO	CHECK RCP Status:
		• CHECK RCPs – AT LEAST ONE RUNNING. (NO)
	BOP	CHECK Feed System Status:
		• RCS Temperature – LESS THAN 564°F. (YES)
		• VERIFY feed reg valves – SHUT. (YES)
		• CHECK feed flow to SGs – GREATER THAN 210 KPPH. (YES)
	RO	CHECK Control Rod Status:
		• CHECK DRPI – AVAILABLE. (NO – No power)
		• VERIFY all control rods – FULLY INSERTED. (YES)
	RO	CHECK PRZ Level – GREATER THAN 17%. (YES)
Note:		**By this point the SGTR should be evident. While not required, they should initiate a MANUAL SI and return to PATH-1, Entry Point A.**
	SRO	TRANSITIONS to PATH-1, Entry Point A.
	SRO	FOLDOUT A applies.
Note:		**Crew may brief on foldout criteria.**
	RO	VERIFY ALL CSIPs AND RHR pumps – RUNNING. (NO-"A" Bus has no power)
	RO	CHECK SI Flow:
		• SI flow – GREATER THAN 200 GPM. (YES)

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Event Description: Loss of All AC Power / TDAFWP Fails to Start/ SGTR

Time	Position	Applicant's Actions or Behavior
	RO	RCS pressure – GREATER THAN 230 PSIG. (YES)
	BOP	CHECK Main Steam Isolation:
		• MAIN steam isolation – ACTUATED. (NO)
	BOP	MAIN steam isolation – REQUIRED (NO)
		• STEAM line pressure – LESS THAN 601 PSIG.
		• CNMT pressure – GREATER THAN 3.0 PSIG.
		• MANUAL closure of all MSIVs AND bypass valves is desired.
	RO	CHECK CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG. (YES)
	BOP	CHECK AFW Status:
		• AFW flow – AT LEAST 210 KPPH AVAILABLE. (YES)
	SRO	ASSIGNS crew member to perform the following:
		• VERIFY alignment of components from actuation of ESFAS Signals using Attachment 6, "Safeguards Actuation Verification", while continuing with implementation of EOPs.
Evaluator Note:		**All equipment will be properly aligned except for that powered from Bus 1A-SA.**
	BOP	CONTROL RCS Temperature:
		• STABILIZE AND maintain temperature between 555°F AND 559°F using Table 1.
Evaluator Note:		**This was already initiated in EPP-4.**

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Event Description: Loss of All AC Power / TDAFWP Fails to Start/ SGTR

Time	Position	Applicant's Actions or Behavior
	BOP	VERIFY AC buses 1A1 AND 1B1 – ENERGIZED. (Only 1B1 can be energized)
	RO	CHECK PRZ PORVs – SHUT. (YES)
	RO	AT least one PRZ PORV Block Valve OPEN. (YES)
	RO	PRZ spray valves – SHUT. (YES)
	BOP	IDENTIFY any faulted SG:
		• CHECK for any of the following:
		• ANY SG pressures – DECREASING IN AN UNCONTROLLED MANNER (NO)
		• ANY SG – COMPLETELY DEPRESSURIZED. (NO)
	SRO	CHECK Secondary Radiation: (N/A – No power)
	SRO	RUPTURED SG – IDENTIFIED. (YES-SG B)
	BOP	RUPTURED SG level – GREATER THAN 25% (YES)
Critical Task	BOP	**STOP feed flow by shutting the MDAFW AND TDAFW isolation valves to ruptured SG.**
	SRO	TRANSITIONS to PATH-2, J.
	SRO	FOLDOUT C applies.
Note:		**Crew may brief on the foldout criteria at this time.**
	SRO	EVALUATE EAL Network using Entry Point U.

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Event Description: Loss of All AC Power / TDAFWP Fails to Start/ SGTR

Time	Position	Applicant's Actions or Behavior
	SRO	IMPLEMENT Function Restoration Procedures as required.
	RO	CHECK RCP Trip Criteria: (RCP's tripped on loss of off-site power)
		• ANY RCP – RUNNING. (NO)
		IDENTIFY any Ruptured SG:
		• CHECK for any of the following:
		• SG level – INCREASING IN AN UNCONTROLLED MANNER. (YES – SG "B")
Caution:		• **At least one SG must be maintained available for RCS cooldown.** • **If the TDAFW pump is the only available source of feed flow, one steam supply valve from an intact SG must be maintained opened.**
Critical Task		ISOLATE Flow from Ruptured SG:
		• **ADJUST ruptured SG PORV controller setpoint to 88% (1145 PSIG) and place in AUTO.**
		• CHECK ruptured SG PORV – SHUT.
		• **SHUT ruptured SG steam supply valve to TDAFW pump:**
		• **SG B: 1MS-70**
		• VERIFY Blowdown isolation valves from ruptured SG – SHUT.
		• SHUT ruptured SG main steam drain isolation before MSIV:
		• SG B: 1MS-266
		• **SHUT ruptured SG MSIV and bypass valve.**

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Event Description:	Loss of All AC Power / TDAFWP Fails to Start/ SGTR		

Time	Position	Applicant's Actions or Behavior
		TERMINATE SCENARIO after SG Isolation block of steps if SG "B" has been isolated. Otherwise, continue to the RCS cooldown initiation to allow the crew the opportunity to recover the error.

CRITICAL TASK SUMMARY

Establish AFW flow (start the TDAFW Pump or restore power to 1B-SB Bus to start MDAFW Pump "B") prior to implementing the EPP-1 coping steps.

Isolate SG "B" prior to initiating the RCS cooldown.

Stop AFW flow to SG "B" prior to exceeding 95% NR level.