Southern Nuclear
J.M. Farley Nuclear Plant

Operations Training
Simulator Exam Scenario
BOOTH INSTRUCTOR GUIDE

ILT-35 NRC EXAM SCENARIO #2

Make sure rods are in manual✓
Look at temp and make sure it is high vs Tavg/Tref (+0.6°F)✓

Validation time: 114 minutes Validated by David Shipman, Todd Smith and Doug Jimmerson The week of February 13, 2012			
TRN Supervisor Approval:	Gary Ohmstede	Date:	3/2/12
NRC Chief Examiner	SEE NUREG 1021 FORM ES-301-3		

SOUTHERN
COMPANY

Facility:	Farley Nuclear Plant		Scenario No.: 2		Op-Test No.:	FA2012-301

Examiners:		Operators:		SRO
	_____		_____	RO
	_____		_____	BOP
	_____		_____	

Initial Conditions: 57% power, 1109 ppm, MOL, ramping up, ready to place the 1B SGFP on service, and ramp to 95% power. (IC-51)

Turnover:
- 1-2A DG T/O for governor work. (OOS 2 days, ETR 4 hrs)
- Current Risk Assessment is GREEN and projected is GREEN.
- A Train On-Service – A Train Protected.
- Thunderstorm warnings in effect for Southeast Alabama & Western Georgia

SPLIT TRAIN ALIGNMENT

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP)	Place the 1B SGFP on service.
		R (RO)	Ramp up 5% reactor power. (if desired)
2	Imf lt459	I (RO)	LT-459, pressurizer level, fails LOW, letdown secures.
		TS (SRO)	**TS 3.3.1 Condition M**
			Restore Letdown and charging to normal.
3	Imf CP4055K-A	I (BOP)	Hydrogen Temperature controller, CP-4055K fails LOW.
4	Imf lt115	I (RO)	LT-115, VCT level controller, fails HIGH.
5	Imf ft495	I (BOP)	FT-495, selected steam Flow Transmitter for 1C SG fails HIGH.
		TS (SRO)	**Tech Spec 3.3.2. Condition D**
6	Imf SK509 B-A Trg 1	M (ALL)	**Loss of BOTH SGFPs** 1A SGFP controller failure, SK-509B fails HIGH, manual control is available; No ramp down required due to power level. Regain control of SGWL.
			1B SGFP trips 120 seconds after 1A SGFP controller lower PB is depressed and 300 sec later the driver fuse blows.
7	preset	C (ALL)	Rx Trip will not work in auto or manual, and one CRDM MG set breaker will not open. FRP-S.1 will be entered. (CT)
		C (BOP)	The Main Turbine will not trip in auto or manual, closing GVs in manual required. (CT)

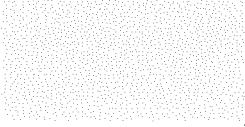| 8 | imf mal- prs1 10 | M (ALL) | SB LOCA (PZR steam space LOCA) when ESP-0.1 step 2 is reached. |
| | | C (BOP) | A Train SI will not AUTO actuate and MOV-8803B will not open (CT) |
| | | | Terminate in EEP-1.0 when transition to ESP-1.2 announced. |

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
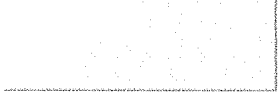
EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
0	0	**MOL, A Train on service, A Train protected,** **Load in IC-212 and sim IC snap directory** **Base IC is IC-51**	
		RUN	RUN simulator
0	0	Generic setup: bat generic_setup_HLT.txt	
0	0	Quick setup (all items with * are included): bat 2012nrcexam_02.txt	
		PRESETS	
0	0	1A CRDM set fails to trip: CMFmalf / c52MGA_cr3	*
0	0	RTB A and B fail to open CMFmalf / cBKRXTRP_cc21 / closed CMFmalf / cbkrxtrp_cc22 / closed	*
8	9	Automatic SI blocked on A train: imf csftyinj_cc1 open	*
8	9	MOV- 8803B will not AUTO open lmf csi8803b_d_cc5 open	*
0	0	Prevent AUTO trip of main turbine MALF / T / MAL-TUR2	*
0	0	Prevent Manual trip of main turbine MALF / T / MAL-TUR24	*
6	0	1B SGFP trips 120 seconds after x21I068L is taken to lower Malf/ imf mal-fwm11b (1 120)	TRG 1
6	0	1A SGFP controller driver blown fuse Cnh/ imf sk509B-V (1 300)	TRG 1
3	0	LJ3 will come into alarm at 48°C imf lj3 failon	TRG 2
0	0	Tag 1-2A DG output breakers for Unit 1 & 2 rack out 1-2A DG DF08-1 rack out 1-2A DG DF08-2 CMFremote / cbk1df08_d_cd1 / open CMFremote / cbk2df08_d_cd1 / open	*

EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
		Triggers and Commands	
6	0	Event Trigger 1: monitors when SK509B is taken to lower trgset 1 " x21I068L" and starts a 120 sec clock to trip the 1B SGFP and blows the controller driver fuse in 300 sec.	*
3	0	LJ3 comes in alarm when H2 temp >48°C trig 2 activates TI-4067 > 48°C trgset 2 "ti4067 > 48"	*

		MCB setup	
		1-2A DG Mode selector switch	Place in Mode 3
		Place HOLD Tag 1-2A MSS	1 HOLD TAG
		Place HOLD Tag on 1-2A DG output breakers	2 HOLD TAGS
		Place Unit 1 and unit 2 Bypass and inoperable panel lights to the up position (EMERGENCY POWER SYSTEM)	Unit 1 A-Train Unit 2 A Train
		DEH **IMPULSE LOOP is in service**	Clear DEH alarms
		Select POWER OPS PRIMARY on MCB monitor Acknowledge computer alarms	**IPC**
		IPC: IF FF5 is in alarm, update rods	Ensure FF5 clear or update rods on IPC
		Setup spreadsheet on OATC computer to resemble reactivity spreadsheet provided	Set up computer
		Recorders	Verify memory disks cleared
		Provide a marked up copy of UOP-3.1 version 111.1 through step 5.11 complete. Mark SOP-21.0, v.108.3 up to step 4.4.11.	UOP-3.1 copy
			FREEZE simulator
		Perform Booth Operators Setup Checklist	
		Open Simview file to be used for plant parameter data collection: Simview / **sv DataCollection.uvl**	sv DataCollection.uvl
		If needed, adjust sim time back to 00:00:00 **SIMVIEW / Sim_Clock.uvl** **Hours: clock(3) = 0** **Minutes: clock(2) = 0** **Seconds: clock(1) = 0**	sv sim_clock.uvl
		VERIFY MICROPHONES READY	Batteries installed
		TURNOVER SHEET AVAILABLE	

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
Prior to RUN	0		
		Start data collection for Simview file **On DataCollection.uvl file press DATA for drop down and then COLLECT to start collecting data**	
	0	**Begin Exam**	 RUN simulator
		Verify Horns ON: hornflag HORNS ON = TRUE	 **Turn Horns ON/OFF ann horn**
1	Start of exam	Place 1B SGFP on service. Ramp up 5% power may be desired (NRC discretion)	
2	NRC CUE	LT-459, pressurizer level, fails LOW, letdown secures. Imf lt459 0 20 Restore Letdown.	
3	NRC CUE	Hydrogen Temperature controller, CP-4055K fails LOW. Imf CP4055K-A 0 30 Turn LJ3 off at 47°C - decreasing	
4	NRC CUE	LT-115, VCT level controller, fails HIGH. Imf lt115 100 20	
5	NRC CUE	FT-495, selected steam Flow Transmitter for 1C SG fails HIGH. Imf ft495 575 20	
6	NRC CUE	**Loss of BOTH SGFPs** 1A SGFP controller failure, SK-509B fails HIGH, manual control is available; No ramp down required due to power level. Imf SK509B-A 10 20	
	preset	1B SGFP trips 120 seconds after 1A SGFP controller	TRIG 1 (120 sec 1B SGFP trips)

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
		lower PB is depressed and 300 sec later the driver fuse blows.	(300 sec 1A SGFP controller fuse blows)
7	preset	Rx Trip will not work in auto or manual, and one CRDM MG set breaker will not open. FRP-S.1 will be entered. The Main Turbine will not trip in auto or manual, closing GVs in manual required.	
8	NRC CUE	SB LOCA (PZR steam space LOCA) when ESP-0.1 step 2 is reached. imf mal-prs1 850 120 A Train SI will not AUTO actuate and MOV-8803B will not open.	
		Terminate in EEP-1.0 when transition to ESP-1.2 announced.	
		End of Exam	HORNS OFF
			FREEZE simulator
		Stop data collection for Simview file sv DataCollection.uvl	
		Export data to file with the name of NRC exam01 grpX.txt *NOTE: Substitute grpX with grp1, grp2, or grp3 as appropriate.* *NOTE: file will be saved in the OPENSIM directory.*	Ensure data file created.

Local operator actions:

EVENT NO.	TIME	ACTIONS
1	WHEN REQUESTED	Go to Local SGFP annunciator panel and reset one switch to clear KB2 (this will allow KB2 to come in later in scenario)

Loa-cfw003 true

2	NONE REQUIRED
3	NONE REQUIRED
4	NONE REQUIRED
5	NONE REQUIRED
6	WHEN REQUESTED

| 7 | 3 minutes after requested | Locally open reactor trip breakers |

CMFmalf / cBKRXTRP_cc21 / open

CMFmalf / cBKRXTRP_cc22 / open

| 7 | WHEN REQUESTED | **TBSO:** "I have locally tripped the main turbine." |

MALF / T / MAL-TUR2 / DELETE

MALF / T / MAL-TUR1

If required,
EXPERT COMMAND: SET JEHTRLOA = TRUE

| 7 | IF REQUESTED | **TBSO:** "I have opened the condenser vacuum breaker isolation valves N1N51V518A and 518B." |

REMOTE / N21 / LOA-CFW012 / 100 / 20 sec ramp

Local operator actions:

EVENT NO.	TIME	ACTIONS

8   WHEN REQUESTED   **SSS / RADSIDE:**
"I have performed steps 1 and 2 of attachment 1 of EEP-1 and need you to perform step 3 of attachment 1."

CAE ECCS_disc_delayed.cae

8   WHEN REQUESTED   **Unit Two UO:**   RESET FIRE ALARM MH1

ANN / MH1 failoff

Communications sheet

EVENT NO.	TIME	Communication:
1	WHEN REQUESTED	- Step 4.4.15.2, both V526B and V502B are open **After performing** LOAs, - report that all 1B SGFP alarms are reset also report the following: - 1B SGFP first out panel is reset
1	WHEN REQUESTED BOP will call for plexiglass cover (step 4.4.29)	Tell BOP that step 4.4.30 and 4.4.31 of SOP-21.0 is complete. - miscellaneous valves and 1B SGFP bracket drains are in their proper positions
1	IF REQUIRED	Prompt the SS to ramp to 95% power.
2	WHEN REQUESTED LT-459 Pressurizer level, fails LOW	**SSS-plant, SM:** Recognize and repeat back LT-459 failure, CR in the cue and that type of communications. **Work Week Coordinator:** "I'll get the CR on LT-459 planned and worked." "I'll get I & C to place bistables in trip within the hour".
3	Hydrogen Temperature controller	NONE expected
4		NONE expected
5	WHEN REQUESTED	**Work Week Coordinator:** "I'll get the CR on FT-495 planned and worked." "I'll get I & C to place bistables in trip within 72 hours".
6		NONE expected

SEE LOCAL OPERATOR ACTION PAGE for actions taken
and provide the below feedback when requested

7	3 MINUTES AFTER REQUESTED	**[BOOTH]** OPEN the Rx trip bkrs using the buttons on LOCAL OPERATOR ACTIONS PAGE, Then report the following: ROVER: "I have locally Opened Unit one Reactor Trip breakers"

Communications sheet

EVENT NO.	TIME	Communication:
	IF REQUESTED	[BOOTH] DELETE MAL-Tur2 and Mal-tur24 using the buttons on LOCAL OPERATOR ACTIONS PAGE, check the Intercept valves have closed, Then report the following: **TBSO:** "I have locally tripped the main turbine."
	IF REQUESTED	[BOOTH] OPEN valves 518A&B using the buttons on LOCAL OPERATOR ACTIONS PAGE, Then report the following: **TBSO:** "I have opened the condenser vacuum breaker isolation valves N1N51V518A and 518B."
8	WHEN REQUESTED	**SM:** "I will make the classifications and notifications." **EXTRA CONTROL ROOM OPERATOR:** "Both CRACS mode selector switches are in ON." **SM / SSS:** "I will get someone to perform step 6 of EEP-1." "I will get an extra operator to secure the running DGs" **ANY CALL TO SHIFT CHEMIST:** Acknowledge to requirement for sampling.

| Appendix D | Scenario 2 detailed summary sheet | Form ES-D-1 |

Initial Conditions: 57% power, 1109 ppm, MOL, ramping up, ready to place the 1B SGFP on service, and ramp to 95% power.

Turnover:
- 1-2A DG T/O for governor work. (OOS 2 days, ETR 4 hrs)
- Current Risk Assessment is GREEN and projected is GREEN.
- A Train On-Service – A Train Protected.
- Thunderstorm warnings in effect for Southeast Alabama & Western Georgia.

Event 1   Place 1B SGFP on service and ramp up 5% power. (if desired)

Verifiable actions: Open SGFP stop valves and increase speed on SGFP to BOILER control, then place the SGFP on the controller in AUTO. SOP-21.0, section 4.4.12 ver 108.3

Ramp up 5% power at 2 MW/min. (if desired)

Event 2   LT-459 Pressurizer level, fails LOW and letdown secures.

Verifiable actions: RO Must take manual control of Charging to maintain pressurizer level less than tech spec (63.5%) and restore letdown and charging to automatic. Charging flow will go to full flow, and with LT-115 failure VCT level will decrease until the running charging pump trips, if allowed. There will be no auto makeup and no RWST rollover due to LT-115 FH. AOP-100 **TS 3.3.1 Condition M**

Event 3   Hydrogen Temperature controller failure LOW.

Verifiable actions: Place the H2 temperature controller in manual and raise the demand to lower H2 temperature to within the band. AOP-100 actions.

Event 4   LT-115, VCT level controller, fails HIGH.

Verifiable actions: LCV-115A must be swapped to VCT position and Makeup will be in manual vs automatic.

Event 5   FT-495, selected steam Flow transmitter for "C" SG fails HIGH.

Verifiable actions: Take manual control of the 1C FRV and then select channel III instruments to control 1C SG functions.   **TS 3.3.2. Condition D**

Event 6   **LOSS of Both** SGFPs. 1A SGFP controller fails HIGH. AOP-13 OR 100 will be entered to decrease the 1A SGFP speed. The 1B SGFP will trip 120 seconds after the 1A SGFP controller is placed in manual and the lower PB is depressed, then the driver fuse blows at 300 sec on 1A SGFP (fails to minimum speed) requiring the crew to manually trip the reactor per AOP-13.

Verifiable actions: place controller for the 1A SGFP in manual and lower to control SG Levels. The team should use guidance of AOP-13/100 and take manual control of the 1A SGFP speed. If no action taken or if a slow response the SGFPs will trip on Hi Hi SGWL

Event 7   The reactor does not trip using either Rx trip switch. The team will attempt to open MG set breakers. The 1A MG breaker will not open. The team will enter FRP-S.1 and insert rods in manual or auto (RO) (CT)

The main turbine will not trip in auto or manual, so the team will close governor valves to trip the turbine (BOP) and then emergency borate (RO or BOP) (CT) (Within 10 minutes following attempts to insert control rods by opening CRDM MG breakers)

Event 8   Pzr Steam space LOCA when ESP-0.1 is reached.

Align HHSI to either A or B Train by manually actuating a SI on A Train or manually opening MOV-8803B. (CT)

Terminate in EEP-1.0 when transition to ESP-1.2 announced.

ARP/ SOP-21.0/ AOP-100/ AOP-13/ FRP-S.1/ EEP-0/ ESP-0.1/EEP-1.0/ESP-1.2

CRITICAL TASK SHEET

—— 1. Insert negative reactivity into the core by **at least one** of the following methods before completing the immediate action steps of FRP-S.1: (WOG CT FR-S.1 - - C) (PRA – 10.29, 1RTOPMANRT---H)

Transition to FRP-S.1 and insert negative reactivity by:
      (1) Insertion of rods in auto or manual at >= 48 SPM w/in 1 minute following attempts to insert control rods by using reactor trip hand switches or opening MG set breakers
      (2) Commencing an emergency boration w/in 10 minutes following attempts to insert control rods by using reactor trip hand switches or opening MG set breakers

(NOTE: Negative reactivity insertion using control rods should begin within 6 minutes of start of event with MFW in service > 40% power, and 1 minute of start of event with no MFW > 40% power, and within 10 minutes if < 40% power.)

—— 2. Isolate the main turbine from the SGs before plant and scenario specific criteria is exceeded: (WOG CT FR-S.1 - - A) (PRA- 10.38, 1TTOPMCBETSW-H)

      • Manually trip main turbine prior to SG's boiling dry

—— 3. Establish flow from at least one HHSI pump before transition out of E-0.
(WOG CT E-0 - - I)

SCENARIO OBJECTIVE/ OVERVIEW:

Normal plant operation, degraded grid, a loss of all SGFPs, ATWT, followed by a Steam space LOCA.

The team should be able to:
• recognize and respond to failures of various instruments and components per ARPs, AOP-13 and AOP-100
• Recognize the symptoms of an ATWT and implement the steps of FRP-S.1, EEP-0.0, ESP-0.1 & EEP-1.0

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	10
2.	Malfunctions after EOP entry (1–2)	4
3.	Abnormal events (2–4)	4
4.	Major transients (1–2)	2
5.	EOPs entered/requiring substantive actions (1–2)	1
6.	EOP contingencies requiring substantive actions (0–2)	1
7.	Critical tasks (2–3)	3

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Event Description: **Place 1B SGFP on service**

Place 1B SGFP on service
Indications Available:

Time	Pos.	Expected Actions/Behavior	Comments
		SOP-21.0, Condensate and Feedwater version 108.3 **Section 4.4**	
		ALL steps including 4.4.11 are complete	
	BOP	(step 4.4.12) Reset the SGFP overspeed trip as follows: 4.4.12.1 Reset the SGFP overspeed trip by depressing TURBINE LATCH pushbutton. 4.4.12.2 Verify that the turning gear trips (if running). 4.4.12.3 Verify the LP and HP GOV valves indicate closed.	
	BOP	(step 4.4.13) Open the SGFP low pressure stop valve by depressing the LOW PRESSURE STOP VALVE OPEN pushbutton.	
	BOP	(step 4.4.14) Open the SGFP high pressure stop valve by depressing the HIGH PRESSURE STOP VALVE OPEN pushbutton.	
	BOP	(step 4.4.15) check the following valves open: ☐ 1B SGFP MINIFLOW (SECONDARY VALVE IND PANEL) ☐ 1B SGFP RECIRC FCV INLET ISO N1N21V502B ☐ 1B SGFP SUCTION ISO N1N21V526B	
			steps 4.4.16 and 4.4.17 are information steps
	BOP	(step 4.4.18) Roll the SGFP to minimum controller speed by depressing the INCREASE SPEED pushbutton.	

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Event Description: **Place 1B SGFP on service**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 4.4.19) Monitor the BN TURB VIB MCR DISPLAY:	Turbine vibrations are monitored
	BOP	(step 4.4.20) WHEN the "Boiler Control" light illuminates, THEN turbine speed control is transferred to the SGFP controller.	SGFP 1B controller SK-509C
	BOP	(step 4.4.21) Reset SGFP first out panel	1B SGFP first out panel reset
	BOP	(step 4.4.22) Verify no alarms are cutout on the SGFP Turbines Local Alarm Panel.	
	BOP	(step 4.4.23) Verify the LP GOV valve AND HP GOV valve has the proper position indication for plant conditions.	
			Step 4.4.24 is NA
	BOP	(step 4.4.25) Open the SGFP DISCH VALVE	N1N21V503B.
Ensure the "Increase Speed" light is illuminated prior to increasing speed using SK-509C			
	BOP	(step 4.4.26) Slowly increase the speed of the oncoming SGFP with SK-509C in MANUAL.	Verify that oncoming SGFP discharge pressure increases
	BOP	(step 4.4.27) WHEN discharge pressures and speeds are approximately the same on both SGFPs, THEN transfer the SK-509C controller to AUTO.	Verify that both SGFPs continue to share the feed flow requirements equally.
Begin ramp up to 95% power IAW UOP-3.1, step 5.15, as the load increases, ...			
	ALL	Re-commences Ramp by coordinating with the BOP to establish Main Turbine Target and ramp rate. A Ramp rate of at 2 MW/ min is normally used as the ramp rate.	
	BOP	**Commence** ramping the turbine at the desired rate.	

Op Test No.: FA2012301   Scenario #   2   Event #   1   Page   3   of   47

Event Description: **Place 1B SGFP on service**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	Begin raising turbine load to 900 MW using the appropriate DEH controls • Ensure load rate increase is within required limitations. • Verify the HOLD light is LIT. • Depress the GO pushbutton and ensure the GO light is LIT. • Ensure the Main Turbine starts to ramp up, GVs start to open.	NOTE: The ramp rate will be 2 MW/min.
	RO	Verify rods are in AUTO or Manual and maintaining Tavg close to Tref.	1 step with D-179 = 8 pcm 5 steps with D-179 = 40 pcm
	RO	(Step 1.0) **Diluting per** SOP-2.3 **APPENDIX B** Version 58 section 2.0 • Set the Total Batch integrator to the desired quantity • Adjust LTDN TO VCT FLOW controller, LK 112, setpoint as desired • M/U mode selector to STOP • MKUP MODE SEL SWITCH to DIL or ALT DIL • IF using ALT DIL AND it is desired to bypass the VCT, THEN place the MKUP TO VCT valve FCV114A in close. • MKUP MODE CONT SWITCH to START. (Step 2.7) Verify proper dilution operation by observing the following: If using ALT DIL, MKUP TO CHG PUMP SUCTION HDR FCV113B opens. • MKUP TO VCT FCV114A opens, unless bypassing the VCT. • Rx makeup flow is displayed on FI-168 MAKEUP FLOW TO CHG/VCT.	

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Event Description: **Place 1B SGFP on service**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 2.8) Verify the dilution automatically stops when the total batch integrator reaches its setpoint as follows: • RMU flow returns to zero as displayed on FI-168 MAKEUP FLOW TO CHG/VCT. • MKUP TO VCT FCV114B closes. • IF ALT DIL was used, then MAKEUP TO CHG PUMP SUCTION HDR FCV113B closes.	
	RO	IF VCT was bypassed, THEN **verify** MKUP TO VCT valve Q1E21FCV114A in AUTO.	
	RO	(step 2.10) Position the M/U mode selector to AUTO (step 2.11) Position the MKUP MODE SEL SWITCH to START	
When the 1B SGFP is on service and at the discretion of the Lead Examiner move to event #2.			

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Event Description: **LT-459, pressurizer level, fails LOW, letdown secures**

LT-459 will fail LOW. This Level Transmitter is channel I and is the primary control channel selected since the PRZR LVL CONT SWITCH is selected to the I/II position. This will cause letdown to secure and charging to go to full flow. AOP-100 actions will be taken. Letdown will be placed back in service using AOP-100.

Indications Available:	
Annunciators: - PRZR LVL LO HTRS OFF LTDN SEC (HA3) - PRZR LVL DEV LO (HB2) - PRZR HTR CONT TRBL (HD4)	**Indications of LT-459 failing LOW** - LI-459 failing low - Backup Heater Breakers open - PI-145 Ltdn HX outlet pressure ↓ - LI-460 and 461 ↑ - FI-122 charging flow ↑ - FK-122 demand ↑ - FI-150 letdown flow goes to 0 gpm - LCV-459 goes closed - LI-112B & LI 115 VCT Level ↓

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100, Instrumentation Malfunction, version 11, section 1.2	
	SRO	Direct BOP to reference ARPs	
	BOP	Performs actions of ARPs (most probably addresses ARPs by priority HA3 first) • Checks indications and determine actual pressurizer level and pressure • Verifies automatic actions have occurred (LCV-459 closed) Informs SRO if an Instrument Failure has occurred. ARP directs entry into AOP-100.	
	SRO	SRO will direct entry to AOP-100. Place ramp on HOLD	This is an expected action but not procedurally required by AOP-100, sect 1.2
	RO	Determines and reports LT-459 failure to SRO	

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Event Description: **LT-459, pressurizer level, fails LOW, letdown secures**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 1) Checks pressurizer level on or trending to program value. (Actual PRZR level increasing) RNO: manual control of charging flow taken - FK-122, CHG FLOW CONTROLLER, in manual and charging flow reduced	
	RO	(Step 2) Check RCP seal injection flows - Adjusts SI flow to 6-13 gpm by using HIK-186, SEAL WTR INJECTION CONTROLLER.	
	SRO/ RO	(step 3) Determine if a PRZR level transmitter / indicator loop has failed. LI-459, LI-460, or LI-461	Determines LI-459 failed low
	SRO/ RO	(Step 3) IF selected PRZR level control channel failed THEN select and unaffected channel. Controlling channel I / II is affected - RO directed to select channel III / II on LS-459Z, PRZR LEVEL CONTROL CHANNEL SWITCH IF required THEN select an unaffected channel on the PRZR level recorder control switch LS/459Y, PRZR LEVEL RECORDER INPUTS SWITCH	Channel 459 selected, change to CH 461 or 460
	SRO/ RO	(step 4) Check letdown in service - Orifice isolation valves one or more open HV-8149A,B,C, LTDN ORIF ISO VLVS - Flow indicated on FI-150, LTDN HX OUTLET FLOW.	Letdown NOT in service

| Op Test No.: | FA2012301 | Scenario # | 2 | Event # | 2 | | Page | 7 | of | 47 |

Event Description: **LT-459, pressurizer level, fails LOW, letdown secures**

Time	Pos.	Expected Actions/Behavior	Comments

	RO	(step 4 RNO) Establish normal letdown as follows:
		- Verify closed all letdown orifice isolation valves
		   • HV-8149A
		   • HV-8149B
		   • HV-8149C
		
		- Verify LP LTDN PRESS PK 145 in manual and demand adjusted to 50% or less.
		IF necessary THEN open LTDN LINE PENE RM ISOs HV-8175A and B from PRIP.
			Action not required

	RO	- Verify open LTDN LINE CTMT ISO HV-8152 - Verify open both LTDN LINE ISO LCV-459 and 460 - Verify FK-122 in Man and establish required minimum charging flow for one orifice to be placed on service. (18 GPM) - Open LTDN ORIF ISO 60 GPM HV-8149B or C to establish approx. 60 gpm letdown flow	**Will open LCV-459** **NOTE to examiner: applicant may take early action to take manual control of charging after requesting SS permission.** **Manual control of FCV-122 lower PB depressed and flow decreased**

	RO	(step 5) Check letdown flow established:
		- Check letdown flow indicated FI-150
		- Place PK-145 in auto.
		   • Verify that PK-145 set between 4.3-7.5 to maintain 260-450 psig letdown pressure
		   • Place PK-145 in Auto
		   • Verify LTDN HX outlet temp maintained at approximately 100°F.
			Checks these indicators:
			TI-116 VCT Temp
			TI-143 Divert letdown HX temp
			TI-144 CCW letdown HX temp

	SRO	(step 6) Refer to Tech Specs 3.3.1 & 3.3.3 determine any LCO requirements. **Tech Spec 3.3.1. Condition M**	TS 3.3.3 - ADMIN LCO due to 2 channels req'd OPERABLE for PAM (2 are operable)

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Event Description: LT-459, pressurizer level, fails LOW, letdown secures

Time	Pos.	Expected Actions/Behavior	Comments

TECHNICAL SPECIFICATION 3.3.1, Reactor Trip System (RTS) Instrumentation

The RTS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.

Table 3.3.1-1 Reactor Trip System Instrumentation

Function 9 - Pressurizer Water Level —High *Applicable in Mode 1 >P-7*
3 required channels *condition M*

	SRO	CONDITION	REQUIRED ACTION	COMPLETION TIME	
		M. One channel inoperable.	------------------NOTE---------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. --------------------------- M.1 Place channel in trip. OR M.2 Reduce THERMAL POWER to < P-7.	72 hours 78 hours	

	SRO	(step 7) Notify Shift Manager	
	RO	(step 8) WHEN plant conditions permit THEN restore components to automatic control as follows: Restore charging flow control to automatic per SOP-2.1, Chemical and Volume Control System Plant Startup and Operation	

SOP-2.1, CVCS Startup and Operation,

version 125, section 4.6.2

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Event Description: **LT-459, pressurizer level, fails LOW, letdown secures**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 4.6.2.1 and following) - Place LK-459F, PZR LVL Controller, in manual - Verify Pzr level is w/i 3% of setpoint as indicated on LR-459 - Manually adjust the output meter on LK-459F to equal the position of the meter pointer on CHG FLOW FI-122A - Place LK-459F in AUTO - Place FK-122 in AUTO	Examiner NOTE: Pzr level must be w/i 3% of setpoint before controllers are placed in AUTO or DE1, REGEN HX LTDN FLOW DISCH TEMP HI, may come in to alarm
		Continue AOP-100 actions here	
	RO	(step 8.2) Restore control of pressurizer heaters: - 1A PRZR HTR GROUP BACKUP - 1B PRZR HTR GROUP BACKUP - 1D PRZR HTR GROUP BACKUP - 1E PRZR HTR GROUP BACKUP (ARP HD4 Actions) - Places 1C PZR HTR switch in OFF and then back to the ON position	
	SRO	(step 9) Submit a Condition Report for failed channel and notify the Work Week Coordinator (Maintenance ATL on backshifts) of the Condition Report.	
		When letdown restored and Tech Specs addressed and at the discretion of the Lead Examiner move to Event #3.	

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Event Description: **Hydrogen Temperature controller CP-4055K fails LOW**

Indications Available:	
Annunciators: - H2 PRESS HIGH (LJ3) - DEH TRBL (LB1)	TI-4067, HYDROGEN TEMP, increasing DEH screen alarm comes in

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.11, MCB Annunciator Panel L, VERSION 50 **LJ3**	
	BOP	(step 1) Check H2 TEMP controller (CP-4055K on MCB) to insure proper setpoint.	
	BOP	(step 2) Verify validity of alarm from computer point indication. NOTE: The MCB indication (TI4067) comes from DEH computer point G1CGAVG, which is an average of points HCOUT21R and HCOUT22R. Historically, there has been a 5-7°C difference between the MCB indication and the point feeding the alarm, such that the alarm may be in with a MCB indication of 42-43°C.	
	SRO	(step 4) Enter AOP-100, section 1.9	
		AOP-100, Instrumentation Malfunction, version 11.0 **Section 1.9**	
	RO	(step 1) Check main generator hydrogen temperature controller functioning properly in AUTO. [ ] HYDROGEN TEMP, CP-4055K	IOA step

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Event Description: **Hydrogen Temperature controller CP-4055K fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 1 RNO) Maintain main generator hydrogen temp < 46°C using manual control of hydrogen temperature controller.	Take manual control of HYDROGEN TEMP, CP-4055K and open valve.
		Note to examiner	If H2 temperature cannot be maintained < 46°C, then a reactor trip would be required.
	BOP	(step 4) Notify the Shift Manager.	
	RO	(step 5) Direct appropriate personnel to determine and correct the cause of the high hydrogen temperature alarm.	
	SRO	Write a CR and call dispatcher to plan work order	
When Hydrogen temperature is being controlled and at the discretion of the Lead Examiner move to Event #4.			

Examiner NOTE: SRO may have to be prompted to assign Event 4 to the OATC (by keeping the UO at H2 generator controller)

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Event Description: **LT-115 fails HIGH.**

LT-115 will fail high. This will cause the VCT to divert to the RHTs and the VCT level will decrease. Auto makeup will not start to refill the VCT.

Indications Available:	
Annunciators: - LTDN DIVERTED TO RHT-VCT LVL HI (DF2) - VCT LVL HI-LO (DF3)	Recognize indications of LT-115 failing HIGH - LI-112, VCT level, decreasing

Time	Pos.	Expected Actions/Behavior	Comments
ARP-1.4, Annunciator Response Procedure, ver 51.1, DF2 and 3			
	SRO	Directs RO to perform Actions of DF2 or DF3	
	RO	(Step 1) Determine if VCT level is high or low as indicated by LI-115 and LI-112B, VCT LEVEL, on the MCB. (step 5) Places VCT HI LEVEL DIVERT VALVE, LCV-115A in the VCT mode. - Manually makeup for VCT level control in accordance with SOP-2.3 IF LI-115 has failed, THEN initiate steps to have the instrumentation repaired.	RO determines LI-115 is failed HIGH, goes to step 5
		The following automatic actions are inhibited: 1) Auto VCT/RCS makeup 2) Auto opening of RWST to charging pump suction on VCT low level 3) Auto VCT outlet isolations closing on lo VCT level	
	SRO	- Submit a Condition Report and notify the Work Week Coordinator (Maintenance ATL on backshifts) - Notify the Shift Manager	
At the discretion of the Lead Examiner move to Event #5.			

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Event Description: **FT-495, selected steam Flow Transmitter for "C" SG fails HIGH**

FT-495, selected steam flow transmitter for 1C SG fails high. The team should select channel III instruments to control 1C SG functions.   Team is expected to perform actions of AOP-100.

Indications Available:	
Annunciators:	Indications of FT-495 failing HIGH:
- 1C SG Stm Flow > Feed Flow (JB3) - MS Line HI Stm Flow Alert (JB4) - 1C SG LVL DEV (JF3)	- FI-494 Steam Flow ↑ - TSLB 4 18-4 LIT - 1C FRV FK-498 Demand ↑ - FI-497 & 496 Feed Flow 1C SG ↑ - 1C SG level LI-494, 495, 496 ↑ - A & B SG level ↓ - SGFP speed ↑ - SGFP suction pressure ↓

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100, Instrumentation Malfunction, ver 11, section 1.5	
	BOP	Announces Receipt of MCB Alarms May notice FI-495, steam flow transmitter for 1C SG, Failed High and inform SRO.	
	SRO	Instructs BOP/RO to perform Immediate Operator Actions of AOP-100	

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Event Description: __FT-495, selected steam Flow Transmitter for "C" SG fails HIGH__

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 1) Maintain SG levels at 65%. IF required, THEN, take manual control of SGFP speed control as necessary to restore SG level to 65% • SGFP master controller SK-509A OR • SGFP individual controllers as needed. [ ] SK-509B [ ] SK-509C IF required, THEN take manual control of the affected feedwater regulating valves [ ] 1A SG FW FLOW FK-478 [ ] 1B SG FW FLOW FK-488 [ ] 1C SG FW FLOW FK-498	NOTE: Step 1 is an Immediate Operator Action and a continuing action step
	SRO	If a loss of main feedwater occurs, then perform the actions of AOP-13, Loss of Main Feedwater	This should not result in a loss of MFW
	SRO	(step 2) If an adverse trend in SG level exists, then establish Trip Criteria	Trip criteria expected: • Rx trip on low SG level 28% • Main Turbine and Feed Pump Trip @ 82% SG level
	BOP	(step 3) IF a ramp is in progress, THEN place Turbine on HOLD	No ramp will be in progress

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Event Description: **FT-495, selected steam Flow Transmitter for "C" SG fails HIGH**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO/ BOP	(step 4) Determine if an instrument failure has occurred. Check for a failed or erroneous indications from the following Steam flow or feed flow indicators. STM FLOW FEED FLOW S/G CH III CH IV CH III CH IV A S/G FI-474 FI-475 FI-477 FI-476 B S/G FI-484 FI-485 FI-487 FI-486 C S/G FI-494 FI-495 FI-497 FI-496 Check for failed or erroneous readings on the following SG pressure indicators S/G CH II CH III CH IV A S/G PI-474 PI-475 PI-476 B S/G PI-484 PI-485 PI-486 C S/G PI-494 **PI-495** PI-496	FT-495 has failed high
	SRO/ BOP	IF the alarm(s) was due to a SGWLC System controlling channel failure, THEN select the unaffected channel and verify proper system response Places switches FS/498Z and FS/498Y for 1C SG in the III position: FT-494 (STM Flow) & FT-497 (FEED Flow)	BOP will verify proper system response
	SRO	(step 5) Refer to Tech Specs 3.3.2 for any LCO requirements. **T.S. 3.3.2 Condition D applicable**	

TECHNICAL SPECIFICATION 3.3.2, ESFAS Instrumentation

The ESFAS instrumentation for each Function in Table 3.3.2-1 shall be OPERABLE

Table 3.3.2-1 ESFAS Instrumentation
Function 4e – High steam flow in two steam lines coincident w/ lo-lo Tavg
Applicable in Modes 1, 2 and 3 with MSIVs open
required channels   2 per stm line   condition D

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Event Description: **FT-495, selected steam Flow Transmitter for "C" SG fails HIGH**

Time	Pos.	Expected Actions/Behavior			Comments
		CONDITION	*REQUIRED ACTION*	*COMPLETION TIME*	
		D. One channel inoperable.	*D.1 ------NOTE-------* *The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels.* *-----------* *Place channel in trip.* *OR* *D.2.1 Be in MODE 3.* *AND* *D.2.2 Be in MODE 4.*	*72 hrs* *78 hrs* *84 hrs*	
	SRO	(step 6) Notify the Shift Manager			
		(step 7) WHEN plant conditions permit, THEN return systems to automatic control.			
	SRO	(step 8) Submit a condition report on the failed component, and notify the Work Week Coordinator (Maintenance ATL on backshifts) of the condition report.			
When Tech Specs have been addressed and at the discretion of the Lead Examiner move to Event #6.					

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Event Description: 1A SGFP controller failure, SK-509B, fails HIGH, manual control is available; No ramp down required due to power level. Regain control of SGWL. **Loss of BOTH SGFPs.**

1A SGFP controller, SK-509B, fails HIGH, and its controller can be shifted to manual and control of the 1A SGFP speed is possible. The crew will enter AOP-13 and take manual control of the 1A SGFP. 80 seconds after the 1A SGFP lower PB is depressed the 1B SGFP will trip and 1A SGFP will controller will lose power 40 seconds later.

Indications Available:	
Annunciators:	**Indications of B SGFP Speed Oscillation**
- 1A SG LVL DEV (JF1)	- 1A SGFP Speed increases
- 1B SG LVL DEV (JF2)	- FRV-controller FK-496, 497, 498 demand lowering
- 1C SG LVL DEV (JF3)	- FK-509B SGFP speed controller demand is rising

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100, Instrumentation Malfunction, ver 11, and/or AOP-13, Condensate and Feedwater Malfunction, ver 32	
	SRO	Directs RO or BOP to address ARPs as time permits - 1A, 1B, & 1C SG LVL DEV (JF1, 2 & 3)	
	SRO	Directs entry into AOP-100, section 1.4, and performance of immediate actions, then directs subsequent actions	
		AOP 100 actions on next page AOP-13 actions on bottom of page 16	

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Event Description: 1A SGFP controller failure, SK-509B, fails HIGH, manual control is available; No ramp down required due to power level. Regain control of SGWL. **Loss of BOTH SGFPs.**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 1) Maintain SG level at the referenced level of 65%. Take manual control of SGFP speed control SK-509B taken to manual **This controller will shift to manual** IF required, THEN, take manual control of SGFP speed control as necessary to restore SG level to 65% SGFP master controller SK-509 IF required, THEN take manual control of the affected feedwater regulating valves [ ] 1A SG FW FLOW FK-478 [ ] 1B SG FW FLOW FK-488 [ ] 1C SG FW FLOW FK-498	Step 1 is an Immediate Operator action **NOTE:** Step 1 is a continuing action step
	SRO	(step 1.3) IF a loss of main feedwater has occurred, THEN perform the actions required by AOP-13.0, LOSS OF MAIN FEEDWATER.	
	SRO	(step 2) Set manual trip criteria on SG level (high and low trip setpoints are 82% & 28% respectively)	
	BOP	(step 3) IF a ramp is in progress, THEN place turbine on HOLD.	
1B SGFP will trip 80 seconds after the 1A SGFP lower PB is depressed. This will initiate AOP-13 entry.		
		AOP-13, Condensate and Feedwater Malfunction, ver 32	
	SRO	(step 1) Check only one SGFP running	This is an SRO decision - only one is running since the 1B SGFP tripped.

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Event Description: 1A SGFP controller failure, SK-509B, fails HIGH, manual control is available; No ramp down required due to power level. Regain control of SGWL. **Loss of BOTH SGFPs.**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 1.1) Check generator load >540 MW	NOTE: the answer is NO , Main Generator load will be approx 485 MW
		RNO send the user to step 3	
	SRO	(step 3) Check indication of any SGFP malfunction	1B SGFP tripped
	BOP	Take manual control of SGFPs, FRVs as necessary to control SG water level	
		1A SGFP trips 40 seconds after 1B SGFP trips	
		AOP-13, Condensate and Feedwater Malfunction, ver 32 **Go to step 2**	
	SRO	Recognize LOSS of BOTH SGFPs Direct Step 2 of AOP-13 - Perform the IOAs of AOP-13	
	RO	(Step 2) Check Rx power less than 5%	NO >5% power
	RO	(step 2 RNO)Trip the reactor using RT handswitches	Reactor does not trip
		See next page for Event 7, FRP-S.1 actions.	

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Event Description: **Rx Trip will not work in auto or manual, and one CRDM MG set breaker will not open. FRP-S.1 will be entered.**

Since Both SGFPs trip, the crew has tried to manually trip the reactor per AOP-13. When the crew tries to trip the reactor, the reactor trip breakers will not open and the CRDM MG set breakers will not open. The Main Turbine will not trip in auto or manual.

Indications Available:	
Annunciators:	**Indications of BOTH SGFP Trips**
- 1A or 1B SGFP Tripped (KC3)	- SGFP Speed Decreasing
- SG LVL DEV (JF1, JF2, JF3)	- Feed Flow Decreasing
- SG LO LVL (JA1, JA2, JA3)	- FRV-controller FK-496, 497, 498 demand increasing
- SG STM Flow > Feed Flow (JB1, JB2, JB3)	- SG Levels decreasing

	Pos.	Expected Actions/Behavior	Comments
		Enter EEP-0, Reactor Trip or Safety Injection, version 43	
	SRO	**Reactor trip** Direct the reactor trip and enter EEP-0	
	RO/ BOP	Immediate Operator actions of EEP-0 (step 1) **Check reactor trip.** Check all reactor trip breakers and reactor trip bypass breakers - OPEN. Check nuclear power - FALLING. check rod bottom lights - LIT. TRIP CRDM MG set supply breakers. 1A(1B) MG SET SUPP BKR [] N1C11E005A [] N1C11E005B (step 1.3 RNO) FRP-S.1 entered	**Immediate Action steps of EEP-0** **NOTE:** Reactor will NOT trip **RNO: Reactor is not tripped by RTBs or CRDM MG sets.**
		FRP-S.1, RESPONSE TO NUCLEAR POWER GENERATION – ATWT, ver 25	
	SRO	Direct entry into **FRP S.1** and complete IOAs.	<u>**Step 1 and 2 are IOA steps**</u>

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Event Description: **Rx Trip will not work in auto or manual, and one CRDM MG set breaker will not open. FRP-S.1 will be entered.**

	Pos.	Expected Actions/Behavior	Comments
	RO	(step 1) IF reactor still NOT tripped, THEN perform the following: Insert control rods in manual control. OR Verify rods insert in AUTO at greater than 48 steps per minute. Dispatch an operator to locally trip the reactor trip and bypass breakers.	<u>Critical task</u> Insert negative reactivity **3 minutes from this phone call RTBs will be opened from BOOTH**
	BOP	(step 2) Check Main Turbine tripped (step 2 RNO) Place MAIN TURB EMERG TRIP switch to TRIP for at least 5 seconds. **This action will not occur.**	<u>Critical task</u> **RNO step 2.2.1:** <u>Close GVs</u> TURBINE MANUAL depressed GV CLOSE depressed FAST ACTION depressed
	BOP	(step 3) Verify AFW pumps running - Both MDAFWPs amps > 0 - TDAFWP speed > 3900 rpm	Note: early action may be taken to throttle AFW to preclude an excessive cooldown. (however, for an FRP-S.1 event, excessive cooldown is not the main concern since the reactor is still at power

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Event Description: **Rx Trip will not work in auto or manual, and one CRDM MG set breaker will not open. FRP-S.1 will be entered.**

	Pos.	Expected Actions/Behavior	Comments
	RO	(step 4) Initiate Emergency Boration of the RCS. - Verify at least one CHG PUMP - RUNNING. - Start a BAT pump - Open MOV 8104 - Establish normal letdwn flow – 8149A **and** either 8149B or C open - Check RCS pressure less than 2335 psig - Establish normal charging flow > 40 gpm - Verify adequate emergency boration flow of > 30 gpm on FI-110	
	BOP	(step 5) **Verify containment ventilation isolation.** Verify containment purge dampers - CLOSED. [] 3197 [] 3198D [] 3198C [] 3196 [] 3198A [] 3198B Verify containment mini purge dampers - CLOSED. CTMT PURGE DMPRS MINI-2866C & 2867C FULL-3198A & 3198D [] 2866C [] 2867C CTMT PURGE DMPRS MINI-2866D & 2867D FULL-3196 & 3197 BOTH-3198B & 3198C [] 2866D [] 2867D Stop MINI PURGE SUPP/EXH FAN.	**Will place HS to STOP**

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Event Description: **Rx Trip will not work in auto or manual, and one CRDM MG set breaker will not open. FRP-S.1 will be entered.**

	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 6) Check SI actuated – BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit complete attachment 1 See attached sheets for Attachment 1 of FRP-S.1	A safety injection may not have occurred so Attachment 1 would not be done See Tab at end of scenario for Attachment 1 actions. Page 42
	RO	(step 7) Check ALL RTBs open Check Main Turbine tripped Both of these actions will be directed to the field	Locally open the reactor trip and reactor trip bypass breakers. Locally place turbine overspeed lever to TRIP for at least 5 seconds.
	RO	(step 8) Check if reactor still critical. If RTBs are open or power range indication is < 5% power OR IR SUR is negative, then go to EEP-0 step 1 If not continue in this procedure.	**NOTE:** This is a continuing action step
	SRO	Transition back to EEP-0	

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Event Description: Rx Trip will not work in auto or manual, and one CRDM MG set breaker will not open. FRP-S.1 will be entered.

	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	Immediate Operator actions of EEP-0 **Check reactor trip.** Check all reactor trip breakers and reactor trip bypass breakers - OPEN. Check nuclear power - FALLING. check rod bottom lights - LIT. **Check turbine - TRIPPED.** TSLB2 14-1 thru 4 lit **Check power to 4160 V ESF busses.** 4160 V ESF busses - AT LEAST ONE ENERGIZED A Train (F & K) power available lights lit OR B Train (G & L) power available lights lit Verify operating diesel generators are being supplied from at least one SW pump. **Check SI Status.** Check any SI actuated indication. BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit	**Immediate Action steps of EEP-0** EH pumps may be taken to OFF here if it is decided the MT is not tripped. (intent is met in FRP-S.1) **NOTE: NO DGs will be running unless a SI has occurred.**
		ESP-0.1, Reactor Trip Response, **ver 32 actions below**	
	SRO	SI is NOT required at this point, directs transition at step 4 of EEP-0 to ESP-0.1, REACTOR TRIP RESPONSE	Directs actions in ESP-0.1 per RO/BOP Actions listed below

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Event Description: **Rx Trip will not work in auto or manual, and one CRDM MG set breaker will not open. FRP-S.1 will be entered.**

Pos.	Expected Actions/Behavior	Comments

RO	(step 1) Check RCS temperature
	- Stable at or approaching 547°F
	- TAVG 1A(1B,1C) RCS LOOP
	  [] TI 412D
	  [] TI 422D STM DUMP
	  [] TI 432D
		NOTE: this is a continuing action step

Put in Pressurizer Steam Space LOCA at this point, Go to Event 8

Pos.	Expected Actions/Behavior	Comments
BOP	(step 2) WHEN RCS average temperature less than 554°F, THEN verify feedwater status. - Verify FRVs closed - Defeat the MADFWP auto start on SGFP trip	NOTE: this is a continuing action step
BOP	(step 2.2) - MDAFWP AUTO/DEFEAT [] 1A in DEFEAT [] 1B in DEFEAT	- Verify BOTH SGFPs tripped - Verify total AFW flow to the SGs >395 gpm
RO	(step 3) Verify ALL RX TRIP breakers OPEN	
RO	(step 4) Check emergency Boration not required - All rods FULLY INSERTED - RCS Tavg >525°F	
BOP	(step 5) Announce Unit 1 Reactor Trip	
	Auto SI will occur on A Train	

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Event Description: **Pzr steam space LOCA**

A Pzr steam space LOCA has occurred. B Train SI will not AUTO actuate and MOV-8803A will not open.

Indications Available:	
Annunciators:	**Indications of LBLOCA**
- Containment Rad monitors in alarm	- RCS Pressure Decreasing
- CTMT Pressure HI-1 Rx Trip SI (GF1)	- SI Actuation
- PRZR LO Press Rx Trip SI (GB4)	- Containment Pressure Increasing
- CTMT Press HI-1 Alert (EE1)	- Numerous CTMT Rad Monitors alarming
- RMS HI RAD (FF1)	

Time	Pos.	Expected Actions/Behavior	Comments
		Re-enter EEP-0, Reactor Trip or Safety Injection,	
	ALL	Immediate Operator actions of EEP-0 **Check reactor trip.** Check all reactor trip breakers and reactor trip bypass breakers - OPEN. Check nuclear power - FALLING. check rod bottom lights - LIT. **Check turbine - TRIPPED.** TSLB2 14-1 thru 4 lit	**Immediate Action steps of EEP-0**
		Check power to 4160 V ESF busses. 4160 V ESF busses - AT LEAST ONE ENERGIZED A Train (F 4160V bus) power available lights lit OR B Train (G 4160V bus) power available lights lit Verify operating diesel generators are being supplied from at least one SW pump.	**NOTE: 3 DGs will be running since an SI has occurred.**

Time	Pos.	Expected Actions/Behavior	Comments
		Check SI Status. Check any SI actuated indication. BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit	<u>Critical task</u> – manually actuate a SI on 'A' Train or align HHSI cooling in Attachment 2 SI will be in progress on 'B' Train.
	SRO, RO, OR BOP	Announces EEP-0 Fold out Page items in effect, directs/takes actions required • Subcooling <16°F [45}, stop all RCPs • RCS Press < 1300 psig, close chg mini-flows • Ctmt pressure > 4 psig, use adverse numbers	
	SRO	(step 5) Directs continuing into EEP-0 at step 5. Directs the BOP to perform Attachment 2.	See Tab at end of scenario for Attachment 2 and 4 actions. Page 32
	RO	(step 6) Check containment pressure- HAS REMAINED LESS THAN 27 psig	Ctmt pressure will be pre-event
	RO	(step 7) Announce "Unit 1 reactor trip and safety injection".	

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 8) **Check AFW status.** Check secondary heat sink Available o Check total AFW flow > 395 gpm [] FI 3229A [] FI 3229B [] FI 3229C o Total Flow FI 3229 OR Check any SG NR level > 31% {48%} WHEN all SG narrow range levels less than 31%{48%}, THEN maintain total AFW flow greater than 395 gpm. WHEN at least two SG narrow range levels greater than 28% AND TDAFWP NOT required, THEN stop TDAFWP.	
	RO	(step 8.4) WHEN SG narrow range level greater than 31%{48%}, THEN maintain SG narrow range level 31%-65%{48%-65%}. • Control MDAFWP flow. MDAFWP FCV 3227 RESET [] A TRN reset [] B TRN reset MDAFWP TO 1A/1B/1C SG B TRN [] FCV 3227 in MOD Control TDAFWP flow. TDAFWP FCV 3228 [] RESET reset TDAFWP SPEED CONT [] SIC 3405 adjusted	**NOTE:** [CA] step –

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 9) **Check RCS temperature.** IF any RCP running, THEN check RCS average temperature - STABLE AT OR APPROACHING 547°F. TAVG 1A(1B,1C) RCS LOOP [] TI 412D [] TI 422D [] TI 432D	
	RO	(step 9 RNO) IF RCS temperature less than 547°F and falling, THEN perform the following. (step 9.1.1) Verify steam dumps closed. STM DUMP INTERLOCK [] A TRN in OFF RESET [] B TRN in OFF RESET (step 9.1.2) Verify atmospheric reliefs closed on MCB [] Demand at 0 and minimum red light LIT (step 9.1.3) Control total AFW flow to minimize RCS cooldown, AFW FLOW TO 1A(1B,1C) SG [] FI 3229A [] FI 3229B [] FI 3229C AFW TOTAL FLOW [] FI 3229 IF MSIVs are closed THEN proceed to step 9.1.8 IF MSIVs are open, THEN isolate steam loads in the turbine building while continuing with RNO step 9.1.5.	**NOTE:** RNO column is not expected to be used for this scenario **NOTE: Will call TBSO to accomplish this task**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 10) **Check pressurizer PORVs and spray valves.** WHEN pressurizer pressure less than 2335 psig, THEN verify both PRZR PORVs closed. Verify both PRZR PORVs indicate CLOSED Check PRZR PORV temperature STABLE OR FALLING. [] PORV Temp TI-463 Check PRT parameters STABLE or FALLING. [] PRT PRESS PI 472 [] PRT LVL LI-470 [] PRT TEMP TI-471 WHEN pressurizer pressure less than 2260 psig, THEN verify normal pressurizer spray valves closed OR in the process of closing. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D Check any PRZR PORV ISO - OPEN	NOTE: [CA] step – NOTE: [CA] step –
	RO	(step 11) **Check RCP criteria.** Check SUB COOLED MARGIN MONITOR indication – GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE	<u>Examiner note:</u> This is a foldout page item, verify applicants trip RCPs
	RO	(step 12) **Monitor charging pump miniflow criteria.** Control charging pump miniflow valves based on RCS pressure. 1C(1A) LOOP RCS WR PRESS [] PI 402A [] PI 403A	<u>Examiner note:</u> This is a foldout page item, verify applicants close miniflow isolation valves

Diagnostics
The SRO will direct the parameters to be reviewed and will determine appropriate procedure to transition to.

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 13) **Check SGs not faulted.** [] Check no SG pressure – FALLING IN AN UNCONTROLLED MANNER OR LESS THAN 50 psig.	
		(step 14) Check SGs not ruptured - Check secondary radiation indication - NORMAL. - No SG rising in an uncontrolled manner	[] R-15 [] 19 [] 23A and B [] 15B and C, [] 60 A, B, C, D
	SRO	(step 15) Check RCS intact - Check ontainment radiation – NORMAL - Check CTMT pressure < 3 psig - Check ECCS sump level <0.4 feet	[] R-2 [] R-7 [] R-27A [] R-27B
		Transition to EEP-1.0, version 30	
	RO	(step 1) Checks RCP stopped due to insufficient subcooling (SCMM<45°F)	
	BOP	(step 2) Check SGs not faulted - no press falling uncontrolled - none less than 50 psig	
	BOP	(step 3) Checks intact SG levels Verifies any intact SG NR level > {48} Controls MDAFW & TDAFW flows as necessary to maintain levels {48%-65%} Stops TDAFW pump WHEN at least 2 SGs >28%	
	BOP	(step 4) Check SGs not ruptured - Check secondary radiation indication - NORMAL.	[] R-15 [] 19 [] 23A and B [] 15B and C, [] 60 A, B, C, D

Op Test No.: FA2012301	Scenario # 2	Event # 8		Page 32 of 47			

Event Description: **Pzr steam space LOCA**

Time	Pos.	Expected Actions/Behavior	Comments
		(step 5) Checks PORVs - Iso valves open with power - PORVs closed with no leakage - no evidence of leak by via downstream temps & PRT parameters	
	SRO	(step 6) directs step 6 be performed (1 hour from start of event requirements - not available to perform in simulator-SRO calls for SSS or an extra to perform) - Close recirc disconnects - Establish 1A & 1B post LOCA H2 analyzer on service per ATT 2 - Plot H2 on Fig 1 - Check and control H2 concentration in Ctmt	
	SRO RO	(step 7) Checks for SI termination criteria and continues on without terminating SI due to inadequate RCS pressure & Pzr level	SI termination criteria may be met but transition to ESP-1.1 is incorrect.
	RO	(step 8) Checks containment spray system - any CS pump started	No - go to step 9
	RO	(step 9) Determines LHSI pumps should NOT be stopped due to RCS Pressure < {435 psig}, RCS pressure stable or rising and RHR pumps running with suction aligned from RWST	RESET SI and STOP RHR pumps
	BOP	(step 12) Performs EEP-1 ATT 4, VERIFYING 4160 V BUSSES ENERGIZED	See Tab at end of scenario for Attachment 4 actions. Page 45
	SRO	(step 13) Directs securing Unloaded DGs	(extra, Unit two UO, or BOP)

Time	Pos.	Expected Actions/Behavior	Comments

		(step 14) Begins evaluation of plant status, Determines both trains of recirc equipment available
		- Checks the following:
		   o BOTH RHR pumps
		   o MOV-8811A/B
		   o MOV-8812A/B
		   o MOV-8706A/B
		   o CCW MOV-3185A/B	

	SRO BOP	(step 14.2) Directs Unit two UO to assist taking ECCS logs (step 14.2) Directs TSC to evaluate need for RCS sampling (step 14.2) checks for no intersystem LOCA outside Ctmt - Aux building radiation NORMAL - Aux building no hi sump levels & pumps not running - WHT and FDT levels not rising unexplained (step 14.2) Verify at least one train of PRF in operation using SOP-60.0, PRF System(Attached)	
		(step 15) Checks LHSI flow in progress by RCS PRESS <275 psig & LHSI flows >1500 gpm	RNO: transition to ESP-1.2

When the decision is made to transfer to ESP-1.2, terminate the scenario.

Cue: BOP will accomplish when at step 5 of EEP-0
Attachment 2 of EEP-0
AUTOMATIC ACTIONS VERIFICATION

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	**(Step 1) Verify one CHG PUMP in each train - STARTED.** [] A train (1A or 1B) amps > 0 [] B train (1C or 1B) amps > 0	1A Chg pump will not be running if no actions have been taken to actuate a SI
	BOP	**(Step 2) Verify RHR PUMPs - STARTED.** RHR PUMP [] 1A amps > 0 [] 1B amps > 0	
	BOP	**(Step 3) Verify Safety Injection Flow.** **(Step 3.1)** Check HHSI flow - GREATER THAN 0 gpm. [] FI 943	HHSI flow will be 0 gpm if no actions have been taken to actuate a SI
	BOP	**(Step 3.1 RNO)** Verify proper SI alignment CHG PUMPS TO REGENERATIVE HX [] Q1E21MOV8107 closed [] Q1E21MOV8108 closed RWST TO CHG PUMP [] Q1E21LCV115B open [] Q1E21LCV115D open VCT OUTLET ISO [] Q1E21LCV115C closed [] Q1E21LCV115E closed HHSI TO RCS CL ISO [] Q1E21MOV8803A open [] Q1E21MOV8803B open CHG PUMP SUCTION HDR ISO [] Q1E21MOV8130A open [] Q1E21MOV8130B open [] Q1E21MOV8131A open [] Q1E21MOV8131B open CHG PUMP DISCH HDR ISO [] Q1E21MOV8132A open [] Q1E21MOV8132B open [] Q1E21MOV8133A open [] Q1E21MOV8133B open	If SI actuation has occurred manually then the following will not be done Critical Task – is to have one HHSI pump running with the corresponding MOV 8803A or B open

Op Test No.:	FA2012301	Scenario #	2	Event #	7		Page	35	of	47

Event Description: Attachment 2 of EEP-0

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	**(Step 3.2)** Check RCS pressure - LESS THAN 275 psig{**435 psig**}.	will be >435 psig
	BOP	**(Step 4) Verify each SW train - HAS TWO SW PUMPs STARTED.** [] A train (1A,1B or 1C) [] B train (1D,1E or 1C)	
	BOP	**(Step 5) Verify each train of CCW - STARTED.** (Step 5.1) Verify one CCW PUMP in each train- STARTED. A train HX 1C or 1B CCW FLOW [] FI 3043CA > 0 gpm OR [] FI 3043BA > 0 gpm B train HX 1A or 1B CCW FLOW [] FI 3043AA > 0 gpm OR [] FI 3043BA > 0 gpm Verify SW flow to associated CCW HX's SW FROM 1A(1B, 1C) CCW HX [] Q1P16FI3009AA > 0 gpm [] Q1P16FI3009BA > 0 gpm [] Q1P16FI3009CA > 0 gpm	1A CCW pump will not be running if no actions have been taken to actuate a SI Critical Task – to ensure a CCW pump

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 6) **Verify containment ventilation isolation.** Verify containment purge dampers - CLOSED. [] 3197 [] 3198D [] 3198C [] 3196 [] 3198A [] 3198B Verify containment mini purge dampers - CLOSED. CTMT PURGE DMPRS MINI-2866C & 2867C FULL-3198A & 3198D [] 2866C [] 2867C CTMT PURGE DMPRS MINI-2866D & 2867D FULL-3196 & 3197 BOTH-3198B & 3198C [] 2866D [] 2867D Stop MINI PURGE SUPP/EXH FAN.	**Will place HS to STOP**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 7) **Verify containment fan cooler alignment.** Verify at least one containment fan cooler per train - STARTED IN SLOW SPEED. CTMT CLR FAN SLOW SPEED A train [] 1A [] 1B B train [] 1C [] 1D Verify associated emergency service water outlet valves - OPEN. EMERG SW FROM 1A(1B,1C,1D) CTMT CLR [] Q1P16MOV3024A [] Q1P16MOV3024B [] Q1P16MOV3024C [] Q1P16MOV3024D	
	BOP	(step 8) **Verify AFW Pumps - STARTED.** Verify both MDAFW Pumps - STARTED [] 1A MDAFW Pump amps > 0 [] 1B MDAFW Pump amps > 0 AND [] FI-3229A indicates > 0 gpm [] FI-3229B indicates > 0 gpm [] FI-3229C indicates > 0 gpm	

(Step 8.2) **Check TDAFW Pump start required.**

⬜Condition	⬜TSLB	⬜Setpoint	⬜Coincidence⬜
RCP Bus Undervoltage	TSLB2 1-1 1-2 1-3	⬜2680 V	1/2 Detectors on 2/3 Busses
Low Low SG Water Level In Any 2/3 SGs	TSLB4 4-1,4-2,4-3 5-1,5-2,5-3 6-1,6-2,6-3	28%	2/3 Detectors on 2/3 SGs

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 8.3) Verify TDAFWP started. [] MLB-4 1-3 lit [] MLB-4 2-3 lit [] MLB-4 3-3 lit TDAFWP SPEED [] SI 3411A > 3900 rpm TDAFWP SPEED CONT [] SIC 3405 adjusted to 100% Verify TDAFW flow path to each SG. TDAFWP TO 1A(1B,1C) SG [] Q1N23HV3228A in MOD [] Q1N23HV3228B in MOD [] Q1N23HV3228C in MOD TDAFWP TO 1A(1B,1C) SG FLOW CONT [] HIC 3228AA open [] HIC 3228BA open [] HIC 3228CA open	

Event Description: 　　　　Attachment 2 of EEP-0

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 9) **Verify main feedwater status.** Verify main feedwater flow control and bypass valves - CLOSED. 1A(1B,1C) SG FW FLOW [] FCV 478 [] FCV 488 [] FCV 498 Verify both SGFPs - TRIPPED. Verify SG blowdown - ISOLATED. 1A(1B,1C) SGBD ISO [] Q1G24HV7614A closed [] Q1G24HV7614B closed [] Q1G24HV7614C closed 9.4 Verify SG blowdown sample - ISOLATED MLB lights lit. 1A(1B,1C) SGBD SAMPLE STEAM GEN ISO [] MLB1 19-2 lit Q1P15HV3328 closed [] MLB1 19-3 lit Q1P15HV3329 closed [] MLB1 19-4 lit Q1P15HV3330 closed	
	BOP	(Step 10) **Check no MSL isolation actuation signal present.** Signal　　　　Setpoint　　　coincidence　　　　TSLB LO SG PRESS < 585 psig　　2/3　　　TSLB4 19-2,3,4 Hi stm flow　　>40%　　　½ on 2/3　　TSLB4 16-3,4 and　　　　　and　　　　　　　　　　17-3,4 18-3,4 Lo-Lo Tavg　　<543°F　　2/3　　　TSLB2 10-1,2,3 HI-HI ctmt press >16.2 psig　2/3　　　TSLB1 2-2,3,4	
	BOP	(Step 11) **Verify PHASE A CTMT ISO.** (Step 11.1) Verify PHASE A CTMT ISO - ACTUATED. [] MLB-2 1-1 lit [] MLB-2 11-1 lit 11.2 Check all MLB-2 lights - LIT.	

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 12) **Check all reactor trip and reactor trip bypass breakers – OPEN** Reactor trip breaker A Reactor trip breaker B Reactor trip bypass breaker A Reactor trip bypass breaker B	
	BOP	(step 13) **Trip CRDM MG set supply breakers.** 1A(1B) MG SET SUPP BKR [] N1C11E005A [] N1C11E005B	
	BOP	(step 14) **Secure secondary components.** Stop both heater drain pumps. HDP [] 1A [] 1B Check any condensate pump started. IF started, THEN stop all but one condensate pump. [] 1A [] 1B If NO condensate pumps are started then place all HSs to STOP 14.3 IF condensate pump operating, THEN verify backup cooling aligned to condensate pumps per FNP-0-SOP-0.0, APPENDIX B, TB SO ACTIONS FOLLOWING A REACTOR TRIP OR SAFETY INJECTION.	**Will call TBSO to accomplish this.**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 15) **Verify** both CRACS mode selector switches in the ON position. CRACS Mode Selector Switch [] A TRAIN [] B TRAIN Will call BOOTH to have this accomplished since this is not in the simulator	
	BOP	(step 16) **WHEN** at least 30 seconds have passed since turbine trip, THEN check main generator tripped. 230 KV BKR [] 810 - OPEN [] 914 - OPEN	
	BOP	(step 17) **Verify** two trains of ECCS equipment aligned. **Perform ATTACHMENT 4, TWO TRAIN ECCS ALIGNMENT VERIFICATION.**	
		End of Attachment 2	

Time	Pos.	Expected Actions/Behavior	Comments
		Attachment 4 of EEP-0 **TWO TRAIN ECCS ALIGNMENT VERIFICATION**	
		(Step 1) Verify two trains of ECCS equipment aligned. (1.1 -1.5) [] Check DF01 closed [] Verify DF02 closed [] Check DG15 closed [] Verfiy DG02 closed [] Verify two trains of battery chargers – energized Amps > 0 (Step 1.6) Verify two trains of ESF equipment aligned. [] Check all MLB-1 lights LIT Verify charging pump suction and discharge valves - OPEN. CHG PUMP DISCH HDR ISO [] Q1E21MOV8132A [] Q1E21MOV8132B [] Q1E21MOV8133A [] Q1E21MOV8133B CHG PUMP SUCTION HDR ISO [] Q1E21MOV8130A [] Q1E21MOV8130B [] Q1E21MOV8131A [] Q1E21MOV8131B	Critical Task – initate A Train SI manually or align SI using ATTACHMENT 9,SAFETY INJECTION ALIGNMENT.

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Event Description: Attachment 4 of EEP-0

Time	Pos.	Expected Actions/Behavior	Comments
		(Step 1.7) Verify all post accident containment air mixing system fans - STARTED. (BOP) POST ACCIDENT MIXING FAN [] 1A [] 1B [] 1C [] 1D RX CAV H2 DILUTION FAN [] 1A [] 1B (Step 1.8) WHEN power restored to any de-energized emergency bus, THEN verify alignment of associated equipment.	
	BOP	(Step 1.9) Verify Spent Fuel Pool Cooling in service per SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.	Call Radside SO
		End of Attachment 4	

Time	Position	Applicant's Action or Behavior
		Attachment 1 of FRP-S.1
		AUTOMATIC SAFETY INJECTION VERIFICATION
	BOP	(step 1) **Check power to 4160 V ESF busses.** 4160 V ESF busses - AT LEAST ONE ENERGIZED A Train (F & K) power available lights lit OR B Train (G & L) power available lights lit Verify operating diesel generators are being supplied from at least one SW pump. (step 2) **Check SI Status.** Check any SI actuated indication. BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit
	BOP	(step 3) Verify MFW status - Verify main FRVs and bypass valves - valves CLOSED. 1A(1B,1C) SG STOP VLVFW FLOW [] FCV 478 [] FCV 488 [] FCV 498 - Verify both SGFPs - TRIPPED. - Verify SGBD isolated - HV 7614A, B C – closed - Verify SGBD sample valves closed by MLB-4 6-4, 7-4 and 8-4 LIT
	BOP	(step 4) Verify Phase A actuated – MLB-2 1-1 and 11-1 Lit all MLB-2 lights LIT
	BOP	(step 5) **Verify one CHG PUMP in each train - STARTED.** [] A train (1A or 1B) amps > 0 [] B train (1C or 1B) amps > 0
	BOP	(step 6) **Verify RHR PUMPs - STARTED.** RHR PUMP 1A and 1B amps > 0

| | BOP | (step 7) **Verify each train of CCW - STARTED.**
Verify one CCW PUMP in each train- STARTED.
A train HX 1C or 1B CCW FLOW

[] FI 3043CA > 0 gpm
OR
[] FI 3043BA > 0 gpm
B train HX 1A or 1B
CCW FLOW
[] FI 3043AA > 0 gpm
OR
[] FI 3043BA > 0 gpm

Verify SW flow to associated CCW HX's
SW FROM 1A(1B, 1C) CCW HX

[] Q1P16FI3009AA > 0 gpm
[] Q1P16FI3009BA > 0 gpm
[] Q1P16FI3009CA > 0 gpm

(step 8) **Verify each SW train - HAS TWO SW PUMPs STARTED.**
[] A train (1A,1B or 1C)
[] B train (1D,1E or 1C) |
| | BOP | (step 9) **Verify containment fan cooler alignment.**
Verify at least one containment fan cooler per train - STARTED IN SLOW SPEED.

CTMT CLR FAN SLOW SPEED
☐ A train
[] 1A
[] 1B

☐ B train
[] 1C
[] 1D

Verify associated emergency service water outlet valves - OPEN.
EMERG SW FROM 1A(1B,1C,1D) CTMT CLR
[] Q1P16MOV3024A
[] Q1P16MOV3024B
[] Q1P16MOV3024C |

		[] Q1P16MOV3024D
	BOP	(Step 10) **Check no MSL isolation actuation signal present.** Signal Setpoint coincidence TSLB LO SG PRESS < 585 psig 2/3 TSLB4 19-2,3,4 Hi stm flow >40% ½ on 2/3 TSLB4 16-3,4 and and 17-3,4 18-3,4 Lo-Lo Tavg <543°F 2/3 TSLB2 10-1,2,3 HI-HI ctmt press >16.2 psig 2/3 TSLB1 2-2,3,4 If a MSLI signal is present then close ALL MSIVs
	BOP	(step 11) Check containment pressure -HAS REMAINED LESS THAN 27 psig.
		End of attachment 1 of FRP-S.1

Event Description: Attachment 4 of EEP-1.0

Time	Pos.	Expected Actions/Behavior	Comments
		Attachment 4 of EEP-1 **VERIFYING 4160 V BUSSES ENERGIZED**	
		(Step 1) Verify 4160 V busses energized. [] Check DF01 closed [] Verify DF02 closed [] Check DG15 closed [] Verfiy DG02 closed [] Verify ALL RCP busses energized - 1A, 1B, 1C 4160V Bus [] Verify 1D/E busses energized (step 1.13) Verify instrument air aligned to containment. (BOP) IA TO PENE RM [] N1P19HV3825 open [] N1P19HV3885 open IA TO CTMT [] Q1P19HV3611 open	
		End of Attachment 4	

<u>Brief</u>

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, call Unit 2 at 2434 or page the Unit 2 Unit Operator.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

<u>Assign operating positions.</u>

<u>Ask for and answer questions.</u>

[X] Unit 1 [ ] Unit 2		**Shift:**	**Date**
Off-going SS	**Oncoming SS**	[ ] N [X] D	Today

Part I – To be reviewed by the oncoming Supervisor prior to assuming the shift.

Security Keys A, S, D, SW, X on key ring .___SS___

Unit	57% power RTP, MOL, 1109 ppm Cb, Xe building in
Status	Place the 1B SGFP on service **and then** ramp to 95% power.

STPs/Evolutions: STP-27.1 completed 2 hours ago	A Train On-Service – A Train Protected

1.0___; 109.1 _____ No adj. ; 63.7 _____; FSP-20,0 _____;

Status of Special Testing

General Information

1.	1-2A DG T/O for governor work. (OOS 2 days, ETR 4 hrs)
2.	Currently in UOP-3.1, complete through step 5.11. At step 5.12 ready to place 1B SGFP on service per SOP-21.0
3.	Start at step 4.4.12 of SOP-21.0 to place 1B SGFP on service.
4.	Do **NOT** perform STP-152.1, MFP 1A(1B) OVERSPEED TRIP MECHANISM TEST
5.	After placing the 1B SGFP on service, continue ramping the unit to 95% power.
6.	Current Risk Assessment is GREEN and projected is GREEN
7.	Thunderstorm warnings in effect for Southeast Alabama & Western Georgia
8.	
9.	

Equipment Status

1-2A DG T/O for governor work			Maintain VCT gas pressure 25-30 psig

Reactivity Plan	**Waste Management Status**
70 Gallon Dilutions as required to maintain temperature and power.	#3 RHT – On Service
	WGS – secured

LCO Status

3.8.1 condition B, STP-27.1 completed 2 hours ago	

Night Orders

No New Night Orders

Part II	Review Shift Complement
	LCOs Reviewed ___SS___ (initials) reviewed as early in shift as possible

Part III:	STP-1.0 Reviewed/Signed	Operator Logs Reviewed	Cond. Report Queue Reviewed	Autolog Reviewed	ELDS & GEN Spreadsheet verified	Keys Turned Over
	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes

Southern Nuclear
J.M. Farley Nuclear Plant

Operations Training
Simulator Exam Scenario
BOOTH INSTRUCTOR GUIDE

ILT-35 NRC EXAM SCENARIO #3

(SPARE)

This scenario can be shortened by 10-15 minutes by
having the UO place the CTMT cooler in service while the
OATC & SS commence the startup.

Validation time: 120 minutes Validated by David Shipman, Todd Smith and Doug Jimmerson The week of February 13, 2012			
TRN Supervisor Approval:	Gary Ohmstede	Date:	3/2/12
	.		
NRC Chief Examiner	SEE NUREG 1021 FORM ES-301-3		

SOUTHERN
COMPANY

Facility:	Farley Nuclear Plant		Scenario No.: 3		Op-Test No.:	FA2012-301

Examiners:		Operators:		SRO
				RO
				BOP

Initial Conditions: 1A CTMT cooler is isolated and will be returned to service per SOP-12.1. 4% power, UOP-1.2, v102, completed thru step 5.57, Ready to perform step 5.58. EOL, 449 ppm Cb, 18,000 MWD; 1A SGFP on service. Aux steam from U-2.
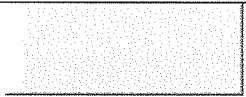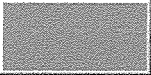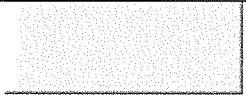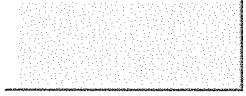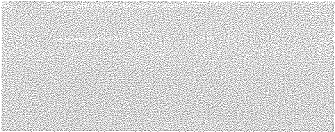
Turnover:
- Plant startup is on hold for turnover and will recommence after 1A CTMT cooler is RTS.
- 1A SGFP is on service, MFR bypass valves are on service.
- 1C DG T/O for slow start investigation.
- LCO 3.8.1 (1C DG).
- Current Risk Assessment is GREEN and projected to remain GREEN.
- **B train o/s, B train protected.**

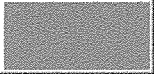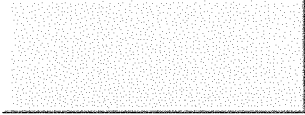|	SPLIT TRAIN ALIGNMENT		
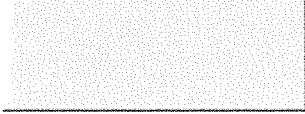
Event No.	Malf. No.	Event Type*	Event Description
~~1~~		~~N (BOP)~~	~~Start the 1A Ctmt Cooler in fast speed per SOP-12.1 ver 41.0~~ Event Not performed *BM*
2		R (RO)	Commence Ramp up to 12% power.
3	lmf FK479-A	C (BOP)	FK-479 FRV Bypass valve controller Auto output fails HIGH
4	lmf LT461	I (RO) TS (SRO)	LT-461, controlling channel, fails HIGH. **TS 3.3.1 Condition M for >10% power. Admin <10%.**
5	imf cpc2027c_co1	TS (SRO)	EA11, 1A Pzr Heater breaker, trips open. **TS 3.4.9.**
			Unit 2 will experience a safety injection during the 1A Pzr Htr failure. This ensures 1-2A DG will align to Unit 2 later on and Unit 1 will experience a loss of all AC condition. (no action required)
6	lmf pt464	I (BOP)	PT-464, Steam Header Pressure, fails HIGH.
7	imf PK444A-A imf pk444c-c	C (RO)	PK-444A, Pzr pressure controller, fails LOW When 1A loop spray valve (PCV-444C) opens it will stick full open.

8	Imf MAL-EPS1	M (ALL)	Dual unit LOSP at step 1 of ESP-0.1, ECP-0.0, Loss of ALL AC Power, entry required.
			1B DG fails to auto start. (No actions required)
		C (BOP)	
		C (BOP)	2C DG can be manually started and will automatically align to B Train emergency busses. (CT)
			1D and 1E SW pumps will not start on the sequencer. (CT)
9	Imf MAL-MSS1B preset	M (ALL)	After 2C DG is started and ESP-0.1 re-entered, Steam break inside ctmt occurs from 1B SG.
		C (RO)	1B CS Pump does not auto start. (CT)
		C (BOP)	
			1A MSIVs do not auto close (CT)
			Terminate when ESP-1.1, SI Termination, entered
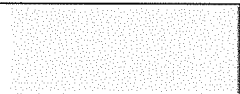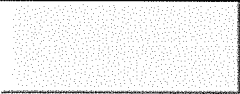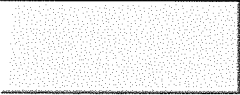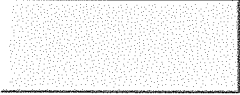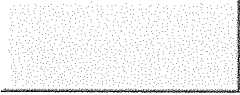
(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
0	0	**Load in IC-213 and sim IC snap directory** **Base IC is IC-45**	
		RUN	RUN simulator
0	0	Generic setup: bat generic_setup_HLT.txt	
		Quick setup is in IC-213	
0	0	Quick setup (all items with * are included): bat 2012nrcexam_03.txt	
		1B DG fails to auto start: Set jdgblk1b = true	If the box = TRUE than the 1B DG will NOT auto start
		PRESETS	
7	10	1D and 1E SW pump will not start on LOSP sequencer imf Cncpsw1f_d_cc5 open lmf Cncpsw1e_d_cc5 open	*
8	12	msiv 3369a and msiv 3370a fail to auto close imf crsh001a_cc5 open imf cmsh002a_d_cc5 open	*
7	0	1B DG fails to Auto Start DISPLAY/JDGBLK1B/FIND/SET = t set jdgblk1b = true	*
0	0	1C DG Tagged out imf cBK1DH07_d_cp1 imf cBK2DH07_d_cp1 imf ZA5 1	*
		Triggers and Commands	
		none	

Scenario 3 Simulator setup

		MCB setup	
		1C DG MSS	Place in Mode 3
		Place HOLD Tag on 1C DG MSS	1 HOLD TAG
		Place HOLD Tag on 1C DG DG output breakers DHO7-1 and DHO7-2	2 HOLD TAGS
		Place Unit 1 and Unit 2 Bypass and inoperable panel lights to the up position (EMERGENCY POWER SYSTEM)	Unit 1 A-Train Unit 2 A Train
		Ensure the 1B Ctmt cooler is selected	1B CTMT CLR selected
		DEH	Clear DEH alarms
		Select CRITICAL STARTUP PARAMETERS on MCB monitor Acknowledge computer alarms	IPC
		IPC: IF FF5 is in alarm, update rods	Ensure FF5 clear or update rods on IPC
		Setup spreadsheet on OATC computer to resemble reactivity spreadsheet provided	Set up computer
		Recorders	Verify memory disks cleared
		Provide a marked up copy of UOP-1.2 v102 completed thru step 5.57, Ready to perform step 5.58.	UOP-1.2 copy
			FREEZE simulator
		Perform Booth Operators Setup Checklist	
		Open Simview file to be used for plant parameter data collection: Simview / sv DataCollection.uvl	sv DataCollection.uvl
		If needed, adjust sim time back to 00:00:00 SIMVIEW / Sim_Clock.uvl Hours: clock(3) = 0 Minutes: clock(2) = 0 Seconds: clock(1) = 0	sv sim_clock.uvl
		VERIFY MICROPHONES READY	Batteries installed
		TURNOVER SHEET AVAILABLE	

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
Prior to RUN	0		
		Start data collection for Simview file **On DataCollection.uvl file press DATA for drop down** **and then COLLECT to start collecting data**	
	0	**Begin Exam**	 RUN simulator
		Verify Horns ON: hornflag HORNS ON = TRUE	 **Turn Horns ON/OFF** **ann horn**
1	Start of exam	Start the 1A Ctmt Cooler in fast speed per SOP-12.1	
2	When the ctmt cooler is started	Commence Ramp up to 12% power.	
3	NRC CUE	FK-479 FRV Bypass valve controller Auto output fails HIGH. Imf FK479-A 10 100	
4	NRC CUE	LT-461 fails HIGH. Imf LT461 100 60	
5	NRC CUE	1A Pzr heater trips imf cpc2027c_co1	
	To prevent a Rx trip, make this call prior to next event	Unit 2 will experience a safety injection during the 1A Pzr Htr failure. This ensures 1-2A DG will align to Unit 2 later on and Unit 1 will experience a loss of all AC condition. (no action required) IMF Csftyinj_cc21 closed Announce Unit 2 Rx trip and Safety Injection **Prior to next event, initiate a phone call from Maint. To place FK-479 back in service: see communications sheet** dmf fk479-a	
		Prior to inserting event 6, ensure SGWLs are close to 65% and FK-479 is returned to service so a Rx trip is less likely.	
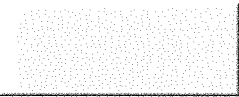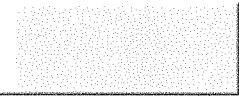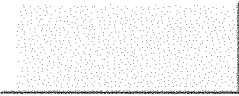
EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
6	NRC CUE	PT-464 fails HIGH. IMF PT464 1200 100	
put in BEFORE Event 7		bat 2012nrcexam_trgset_1.txt Causes 1A loop spray valve to stick full open.	
7	NRC CUE	PK-444A, Pzr pressure controller, fails LOW IMF PK444A-A 10 20 When 1A loop spray valve (PCV-444C) opens it will stick full open.	
8	Step 1 of ESP-0.1 or step 5 of EEP-0	Dual unit LOSP at step 1 of ESP-0.1 or EEP-0 step 5, ECP-0.0, Loss of ALL AC Power, entry required. IMF MAL-EPS1 1 10 1B DG fails to auto start. (No actions required) 2C DG can be manually started and will automatically align to B Train emergency busses. (CT) 1D and 1E SW pumps will not start on the sequencer. (CT)	
9	NRC CUE	After 2C DG is started, Steam break inside ctmt occurs from 1B SG. IMF MAL-MSS1B 3 300 1B CS Pump does not auto start. (CT) 1A MSIVs do not auto close (CT)	
		Terminate when ESP-1.1, SI Termination, entered	
		End of Exam	HORNS OFF
			FREEZE simulator
		Stop data collection for Simview file sv DataCollection.uvl	
		Export data to file with the name of NRC exam01 grpX.txt *NOTE: Substitute grpX with grp1, grp2, or grp3 as appropriate.*	Ensure data file created.

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
		NOTE: file will be saved in the OPENSIM directory.	

Local operator actions:

EVENT NO.	TIME	ACTIONS
1	NONE REQUIRED	
2	NONE REQUIRED	
3	NONE REQUIRED	
4	NONE REQUIRED	
5	NONE REQUIRED	
6	WHEN REQUESTED	
7	IF REQUESTED	
8	5 minutes after requested	Close V017B TDAFW Pump isolation valve

Remote n23 / loa-afw007 / 0 / 20 second ramp

| 8 | IF REQUESTED | Clear fire alarm |

imf mh1 2

Clear MK4 LIQ PANEL alarm

Imf mk4 2

Local operator actions:

EVENT NO.	TIME	ACTIONS
8	If requested	Start the 1B EAC

Irf Loa-cas019 true

Line up N2 to the PORVs

Irf loa-cas022 80 25

Open HV2228

Irf loa-cas028 100 20

Communications sheet

EVENT NO.	TIME	Communication:
1		NONE expected
2	IF REQUESTED	Have EM or OPS prepare to close Disconnect 915 per UOP-1.2, step 5.60.7.
3	IF REQUESTED	**ROVER:** Acknowledges to check FCV-479 in the MSVR.
4		NONE expected
5	WHEN REQUESTED	**ROVER:** EA11 is open. (there are no indications available on this breaker) **DISPATCHER:** Acknowledges when informed that the CR is in the queue.
5	During Event 5, call from maintenance	FK-479, FRV Bypass valve controller has been repaired and is ready to be placed in service **SM:** If called, SM agrees with placing FK-479 in service
6	WHEN REQUESTED	**SSS-plant, SM and Dispatcher:** Recognize and repeat back PT-464 failure, CR in the cue and that type of communications
7		NONE expected
8	WHEN REQUESTED	**DB SO:** Acknowledges to check the 2C DG alarms and that type of communications
8	IF REQUESTED	**Extra Operator:** The fire alarm is 1A-22 and I have acknowledged it on the fire alarm panel. **Radside SO:** The WHT high level alarm is in.

Communications sheet

EVENT NO.	TIME	Communication:
8	WHEN REQUESTED	**SM:** "I will make the classifications and notifications." **EXTRA CONTROL ROOM OPERATOR:** "Both CRACS mode selector switches are in ON." **SM / SSS:** "I will get an extra operator to secure the running DGs" **ANY CALL TO SHIFT CHEMIST:** Acknowledge to requirement for sampling.
8	WHEN REQUESTED	**Rover:** Align 1B Emergency air compressor **Radside SO:** Align backup N2 to the PORVs
9	WHEN REQUESTED	**Rover:** Isolate 1B SG from the HSDP per step 4.5 of EEP-2.0.

Initial Conditions: 1A CTMT cooler is isolated and will be returned to service per SOP-12.1. 4% power, UOP-1.2, v102, completed thru step 5.57, Ready to perform step 5.58. EOL, 449 ppm Cb, 18,000 MWD; 1A SGFP on service. Aux steam from U-2.

Turnover:
- Plant startup is on hold for turnover and will recommence after 1A CTMT cooler is RTS.
- 1A SGFP is on service, MFR bypass valves are on service.
- 1C DG T/O for slow start investigation.
- LCO 3.8.1 (1C DG).
- Current Risk Assessment is GREEN and projected to remain GREEN.
- B train o/s, B train protected.

Event 1   Start the 1A Ctmt Cooler in fast speed per SOP-12.1 ver 41.0

Event 2   Commence Ramp up to 12% power.

Verifiable actions: RO uses rods to increase RCS temperature, adjusts Steam Dumps to increase Rx power and adjusts MFW flow to the SGs (Bypass FRVs on service).

Event 3   FK-479, Bypass FRV, fails HIGH, Auto output failure.

Verifiable Actions: RO/BOP will manually control SG WL at low power levels. This will be a reactivity event as well. Stm dumps will have to be adjusted due to the cooldown.

Event 4   LT-461, controlling channel, fails HIGH.

Verifiable actions: charging flow in manual required to prevent Pzr level from decreasing to 15% and letdown securing, and select out the failed channel. Requires restoration of charging flow to AUTO.

TS 3.3.1 Condition M for >10% power. Admin <10%. AOP-100

Event 5   1A Pzr Heater Breaker trips open

TS 3.4.9 Condition B

Unit 2 will experience a safety injection during the 1A Pzr Heater failure. This ensures 1-2A DG will align to Unit 2 when the LOSP occurs and Unit 1 will experience a loss of all AC condition. (no action required)

Event 6   PT-464 fails high, Steam dumps open until shut by P-12, SGFP speed increases.

Verifiable actions: BOP will manually control SGFP speed and steam dumps to control RCS temperature. This is also a reactivity event. Manual control of steam dumps will be required after this event. Probable letdown isolation due to the cooldown. AOP-100.

Next event can be put in before letdown is re-established but after the plant is stabilized.

Event 7   PK-444A, Pzr pressure controller, fails LOW.

Verifiable actions: close PORV-444B, close spray valves for BOTH RCPs, trip the reactor prior to 2100 psig, then trip 1A and 1B RCPs.

Event 8   Dual unit LOSP, 1B DG does not auto start and 1C DG is tagged out, 1-2A DG is supplying unit 2. 1D and 1E SW pumps do not start on the sequencer.

Verifiable actions: start the 2C DG, (CT) start at least one SW pump. (CT)

<u>Event 9</u> 1B SG will have a fault inside containment after 2C DG is started.

1B CS Pump does not auto start. (CT)

Both 1A MSIVs will **NOT** auto close. Start the 1B CS Pump (CT) and close one MSIV on 1A MS line and isolate AFW flow to the faulted SG. (CT)

SOP-12.1 / AOP-100, sections 1.3, 1.2, 1.5 and 1.1 / EEP-0 / ESP-0.1 / ECP-0.0 / possible FRP-Z.1 entry / EEP-2.0 / ESP-1.1

CRITICAL TASK SHEET

___ 1. Restore power to any emergency bus prior to completing step 5 of ECP-0.0 and within 30 minutes of start of the event. (WOG CT E-0 - - C) (PRA - 10.44 DGOPSTART2C—H)

- Perform 2C DG SBO start.

___ 2. Manually Start the SW pump such that the EDG does not fail because of damage caused by engine overheating. (WOG CT ECA-0.0 - - F)

- Start 1D or 1E SW pump

___ 3. Isolate the faulted SG before transition out of E-2. (WOG CT E-2 - - A) (PRA - 10.41 AFW-ISO-BI)

- Manually Close ALL MSIVs to isolate the faulted SG
- Close AFW FCVs to the faulted SG

___ 4. Manually actuate at least the minimum required complement of containment cooling equipment before an extreme (red-path) challenge develops to the containment CSF. (WOG CT E-0 - - E)
  - Start the 1B CS pump after Containment pressure is/has been > 27 psig, and prior to a Red Path on FRP-Z.1 (54 psig) or start 2 ctmt cooler fans.
  - Requirement is 1 ctmt cooler fan **and** 1 CS pump OR 2 ctmt cooler fans.

SCENARIO OBJECTIVE/ OVERVIEW:

Low power instrument and component failures with LOSP and Steam Fault inside containment.
The team should be able to:
- Place the 1A Ctmt cooler in service, ramp the plant from 4% to 12 % power,
- respond to several instrument failures that affect the Stm dumps, Pzr level control and Pzr heater trip,
- respond to a FRV bypass controller failure that has the potential for affecting core reactivity by applying the guidance of AOP-100,
- respond to a Pzr pressure controller failure and then diagnose a stuck open spray valve per AOP-100,
- respond to a LOSP per ECP-0.0 during which component failures occur, and respond to a Steam fault inside containment with component failures.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	9
2.	Malfunctions after EOP entry (1–2)	3
3.	Abnormal events (2–4)	5
4.	Major transients (1–2)	2
5.	EOPs entered/requiring substantive actions (1–2)	1
6.	EOP contingencies requiring substantive actions (0–2)	2*
7.	Critical tasks (2–3)	4

*Possible FRP-Z.1 entry

Op Test No.: FA2012301	Scenario # 3	Event # 1	Page 1 of 44

Event Description: **Start the 1A Ctmt cooler per SOP-12.1, step 4.1**

Start the 1A Ctmt Cooler in fast speed per SOP-12.1

Indications Available:

Annunciators:	
- NONE	

Time	Pos.	Expected Actions/Behavior	Comments
		SOP-12.1, ver 41.0 **Step 4.1 Containment Cooling System Startup**	
	BOP	(Step 4.1.1) **OPEN** SW TO 1A CTMT CLR Q1P16MOV3019A	
	BOP	(Step 4.1.2) **OPEN** SW FROM 1A CTMT CLR Q1P16MOV3441A	
	BOP	(Step 4.1.3) **OPEN** 1A CTMT CLR SW DISCH Q1P16MOV3023A	
	BOP	(Step 4.1.4) **Check** SW combined flow through A Train (1A & 1B containment coolers) ≥ 2000 GPM.	
	BOP	(Step 4.1.5) **Check** SW combined flow through B Train (1C & 1D containment coolers) ≥ 2675 GPM.	
	BOP	(Step 4.1.6) **Start** the 1A containment cooler in FAST (SLOW) speed:	
	BOP	(Step 4.1.7) **Check** CTMT CLR DISCH OPEN lights illuminated for: CTMT CLR 1A DISCH 3186A OPEN	

| Op Test No.: FA2012301 | Scenario # 3 | Event # 1 | Page 2 of 44 |

Event Description: **Start the 1A Ctmt cooler per SOP-12.1, step 4.1**

Time	Pos.	Expected Actions/Behavior	Comments
		(Step 4.1.8) Place Dome Recirc fans in HIGH (LOW) speed.	All (4) Dome recirc fans are in HIGH speed
NOTE:		HV-3999A is on the A train BOP panel (RED labels) HV-3999B is on the B Train BOP panel (Blue labels) **The lights above the Rx Cavity Cooling Fan control switches (BLACK labels)** are the Discharge Dampers, **and are NOT** HV-3999A/B indication.	
		(Step 4.1.10) Open 1A and 1B Rx cavity cooling dampers (HV3999A and B)	1A and 1B Rx cavity cooling dampers(HV3999A and B) are open
Event #2 will begin when the Ctmt cooler is RTS.			

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Event Description: **Ramp up to 12% power**

Increase Reactor power to 12% and get ready to roll the Main Turbine. When simulator is taken to run the crew is expected to increase Reactor power to 12% IAW UOP-1.2. At 8% the NRC will evaluate going to the next event. This evolution will take approx. 15 -20 minutes

Indications Available:

Annunciators: NA

Time	Pos.	Expected Actions/Behavior	Comments
		UOP-1.2, Startup of Unit from Hot Standby to Minimum Load, version 102, step 5.58	
	RO	Begin to increase reactor power to greater than 12% with following controls. Manual adjustment of control rods Steam dumps in Steam Pressure Control Mode	Manual adjustment of rods (not more than 3 steps at a time) Stm dump control – adjust PK-464 counterclockwise to release more steam, decrease Tavg, pull rods and increase power
	SRO	Monitor reactor power and Steam Dump adjustments as reactor power rises	Examiner NOTE: Diluting is not procedurally required or expected at step 5.58 of UOP-1.2 and as such would not be a part of the reactivity plan
	BOP	Will be reviewing UOP-1.2 and getting ready to roll the main turbine.	

Op Test No.:	FA2012301	Scenario #	3	Event #	2	Page	4	of	44

Event Description: **Ramp up to 12% power**

Time	Pos.	Expected Actions/Behavior	Comments

	RO	<u>WHEN</u> Nuclear at Power Permissive P-10 permissive status light is illuminated (2/4 power ranges greater than 10%), <u>THEN</u> perform the following: {CMT-0003695}
		
		Block the intermediate range reactor trip and overpower rod stop.
		
		    Place INTEMEDIATE RANGE BLOCK TRN A to BLOCK.
		    Place INTEMEDIATE RANGE BLOCK TRN B to BLOCK.
		
		On the Bypass and Permissive Panel verify the following:
		    The INTERM RANGE TRAIN A TRIP BLOCKED light illuminated.
		    The INTERM RANGE TRAIN B TRIP BLOCKED light illuminated.
		
		Block the power range low setting reactor trip.
		    Place POWER RANGE BLOCK TRN A to BLOCK.
		    Place POWER RANGE BLOCK TRN B to BLOCK.
		
		On the Bypass and Permissive Panel verify the following:
		    The POWER RANGE LOW SETTING TRAIN A TRIP BLOCKED light illuminated.
		    The POWER RANGE LOW SETTING TRAIN B TRIP BLOCKED light illuminated.	

	RO	Verify that Low Power Trip Block P-7 status light is not illuminated to ensure the unblocking of the following reactor trips.
		    Pressurizer Low Pressure
		    Pressurizer High Water Level
		    Loss of Flow-Two Loops	

| Op Test No.: | FA2012301 | Scenario # | 3 | Event # | 2 | Page | 5 | of | 44 |

Event Description: **Ramp up to 12% power**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	Verify NR-45B is in the desired speed, i.e., 2nd speed (2 min/div) <u>OR</u> normal speed. (10 min/div)	
	SRO	Direct qualified EM or OPS personnel to close disconnect switch 915	
When 10-12% power is reached and at the discretion of the Lead Examiner move to event #3.			

| Op Test No.: FA2012301 | Scenario # 3 | Event # 3 | Page 6 of 44 |

Event Description: **FK-479 failure high Auto output failure**

Description here
Indications Available:

Annunciators:	Recognize indications of FK-499 failing high:
- 1C SG LVL DEV (JF3) - 1C SG FEED FLOW > STM FLOW (JG3) - 1C SG HI-HI LVL ALERT (JD3)	- 1C SG feed flow rising - 1C SG NR level rising - FRV bypass valve going full open

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100 section 1.5, version 11 **(possible AOP-13 entry)**	
	SRO	Instructs BOP/RO to perform Immediate Operator Actions of AOP-100	

	BOP	(step 1) Maintain SG levels at 65%.
		IF required, THEN, take manual control of SGFP speed control as necessary to restore SG level to 65%
		- SGFP master controller SK-509A
		OR
		- SGFP individual controllers as needed.
		    [ ] SK-509B
		    [ ] SK-509C
		
		IF required, THEN take manual control of the affected feedwater bypass valves
		[ ] **1A SG FW FLOW FK-479**
		[ ] 1B SG FW FLOW FK-489
		[ ] 1C SG FW FLOW FK-499
			NOTE: Step 1 is an Immediate Operator Action and a continuing action step

	SRO	If a loss of main feedwater occurs, then perform the actions of AOP-13, Loss of Main Feedwater	This will not result in a loss of MFW
	SRO	(step 2) If an adverse trend in SG level exists, then establish Trip Criteria	Trip criteria expected: - Rx trip on low SG level 28% - Main Turbine and Feed Pump Trip @ 82% SG level
			-
	BOP	(step 3) IF a ramp is in progress, THEN place Turbine on HOLD	No ramp will be in progress

Event Description: **FK-479 failure high Auto output failure**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO/ BOP	(step 4) Determine if an instrument failure has occurred. Check for a failed or erroneous indications from the following Steam flow or feed flow indicators. 　　　　　STM FLOW　　　FEED FLOW S/G　　CH III　CH IV　CH III　CH IV A S/G　FI-474　FI-475　FI-477　FI-476 B S/G　FI-484　FI-485　FI-487　FI-486 C S/G　FI-494　FI-495　FI-497　FI-496 Check for failed or erroneous readings on the following SG pressure indicators S/G　　CH II　　CH III　　CH IV A S/G　PI-474　PI-475　PI-476 B S/G　PI-484　PI-485　PI-486 C S/G　PI-494　PI-495　PI-496	NO instrument failure occurred
	SRO/B OP	IF the alarm(s) was due to a SGWLC System controlling channel failure, THEN select the unaffected channel and verify proper system response Places switches FS/498Z and FS/498Y for 1C SG in the III position: FT-494 (STM Flow) & FT-497 (FEED Flow)	No action required due to controller failure.
	SRO	(step 5) Refer to Tech Specs 3.3.2 and 3.7.3 for any LCO requirements.	No LCO requirements
	SRO	(step 6) Notify the Shift Manager	
		(step 7) WHEN plant conditions permit, THEN return systems to automatic control.	
	SRO	(step 8) Submit a condition report on the failed component, and notify the Work Week Coordinator (Maintenance ATL on backshifts) of the condition report.	
		At the discretion of the Lead Examiner move to Event #4	

Op Test No.: FA2012301	Scenario # 3	Event # 4	Page 8 of 44

Event Description: **LT-461 fails high, selected and controlling LT.**

LT-461 fails high. The crew will enter AOP-100 for the failing level transmitter and get control of pzr level before it trips letdown. If letdown trips then it will have to be placed on service prior to continuing.

Indications Available:

Annunciators:	Recognize indications of LT-461 failing high slowly:
- PRZR LVL HI B/U HTRS ON (HA2)	- LT-459, 460, Actual Przr level decreasing
- PRZR LVL HI RX TRIP ALERT (HA1)	- FI-122 slowly lowering
- CHG HDR FLOW HI-LO (EA2)	- VCT level rising

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100, Instrumentation Malfunction, ver 11, section 1.2	
	SRO	Direct entry into AOP-100 Perform the IOAs of AOP-100 for RCS pressure.	
	RO	(step 1) **Check** pressurizer level is on or trending to program value.	PZR level will be slowly decreasing
	RO	(step 2) **Check** RCP Seal Injection flows. [ ] HIK-186 adjusted to 6-13 gpm	No adjustment will be necessary
	RO	(step 3) **Determine** if a pressurizer level transmitter/indicator loop has failed.	LT-461 has failed high
	SRO/ RO	(Step 3) IF selected PRZR level control channel failed THEN select and unaffected channel. Controlling channel III / II is affected - RO directed to select channel I / II on LS-459Z, PRZR LEVEL CONTROL CHANNEL SWITCH IF required THEN select an unaffected channel on the PRZR level recorder control switch LS/459Y, PRZR LEVEL RECORDER INPUTS SWITCH	Channel 461 is selected, change to I / II position
	SRO/ RO	(step 4) Check letdown in service - Orifice isolation valves one or more open HV-8149A,B,C, LTDN ORIF ISO VLVS - Flow indicated on FI-150, LTDN HX OUTLET FLOW.	Letdown will remain in service

Op Test No.:	FA2012301	Scenario #	3	Event #	4		Page	9	of	44

Event Description: **LT-461 fails high, selected and controlling LT.**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 6) Refer to Tech Specs 3.3.1 & 3.3.3 determine any LCO requirements. **Tech Spec 3.3.1. Condition M**	Applicant may identify TS 3.3.3 as an **ADMIN LCO** only

TECHNICAL SPECIFICATION 3.3.1, Reactor Trip System (RTS) Instrumentation
The RTS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.

Table 3.3.1-1 Reactor Trip System Instrumentation
Function 9 - Pressurizer Water Level —High   Applicable in Mode 1 >P-7
3 required channels   condition M

	SRO	CONDITION	REQUIRED ACTION	COMPLETION TIME	
		M. One channel inoperable.	*---------------NOTE----------* *The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels.* *----------------------------* *M.1 Place channel in trip.* *OR* *M.2 Reduce THERMAL POWER to < P-7.*	*72 hours* *78 hours*	

	SRO	(step 7) Notify Shift Manager	
	RO	(step 8) WHEN plant conditions permit THEN restore components to automatic control as follows: Restore charging flow control to automatic per SOP-2.1, Chemical and Volume Control System Plant Startup and Operation	

SOP-2.1, CVCS Startup and Operation
version 126, section 4.6.2

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Event Description: **LT-461 fails high, selected and controlling LT.**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 4.6.2.1 and following) - Place LK-459F, PZR LVL Controller, in manual - Verify Pzr level is w/l 3% of setpoint as indicated on LR-459 - Manually adjust the output meter on LK-459F to equal the position of the meter pointer on CHG FLOW FI-122A - Place LK-459F in AUTO - Place FK-122 in AUTO	
		Continue AOP-100 actions here	
	RO	(step 8.2) Restore control of pressurizer heaters: - 1A PRZR HTR GROUP BACKUP - 1B PRZR HTR GROUP BACKUP - 1D PRZR HTR GROUP BACKUP - 1E PRZR HTR GROUP BACKUP (ARP HD4 Actions) - Places 1C PZR HTR switch in OFF and then back to the ON position	
	SRO	(step 9) Submit a Condition Report for failed channel and notify the Work Week Coordinator (Maintenance ATL on backshifts) of the Condition Report.	
When Tech Specs have been evaluated and the plant is under control and at the discretion of the Lead Examiner move to Event #5.			

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Event Description: **EA11, 1A Pzr Heater breaker, will trip open.**

When Pzr level is under control, EA11, 1A Pzr Heater breaker, will trip open.

Indications Available:	
Annunciators: - PRZR HTR BKR TRIPPED (HD5)	Recognize indications of A Pzr Htr breaker tripping: - 1A PZRZ HTR GROUP BACKUP green light LIT and Amber light LIT

Time	Pos.	Expected Actions/Behavior	Comments
		ARP- 1.8, HD5, Ver. 35.1	
	RO	(step 1) Determine which pressurizer heater group has tripped.	
	BOP	(step 2) refer to HC1 ARP	
	SRO	(step 4) Notify appropriate personnel to determine and correct the problem	CR written, SM notified
	SRO	(Step 5) Refer to Tech Spec 3.4.9	

TECHNICAL SPECIFICATION 3.4.9, Pressurizer

The pressurizer shall be OPERABLE with:

a. Pressurizer water level $\leq 63.5\%$ indicated; and

b. Two groups of pressurizer heaters OPERABLE with the capacity of each group ≥ 125 kW and capable of being powered from an emergency power supply.

1A Pzr Heater is a Tech Spec heater due to power supply.

		CONDITION	REQUIRED ACTION	COMPLETION TIME	
		B. One required group of pressurizer heaters inoperable.	B.1 Restore required group of pressurizer heaters to OPERABLE status.	72 hours	
	SRO	(step 7) Notify the Shift Manager			
	SRO	(Step 9) Submit a condition report for the failed instrument, and notify the Notify the Work Week Coordinator			

Prior to inserting event 6, ensure SGWLs are close to 65% and FK-479 is returned to service so a Rx trip is less likely.

When Tech Specs have been evaluated and the plant is under control and **at the discretion of the Lead Examiner move to Event #6.**

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Event Description: **PT-464, Steam Header Pressure, fails HIGH.**

PT-464 fails HIGH. This will result in SGFP speed increasing, STM Dumps will go full open, and close at 543°F, shift to manual and will not re-open until P-12 is reset or temperature rises above 545°F AND the controller placed in AUTO. RCS Tavg will slowly rise until the atmospherics lift. Reactor power will fluctuate throughout based on steam flow and temperature effects.

Indications Available:

Annunciators:	Indications of PT-464 failure:
- RX COOLANT LOOPS 1A, 1B, OR 1C TAVG LO-LO (FF4) - 1A SG LVL DEV (JF1) - 1B SG LVL DEV (JF2) - 1C SG LVL DEV (JF3)	- Steam dump demand indicator TI-408 increasing - Additional steam dump valves opening (as seen on Secondary Valve Position Indication Panel) - Steam flow increasing on all 3 SGs (as seen on SF/FF recorders) - PI-464A increasing to 1200 psig - RCS Tavg lowering - Rx power increasing

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100, Instrumentation Malfunction, ver 11, **section 1.4**	
	SRO	Directs RO or BOP to address ARPs as time permits • HF4, RX COOLANT LOOPS 1A, 1B, OR 1C TAVG LO-LO • JF1, 2, & 3: 1A, 1B, & 1C SG LVL DEV	**NOTE to examiner**: letdown may isolate on this event due to lowering pressurizer level when steam dumps go full open. Pzr level will be approx. 22% at start of event.
	SRO	Directs entry into AOP-100, section 1.4, and performance of immediate actions, then directs subsequent actions per RO & BOP rows below:	
	BOP	(step 1)Take manual control of SGFP speed control - SK-509A taken to manual and decreases speed	**immediate operator actions**

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Event Description: **PT-464, Steam Header Pressure, fails HIGH.**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 2)Set manual trip criteria on SG level (high and low trip setpoints are 82% & 28% respectively)	step 3 places ramp on hold – Main Turbine not tied to grid.
		(step 4) Adjust speed back to within the normal operating range for the feed flow/steam flow ΔP required for the existing power level. **Unit 1 NO LOAD ΔP is 50 psid for 10%.** Approximate ΔP can be determined from the following MCB indications. o SGFP DISCH PRESS PI-4003 o SG Pressure indications:	
	SRO	(step 5 RNO) Directs BOP operator to manually operate steam dumps to prevent opening of SG atmospheric relief valves as RCS temperature recovers	NOTE: Failure of PT-464 will affect automatic operation of the steam dumps in steam pressure mode.
	BOP	(step 5) Take manual control of the steam dumps and adjust to maintain Tavg at approx 550°F. - STM HDR PRESS PK-464 taken to raise to open STM Dumps to control RCS pressure	

Table within step 4:

S/G	CH II	CH III	CH IV
A S/G	PI-474	PI-475	PI-476
B S/G	PI-484	I-485	PI-486
C S/G	PI-494	PI-49	PI-496

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Event Description: **PT-464, Steam Header Pressure, fails HIGH.**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 6) Notifies Shift Manager (step 7) When plant conditions permit, Then restore components to AUTO control	Cannot do this step with PT-464 failed
	SRO	(step 8) Submits a CR & Notifies the Work Week Coordinator	
	SRO	Enters LCO 3.4.2, RCS Minimum Temperature for Criticality: Be in Mode 3 in 30 minutes: **IF Tavg < 541°F**	If required
TECHNICAL SPECIFICATION 3.4.2, RCS Minimum Temperature for Criticality			
	CRS	3.4 RCS 3.4.2, RCS Minimum Temperature for Criticality Each RCS loop average temperature (Tavg) shall be ≥ 541°F.	**NOTE:** Tech Spec applicability will vary depending of how quickly the event is diagnosed.

		CONDITION	REQUIRED ACTION	COMPLETION TIME	
		A. Tavg in one or more RCS loops not within limit.	A.1 Be in MODE 3.	30 minutes	

Restoration of letdown is not required to continue but may be allowed at the discretion of the Lead Examiner

At the discretion of the Lead Examiner move to Event #7.

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Event Description: **PK-444A, Pzr Pressure control controller, fails LOW**

PK-444A fails LOW which opens the spray valves and PORV-444B. RCS pressure falls.

Indications Available:

Annunciators:	Recognize indications of PK-444A failing LOW
- PRZR PRESS HI-LO (HC1) - PRZR HI-LO PRESS ALERT (HC2) - PRZR PRESS REL VLV 445A OR B/U HTRS ON (HD1)	- PK-444A controller reading 0% output - BOTH Spray valves open - PORV-444B open - RCS pressure falling

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100, Instrumentation Malfunction, ver 11, section 1.1	
	SS	Directs AOP-100 section 1.1 immediate actions to be performed	
		NOTE: WHEN transitioning to EEP-0, REACTOR TRIP OR SAFETY INJECTION AND at the Shift Supervisors direction, It is ACCEPTABLE for one team member to complete the Immediate Operator Actions of EEP-0, while the other team member verifies a Reactor Trip, THEN trips the appropriate RCPs before finishing the Immediate Operator Actions of EEP-0.	
	RO	(Step 1) Take manual control to raise RCS pressure: • PORVs PCV444B • Sprays PK-444C & D • Heaters 1A, 1B, 1C, 1D, 1E • PK-444A PRZR PRESS REFERENCE controller	**Immediate Action steps 1 and 2**

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Event Description: **PK-444A, Pzr Pressure control controller, fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 2) IF pressurizer pressure is decreasing due to a mechanically stuck open spray valve PCV444C or PCV444D, THEN perform the following: - IF the reactor trip breakers are closed, THEN trip the reactor prior to pressure reaching 2100 PSIG. - WHEN the reactor is tripped, THEN go to EEP-0, REACTOR TRIP OR SAFETY INJECTION.	
	BOP	WHEN the reactor is tripped, THEN verify 1A and 1B RCPs secured.	BOP will verify the reactor is tripped and then secure 1A and 1B RCPs
	SRO	**Reactor trip** Direct the reactor trip and enter EEP-0	

EEP-0, Reactor Trip or Safety Injection, version 43

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	Immediate Operator actions of EEP-0 (step 1) **Check reactor trip.** Check all reactor trip breakers and reactor trip bypass breakers - OPEN. Check nuclear power - FALLING. Check rod bottom lights - LIT. (step 2) **Check turbine - TRIPPED.** TSLB2 14-1 thru 4 lit (step 3) **Check power to 4160 V ESF busses.** 4160 V ESF busses - AT LEAST ONE ENERGIZED A Train (F 4160V bus) power available lights lit OR B Train (G 4160V bus) power available lights lit Verify operating diesel generators are being supplied from at least one SW pump.	**Immediate Action steps of EEP-0**

Time	Pos.	Expected Actions/Behavior	Comments
		(step 4) **Check SI Status.** Check any SI actuated indication. BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit	
		When ESP-0.1 entered then put in LOSP at discretion of Lead Examiner. **Steps 1 – 6 of ESP-0.1 below**	
		ESP.0.1, Reactor Trip Response, version 32	
	SRO	Directs actions in ESP-0.1 per RO/BOP Actions listed below	
	RO	(step 1) Check RCS temperature - Stable at or approaching 547°F - TAVG 1A(1B,1C) RCS LOOP [] TI 412D [] TI 422D STM DUMP [] TI 432D	NOTE: this is a continuing action step
	BOP	(step 1 RNO) Verify steam dumps closed. STM DUMP INTERLOCK [] A TRN in OFF RESET OR [] B TRN in OFF RESET	RCS temperature will be decreasing due to the RCP trips and AFW flow
	BOP	Verify atmospheric reliefs closed 1A(1B,1C) MS ATMOS REL VLV [] PC 3371A [] PC 3371B [] PC 3371C	
	BOP	(step 1.1.3) IF MSIVs are open, THEN isolate turbine building steam loads while continuing with RNO step 1.1.4.	Directs TB SO to wrap up the TB completing steps 1.1.3.1 – 1.1.3.3

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Event Description: **PK-444A, Pzr Pressure control controller, fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 1.1.4) IF cooldown continues, THEN minimize total AFW flow. AFW FLOW TO 1A(1B,1C) SG [] FI 3229A [] FI 3229B [] FI 3229C AFW TOTAL FLOW [] FI 3229 ☐ Control MDAFWP flow. MDAFWP FCV 3227 RESET [] A TRN reset [] B TRN reset MDAFWP TO 1A/1B/1C SG B TRN [] FCV 3227 in MOD Control TDAFWP flow.	Adjusts pots for AFW flow to maintain > 395 gpm if SG NR levels are <31%
	BOP	(step 1.1.5) IF cooldown continues, THEN close main steam isolation and bypass valves.	Cooldown should be under control by this time
	BOP	(step 2) WHEN RCS average temperature less than 554°F, THEN verify feedwater status. - Verify FRVs closed (step 2.2) - MDAFWP AUTO/DEFEAT [] 1A in DEFEAT [] 1B in DEFEAT (step 2.3) -Verify BOTH SGFPs tripped (step 2.4) -Verify total AFW flow to the SGs >395 gpm	NOTE: this is a continuing action step Will have to close the Bypass FRVs since P-4 is not present
	RO	(step 3) Verify ALL RX TRIP breakers OPEN	
When ESP-0.1 entered OR EEP-0.0 step 5 is started, then, at the discretion of the Lead Examiner, move to Event 8.			

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Event Description: **Loss of ALL AC power.**

A LOSP event occurs. 1C DG is tagged out, 1-2A DG is supplying power to Unit 2, 1B DG does not start. IB DG could be started if required and 2C DG will start per ECP-0.0.

Indications Available:	
Annunciators: - Many and various - EPB power indication lights not LIT	Recognize indications of Loss of ALL AC power - RCPs tripped - Components not running

Time	Pos.	Expected Actions/Behavior	Comments
		SRO may assign early action to BOP to perform load shed before actually entering ECP-0.0	
		ECP-0.0, Loss of ALL AC Power version 25	
	SRO	Recognize Loss of all AC and direct IOAs of ECP-0.	
	RO/ BOP	(step 1) Check reactor tripped. [] Check reactor trip and reactor trip bypass breakers - OPEN. [] Nuclear power – FALLING (step 1.1 RNO) Manually trip reactor. (step 1.2) IF reactor can NOT be tripped, THEN trip both MG set supply breakers. [] N1C11E005A [] N1C11E005B (step 2) Check turbine tripped. [] TSLB2 14-1 lit [] TSLB2 14-2 lit [] TSLB2 14-3 lit [] TSLB2 14-4 lit	Immediate Operator actions of ECP-0 are steps 1 and 2 **No power** **YES**

| | | RO | (step 3) **Verify RCS isolated.**
(step 3.1) Verify normal letdown isolated.

3.1.1 Verify all letdown line orifice isolation valves - CLOSED.
LTDN ORIF ISO 45 GPM
[] Q1E21HV8149A

LTDN ORIF ISO 60 GPM
[] Q1E21HV8149B
[] Q1E21HV8149C

OR
3.1.2 Verify letdown line isolation valves - CLOSED.
LTD LINE ISO
[] Q1E21LCV459
[] Q1E21LCV460

(step 3.2) WHEN RCS pressure less than 2335 psig, THEN verify both PRZR PORVs closed.
(step 3.3) Verify excess letdown line - ISOLATED.
EXC LTDN ISO VLV
[] Q1E21HV8153 closed
[] Q1E21HV8154 closed

(step 3.4) Verify all reactor vessel head vent valves - CLOSED.
RX VESSEL HEAD VENT OUTER ISO
[] Q1B13SV2213A
[] Q1B13SV2213B

RX VESSEL HEAD VENT INNER ISO
[] Q1B13SV2214A
[] Q1B13SV2214B | |
| | | | | |

	RO	(step 4) **Verify total AFW flow GREATER THAN 395 gpm.** AFW TOTAL FLOW [] FI 3229 (step 4 RNO) Verify TDAFWP running. TDAFWP STM SUPP FROM 1B(1C) SG [] MLB-4 1-3 lit [] MLB-4 2-3 lit [] MLB-4 3-3 lit TDAFWP SPEED [] SI 3411A > 3900 rpm TDAFWP SPEED CONT [] SIC 3405 adjusted to 100% Place TDAFWP STM SUPP FROM 1B SG HV3235A/26 AND TDAFWP STM SUPP FROM 1C SG to the START position	Once verified, AFW flow may be throttled back if SGWLs are >31%
	BOP	(step 5) [CA] **Restore power to any emergency bus.** (step 5.1) Verify supply breakers for major loads on emergency 4160 V busses - OPEN. [] BKR DF01 (1A S/U XFMR TO 1F 4160 V BUS) [] BKR DF15 (1B S/U XFMR TO 1F 4160 V BUS) [] BKR DF-13-1 (1F 4160 V BUS TIE TO 1H 4160 V BUS) [] BKR DG01 (1A S/U XFMR TO 1G 4160 V BUS) [] BKR DG15 (1B S/U XFMR TO 1G 4160 V BUS	SRO may assign early action to BOP to perform load shed On EPB

	BOP/ RO	[] 1C CCW PUMP BKR DF-04-1 [] 1B CCW PUMP BKR DF-05-1 [] 1B CCW PUMP BKR DG-05-1 [] 1A CCW PUMP BKR DG-04-1 [] 1A SW PUMP BKR DK-03-1 [] 1B SW PUMP BKR DK-04-1 [] 1C SW PUMP BKR DK-05-1 [] 1C SW PUMP BKR DL-05-1 [] 1D SW PUMP BKR DL-03-1 [] 1E SW PUMP BKR DL-04-1 [] #4 RW PUMP BKR DJ-03-1 [] #5 RW PUMP BKR DJ-04-1 [] #8 RW PUMP BKR DH-03-1 [] #9 RW PUMP BKR DH-04-1 [] #10 RW PUMP BKR DH-05-1 [] 1B CRDM CLG FAN BKR ED-11-1 [] 1A CRDM CLG FAN BKR EE-13-1 [] 1A CS PUMP BKR DF-11-1 [] 1B CS PUMP BKR DG-11-1 [] 1A RHR PUMP BKR DF-09-1 [] 1B RHR PUMP BKR DG-09-1 [] 1A CHG PUMP BKR DF-06-1 [] 1B CHG PUMP A TRN BKR DF-07-1 [] 1B CHG PUMP B TRN BKR DG-07-1 [] 1C CHG PUMP BKR DG-06-1 [] 1A MDAFWP BKR DF-10-1 [] 1B MDAFWP BKR DG-10-1	Load shed list continued from above Components on MCB and may be verified by RO

	BOP	**Check 1-2A, 1C or 1B diesel generator running for Unit 1.**
		
		Perform 2C DG SBO start:
		  o MSS in MODE 1
		  o USS in UNIT 1
		  o When load shed has been competed then depress START PB
		    2C DG will start
		
		  o Check Unit 1 2C DG output breaker DJ06 closes.
		  o Verify breaker DG13 closed. (1G 4160 V bus tie to 1J 4160 V BUS)
		  o Verify breaker DG02 closed. (1G 4160 V bus tie to 1L 4160 V bus)
		  o IF 1G 4160V bus energized, THEN proceed to step 5.7
			NO
			
			Critical task
			
			YES
			
			YES
			
			YES

		·	

	BOP	**Verify adequate SW flow.**
		   o Verify two SW PUMPS in energized train - RUNNING.
		[] A Train (1A, 1B or 1C)
		[] B Train (1D, 1E or 1C)
		
		   o IF A train energized, THEN verify SW TO/FROM DG BLDG - A HDR Q1P16V519/537 open.
		   o IF B train energized, THEN verify SW TO/FROM DG BLDG - B HDR Q1P16V518/536 open.
			Critical task
			
			Start 1D and/or 1E SW pump(s)
			
			YES
			
			YES

	BOP	Check no running diesel generator lube oil temperature annunciator in alarm. (155 ft, DG BLDG local control panel)	**Will call DB SO to check 2C DG**
	SRO	IF 1F OR 1G 4160 V bus energized THEN go to procedure and step in effect and implement function restoration procedures as necessary.	
		EEP-0, Reactor Trip or Safety Injection**, version 43**	

	RO/ BOP	Immediate Operator actions of EEP-0 (step 1) **Check reactor trip.** Check all reactor trip breakers and reactor trip bypass breakers - OPEN. Check nuclear power - FALLING. Check rod bottom lights - LIT. (step 2) **Check turbine - TRIPPED.** TSLB2 14-1 thru 4 lit (step 3) **Check power to 4160 V ESF busses.** 4160 V ESF busses - AT LEAST ONE ENERGIZED A Train (F 4160V bus) power available lights lit OR B Train (G 4160V bus) power available lights lit Verify operating diesel generators are being supplied from at least one SW pump.	**Immediate Action steps of EEP-0**
		(step 4) **Check SI Status.** Check any SI actuated indication. BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit	
		ESP.0.1, Reactor Trip Response, version 32	
	SRO	Directs actions in ESP-0.1 per RO/BOP Actions listed below	

	RO	(step 1) Check RCS temperature
		- Stable at or approaching 547°F
		- TAVG 1A(1B,1C) RCS LOOP
		    [] TI 412D
		    [] TI 422D STM DUMP
		    [] TI 432D
			NOTE: this is a continuing action step

When ESP-0.1 entered OR EEP-0.0 step 5 is started then, at the discretion of the Lead Examiner, move to Event 8.			

Event Description: **Steam break inside ctmt from 1B SG.**

When ESP-0.1 entered or step 5 of EEP-0, 1B SG will have a Stm Fault inside containment. The 1A MSIVs do not auto close so two SGs will be affected until MSIVs are closed. When the Steam Break occurs an Automatic SI will actuate if not already in. 1B CS pump will not auto start due to 2C DG running and past step 2.

Indications Available:	
Annunciators:	Recognize indications of LARGE Steam BREAK INSIDE CTMT
- Various and many	- Ctmt pressure rising
- Fire alarm (MH1)	- Przr level decreasing
- Hi ctmt pressure (EE1) (EE2) (EE3)	- SG pressures decreasing
	- Dewpoints in ctmt rising
	- Ctmt cooler drains increasing

Time	Pos.	Expected Actions/Behavior	Comments
		EEP-0, Reactor Trip or Safety Injection, version 43	
	RO/ BOP	Immediate Operator actions of EEP-0 (step 1) **Check reactor trip.** Check all reactor trip breakers and reactor trip bypass breakers - OPEN. Check nuclear power - FALLING. Check rod bottom lights - LIT. (step 2) **Check turbine - TRIPPED.** TSLB2 14-1 thru 4 lit (step 3) **Check power to 4160 V ESF busses.** 4160 V ESF busses - AT LEAST ONE ENERGIZED A Train (F 4160V bus) power available lights lit OR B Train (G 4160V bus) power available lights lit Verify operating diesel generators are being supplied from at least one SW pump.	**Immediate Action steps of EEP-0**

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Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
		(step 4) **Check SI Status.** Check any SI actuated indication. BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit	
	SRO	(step 5) Directs continuing into EEP-0 at step 5. **Directs the BOP to perform Attachment 2 of EEP-0.**	See **page 38,** which is at the Tab at end of scenario for Attachment 2 and 4 actions.
	RO	(step 6) **Check** containment pressure- HAS REMAINED LESS THAN 27 psig (checked on IPC or PI950, 951, 952, 953,CNMT PRESSURE) 6.1 Verify PHASE B CTMT ISO - ACTUATED. [] MLB-3 1-1 lit [] MLB-3 6-1 lit 6.2 Stop all RCPs. [] 1A [] 1B [] 1C 6.3 Verify PHASE B CTMT ISO alignment. Check containment spray. 6.4.1 Check CS flow in both trains > 0 gpm. CS FLOW [] FI 958A [] FI 958B	**NOTE:** [CA] step **Critical task** To start the 1B CS pump when ctmt press >27 psig or ensure 2 ctmt coolers are running. For a stm fault inside ctmt this is the required equipment that needs to be running
FRP-Z.1 may be entered if >27 psig in Ctmt and the CA step not used			
	RO	(step 7) **Announce** "Unit 1 reactor trip and safety injection".	

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Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 8) **Check AFW status.** Check secondary heat sink Available o Check total AFW flow > 395 gpm [] FI 3229A [] FI 3229B [] FI 3229C o Total Flow FI 3229 OR Check any SG NR level > 31% {48%} WHEN all SG narrow range levels less than 31%{48%}, THEN maintain total AFW flow greater than 395 gpm. WHEN at least two SG narrow range levels greater than 28% AND TDAFWP NOT required, THEN stop TDAFWP.	
	RO	(step 8.4) WHEN SG narrow range level greater than 31%{48%}, THEN maintain SG narrow range level 31%-65%{48%-65%}. • Control MDAFWP flow. MDAFWP FCV 3227 RESET [] A TRN reset [] B TRN reset MDAFWP TO 1A/1B/1C SG B TRN [] FCV 3227 in MOD Control TDAFWP flow. TDAFWP FCV 3228 [] RESET reset TDAFWP SPEED CONT [] SIC 3405 adjusted	**NOTE:** [CA] step –
	RO	(step 9) **Check RCS temperature.** IF any RCP running, THEN check RCS average temperature - STABLE AT OR APPROACHING 547°F. TAVG 1A(1B,1C) RCS LOOP [] TI 412D [] TI 422D [] TI 432D	

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Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 9 RNO) IF RCS temperature less than 547°F and falling, THEN perform the following. (step 9.1.1) Verify steam dumps closed. STM DUMP INTERLOCK [] A TRN in OFF RESET [] B TRN in OFF RESET (step 9.1.2) Verify atmospheric reliefs closed on MCB [] Demand at 0 and minimum red light LIT (step 9.1.3) Control total AFW flow to minimize RCS cooldown, AFW FLOW TO 1A(1B,1C) SG [] FI 3229A [] FI 3229B [] FI 3229C AFW TOTAL FLOW [] FI 3229 IF MSIVs are closed THEN proceed to step 9.1.8 IF MSIVs are open, THEN isolate steam loads in the turbine building while continuing with RNO step 9.1.6.	**NOTE:** <u>RNO</u> column since RCS temp will be <547°F **NOTE: Will call TBSO to accomplish this task**

Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 10) **Check pressurizer PORVs and spray valves.** WHEN pressurizer pressure less than 2335 psig, THEN verify both PRZR PORVs closed. Verify both PRZR PORVs indicate CLOSED Check PRZR PORV temperature STABLE OR FALLING. [] PORV Temp TI-463 Check PRT parameters STABLE or FALLING. [] PRT PRESS PI 472 [] PRT LVL LI-470 [] PRT TEMP TI-471 WHEN pressurizer pressure less than 2260 psig, THEN verify normal pressurizer spray valves closed OR in the process of closing. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D Check any PRZR PORV ISO - OPEN	**NOTE:** [CA] step – **NOTE:** [CA] step –
	RO	(step 11) **Check RCP criteria.** Check SUB COOLED MARGIN MONITOR indication – GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE	
	RO	(step 12) **Monitor charging pump miniflow criteria.** Control charging pump miniflow valves based on RCS pressure. 1C(1A) LOOP RCS WR PRESS [] PI 402A [] PI 403A	**NOTE:** Based on RCS pressure, close miniflows < 1300 and open when > 1900 psig.
		Diagnostics	
		The SRO will direct the parameters to be reviewed and will determine appropriate procedure to transition to.	

Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 13) **Check SGs not faulted.** [] Check no SG pressure – FALLING IN AN UNCONTROLLED MANNER OR LESS THAN 50 psig. RNO – Go to EEP-2.0, Faulted SG Isolation	2 SGs will be faulted
		Actions for FRP-Z.1, ver 15	
	SRO	Direct transition to EEP-2 or FRP-Z.1	**See EEP-2 on page 32** if FRP-Z.1 not entered
	RO	(step 1) Verify PHASE A CTMT ISO - ACTUATED. [] MLB-2 1-1 lit [] MLB-2 11-1 lit (step 2) Check all MLB-2 lights - LIT. - Verify containment ventilation isolation. - Verify all containment purge dampers- CLOSED. - Verify containment mini purge dampers - CLOSED. - Stop MINI PURGE SUPP/EXH FAN.	
	RO	(step 3) Check if containment spray is required. - Containment pressure - HAS RISEN TO GREATER THAN 27 psig. - Verify PHASE B CTMT ISO – ACTUATED - Verify containment spray pumps – RUNNING - Check containment spray flow in both trains - > 0 gpm. CS FLOW on FI 958A and FI 958B	NOTE: [CA] step – Critical task 1B CS Pump will need to be started
	BOP	Check all MLB-3 lights - LIT.	

Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	Stop all RCPs.	
	BOP	(step 4) **Verify containment fan cooler alignment.** Verify all available containment fan coolers - STARTED IN SLOW SPEED. CTMT CLR FAN SLOW SPEED [] 1A [] 1B - TRIPPED [] 1C [] 1D – DID NOT START Verify associated emergency service water outlet valves - OPEN. EMERG SW FROM 1A(1B,1C,1D) CTMT CLR [] Q1P16MOV3024A [] Q1P16MOV3024B [] Q1P16MOV3024C [] Q1P16MOV3024D	**NOTE:** 1D ctmt cooler is the only cooler running <u>Critical task</u> Start the 1C and 1D CTMT cooler or the 1B CS pump and 1 ctmt cooler
	BOP	(step 5) **Verify MSIV and bypass valves**	<u>Critical task</u> **CLOSE MSIVs.**
	BOP	(step 6) **Check if feed flow should be isolated to any SG.** Check any SG pressure - FALLING IN AN UNCONTROLLED MANNER OR LESS THAN 50 psig. Verify all faulted SG main feed stop valves - CLOSED.	
	SRO	Evaluation - IF all SGs faulted THEN maintain 20 gpm AFW flow to each SG.	Only the 1B SG is faulted
	BOP	(step 6.4) Isolate AFW flow to all faulted SGs. Close MDAFWP isolation valves to all faulted SGs. (BOP)	<u>Critical task</u> Closes MOV3764B (BOP) <u>MOV3764D</u> has **no power** available (MOV in series)
	BOP	Close TDAFWP flow control valves to all faulted SGs. TDAFWP FCV 3228 [] RESET reset	Take HV-3228B pot to 0

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	Call to SSS-P or TSC to have Q1N23V017B closed in the MSVR	
		EEP- 2.0, Faulted Steam Generator Isolation, version 15	
	BOP	(step 1) **Verify all MSIV and bypass valves - CLOSED.** Place handswitches for all MSIVs to the CLOSED position (6 total)	<u>Critical task</u> CLOSE MSIVs.
	BOP	(step 2) **Check if any SG not faulted.** Check pressure in at least one SG - STABLE OR RISING. (step 3) Identify the faulted SG	Only 1B SG will be blowing down once the MSIVs are closed 1B SG
	BOP	(step 4) **Isolate all faulted SGs.** - Verify 1B ARV closed - **PC3371B minimum demand** - Verify 1B SG Feed stop valves closed **MOV3232B** - Verify blowdown from all faulted SGs - ISOLATED. **HV 7614B** Since the fault is on the 1B SG, the crew will proceed to step 4.5	
	SRO	(step 4.5) IF 1B SG faulted, then isolate TDAFWP steam supply from 1B SG - IF TDAFWP NOT required, THEN isolate TDAFWP steam supply from 1B SG at hot shutdown panel.	Will call BOOTH operator to have this accomplished
	BOP	(step 4.6) Verify SG blowdown sample ISOLATED MLB lights lit. 1A(1B,1C) SGBD SAMPLE ISO [] MLB1 19-2 lit Q1P15HV3328 closed [] MLB1 19-3 lit Q1P15HV3329 closed [] MLB1 19-4 lit Q1P15HV3330 closed	

Op Test No.:	FA2012301	Scenario #	3	Event #	9	Page	33	of	44

Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 5) Isolate AFW flow to all faulted SGs. Close MDAFWP isolation valves to all faulted SGs. (BOP) - Closes MOV3764B or MOV3764D	<u>Critical task</u> Closes MOV3764B on the BOP <u>MOV3764D</u> has **no power** available (MOV in series)
	BOP	(step 5.2) Close TDAFWP flow control valves to all faulted SGs. TDAFWP FCV 3228 [] RESET reset	<u>Critical task</u> Close HV3228B pot to 0 AND call to close V017B below.
	SRO	(step 5.3) Call to SSS-P or TSC to have Q1N23V017B closed in the MSVR	key Z-139
	BOP	(step 6) Check CST level greater than 5.3 feet (step 7) **Check secondary radiation indication - NORMAL.**	[] R-15 [] 19 [] 23A and B [] 15B and C, [] 60 A, B, C, D
	SRO	(step 8) Evaluate SI termination criteria - Check SCMM indication – GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE. - Check secondary heat sink available. >395 gpm AFW flow OR > 31%{48%} SGNR level - Check RCS pressure - STABLE OR RISING - Check pressurizer level > 13%{43%}.	

Expected end of scenario

When the Faulted SG is isolated and announcement of SI termination transition identified (ESP-1.1 or EEP-1 return) , then terminate the exam.

| | SRO | Enter EEP-1 or ESP-1.1 depending on SI termination criteria | See below for both procedure actions |

Op Test No.: FA2012301   Scenario #   3   Event #   9   Page   34   of   44

Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
		ESP- 1.1, SI TERMINATION, version 25	
	RO	(Step 1) Verify SI Reset [] MLB-1 1-1 not lit (A TRN) [] MLB-1 11-1 not lit (B TRN)	
	RO	(Step 2)**Stop all but one CHG PUMP.**	
	SRO	(Step 3) **Verify RCS pressure - STABLE OR Rising** 1C(1A) LOOP RCS WR PRESS [] PI 402A [] PI 403A	
	RO	(Step 4) **Isolate HHSI flow.**	Verify alignment and change chg pump suctions to the VCT
	RO	(Step 5) **Establish normal charging.**	Align FCV-122 to operation
		If EEP-1 is entered and the exam is allowed to continue then these actions will be performed.	
		EEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, rev 30	
	RO	(step 1) **Check RCP criteria.** Check SUB COOLED MARGIN MONITOR indication - GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE.	
	BOP	(step 2) **Check SGs not faulted.** Check no SG pressure – FALLING IN AN UNCONTROLLED MANNER OR LESS THAN 50 psig.	RNO IF affected SG not isolated then Go to EEP-2

Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 3) **Check intact SG levels.** Check any intact SG narrow range level – GREATER THAN 31%{48%}. WHEN SG narrow range level greater than 31%{48%}, THEN maintain SG narrow range level 31%-65%{48%-65%}. Control MDAFWP flow. MDAFWP FCV 3227 RESET [] A TRN reset [] B TRN reset MDAFWP TO 1A/1B/1C SG B TRN [] FCV 3227 in MOD Control TDAFWP flow. TDAFWP FCV 3228 [] RESET reset TDAFWP SPEED CONT [] SIC 3405 adjusted	NOTE: [CA] step –
	BOP	(step 4) **Check secondary radiation indication - NORMAL.** Checks rad monitors	[] R-15 [] 19 [] 23A and B [] 15B and C, [] 60 A, B, C, D
	RO	(step 5) **Check pressurizer PORVs** **Check any PRZR PORV ISO – power available** WHEN pressurizer pressure less than 2335 psig, THEN verify pressurizer PORVs closed with no leakage. [] Verify both PRZR PORVs – CLOSED Check PRZR PORV temperature STABLE OR FALLING. [] PORV Temp TI-463 Check PRT parameters STABLE or FALLING. [] PRT PRESS PI 472 [] PRT LVL LI-470 [] PRT TEMP TI-471 [] Check at least one PRZR PORV ISO - OPEN	NOTE: [CA] step –

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 6) **Perform the following within 1 hour of start of event.**	**NOTE:** These steps are not required since this is a steam fault event.
	SRO	(step 7) <u>**Evaluate SI termination criteria**</u> [] Check SUB COOLED MARGIN MONITOR indication – GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE. Check secondary heat sink available. [] >395 gpm AFW flow OR [] > 31%{48%} SGNR level [] Check RCS pressure - STABLE OR RISING [] Check pressurizer level GREATER THAN 13%{43%}.	RNO – if all SI termination criteria is met then go to ESP-1.1, see actions above on page 33
	RO	(step 8) **[CA] Check containment spray system.** Check any CS PUMP - STARTED. Reset containment spray signals. CS RESET [] A TRN [] B TRN	
	RO	(step 9) **[CA] Check if LHSI Pumps should be stopped** Check RCS pressure - > {435 psig} [] PI 402B [] PI 403B - Check RCS pressure stable or rising - RHR pumps running from RWST - Verify SI reset. [] MLB-1 1-1 not lit (A TRN) [] MLB-1 11-1 not lit (B TRN) - Stop any RHR Pumps running with suction aligned to the RWST.	

Event Description: **Steam break inside ctmt from 1B SG.**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 10) **Check no SG pressure - FALLING IN AN UNCONTROLLED MANNER**	(step 10 RNO) Return to step 1.

When the Faulted SG is isolated and announcement of SI termination transition identified (ESP-1.1 or EEP-1 return), then terminate the exam.

Event Description: **Attachment 2 of EEP-0**

Cue: BOP will accomplish when at step 5 of EEP-0

Attachment 2 of EEP-0

AUTOMATIC ACTIONS VERIFICATION

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	**(Step 1) Verify one CHG PUMP in each train - STARTED.** [] A train (1A or 1B) amps > 0 [] B train (1C or 1B) amps > 0	
	BOP	**(Step 2) Verify RHR PUMPs - STARTED.** RHR PUMP [] 1A amps > 0 [] 1B amps > 0	
	BOP	**(Step 3) Verify Safety Injection Flow.** **(Step 3.1)** Check HHSI flow - GREATER THAN 0 gpm. [] FI 943	
	BOP	**(Step 3.2)** Check RCS pressure - LESS THAN 275 psig{**435 psig**}.	
	BOP	**(step 3.3)** Check LHSI flow – greater than 1.5×10^3 gpm [] 1A RHR HDR FLOW FI-605A [] 1B RHR HDR FLOW FI-605B	
	BOP	**(Step 4) Verify each SW train - HAS TWO SW PUMPs STARTED.** [] A train (1A,1B or 1C) [] B train (1D,1E or 1C)	

Event Description: **Attachment 2 of EEP-0**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	**(Step 5) Verify each train of CCW - STARTED.** (Step 5.1) Verify one CCW PUMP in each train- STARTED. A train HX 1C or 1B CCW FLOW [] FI 3043CA > 0 gpm OR [] FI 3043BA > 0 gpm B train HX 1A or 1B CCW FLOW [] FI 3043AA > 0 gpm OR [] FI 3043BA > 0 gpm Verify SW flow to associated CCW HX's SW FROM 1A(1B, 1C) CCW HX [] Q1P16FI3009AA > 0 gpm [] Q1P16FI3009BA > 0 gpm [] Q1P16FI3009CA > 0 gpm	
	BOP	(step 6) **Verify containment ventilation isolation.** Verify containment purge dampers - CLOSED. [] 3197 [] 3198D [] 3198C [] 3196 [] 3198A [] 3198B Verify containment mini purge dampers - CLOSED. CTMT PURGE DMPRS MINI-2866C & 2867C FULL-3198A & 3198D [] 2866C [] 2867C CTMT PURGE DMPRS MINI-2866D & 2867D FULL-3196 & 3197 BOTH-3198B & 3198C [] 2866D [] 2867D Stop MINI PURGE SUPP/EXH FAN.	**Will place HS to STOP**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 7) **Verify containment fan cooler alignment.** Verify at least one containment fan cooler per train - STARTED IN SLOW SPEED. CTMT CLR FAN SLOW SPEED A train [] 1A [] 1B B train [] 1C [] 1D Verify associated emergency service water outlet valves - OPEN. EMERG SW FROM 1A(1B,1C,1D) CTMT CLR [] Q1P16MOV3024A [] Q1P16MOV3024B [] Q1P16MOV3024C [] Q1P16MOV3024D	A trn is not running due to loss of power **Critical task – Start** 1C ctmt cooler if 1B CS not running since only 1D ctmt cooler will be running due to the LOSP sequencer
	BOP	(step 8) **Verify AFW Pumps - STARTED.** Verify both MDAFW Pumps - STARTED [] 1A MDAFW Pump amps > 0 [] 1B MDAFW Pump amps > 0 AND [] FI-3229A indicates > 0 gpm [] FI-3229B indicates > 0 gpm [] FI-3229C indicates > 0 gpm	
		(Step 8.2) Check TDAFW Pump start required.	

(Step 8.2) Check TDAFW Pump start required.

□Condition	□TSLB	□Setpoint	□Coincidence□
RCP Bus Undervoltage	TSLB2 1-1 1-2 1-3	□2680 V	1/2 Detectors on 2/3 Busses
Low Low SG Water Level In Any 2/3 SGs	TSLB4 4-1,4-2,4-3 5-1,5-2,5-3 6-1,6-2,6-3	28%	2/3 Detectors on 2/3 SGs

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 8.3) Verify TDAFWP started. [] MLB-4 1-3 lit [] MLB-4 2-3 lit [] MLB-4 3-3 lit TDAFWP SPEED [] SI 3411A > 3900 rpm TDAFWP SPEED CONT [] SIC 3405 adjusted to 100% Verify TDAFW flow path to each SG. TDAFWP TO 1A(1B,1C) SG [] Q1N23HV3228A in MOD [] Q1N23HV3228B in MOD [] Q1N23HV3228C in MOD TDAFWP TO 1A(1B,1C) SG FLOW CONT [] HIC 3228AA open [] HIC 3228BA open [] HIC 3228CA open	
	BOP	(step 9) **Verify main feedwater status.** Verify main feedwater flow control and bypass valves - CLOSED. 1A(1B,1C) SG FW FLOW [] FCV 478 [] FCV 488 [] FCV 498 Verify both SGFPs - TRIPPED. Verify SG blowdown - ISOLATED. 1A(1B,1C) SGBD ISO [] Q1G24HV7614A closed [] Q1G24HV7614B closed [] Q1G24HV7614C closed 9.4 Verify SG blowdown sample - ISOLATED MLB lights lit. 1A(1B,1C) SGBD SAMPLE STEAM GEN ISO [] MLB1 19-2 lit Q1P15HV3328 closed [] MLB1 19-3 lit Q1P15HV3329 closed [] MLB1 19-4 lit Q1P15HV3330 closed	

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	**(Step 10) Check no MSL isolation actuation signal present.** Signal — Setpoint — coincidence — TSLB LO SG PRESS < 585 psig 2/3 TSLB4 19-2,3,4 Hi stm flow >40% ½ on 2/3 TSLB4 16-3,4 and and 17-3,4 18-3,4 Lo-Lo Tavg <543°F 2/3 TSLB2 10-1,2,3 HI-HI ctmt press >16.2 psig 2/3 TSLB1 2-2,3,4	
	BOP	(Step 11) **Verify PHASE A CTMT ISO.** (Step 11.1) Verify PHASE A CTMT ISO - ACTUATED. [] MLB-2 1-1 lit [] MLB-2 11-1 lit 11.2 Check all MLB-2 lights - LIT.	
	BOP	(step 12) **Check all reactor trip and reactor trip bypass breakers – OPEN** Reactor trip breaker A Reactor trip breaker B Reactor trip bypass breaker A Reactor trip bypass breaker B	
	BOP	(step 13) **Trip CRDM MG set supply breakers.** 1A(1B) MG SET SUPP BKR [] N1C11E005A [] N1C11E005B	
	BOP	(step 14) **Secure secondary components.** Stop both heater drain pumps. Check any condensate pump started. IF started, THEN stop all but one condensate pump. If NO condensate pumps are started then place all HSs to STOP 14.3 IF condensate pump operating, THEN verify backup cooling aligned to condensate pumps per FNP-0-SOP-0.0, APPENDIX B, TB SO ACTIONS FOLLOWING A REACTOR TRIP OR SAFETY INJECTION.	**Will call TBSO to accomplish this.**

Event Description: **Attachment 2 of EEP-0**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 15) **Verify both CRACS mode selector switches in the ON position.** CRACS Mode Selector Switch [] A TRAIN [] B TRAIN Will call BOOTH to have this accomplished since this is not in the simulator	
	BOP	(step 16) **WHEN at least 30 seconds have passed since turbine trip,** **THEN check main generator tripped.** 230 KV BKR [] 810 - OPEN [] 914 - OPEN	
	BOP	(step 17) **Verify two trains of ECCS equipment aligned.** Perform ATTACHMENT 4, TWO TRAIN ECCS ALIGNMENT VERIFICATION.	SEE page 44
		End of Attachment 2	

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Event Description: **Attachment 4 of EEP-0**

Time	Pos.	Expected Actions/Behavior	Comments
		Attachment 4 of EEP-0 **TWO TRAIN ECCS ALIGNMENT VERIFICATION**	
		(Step 1) Verify two trains of ECCS equipment aligned. [] Check DF01 closed [] Verify DF02 closed [] Check DG15 closed [] Verfiy DG02 closed [] Verify two trains of battery chargers – energized Amps > 0 (Step 1.6) Verify two trains of ESF equipment aligned. [] Check all MLB-1 lights LIT Verify charging pump suction and discharge valves - OPEN. CHG PUMP DISCH HDR ISO [] Q1E21MOV8132A [] Q1E21MOV8132B [] Q1E21MOV8133A [] Q1E21MOV8133B CHG PUMP SUCTION HDR ISO [] Q1E21MOV8130A [] Q1E21MOV8130B [] Q1E21MOV8131A [] Q1E21MOV8131B	
		(Step 1.7) Verify all post accident containment air mixing system fans - STARTED. (BOP) POST ACCIDENT MIXING FANs RX CAV H2 DILUTION FANs (Step 1.8) WHEN power restored to any de-energized emergency bus, THEN verify alignment of associated equipment.	
	BOP	(Step 1.9) Verify Spent Fuel Pool Cooling in service per SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.	Call Radside SO
		End of Attachment 4	

Brief

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, call Unit 2 at 2434 or page the Unit 2 Unit Operator.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

Ask for and answer questions.

Appendix D	Turnover sheet	Form ES-D-2

[X] Unit 1 [ ] Unit 2		Shift:	Date
Off-going SS	Oncoming SS	[ ] N [X] D	Today

Part I – To be reviewed by the oncoming Supervisor prior to assuming the shift.

Security Keys A, S, D, SW, X on key ring .___SS

Unit Status	4% power, UOP-1.2, v102, completed thru step 5.57, Ready to perform step 5.58. EOL, 449 ppm Cb, 18,000 MWD; 1A SGFP on service. Aux steam from U-2.

STPs/Evolutions: STP-27.1 completed 2 hours ago	**B** Train On-Service – **B** Train Protected

1.0___; 109.1 _____ No adj. ; 63.7 ____; FSP-20,0 _____;

Status of Special Testing

1A CTMT cooler was isolated for leak detection and will be returned to service per SOP-12.1.

General Information

1.	Return 1A Ctmt Cooler to service per SOP-12.1 ver. 41.0, step 4.1.
2.	Plant startup is on hold for turnover and will recommence after the turnover is complete.
3.	PLANT Management has approved Mode 1 entry.
4.	Ramp up to 12% reactor power.
5.	1C DG is Tagged Out for slow start investigation.
6.	Current Risk Assessment is GREEN and projected is GREEN
7.	
8.	
9.	

Equipment Status

1C DG T/O for slow start investigation.		Maintain VCT gas pressure 25-30 psig

Reactivity Plan	Waste Management Status	
	#3 RHT – On Service	
	WGS – secured	

LCO Status

3.8.1 condition B, STP-27.1 completed 2 hours ago	
3.6.6 ADMIN LCO for 1A Ctmt cooler isolated	

Night Orders

No New Night Orders

Part II	Review Shift Complement
	LCOs Reviewed _____SS_____ (initials) reviewed as early in shift as possible

Part III:	STP-1.0 Reviewed/Signed	Operator Logs Reviewed	Cond. Report Queue Reviewed	Autolog Reviewed	ELDS & GEN Spreadsheet verified	Keys Turned Over
	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes

Southern Nuclear
J.M. Farley Nuclear Plant

Operations Training
Simulator Exam Scenario
BOOTH INSTRUCTOR GUIDE

ILT-35 NRC EXAM SCENARIO #4
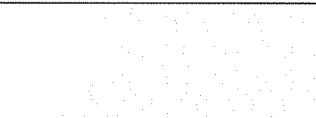
Validation time: 110 minutes Validated by David Shipman, Todd Smith and Doug Jimmerson The week of February 13, 2012			
TRN Supervisor Approval:	Gary Ohmstede	Date:	3/2/12
NRC Chief Examiner	SEE NUREG 1021 FORM ES-301-3		

| Facility: | Farley Nuclear Plant | | Scenario No.: 4 | | Op-Test No.: | FA2012-301 |

Examiners: _____   Operators: _____ SRO

_____   _____ RO

_____   _____ BOP

Initial Conditions: 29% power, 998 ppm, MOL 10000 MWD/MTU

Turnover:
- A seismic event has occurred. Ramp down at 2 MW/MIN was in progress and is now on HOLD for turnover.
- 1-2A DG is T/O due to the crankcase being cracked and oil draining out of DG.
- 1A MDAFW pump has a cracked pump casing, was leaking and is tagged out.
- Current Risk Assessment is YELLOW and projected is YELLOW due to the 1A MDAFW pump and 1-2A DG issues.
- A Train On-Service – A Train Protected.
- Earthquake recovery is in progress.

SPLIT TRAIN ALIGNMENT			
Event No.	Malf. No.	Event Type*	Event Description
1	lmf ft122	(I) (RO)	FT-122, charging flow transmitter, fails HIGH
2	irf loa-cfw001	C (BOP) TS (SRO)	CST rupture –base plate crack from bottom to top– will place SW on AFW suctions TS 3.7.6 condition A
3	lmf TK144-D	(I) (RO)	TK-144 fails HIGH. TCV-143 fails to divert on high temperature. Controller can NOT be controlled in manual. Letdown will have to be secured.
4		N (BOP)	Place Excess letdown on service IAW AOP-16.
5	imf mal-rcs4c	TS (SRO) N (BOP) R (RO)	1C SG tube leak – 5 gpm over 3 min and stabilizes TS 3.4.13 Condition B Commence ramp off line
6	lmf CP4055H-A	C (BOP)	Main Turbine Lube Oil Temperature Controller Auto Output Failure LOW
7	Bat 2012nr cexam _highvi bs.txt	C (BOP)	This causes High Vibration on Main Turbine of >15 mils. AOP-3.0 entered to trip the Main Turbine and decrease Rx power to 8%.
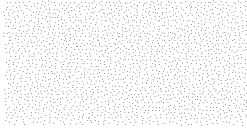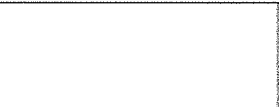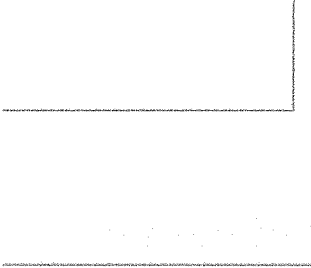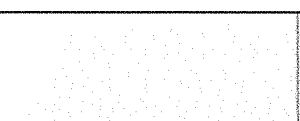
8	imf mal-mss9	M (ALL)	Main Steam header break in Turbine Building after Rx power is stable near 8%.
			AOP-14 Rx trip required. (CT)
		C (BOP)	1C SG MSIVs will not auto close, manual closure required. (CT)
9	imf mal-rcs4c	M (ALL)	1C SGTR 400 gpm when Reactor is tripped.
			Safety injection required. (CT)
			Terminate when cooldown and depressurization complete (CT)

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
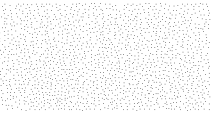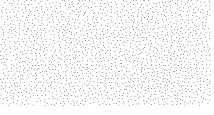
EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
0	0	Load in IC-214 Base IC is IC-39	
		RUN	RUN simulator
0	0	Generic setup: bat generic_setup_HLT.txt	
0	0	Quick setup (all items with * are included): bat 2012nrcexam_04.txt	
		PRESETS	
8	0	Rx trip breakers fails to open in auto but will open manually: CMFmalf / cBKRXTRP_cc5 open CMFmalf / cBKRXTRP_cc6 open	*
8	0	RTB handswitch #1 will not work Imf cbkrxtrp_opos1 open	*
0	0	Fail auto SI signals, Manual SI works CMFmalf / csftyinj_cc1 / open CMFmalf / csftyinj_cc11 / open	*
0	0	Main Turb fails to auto trip Imf MAL-TUR2	*
7	8	1C MSIVs will not close on auto closure CMFmalf / crsh001c_cc5 /open CMFmalf / cmsh002c_d_cc5 /open	*
4	4	TCV-143 fails to divert on High temperature Imf ccvt143_d_cc1 closed	*
0	0	Tag 1-2A DG output breakers for Unit 1 & 2 rack out 1-2A DG DF08-1 rack out 1-2A DG DF08-2 CMFremote / cbk1df08_d_cd1 / open CMFremote / cbk2df08_d_cd1 / open	*
0	0	Tag 1A MDAFW pump irf cafp01a_d_cd1 open	*
		Triggers and Commands	
3	3	Trigger 1: When CST level < 14.1 decrease CST to 0 feet over 300 seconds. Event: bcfw132b < 14.1 Command: irf loa-cfw001 0 300	*
8	9	Trigger 3:1C 400 gpm SGTR ramped in over 60 seconds when when Rx trip breakers open trgset 3 "j52rtao && j52rtbo" Command: imf mal-rcs4c 400 60	*

		MCB setup	
		1-2A DG Mode selector switch	Place in Mode 3
		Place HOLD Tag 1-2A MSS	1 HOLD TAG
		Place HOLD Tag on 1-2A DG output breakers	2 HOLD TAGS
		Place HOLD tag on 1A MDAFW pump handswitch	1 HOLD TAG
		Place Unit 1 Bypass and Inoperable Panel light to the up position (AFW SYSTEM)	Unit 1 A-Train
		Place Unit 1 and Unit 2 Bypass and Inoperable Panel lights to the up position (EMERGENCY POWER SYSTEM)	Unit 1 A-Train Unit 2 A Train
		DEH IMPULSE LOOP is in service	Clear DEH alarms
		Select POWER OPS PRIMARY on MCB monitor Acknowledge computer alarms	**IPC**
		IPC: IF FF5 is in alarm, update rods	Ensure FF5 clear or update rods on IPC
		Setup spreadsheet on OATC computer to resemble reactivity spreadsheet provided	Set up computer
		Recorders	Verify memory disks cleared
		Write on UOP-2.1, "ACC has given permission to remove the generator from the grid"	
		Provide a marked up copy of UOP-3.1 version 111.1 through step 8.16 complete and UOP-2.1 version 71.0 step 5.1 is N/A; at step 5.3.2.	UOP-3.1 and UOP-2.1 copy
			FREEZE simulator
		Perform Booth Operators Setup Checklist	
		Open Simview file to be used for plant parameter data collection: Simview / **sv DataCollection.uvl**	sv DataCollection.uvl
		If needed, adjust sim time back to 00:00:00 SIMVIEW / Sim_Clock.uvl Hours: clock(3) = 0 Minutes: clock(2) = 0 Seconds: clock(1) = 0	sv sim_clock.uvl
		VERIFY MICROPHONES READY	Batteries installed
		TURNOVER SHEET AVAILABLE	

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
Prior to RUN	0		
		Start data collection for Simview file **On DataCollection.uvl file press DATA for drop down and then COLLECT to start collecting data**	
	0	**Begin Exam**	RUN simulator
		Verify Horns ON: hornflag HORNS ON = TRUE	**Turn Horns ON/OFF ann horn**
1	Start of exam	FT-122, charging flow transmitter, fails HIGH Imf ft122 150 50	
2	NRC CUE 4 min to 1st alarm	CST rupture –base plate crack from bottom to top– will place SW on AFW suctions Remote / N21 / irf loa-cfw001 /14 / 300 second ramp CST level will drop to 0 over a slower time frame when the CST level reaches 14.1 Remote / N21 / irf loa-cfw001 / 0 / 300 second ramp. Caption CST level Variable = bcfw132b	Note: (CST level rate of change is automatically adjusted on TRG 1. Button is backup)
3	NRC CUE 5 min to 1st alarm	TK-144 fails HIGH. TCV-143 fails to divert on high temperature. Imf TK144-D / 10 / 60	
4	NRC CUE	Place Excess letdown on service IAW AOP-16.	
5	NRC CUE	1C SG tube leak – 5 gpm over 3 min and stabilizes Malf / M / imf mal-rcs4c / 5 /180 Commence ramp off line	
6	NRC CUE	Main Turbine Lube Oil Temperature Controller Auto Output Failure LOW CP-4055 CNH / Imf CP4055H-A 0 45 Takes ~ 2 minutes till first alarm	

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
7	NRC CUE	Main Turbine High vibrations Bat 2012nrcexam_highvibs.txt	
8	NRC CUE	Main Steam header break in Turbine Building. imf mal-mss9 1.5 300 AOP-14 Rx trip and safety injection required. (CT) 1C SG MSIVs will not auto close, manual closure required. (CT)	
9	Preset	1C SGTR 400 gpm when Reactor is tripped. **If a Rx trip does not occur, ask NRC when to put in SGTR** imf mal-rcs4c 400 60 **1C SG overfill variable (SG full when > 0.995):** thlecell(132)	TRG 3

CONDITIONAL: AFW pumps will be TRIPPED (seize) if running without a suction source for >3 mins.
 	
Simulator will not model a failure of AFW pumps if run without suction source.
		MONITOR AFW suction, if 0 psig for > 3 mins then, **with Examiner's direction,** TRIP the Running AFW pumps; NO suction source aligned.
		
		    IF 0 psig for > 3 mins then trip the MDAFW pump
		
		    IF 0 psig for > 3 mins then trip the TDAFW pump
			IF conditions met then:
			
			CMFmalf/ cAFP01B_d_cc132
			
			Malf/mal-FWM1C T

		Terminate when cooldown and depressurization complete (CT)	
		End of Exam	
			HORNS OFF
			FREEZE simulator

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
		Stop data collection for Simview file **sv DataCollection.uvl**	
		Export data to file with the name of NRC exam01 grpX.txt *NOTE: Substitute grpX with grp1, grp2, or grp3 as appropriate.* *NOTE: file will be saved in the OPENSIM directory.*	Ensure data file created.

Local operator actions:

EVENT NO.	TIME	ACTIONS

1   NONE REQUIRED

2   WHEN REQUESTED

<div align="center">Secure SGBD</div>

<div align="center">bat 2012nrcexam_sgbdiso.txt</div>

AFTER a short delay, **RADSIDE SO**: Direct the MCR to "Close HV7614A/B/C per step 4.3.3 of SOP-16.1."

3   NONE REQUIRED

4   Acknowledge MK4

<div align="center">Liquid waste panel alarm</div>

5   NONE REQUIRED

6   NONE REQUIRED

7   WHEN REQUESTED   **TBSO:**
"I have locally tripped the main turbine."

<div align="center">MALF / T / MAL-TUR2 / DELETE</div>

<div align="center">MALF / T / MAL-TUR1</div>

7   IF REQUESTED   **TBSO:**
"I have opened the condenser vacuum breaker isolation valves N1N51V518A and 518B."

<div align="center">REMOTE / N21 / LOA-CFW012 / 100 / 20 sec ramp</div>

8   NONE REQUIRED

9   WHEN REQUESTED   **ROVER:**
Place in local and close at HSP F: TDAFWP STM SUPP FROM 1C SG, Q1N12HV3235B.

Local operator actions:

EVENT NO.   TIME   **ACTIONS**

Communications sheet

EVENT NO.	TIME	Communication:
1	IF REQUESTED	**Radside SO:** The charging pump looks fine and FCV-122 is about 15% open. **DISPATCHER:** - Acknowledges when informed that the CR is in the queue.
2	When the CST low level alarm comes in report: When requested for SGBD- see LOA page to secure SGBD	**DBSO:** The CST base plate has a large crack in it and water is gushing out of the hole. There is no way to stop the leak. **Radside SO:** SGBD is secured. **If asked by SS** what to do, ask him his recommendation and agree with it. **SM:** I will make notifications as required.
3	WHEN REQUESTED	**Chemistry:** will be asked to respond to high temperature in Demineralizer beds. We will sample the demin bed that was on service and let you know the sample results. Leave TCV-144 bypassing the demins until we get a sample back. We will secure ZAS. **HP:** - We will monitor radiation readings in the Aux building and repost the areas as radiation levels rise.
4	WHEN REQUESTED **When 10 minutes** have passed	**RADSIDE SO:** TCV-144 is fully closed and the letdown piping is slightly brown and very warm. If requested to BYPASS CCW for the letdown Hx, then say,"the handwheel for the bypass valve is missing." The RCDT system is in operation IAW SOP-50. **To the OATC**, "Go to OPEN and back to AUTO on LCV-1003" TCV-143 no problem locally **When 10 minutes** have passed, call OATC to report that 300 gallons has been flushed to the RCDT. When asked about MK4, alarm is due to high RCDT level.

Communications sheet

EVENT NO.	TIME	Communication:
5	WHEN REQUESTED	AOP-2.0 communications- HP and shift radiochemist, counting room, and SM will all be notified.

DISPATCHER:
I will place SJAE on service.

Radside SO:
I will secure SGBD.

6   WHEN REQUESTED

Monitor temperatures on SIPC. Under SYSTEMS click on the Main Turbine button. Subtract 5°F from a journal bearing to get a temperature for a thrust bearing.

TBSO:
"I have walked down the turbine and am finding all lube oil temperatures higher than normal."

U2 UO or Extra Operator: (This assumes KK4 NOT in alarm)
"All the journal bearing temperatures and thrust bearing temperatures are elevated, but none are in alarm."

If KK4 in alarm – bearing closest to 210°F report as being some value > °F but less than 220°F.

7   IF REQUESTED

DISPATCHER:
Acknowledge ramping down and off line.

Booth prompt (if necessary)

TBSO:
The vibration seems to be getting worse.

IF REQUESTED

TBSO:
"I have locally tripped the main turbine."

8   IF REQUESTED

TBSO:
There is a lot of steam in the Turbine Building 155' by the EH skid.

WHEN REQUESTED

SM:
"I will make the classifications and notifications."

EXTRA CONTROL ROOM OPERATOR:
"Both CRACS mode selector switches are in ON."

ANY CALL TO SHIFT CHEMIST:
Acknowledge to requirement for sampling.

TBSO:
Back up cooling to the Cond pumps is aligned.

Other routine calls - provide appropriate information

Initial Conditions: 29% power, 998 ppm, MOL

Turnover:
- A seismic event has occurred. Ramp down at 2 MW/MIN was in progress and is now on HOLD for turnover.
- 1-2A DG is T/O due to the crankcase being cracked and oil draining out of DG.
- 1A MDAFW pump has a cracked pump casing, was leaking and is tagged out.
- Current Risk Assessment is YELLOW and projected is YELLOW due to the 1A MDAFW pump and 1-2A DG issues.
- **A** Train On-Service – **A** Train Protected.
- Earthquake recovery is in progress.

Event 1   FT-122 fails HIGH – AOP-16 entry.

Verifiable actions: Take manual control of FCV-122 before Pzr level decreases to out low and control Przr level

Event 2   CST rupture – base plate crack from bottom to top – **TS 3.7.6 condition A**

Verifiable actions: place SW on AFW suctions per SOP-22.0 (PRA - 10.4 1AFOP-SW-ALGNH)

Event 3   TK-144 fails HIGH. TCV-143 fails to divert on high temperature. Controller cannot be controlled in manual. Letdown will be secured and AOP-16 will be entered to place excess letdown on service.

Verifiable actions: Close letdown orifice isolation valves, stop the ramp and enter AOP-16.

Event 4   Place Excess letdown on service IAW SOP-2.7.

Verifiable actions: Open isolation valves and control flow to control temperature <165°F.

Event 5   1C SG tube leak – 5 gpm over 3 min and stabilizes **TS 3.4.13** (d) 150 gallons per day primary to secondary LEAKAGE through any one SG. **Condition B**

Verifiable actions: Commence ramp off line –RO will adjust rods or boron to control Tavg/Tref on program, BOP will set up and start a ramp on the Main Turbine. Due to the FT-122 failure it is difficult to verify leak rate.

Event 6   Main Turbine Lube Oil Temperature Controller, CP-4055, Auto Output Failure LOW

Verifiable actions: place CP-4055 in manual and open per skill of the craft.

Event 7   Main Turbine vibrations will increase to >15 mils – AOP-3.0 entered to trip the Main Turbine and ramp to 8% power.

Verifiable actions: Main Turbine trip, rods shimmed in, Rx power reduced to 8%, in preparation to place steam dumps in the STM PRESS mode.

Event 8   Main Steam header break in the Turbine Building when Rx power at 8%.

AOP-14 Rx trip required. (CT)

1C SG MSIVs will not auto close, manual closure required. (CT)

Event 9   1C SGTR 400 gpm when MSIVs Reactor is tripped and safety injection required. (CT)

AOP-16 / ARP-JD4&JE4 / SOP-22 / AOP-2.0 / AOP-14.0/ AOP-3.0 / EEP-0 / EEP-3.0

CRITICAL TASK SHEET

____ 1. Actuate a manual Rx trip prior to SI (WOG CT E-0 - - A) (PRA - 10.29 1RTOPMANRT---H)

____ 2. Manually actuate at least one train of SIS-actuated safeguards before any of the following: (WOG CT E-0 - - D)
   - Transition to any E- 3 series procedure, as appropriate

____ 3. Isolate 1C MSIV in EEP-3.0 before a transition to ECP-3.1 occurs. (WOG CT E-3 - - A) (PRA - 10.63 OAl_A_1------H)

____ 4. Depressurize the RCS to meet SI termination criteria before SG overfill parameters are exceeded. (WOG CT E-3 - - C)

SCENARIO OBJECTIVE/ OVERVIEW: Low power scenario at 29% and failures during a seismic event where a ramp down is required.
While at 29% power, the team will have to:
   - respond to several instrument and component problems using the appropriate ARPs, AOP-100 and AOP-16.
   - shift suctions of AFW pumps to the SW system, respond to a SGT leak per AOP-2.0 and ramp down with Charging flow in manual
   - respond to a Steam Break in the MSVR per AOP-14 and trip the reactor, safety inject the plant and close MSIVs, then
   - respond to a SGTR from the 1C SG, then cooldown and depressurize the RCS using EEP-3.0.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	9
2.	Malfunctions after EOP entry (1–2)	2
3.	Abnormal events (2–4)	6
4.	Major transients (1–2)	2
5.	EOPs entered/requiring substantive actions (1–2)	1
6.	EOP contingencies requiring substantive actions (0–2)	0
7.	Critical tasks (2–3)	4

Op Test No.: FA2012301	Scenario # 4	Event # 1	Page 1 of 43

Event Description: **FT-122, charging flow transmitter, fails HIGH**

FT-122 will fail high. This will cause FCV-122 to close fully but the indication to show 150 gpm. The crew will use AOP-16 to restore control of Charging flow and charging will remain in manual for the entire scenario.

Indications Available:

Annunciators: - CHG HDR FLOW HI-LO (EA2)	Recognize indications of FT-122 failing HIGH - FT-122 will indicate 150 gpm (pegged high) - VCT level will ↑ - Przr level will ↓ slowly - FK-122 demand will go to approx. 19% - LK-459F will ↑ slowly

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-16, CVCS Malfunction, ver 17.0	
	SRO	Determine a charging system malfunction is occurring and direct entry into AOP-16.	
	RO	- Monitor VCT level - Observe CHG HDR PRESS and MOTOR AMPS to ensure proper charging pump operation - PI-121 and ammeter for chg pump - Actual amps will be lower than normal	
	RO	(Step 1) **Verify** charging flow adequate to cool letdown. RNO – close all LTDN ORIF ISO's [] Q1E21HV8149A [] Q1E21HV8149B [] Q1E21HV8149C	If Pzr level ↓ to 15%, letdown flow will secure
	RO	(Step 2) **Stop any load change in progress**	
	RO	(Step 3) **Monitor VCT level to ensure proper level is maintained**	

| Op Test No.: FA2012301 | Scenario # 4 | Event # 1 | Page 2 of 43 |

Event Description: **FT-122, charging flow transmitter, fails HIGH**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 4) **[CA] Observe CHG HDR PRESS and MOTOR AMPS to ensure proper charging pump operation.** [] PI-121 [] AMMETER FOR RUNNING CHG PUMP	
	RO	(Step 5) Check charging pump – RUNNING	YES
	RO	(Step 6) Check Charging flow FK-122 controlling in AUTO with flow indicated **RNO- FT- 122 taken to manual control** There will be flow indicated and 122 in AUTO - Seal inj flow will increase due to FCV122 going closed.	**The answer to this question is NO.** An incorrect determination here will cause the crew to place 122 on the bypass.
	RO	(Step 7) Check DE3 clear	
	RO	(Step 8) **Determine Status of Normal Letdown:** Check normal CVCS letdown - AFFECTED BY MALFUNCTION - LTDN HX OUTLET FLOW, FI-150, NO FLOW INDICATED (Step 8.2) Minimize RCS makeup: Manually close charging flow control: CHG FLOW [] FK-122 (Step 8.2.2) Minimize seal injection between 6-13 gpm (Step 8.2.3) Direct Chemistry to shutdown the zinc addition system (ZAS) (Step 8.3) Dispatch personnel to investigate cause of the Letdown malfunction	Letdown may have been removed from service so it might have to be placed in service when FCV-122 control is regained.
	RO	(Step 9) **Determine if normal letdown should be re-established:** Check normal letdown malfunction(s) - CORRECTED	Yes- manual control of FCV-122 established

| Op Test No.: | FA2012301 | Scenario # | 4 | Event # | 1 | Page | 3 | of | 43 |

Event Description: **FT-122, charging flow transmitter, fails HIGH**

Time	Pos.	Expected Actions/Behavior	Comments
		Restore letdown with the following steps:	IF ISOLATED
	RO	(Step 9.2) Verify all letdown orifice isolation valves - CLOSED LTDN ORIF ISO 45 GPM [] Q1E21HV8149A LTDN ORIF ISO 60 GPM [] Q1E21HV8149B [] Q1E21HV8149C (Step 9.3) Place LP LTDN PRESS PK 145 on service: [] Place controller in MANUAL [] Adjust demand signal to 50% or less (Step 9.4) Place LTDN HX OUTLET TEMP TK 144 on service: [] Place controller in AUTO [] Set to maintain temperature 90 to 115°F	**If not isolated** go to step 18 on page 5
	RO	(Step 9.5) Verify VCT HI LVL DIVERT VLV LCV-115A alignment: [] Position indicator VCT light - LIT [] Handswitch in - AUTO	
	RO	(Step 9.6) Verify LTDN HI TEMP DIVERT VLV Q1E21TCV143: [] DEMIN light - LIT [] Handswitch in – AUTO (Step 9.7) IF necessary, THEN OPEN both LTDN LINE PENE RM ISO's from the PRIP. [] Q1E21HV8175A [] Q1E21HV8175B (Step 9.8 Verify LTDN LINE CTMT ISO Q1E21HV8152 - OPEN (Step 9.9 Verify LTDN LINE ISO valves - OPEN [] Q1E21LCV459 [] Q1E21LCV460	

| Op Test No.: | FA2012301 | Scenario # | 4 | Event # | 1 | | Page | 4 | of | 43 |

Event Description: **FT-122, charging flow transmitter, fails HIGH**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 9.10) Initiate minimum charging flow: (Step 9.10.1) Verify CHG FLOW FK 122 in - MAN (Step 9.10.2) Establish minimum charging flow based on orifices to be placed on service: ☐ 1 Orifice - 18 gpm OR ☐ 2 Orifices - 40 gpm (Step 9.11) Establish approximately 60 gpm letdown flow by OPENING: [] Q1E21HV8149B OR [] Q1E21HV8149C	
	RO	(Step 9.12) [CA] IF all backup heaters energized due to pressurizer level deviation, THEN verify two sets of backup heaters in ON prior to level deviation clearing. (Step 9.13) Adjust LP LTDN PRESS PK 145 to maintain desired letdown pressure - BETWEEN 260-450 PSIG	
	RO	(Step 9.13.1) Set controller between 4.3 and 7.5 (Step 9.13.2) Check letdown flow – STABLE (Step 9.13.3) Place PK 145 in AUTO (Step 9.13.4) Control Letdown pressure as desired (Step 9.14) Control LTDN HX OUTLET TEMP,TK 144 to maintain LTDN temp 90 to 115°F. [] TI-116 VCT TEMP [] TI-143 DIVERT LTDN HX TEMP [] TI-144 CCW LTDN HX TEMP (Step 9.15) Refer to SOP-2.1, CVCS system PLANT STARTUP AND OPERATION, for further guidance on Letdown system control	
	RO	(step 10) **Determine** status of letdown flow: Check letdown flow - established	

| Op Test No.: | FA2012301 | Scenario # | 4 | Event # | 1 | | Page | 5 | of | 43 |

Event Description: **FT-122, charging flow transmitter, fails HIGH**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 10.2) Go to procedure and step in effect	
	RO	(step 18) **Determine** Charging Status: Check charging - AFFECTED BY MALFUNCTION • CHG FLOW, FI-122A - ABNORMAL FLOW INDICATED Check Charging flow – controlled [] FK-122 in AUTO OR [] FK-122 in MANUAL	Continue here from step 9 RNO if letdown not removed from service.
		(step 19) **Check** VCT outlet isolation valves OPEN [] LCV115C and 115E	
		(step 20) **Verify** charging pump suction header aligned: [] Q1E21MOV8130A open [] Q1E21MOV8130B open [] Q1E21MOV8131A open [] Q1E21MOV8131B open	
		(step 21) **Verify charging pump discharge flow path-ALIGNED** CHG PUMP DISCH HDR ISO [] Q1E21MOV8132A open [] Q1E21MOV8132B open [] Q1E21MOV8133A open [] Q1E21MOV8133B open CHG PUMPS TO REGENERATIVE HX [] Q1E21MOV8107 open [] Q1E21MOV8108 open	
		(step 22) **[CA] Maintain** pressurizer level between 20-60%: Check pressurizer level STABLE	

| Op Test No.: | FA2012301 | Scenario # | 4 | Event # | 1 | | Page | 6 | of | 43 |

Event Description: **FT-122, charging flow transmitter, fails HIGH**

Time	Pos.	Expected Actions/Behavior	Comments
		(step 23) **Check** charging flow – ESTABLISHED (step 24) **Determine** normal letdown established	
			Step 25 is NA
		(step 26) **Go** to procedure and step in effect.	
	SRO	Submit a Condition Report and notify the Work Week Coordinator (Maintenance ATL on backshifts) Notify the Shift Manager	
At the discretion of the Lead Examiner move to Event #2.			

NOTE to examiner:
CST level will decrease over a 5 min time frame to 14 feet. The first alarm comes in at about the 4 minute mark.

Op Test No.: FA2012301	Scenario # 4	Event # 2	Page 7 of 43

Event Description: **CST rupture –base plate crack from bottom to top**

CST level will decrease over a <u>5 min time frame</u> to 14 feet. The first alarm comes in at 16 feet so if the crew does not notice the decreasing level, the first alarm will be at about the 4 minute mark. The DBSO will be sent out to look for the problem and then a report will be given about a crane accident. The CST level will continue to fall to 0 feet.

Indications Available:	
Annunciators: - CST LVL HI-LO (JE5) - CST LVL LO-LO A TRN and B TRN (JD4 and JE4)	Recognize indications of CST LEVEL Decreasing: - LI-4005 B decreasing - Computer alarms

Time	Pos.	Expected Actions/Behavior	Comments
		150,000 gallons = 12 feet	
		ARP-1.9, JE5, JD4, JE4, ver 47.	
	SRO	Direct ARP reference (JE5) and a call to the DBSO to look for problems.	
	BOP	(JE5 step 2) manually close CP-4055F HOTWELL FILL CONTROLLER, to avoid collapsing tank diaphragm.	
	BOP	(JE5 step 3) IF CST level is low, and SGBD is on service, THEN secure SGBD. (JE5 step 4) Call Radside SO and have SGBD secured	
	BOP	(JE5 step 7) Direct DBSO to commence filling the tank (Unless report of rupture has come in)	
	SRO	(JE4.JD4 step 1) Monitor condensate storage tank level on LI-4005B, LI-4132A and LI-4132B to verify validity of alarm Direct BOP to monitor this issue	
	SRO	(JE4.JD4 step 2) <u>Make a decision to do the following:</u> IF Auxiliary Feedwater is required and Tank Level if < 5.3 feet, <u>THEN</u> shift Auxiliary Feed Pump Suctions to the Service Water System per SOP-22.0, AUXILIARY FEEDWATER SYSTEM.	See page 8 for SOP-22, version 64, section 4.7 actions

Op Test No.: FA2012301	Scenario # 4	Event # 2	Page 8 of 43

Event Description: **CST rupture –base plate crack from bottom to top**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(JE4.JD4 step 9) _Evaluate Tech Specs **3.7.6 condition A** Verify by administrative means OPERABLILITY of backup water supply w/l 4 hours and restore the CST to OPERABLE status w/l 7 days	
		See below for Tech specs	

TECHNICAL SPECIFICATION 3.7.6, *Condensate Storage Tank (CST)*
The CST shall be OPERABLE. (≥ 150,000 GAL)

	SRO		

		CONDITION	REQUIRED ACTION	COMPLETION TIME	
		A. CST inoperable.	A.1 Verify by administrative means OPERABILITY of backup water supply. AND A.2 Restore CST to OPERABLE status.	4 hours AND Once per 12 hours thereafter 7 days	

	SRO	Submit a condition report on the failed component, and notify the Work Week Coordinator (Maintenance ATL on backshifts) of the condition report.	
	SRO	Inform the SM of the failure and Tech Spec entry	

SOP-22.0, AUXILIARY FEEDWATER SYSTEM, version 68
section 4.7 actions

	BOP	(step 4.7.1) Notify Shift Chemist that SW will be added to the SG's.	
	BOP	(step 4.7.2) Verify service water is in operation per SOP-24.0, SERVICE WATER SYSTEM maintaining proper SW pressure.	
			BOP (2504-N) or Back panel handswitches
	BOP	(step 4.7.3) Open MDAFWP SW SUPP: (BOP key operated switches) [] MOV3209A [] MOV3209B	

| Op Test No.: | FA2012301 | Scenario # | 4 | Event # | 2 | | Page | 9 | of | 43 |

Event Description: **CST rupture –base plate crack from bottom to top**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 4.7.4) Open: (BOP) [] MDAFWP SW SUPP MOV3210A [] MDAFWP SW SUPP MOV3210B [] TDAFWP SW SUPP MOV3216.	
	BOP	(step 4.7.5) Place AFW system in operation per section 4.1 or 4.3 of this SOP.	
When SW is aligned to the AFW pumps and Tech Specs have been evaluated then move to Event #3.			

NOTE to examiner:

CST level will decrease over a 5 min time frame to 14 feet. The first alarm comes in at about the 4 minute mark.

Op Test No.: FA2012301	Scenario # 4	Event # 3	Page 10 of 43

Event Description: **TK-144 fails HIGH**

TK-144 fails HIGH, and TCV-143 does not divert to bypass the demins. This failure does NOT allow manual control of TCV 144 and therefore letdown will have to be secured.

<table>
<tr><th colspan="2">Indications Available:</th></tr>
<tr>
<td>Annunciators:
- LTDN TO DEMIN DIVERTED-TEMP HI (DF1)</td>
<td>Recognize indications of TK-144 failing high
- TI-143 indicating off scale high (>200°F)
- TI-144 indicating off scale high (>200°F)
- Possible boration and RCS temperature decrease if prolonged</td>
</tr>
</table>

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.4, DF1 rev 52.1	
	SRO	Direct entry into DF1 ARP	
	RO	(step 1) Verify Q1E21TCV143 has diverted letdown flow to VCT to bypass demins - TCV-143 white light LIT (VCT) on MCB (step 2) Monitor charging and letdown flows and temperatures. FI 122, FI 150, TI 140, TI 144 and 143 (step 3) Try to take manual control of TCV 144 (step 4) Adjust charging or letdown flow as required to reduce the letdown flow temperature.	**NO** **will not be able to take manual control of TCV-144**
	SRO	(step 6) Direct removing letdown from service by closing LTDN ORIF ISO 45 (60) GPM Q1E21HV8149A, B, and C (step 7) Direct placing ramp on HOLD (step 8) Direct entering AOP-16	
		AOP-16, CVCS Malfunction, ver 17.0	
	RO	(Step 1) **Verify** charging flow adequate to cool letdown. RNO – close all LTDN ORIF ISO's [] Q1E21HV8149A [] Q1E21HV8149B [] Q1E21HV8149C	Letdown flow is secured

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Event Description: **TK-144 fails HIGH**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 2) **Stop any load change in progress**	
	RO	(Step 3) **Monitor VCT level to ensure proper level is maintained**	
	RO	(Step 4) **[CA] Observe CHG HDR PRESS and MOTOR AMPS to ensure proper charging pump operation.** [] PI-121 [] AMMETER FOR RUNNING CHG PUMP	
	RO	(Step 5) Check charging pump – RUNNING	YES
	RO	(Step 6) Check Charging flow FK-122 controlling in AUTO with flow indicated	YES
	RO	(Step 7) Check DE3 clear	YES
	RO	(Step 8) **Determine Status of Normal Letdown:** Check normal CVCS letdown - AFFECTED BY MALFUNCTION - LTDN HX OUTLET FLOW, FI-150, NO FLOW INDICATED (Step 8.2) Minimize RCS makeup: Manually close charging flow control: CHG FLOW [] FK-122 (Step 8.2.2) Minimize seal injection between 6-13 gpm (Step 8.2.3) Direct Chemistry to shutdown the zinc addition system (ZAS) (Step 8.3) Dispatch personnel to investigate cause of the Letdown malfunction	Letdown will have been removed from service
	SRO	IF desired due to plant conditions, THEN place excess letdown in service using SOP-2.7, CVCS EXCESS LETDOWN	See page 12
Event #4 (placing excess letdown in service) will be entered from AOP-16.

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Event Description: **Place Excess letdown in service**	

Excess Letdown will be placed in service per SOP-2.7.	
Indications Available:	
Annunciators: - PRZR LVL HI B/U HTRS ON (HA2) - PRZR LVL HI RX TRIP ALERT (HA1) - CHG HDR FLOW HI-LO (EA2)	Recognize indications of LT-461 failing high slowly: - LT-459, 460, Actual Przr level decreasing - FI-122 slowly lowering - VCT level rising

Time	Pos.	Expected Actions/Behavior	Comments
		SOP-2.7, CVCS Excess Letdown, ver 11.1	

CAUTION: Do not exceed 165° F excess letdown heat exchanger outlet temperature.

Excess letdown flow will be limited to approximately 10-15 gpm.

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 4.1.1/.2) **Verify** the RCDT system in operation per SOP-50.0, LIQUID WASTE PROCESSING SYSTEM	Will call Radside SO and check on status and notify the SO to expect an increase in RCDT level due to excess letdown being placed on service.

	BOP	(step 4.1.3/.4/.5) **Verify** the following valves open:
		     - HV3095
		     - HV3443
		     - HV3067
		
		(step 4.1.6) **Verify** HV-137 is closed
		
		(step 4.1.7/.8) **Open** HV 8153 and 8154	

		(step 4.1.9) **Place** excess letdown divert valve Q1E21HV8143 control switch in the **RCDT position** (step 4.1.10) Slowly **throttle open** the excess LTDN HX discharge valve Q1E21HCV137 to establish excess letdown flow not to exceed 165° F excess letdown heat exchanger outlet temperature	

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Event Description: **Place Excess letdown in service**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	Should read the Caution in the procedure and speak to reactivity changes associated with placing excess letdown on service. Should decide and brief the crew on aligning excess letdown to the VCT/Charging pump suction and the expectations on this. This is not required to be done since it will take a significant amount of time to do this evolution.	**CAUTION** A small portion of excess letdown piping can not be flushed to the RCDT (calculated to be approx. one gallon) and there are uncertainties associated with achieving a complete flush. Therefore, the reactivity affects associated with directing excess letdown to the VCT/Charging pump suction must be considered and contingencies established for mitigating the consequences.
	SRO	Direct crew back to AOP -16.	
	SRO	AOP-16 (Step 9) **Determine** if normal letdown should be re-established: Check normal letdown malfunction(s) - CORRECTED	NO
	RO	(step 10) **Determine** status of letdown flow: Check letdown flow - established	Excess letdown established
	SRO	(step 10.2) Go to procedure and step in effect	
When Excess letdown is in service and at the discretion of the Lead Examiner move to Event #5.			

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Event Description: **1C SG tube leak – 5 gpm over 3 min and stabilizes**

1C SG tube leak will start and ramp in over 3 minutes.

Indications Available:

Annunciators:	Recognize indications of SG TUBE LEAK
- SG TUBE LEAK ABOVE SETPT (FG1)	- R-15, 19 AND 23 IN ALARM
- RMS HI RAD (FH1)	- R-70C READING > 1000 GPD

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.6, FG1 **version 68**	
	BOP	(step 1) check R-70s to determine SG in alarm. (step 3) Notify Chemistry of the alarm condition. (step 6) Enter AOP-2.0, SGT Leakage (step 7) Refer to TS 3.4.13	AOP-2.0 may be entered directly due to alarm conditions on page 15
		ARP-1.6, FH1	
	BOP	Reference ARP FH1 (step 1) check R-70s to determine SG in alarm. (step 2) Insure any auto actions have occurred.	FG1 has much of the same actions
	BOP	Check ARP FH1 for actions as Rad monitors come into alarm. (step 3.3) Do not allow personnel to enter the affected area without the approval of the Health Physics Department.	

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Event Description: **1C SG tube leak – 5 gpm over 3 min and stabilizes**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	<u>IF</u> R-15 alarms <u>AND</u> remains above the alarm setpoint (not a momentary spike), <u>THEN</u> perform the following: - <u>IF</u> high effluent activity is possible, <u>THEN</u> implement EIP-9.0, ACTIONS. - Notify the Counting Room to <u>immediately</u> sample the SGs per CCP-31 to determine the leak rate. - Notify the Operations Shift Manager.	**Call Counting Room** **Call SM**
	BOP	<u>IF</u> R-19 alarms refer to SOP-45.0 for guidance in sampling SGs with R-19 in alarm. <u>IF</u> R-23A <u>OR</u> R-23B alarms, contact the RAD man to verify SGBD secured.	**Call shift chemist** **Call Radside SO**
	SRO	Direct entry into AOP-2.0, Steam Generator Tube Leakage, **rev 33.1**	
	RO	(step 1) Maintain pressurizer level stable at normal programmed value by: - Control charging - Reduce letdown close HV-8149 A, B, C	**NOTE:** This is a continuing action step FK-122 adjusted as required Reduce excess letdown flow rate as necessary
		(step 1.3) Determine leak rate, if possible (use STP-9.0, RCS leakage) (RNO step 1.3) Determine leak rate based on flow balance _____(charging flow) +_____(seal injection flow) -_____(letdown flow) -_____(#1 seal leakoff flow) =_____(RCS leak rate)	Plant conditions will NOT permit the use of STP-9.0, so a leak rate flow balance will be used Since charging flow is broke from event 1, the crew will have to estimate using VCT level, Pzr level stable and make an educated guess.

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Event Description: **1C SG tube leak – 5 gpm over 3 min and stabilizes**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 2) Maintain VCT level greater than 20%. by: Verify RMW system in AUTO OR Manually control makeup as required by using SOP-2.3, CVCS Rx makeup system	**NOTE:** This is a continuing action step **RNO** is to trip the Rx and actuate an SI
	BOP	(step 3) Check that the Continuous Radiation Monitoring System is operable Either R-15- OPERABLE OR R-70s- OPERABLE	
	SRO	(step 4) Check reactor power conditions: - Check NO power ascension in progress - Check NO power reduction in progress - Check reactor power greater than 20%	
	BOP	(step 5) Monitor primary to secondary leakage Check R-70s or R-15 for increasing count rate Begin trending R-70C, SG TUBE LEAK, and R-15, SJAE EXH, using the plant computer and Data sheet 1.	**NOTE:** This is a continuing action step Chemistry will acknowledge CCP-31 app C
	BOP	(step 6) Call TBSO to place SJAE filtration on service.	
	SRO	(step 7) Direct chemistry to perform grab samples and leak rate determinations. CCP-201 Table 55 (step 8) Notify SM of leak rate (step 9) Continue to monitor R-70's, R-15 or CHM/HP leak rate input for primary to secondary leak rate and rate of change using Data sheet 1. (step 10) Evaluate Table to determine appropriate response: - ACTION LEVEL 4 ≥30 gpd/hr rate of increase <u>AND</u> ≥75 gpd leak in any SG	 **NOTE:** This is a continuing action step **NOTE:** This is a continuing action step Proceed to step 11

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Event Description: **1C SG tube leak – 5 gpm over 3 min and stabilizes**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 11) Check any two of the following rad monitors trending in the same direction: - R-70s/R-15 **OR** R-70s/R-23A(B) **OR** R-15/R-23A(B) trending in the same direction with the same order of magnitude	
	SRO	Direct placing the Unit in Mode 3 within the next 2 hours. - Identify the correct leaking SG Using R-70s, R-60s and level rise in any SG	1C SG has a 5 gpm tube leak
	ALL	Re-commences Ramp by coordinating with the BOP to establish Main Turbine Target and ramp rate. A Ramp rate of at 2 MW/ min will be required to ramp unit off per the turnover sheet.	Ramp will begin at approx. 200 MW proceeding to 40 MW
	BOP	Begin lowering turbine load to 40 MW using the appropriate DEH controls • Ensure load rate increase is within required limitations. • Verify the HOLD light is LIT. • Depress the GO pushbutton and ensure the GO light is LIT. • Ensure the Main Turbine starts to ramp down, GVs start to close.	NOTE: The ramp rate will be 5 MW/min.
	RO	Verify rods are in AUTO or Manual and maintaining Tavg close to Tref.	
		SOP-2.3, CVCS Reactor Makeup Control System version 58, steps below	

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Event Description: **1C SG tube leak – 5 gpm over 3 min and stabilizes**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 1.0) Borating per SOP-2.3 appendix B ● Set the boric acid integrator to the desired quantity ● Adjust LTDN TO VCT FLOW LK 112 setpoint as desired ● M/U mode selector to STOP ● MKUP MODE SEL SWITCH to BOR ● MKUP MODE CONT SWITCH to START. (Step 1.6) Verify proper boration operation by observing the following: • On service boric acid pump started. • MKUP TO CHG PUMP SUCTION HDR FCV113B opens. • BORIC ACID TO BLENDER FCV113A opens. • Boric acid flow is displayed on FI-113 MAKEUP FLOW TO CHG/VCT.	Version 58 **NOTE:** A continuous boration is allowed by appendix C which maintains the Boric Acid system lined up. The RO will take the MSS to START each time a boration is required **or** set the system up to borate continuously. (approx 700 gal continuous boration)
		Rest of AOP-2.0 here	
	SRO	(step 11.7) Call SM to evaluate emergency classifications per EIP-8.0 or EIP-9.0	
	SRO	(step 16) Direct Chemistry to monitor the turbine building sump for activity	
	SRO	(step 17) Refer to FNP-0-AOP-2.1; Contingency Plan For Minimizing And Controlling Contaminated Secondary Condensate.	
	BOP	(step 18) **Verify affected SG(s) identified.** Check any SG level - RISING IN AN UNEXPLAINED MANNER. OR Check any SG radiation indication – HIGH R-70 A, B, C and R-60 A, B, C	
	BOP	(STEP 19) Verify affected SG(s) atmospheric relief valve-ALIGNED - 8.25 and in AUTO	
	BOP	(STEP 20) Check affected SG atmospheric relief valve – CLOSED	

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Event Description: **1C SG tube leak – 5 gpm over 3 min and stabilizes**

Time	Pos.	Expected Actions/Behavior	Comments
		(STEP 21) if TDAFWP is running or required then direct the CR to perform CCP-645 (STEP 22) Isolate steam supply from affected SG(s) to TDAFWP from 1C SG by directing ROVER to do the following: - Establish LOCAL control from HSD Panel <u>AND</u> Isolate TDAFWP steam supply from 1C SG by taking HV3235B in LOCAL and then to STOP	
	BOP	(STEP 23) Verify SGBD isolated from the 1C SG- 7614C closed (STEP 24) Check AS supplied from Unit 2	 Call SSS to align AS
	SRO	*(step 7 of ARP FG1) Evaluate Tech Specs 3.4.13 mandatory LCO* *RCS operational LEAKAGE shall be limited to: d. 150 gallons per day primary to secondary LEAKAGE through any one steam generator (SG).*	*Condition B- be in mode 3 in 6 hours.*

TECHNICAL SPECIFICATION 3.4.13, RCS Operational LEAKAGE
RCS operational LEAKAGE shall be limited to:
d. 150 gallons per day primary to secondary LEAKAGE through any one SG.

		CONDITION	REQUIRED ACTION	COMPLETION TIME	
		B. Required Action and associated Completion Time of Condition A not met. OR Pressure boundary LEAKAGE exists. OR Primary to secondary LEAKAGE not within limit.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours	

At the discretion of the Lead Examiner move to Event #6.

Note to examiner:

It takes approximately 2 minutes to get alarm when the Main Turbine Lube Oil Temperature Controller CP-4055 Auto Output Failure is inserted

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Event Description: **Main Turbine Lube Oil Temperature Controller CP-4055 Auto Output Failure LOW**

Main Turbine Lube Oil Temperature Controller CP-4055 Auto Output Failure, Requiring Manual Control of Main Lube Oil Temperature using CP-4055.

Indications Available:

Annunciators:	Indications of Main Turbine Lube Oil Temperature Controller Failure:
- DEH Trouble Alarm (LB1)	- TI-4020 Turbine Bearing Oil Temperature increasing. - CP-4055 Turbine Bearing Oil Temperature Controller demand fails low.

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.11, LB1, **version 50**	
	BOP	Announces receipt of annunciator LB1	
	SRO	Directs BOP to respond to LB1	
	BOP	Checks DEH CRT alarm sub screen Informs SRO Lube Oil Cooler Out alarm displayed on the DEH alarm sub screen	
	SRO	Directs taking manual control of Main Turbine Lube Oil Temperature Establishes Control Band for Lube Oil Outlet temperature	There is no procedural guidance to take manual control of this controller.
	BOP	Takes Manual control of Main Turbine Lube Oil Temperature	
		When Main Lube Oil temperature is decreasing and at the discretion of the Lead Examiner, move to Event 7.	

Event Description: **High Vibration on Main Turbine of >15 mils**

Vibrations will increase rapidly on the Main Turbine. ARP KD4 will have the crew trip the Main Turbine. NOTE: Vibrations will decrease after main turbine is tripped. The crew will ramp Reactor power down to 8% to transfer the Stm Dumps to the STM PRESS mode.

Indications Available:	
Annunciators: - MAIN TURB GEN VIB ALARM (KD4)	Recognize indications of High Vibrations: - Vibration Display Monitor will show in RED high out of spec readings - DEH Turbine bearing page will show high readings - IPC Main Turbine page will show high readings

Time	Pos.	Expected Actions/Behavior	Comments
		ARP 1.10, KD4 version 70	
	SRO	Direct actions of KD4	
	BOP	KD4 (step 1) Check indications on BN TURB VIB MCR DISPLAY to determine the cause of the alarm Or On DEH Or On IPC	
	SRO	(step 2) IF shaft vibration exceeds 7 mils, THEN investigation is necessary if vibration is continuous.	
	BOP	(step 3) IF shaft vibration for #9 bearing is > 7 mils, THEN go to Step 11. (step 4) IF shaft vibration is > 7 mils but less than 14 mils, THEN reduce turbine speed or load to reduce vibration.	

	SRO	(step 5) IF shaft vibration exceeds 14 mils, OR thrust bearing wear exceeds 40 mils THEN perform the following: IF Reactor Power is < 35%, THEN Trip the Turbine and refer to AOP-3.0, TURBINE TRIP BELOW P-9 SETPOINT.	Direct tripping the Main Turbine and enter AOP-3.0
	BOP	Place MAIN TURB EMERG TRIP switch to TRIP for at least 5 seconds.	

AOP 3.0, Turbine Trip below P-9 setpoint, version 17

	BOP	(step 1) **Check turbine - TRIPPED.** [ ] TSLB2 14-1 lit [ ] TSLB2 14-2 lit [ ] TSLB2 14-3 lit [ ] TSLB2 14-4 lit	
	RO	(step 2) **Stabilize reactor power.** 2.1 Verify Rod Control in MANUAL 2.2 Adjust control rods in MANUAL to control RCS TAVG. 2.3 Verify steam dumps modulate to maintain reactor power less than 35%.	**NOTE to examiner:** RO may place rods in AUTO, if left in MANUAL, applicant will need to insert rods after turbine trip. Verify rods returned to MANUAL before going subcritical
	RO	RNO (step 2.3) 2.3.1 Reduce reactor power to less than 8%. 2.3.2 Direct counting room to perform CCP-645, MAIN STEAM ABNORMAL ENVIRONMENTAL RELEASE. 2.3.3 Control atmospheric relief valves to maintain RCS TAVG at program value for existing power level. 1A(1B,1C) MS ATMOSREL VLV [ ] PC 3371A adjusted [ ] PC 3371B adjusted [ ] PC 3371C adjusted	
	BOP	(step 3) **WHEN** at least 30 seconds have passed since turbine trip, THEN check main generator tripped.	

	RO	(step 4) **Check all RCPs - STARTED.** RCP [ ] 1A [ ] 1B [ ] 1C	
	BOP	(step 5) **Check** SG levels - STABLE OR TRENDING TO 65%.	
	BOP	(step 6) **Verify MSRs - RESET.** REHEATER CONTROL SYSTEM [ ] CP 4054	
	BOP	(step 7) **Stop** both heater drain pumps. HDP [ ] 1A [ ] 1B	
	BOP	(step 8) **Check** main turbine status. 8.1 WHEN main turbine is < 600 rpm, THEN verify main turbine shaft lift pump - RUNNING. MN TURB SHAFT LIFT [ ] N1N33P504	
	BOP	(step 9) **IF** steam dump system in TAVG mode, **THEN** transfer to STM PRESS mode. 9.1 Reduce reactor power to less than 8%. 9.2 Place standby CNDS PUMP in STOP. 9.3 WHEN SGFP suction pressure greater than 500 psig, THEN stop all but one CNDS PUMP.	

	RO	9.4 WHEN BYP & PERMISSIVE NUCLEAR AT POWER PERMISSIVE P-10 status light NOT lit, THEN perform the following: 9.4.1 Verify intermediate range reactor trip and rod stop - UNBLOCKED. BYP & PERMISSIVE INTERMEDIATE RANGE TRAIN A(B) TRIP BLOCKED [ ] Train A not lit [ ] Train B not lit 9.4.2 Verify power range low setpoint reactor trip - UNBLOCKED. BYP & PERMISSIVE POWER RANGE TRAIN A(B) TRIP BLOCKED [ ] Train A not lit [ ] Train B not lit 9.4.3 Verify BYP & PERMISSIVE LOW POWER TRIP BLOCK P-7 status light - LIT.	
	RO	(step 9.5) Check reactor power - LESS THAN 8%	
When Reactor power decreases to value approved by the NRC, is stable or under control, then go to the next event.		
When Rx power is under control, move to Event 8			

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Event Description: **Steam break in Turbine Building.**

When Rx power is under control, a steam break in the Turbine Building will occur when NRC directs. The 1C MSIVs do not auto close and MSIVs are required to be closed to isolate the fault.

Indications Available:	
Annunciators: - Various and many -	Recognize indications of LARGE Steam BREAK in MSVR: - Unexplained rise in steam flow - Unexplained rise in feedwater flow - Unexplained reduction in steam generator level and/or pressure - Unexplained reduction in RCS/PRZR pressure and/or level - Unexplained reduction in Tavg with Tavg below Tref - Atmospherics or steam dumps closing with Reactor power rising

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-14.0, Secondary System Leakage, version 10	
	SRO	Direct entry into AOP-14.0	
	RO/ BOP	(step 1.0) **[CA] Evaluate** plant status for safe operation. • Pressurizer level GREATER THAN 15% AND • Pressurizer pressure GREATER THAN 2000 psig AND • Steam generator pressure GREATER THAN 650 psig AND • Containment pressure LESS THAN 2 psig AND with main generator off line, THEN check reactor power less than ~ 15%	**NOTE to examiner:** Crew may quickly close the MSIVs. If this occurs a reactor trip may not occur, **so the NRC will need to cue the SGTR.** The trigger will not fire w/o a Rx trip

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	Directs RNO (step 1.0) 1.1 Trip the reactor 1.2 IF reactor tripped, THEN CLOSE SG MSIVs and bypass valves. 1.4 Go to EEP-0, REACTOR TRIP OR SAFETY INJECTION.	If parameters not met here then step 2 would be referenced **Critical task** CLOSE MSIVs.
	BOP	(step 2) **Identify SECONDARY leakage source.** 2.1 Check SG atmospheric relief valves CLOSED. 2.2 Check Main Steam Safety valves - CLOSED.	
	BOP	(step 2.3) Check no abnormal steam leakage in Main Steam Valve Room.	Phone call to Rover or SSS or Security guard
		RNO (step 2.3) Perform the following. a) Isolate affected components consistent with plant operating requirements b) IF steam leakage cannot be isolated AND the plant is in Mode 3, THEN verify the reactor is tripped.	Call to Turbine Bldg N/A- not in mode 3
When the Reactor is tripped, Event 9 will start; a 400 gpm SGTR on 1C SG will ramp in over 60 seconds.			

Event Description:

1C SG 400 gpm SGTR ramped in over 60 seconds

When the Reactor Trip breakers are opened, a 400 GPM SGTR will ramp in over 60 seconds
Indications Available:

Annunciators:	Recognize indications of 1C SG 400 gpm SGTR:
- Various and many	-
-	

Time	Pos.	Expected Actions/Behavior	Comments
		EEP-0, Reactor Trip or Safety Injection, version 43	
	RO/ BOP	Immediate Operator actions of EEP-0 (step 1) **Check reactor trip.** Check all reactor trip breakers and reactor trip bypass breakers - OPEN. Check nuclear power - FALLING. Check rod bottom lights - LIT. (step 2) **Check turbine - TRIPPED.** TSLB2 14-1 thru 4 lit (step 3) **Check power to 4160 V ESF busses.** 4160 V ESF busses - AT LEAST ONE ENERGIZED A Train (F 4160V bus) power available lights lit OR B Train (G 4160V bus) power available lights lit Verify operating diesel generators are being supplied from at least one SW pump.	**Immediate Action steps of EEP-0** <u>**Critical task**</u> Trip the reactor
	RO/ BOP	(step 4) **Check SI Status.** Check any SI actuated indication. BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit	If no SI signal is in at this time ESP-0.1 will be entered. If SI actuated then go to page 27 and skip ESP-0.1.
		ESP-0.1, Reactor Trip Response, version 32	

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Event Description: **1C SG 400 gpm SGTR ramped in over 60 seconds**

	RO	(step 1) Check RCS temperature - Stable at or approaching 547°F - TAVG 1A(1B,1C) RCS LOOP [] TI 412D [] TI 422D STM DUMP [] TI 432D	NOTE: this is a continuing action step
	BOP	(step 1 RNO) Verify steam dumps closed. STM DUMP INTERLOCK [] A TRN in OFF RESET OR [] B TRN in OFF RESET Verify atmospheric reliefs closed 1A(1B,1C) MS ATMOS REL VLV [] PC 3371A [] PC 3371B [] PC 3371C	
Safety Injection Foldout page criteria will be met due to PRZR level <4%. A safety Injection will be actuated and EEP-0 re-entered. **Critical task- actuate the SI**			
	TEAM	Re-perform IOAs of EEP-0 above	Page 26 above
		EEP-0 **continued here:**	
	SRO	(step 5) Directs continuing into EEP-0 at step 5. **Directs** the BOP to perform Attachment 2 of EEP-0.	See **page 37,** which is at the Tab at end of scenario for Attachment 2 and 4 actions.
	RO	(step 6) Check containment pressure- HAS REMAINED LESS THAN 27 psig (checked on IPC or PI950, 951, 952, 953,CNMT PRESSURE)	**NOTE:** [CA] step
	RO	(step 7) Announce "Unit 1 reactor trip and safety injection".	

	RO	(step 8) **Check AFW status.** Check secondary heat sink Available o Check total AFW flow > 395 gpm [] FI 3229A [] FI 3229B [] FI 3229C o Total Flow FI 3229 OR Check any SG NR level > 31% {48%} WHEN all SG narrow range levels less than 31%{48%}, THEN maintain total AFW flow greater than 395 gpm. WHEN at least two SG narrow range levels greater than 28% AND TDAFWP NOT required, THEN stop TDAFWP.	
	RO	(step 8.4) WHEN SG narrow range level greater than 31%{48%}, THEN maintain SG narrow range level 31%-65%{48%-65%}. • Control MDAFWP flow. MDAFWP FCV 3227 RESET [] A TRN reset [] B TRN reset MDAFWP TO 1A/1B/1C SG B TRN [] FCV 3227 in MOD Control TDAFWP flow. TDAFWP FCV 3228 [] RESET reset TDAFWP SPEED CONT [] SIC 3405 adjusted	**NOTE:** [CA] step –
	RO	(step 9) **Check RCS temperature.** IF any RCP running, THEN check RCS average temperature - STABLE AT OR APPROACHING 547°F. TAVG 1A(1B,1C) RCS LOOP [] TI 412D [] TI 422D [] TI 432D	

	RO	(step 9 RNO) IF RCS temperature less than 547°F and falling, THEN perform the following. (step 9.1.1) Verify steam dumps closed. STM DUMP INTERLOCK [] A TRN in OFF RESET [] B TRN in OFF RESET (step 9.1.2) Verify atmospheric reliefs closed on MCB [] Demand at 0 and minimum red light LIT (step 9.1.3) Control total AFW flow to minimize RCS cooldown, AFW FLOW TO 1A(1B,1C) SG [] FI 3229A [] FI 3229B [] FI 3229C AFW TOTAL FLOW [] FI 3229 IF MSIVs are closed THEN proceed to step 9.1.8	**NOTE:** RNO column since RCS temp will be <547°F	
	RO	(step 10) **Check pressurizer PORVs and spray valves.** WHEN pressurizer pressure less than 2335 psig, THEN verify both PRZR PORVs closed. Verify both PRZR PORVs indicate CLOSED Check PRZR PORV temperature STABLE OR FALLING. [] PORV Temp TI-463 Check PRT parameters STABLE or FALLING. [] PRT PRESS PI 472 [] PRT LVL LI-470 [] PRT TEMP TI-471 WHEN pressurizer pressure less than 2260 psig, THEN verify normal pressurizer spray valves closed OR in the process of closing. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D Check any PRZR PORV ISO - OPEN	**NOTE:** [CA] step – **NOTE:** [CA] step –	

	RO	(step 11) **Check RCP criteria.** Check SUB COOLED MARGIN MONITOR indication – GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE	
	RO	(step 12) **Monitor charging pump miniflow criteria.** Control charging pump miniflow valves based on RCS pressure. 1C(1A) LOOP RCS WR PRESS [] PI 402A [] PI 403A	NOTE: Based on RCS pressure, close miniflows < 1300 and open when > 1900 psig.

<u>Diagnostics</u>

The SRO will direct the parameters to be reviewed and will determine appropriate procedure to transition to.

	SRO	(step 13) **Check SGs not faulted.** [] Check no SG pressure – FALLING IN AN UNCONTROLLED MANNER OR LESS THAN 50 psig.	.
	SRO	(step 14) **Check SGs not RUPTURED** Check secondary radiation indication - NORMAL. [] R-15 SJAE EXH [] R-19 SGBD SAMPLE [] R-23A SGBD HX OUTLET [] R-23B SGBD TO DILUTION [] R-15B TURB BLDG VNTL (BOP) [] R-15C TURB BLDG VNTL (BOP) [] R-60A MS ATMOS REL (BOP) [] R-60B MS ATMOS REL (BOP) [] R-60C MS ATMOS REL (BOP) [] R-60D TDAFWP EXH (BOP) No SG level rising in an uncontrolled manner.	RNO to go to EEP-3.0

EEP-3.0, SGTR, ver 26

	RO	(step 1) Check RCP criteria. Check SUB COOLED MARGIN MONITOR indication - > 16°F{45°F} SUBCOOLED IN CETC MODE.	

	BOP	(step 2) Identify ruptured SG(s). Check any SG level - RISING IN AN UNCONTROLLED MANNER	NOTE: this is a continuing action step
	SRO/ RO	(step 3) WHEN ruptured SG(s) identified, THEN isolate flow from ruptured SG(s). Verify ruptured SG(s) atmospheric relief valve - ALIGNED. - PC3371C, 1C MS ATMOS REL VLV, set 8.25 and in auto - Verify 3371C, 1C MS ATMOS REL VLV, is closed Isolate steam supply from 1C SG to TDAFWP: Check at least one MDAFWP running and no TDAFWP auto start signals present (step 3.3.4) Stop the TDAFWP from the MCB (step 3.3.6) initiate actions to isolate the TDAFW steam supply from the ruptured SG while continuing with step 3.6.	NOTE: this is a continuing action step 1C SG is ruptured
		(step 3.6) Verify blowdown from ruptured SG(s) - ISOLATED. (step 3.7) Verify at least one SG MSIV on 1C SG closed	**CRITICAL TASK –** Verifies MSIV 3369C or 3370C closed and bypass valves closed
	BOP	(step 4) **WHEN** ruptured SG(s) NR level greater than 31% THEN perform the following: Isolate AFW flow to ruptured SG(s) using FCVs. - FCV 3227C in MOD, and closed - HV 3328C in MOD and closed	NOTE: this is a continuing action step
	SRO	(step 5) **Check** ruptured SG(s) pressure GREATER THAN 250 psig.	
	SRO	(step 6) **Perform** RCS cooldown. Determine required CETCs for cooldown based on ruptured SG pressure.	

Event Description: **1C SG 400 gpm SGTR ramped in over 60 seconds**

		RUPTURED SG PRESSURE (psig)	REQUIRED CORE EXIT TEMPERATURE

RUPTURED SG PRESSURE (psig)	REQUIRED CORE EXIT TEMPERATURE
1151 - 1200	536°F (522°F)
1101 - 1150	531°F (516°F)
1051 - 1100	525°F (510°F)
1001 - 1050	519°F (504°F)
951 - 1000	513°F (498°F)
901 - 950	507°F (491°F)
851 - 900	500°F (484°F)
801 - 850	494°F (477°F)
751 - 800	487°F (469°F)
701 - 750	479°F (461°F)
651 - 700	471°F (453°F)
601 - 650	463°F (443°F)
551 - 600	454°F (434°F)
501 - 550	445°F (423°F)
451 - 500	434°F (412°F)
401 - 450	423°F (400°F)
351 - 400	411°F (386°F)
301 - 350	398°F (370°F)
251 - 300	383°F (353°F)
- 250	365°F (332°F)

	SRO	Direct the STA to Display the hottest CETC page 1TC1 on plant computer. This is normally selected by the STA and put on the control board display.	
			Critical task Cooldown and depressurize
	SRO	**Will direct these steps:** (step 6.4 RNO) **Begin RCS cooldown to cold shutdown.** (step 6.4.1) Direct countingroom to perform CCP-645 (step 6.4.2) Dump steam from the INTACT SGs at maximum attainable rate MS ATMOS REL VLV - PC3371A - PC3371B	Steam Dumps are not available due to the Steam Fault and MSIVs closed Atmospherics will be opened fully by adjusting the pots to full open

	RO	(step 6.5) Check hottest CETCs less than required temperature. (step 6.6) Stop the cooldown	Continue to step 7 until CETCs are < required temp.
	BOP	(step 7) **Check intact SG levels.** Check any intact SG narrow range level – GREATER THAN 31%{48%}. [CA] WHEN SG narrow range level greater than 31%{48%}, THEN maintain SG narrow range level 31%-65%{48%-65%}. Control MDAFWP flow. MDAFWP FCV 3227 RESET [] A TRN reset [] B TRN reset MDAFWP TO 1A/1B/1C SG B TRN [] FCV 3227 in MOD Control TDAFWP flow. TDAFWP FCV 3228 [] RESET reset TDAFWP SPEED CONT [] SIC 3405 adjusted	
	RO	(step 8) **Check pressurizer PORVs** **Check any PRZR PORV ISO – power available** [CA] WHEN pressurizer pressure less than 2335 psig, THEN verify pressurizer PORVs closed with no leakage. Verify both PRZR PORVs – CLOSED Check PRZR PORV temperature STABLE OR FALLING. [] PORV Temp TI-463 Check PRT parameters STABLE or FALLING. [] PRT PRESS PI 472 [] PRT LVL LI-470 [] PRT TEMP TI-471 Check at least one PRZR PORV ISO - OPEN	

Event Description: **1C SG 400 gpm SGTR ramped in over 60 seconds**

	BOP	(step 9) **Verify SI - RESET.** MLB-1 1-1 not lit (A TRN) and MLB-1 11-1 not lit (B TRN) (step 10) **Verify PHASE A CTMT ISO - RESET.** MLB-2 1-1 not lit and MLB-2 11-1 not lit	
	BOP	(step 11) Check PHASE B CTMT ISO - RESET.	
	RO	(step 12) **IF instrument air available, THEN establish instrument air to containment.** Verify at least one air compressor started. AIR COMPRESSOR [] 1A [] 1B [] 1C Check INST AIR PRESS PI 4004B greater than 85 psig. Check instrument air to containment. IA TO CTMT [] MLB-3 1-2 NOT lit IA TO PENE RM PRESS LO [] Annunciator KD1 clear	
	RO	(step 13) **[CA] Check if LHSI Pumps should be stopped.** Check RCS pressure – GREATER THAN 275 psig{435 psig} on PT-402 AND 403, 1A/1C LOOP RCS WR PRESS. Check RCS pressure - STABLE OR RISING Secure any running RHR pumps	**Take HS to stop.**

	SRO	(step 14) **Check if Cooldown should be stopped.** Check hottest core exit T/Cs - LESS THAN REQUIRED Temperature. Stop RCS cooldown Maintain core exit T/Cs – LESS THAN REQUIRED TEMPERATURE.	**RNO** Do NOT proceed until hottest core exit T/Cs - LESS THAN REQUIRED TEMPERATURE.
	SRO	(step 15) **Check ruptured SG(s) pressure - STABLE OR RISING.** (step 16) **Check SUB COOLED MARGIN MONITOR indication - GREATER THAN 36°F{65°F} SUBCOOLED IN CETC MODE.**	
	RO	(step 17) **Reduce RCS pressure to minimize break flow and refill pressurizer.** Open all available normal pressurizer spray valves. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D	**Critical task**
	SRO	(step 17.2) **Reduce** RCS pressure until one of the following three conditions occurs, then stop RCS pressure reduction. RCS pressure less than ruptured SG pressure AND pressurizer level greater than 13%{43%} OR RCS pressure within 300 psi of ruptured SG(s) pressure AND Pzr level >43%{50%} OR Pressurizer level greater than 73%{66%} OR SCMM indication less than 16°F{45°F} subcooled in CETC mode.	**Then verify the sprays are closed.**
	SRO	(step 19) Check RCS pressure – rising on PT-402 AND 403, 1A/1C LOOP RCS WR PRESS.	
When spray valves closed and at the discretion of the Lead Examiner, terminate the scenario.			

Event Description: **Attachment 2 of EEP-0**

Cue: BOP will accomplish when at step 5 of EEP-0
Attachment 2 of EEP-0
AUTOMATIC ACTIONS VERIFICATION

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	**(Step 1) Verify one CHG PUMP in each train - STARTED.** [] A train (1A or 1B) amps > 0 [] B train (1C or 1B) amps > 0	
	BOP	**(Step 2) Verify RHR PUMPs - STARTED.** RHR PUMP [] 1A amps > 0 [] 1B amps > 0	
	BOP	**(Step 3) Verify Safety Injection Flow.** **(Step 3.1)** Check HHSI flow - GREATER THAN 0 gpm. [] FI 943	
	BOP	**(Step 3.2)** Check RCS pressure - LESS THAN 275 psig{**435 psig**}.	
	BOP	**(step 3.3)** Check LHSI flow – greater than 1.5×10^3 gpm [] 1A RHR HDR FLOW FI-605A [] 1B RHR HDR FLOW FI-605B	
	BOP	**(Step 4) Verify each SW train - HAS TWO SW PUMPs STARTED.** [] A train (1A,1B or 1C) [] B train (1D,1E or 1C)	

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	**(Step 5) Verify each train of CCW - STARTED.** (Step 5.1) Verify one CCW PUMP in each train- STARTED. A train HX 1C or 1B CCW FLOW [] FI 3043CA > 0 gpm OR [] FI 3043BA > 0 gpm B train HX 1A or 1B CCW FLOW [] FI 3043AA > 0 gpm OR [] FI 3043BA > 0 gpm Verify SW flow to associated CCW HX's SW FROM 1A(1B, 1C) CCW HX [] Q1P16FI3009AA > 0 gpm [] Q1P16FI3009BA > 0 gpm [] Q1P16FI3009CA > 0 gpm	
	BOP	(step 6) **Verify containment ventilation isolation.** Verify containment purge dampers - CLOSED. [] 3197 [] 3198D [] 3198C [] 3196 [] 3198A [] 3198B Verify containment mini purge dampers - CLOSED. CTMT PURGE DMPRS MINI-2866C & 2867C FULL-3198A & 3198D [] 2866C [] 2867C CTMT PURGE DMPRS MINI-2866D & 2867D FULL-3196 & 3197 BOTH-3198B & 3198C [] 2866D [] 2867D Stop MINI PURGE SUPP/EXH FAN.	**Will place HS to STOP**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 7) **Verify containment fan cooler alignment.** Verify at least one containment fan cooler per train - STARTED IN SLOW SPEED. <u>CTMT CLR FAN SLOW SPEED</u> A train [] 1A **[] 1B trips** B train [] 1C **[] 1D does not auto start** Verify associated emergency service water outlet valves - OPEN. EMERG SW FROM 1A(1B,1C,1D) CTMT CLR [] Q1P16MOV3024A [] Q1P16MOV3024B [] Q1P16MOV3024C [] Q1P16MOV3024D	
	BOP	(step 8) **Verify AFW Pumps - STARTED.** Verify both MDAFW Pumps - STARTED [] 1A MDAFW Pump amps > 0 [] 1B MDAFW Pump amps > 0 AND [] FI-3229A indicates > 0 gpm [] FI-3229B indicates > 0 gpm [] FI-3229C indicates > 0 gpm	

		(Step 8.2) Check TDAFW Pump start required.			
		☐Condition	☐TSLB	☐Setpoint	☐Coincidence☐
		RCP Bus <u>Undervoltage</u>	TSLB2 1-1 1-2 1-3	☐2680 V	1/2 Detectors on 2/3 Busses
		Low Low SG Water Level In Any 2/3 SGs	<u>TSLB4</u> 4-1,4-2,4-3 5-1,5-2,5-3 6-1,6-2,6-3	28%	2/3 Detectors on 2/3 SGs

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 8.3) Verify TDAFWP started. [] MLB-4 1-3 lit [] MLB-4 2-3 lit [] MLB-4 3-3 lit TDAFWP SPEED [] SI 3411A > 3900 rpm TDAFWP SPEED CONT [] SIC 3405 adjusted to 100% Verify TDAFW flow path to each SG. TDAFWP TO 1A(1B,1C) SG [] Q1N23HV3228A in MOD [] Q1N23HV3228B in MOD [] Q1N23HV3228C in MOD TDAFWP TO 1A(1B,1C) SG FLOW CONT [] HIC 3228AA open [] HIC 3228BA open [] HIC 3228CA open	
	BOP	(step 9) **Verify main feedwater status.** Verify main feedwater flow control and bypass valves - CLOSED. 1A(1B,1C) SG FW FLOW [] FCV 478 [] FCV 488 [] FCV 498 Verify both SGFPs - TRIPPED. Verify SG blowdown - ISOLATED. 1A(1B,1C) SGBD ISO [] Q1G24HV7614A closed [] Q1G24HV7614B closed [] Q1G24HV7614C closed 9.4 Verify SG blowdown sample - ISOLATED MLB lights lit. 1A(1B,1C) SGBD SAMPLE STEAM GEN ISO [] MLB1 19-2 lit Q1P15HV3328 closed [] MLB1 19-3 lit Q1P15HV3329 closed [] MLB1 19-4 lit Q1P15HV3330 closed	

Event Description:

Attachment 2 of EEP-0

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 10) **Check no MSL isolation actuation signal present.** Signal Setpoint coincidence TSLB LO SG PRESS < 585 psig 2/3 TSLB4 19-2,3,4 Hi stm flow >40% ½ on 2/3 TSLB4 16-3,4 and and 17-3,4 18-3,4 Lo-Lo Tavg <543°F 2/3 TSLB2 10-1,2,3 HI-HI ctmt press >16.2 psig 2/3 TSLB1 2-2,3,4	
	BOP	(Step 11) **Verify PHASE A CTMT ISO.** (Step 11.1) Verify PHASE A CTMT ISO - ACTUATED. [] MLB-2 1-1 lit [] MLB-2 11-1 lit 11.2 Check all MLB-2 lights - LIT.	
	BOP	(step 12) **Check all reactor trip and reactor trip bypass breakers – OPEN** Reactor trip breaker A Reactor trip breaker B Reactor trip bypass breaker A Reactor trip bypass breaker B	
	BOP	(step 13) **Trip CRDM MG set supply breakers.** 1A(1B) MG SET SUPP BKR [] N1C11E005A [] N1C11E005B	
	BOP	(step 14) **Secure secondary components.** Stop both heater drain pumps. Check any condensate pump started. IF started, THEN stop all but one condensate pump. If NO condensate pumps are started then place all HSs to STOP 14.3 IF condensate pump operating, THEN verify backup cooling aligned to condensate pumps per FNP-0-SOP-0.0, APPENDIX B, TB SO ACTIONS FOLLOWING A REACTOR TRIP OR SAFETY INJECTION.	**Will call TBSO to accomplish this.**

Event Description: **Attachment 2 of EEP-0**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 15) **Verify both CRACS mode selector switches in the ON position.** CRACS Mode Selector Switch [] A TRAIN [] B TRAIN Will call BOOTH to have this accomplished since this is not in the simulator	
	BOP	(step 16) **WHEN at least 30 seconds have passed since turbine trip,** **THEN check main generator tripped.** 230 KV BKR [] 810 - OPEN [] 914 - OPEN	
	BOP	(step 17) **Verify two trains of ECCS equipment aligned.** Perform ATTACHMENT 4, TWO TRAIN ECCS ALIGNMENT VERIFICATION.	SEE <u>page 43</u>
End of Attachment 2			

Time	Pos.	Expected Actions/Behavior	Comments
		Attachment 4 of EEP-0	
		TWO TRAIN ECCS ALIGNMENT VERIFICATION	
		(Step 1) Verify two trains of ECCS equipment aligned. [] Check DF01 closed [] Verify DF02 closed [] Check DG15 closed [] Verfiy DG02 closed [] Verify two trains of battery chargers – energized Amps > 0 (Step 1.6) Verify two trains of ESF equipment aligned. [] Check all MLB-1 lights LIT Verify charging pump suction and discharge valves - OPEN. CHG PUMP DISCH HDR ISO [] Q1E21MOV8132A [] Q1E21MOV8132B [] Q1E21MOV8133A [] Q1E21MOV8133B CHG PUMP SUCTION HDR ISO [] Q1E21MOV8130A [] Q1E21MOV8130B [] Q1E21MOV8131A [] Q1E21MOV8131B	
		(Step 1.7) Verify all post accident containment air mixing system fans - STARTED. (BOP) POST ACCIDENT MIXING FANs RX CAV H2 DILUTION FANs (Step 1.8) WHEN power restored to any de-energized emergency bus, THEN verify alignment of associated equipment.	
	BOP	(Step 1.9) Verify Spent Fuel Pool Cooling in service per SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.	Call Radside SO
		End of Attachment 4	

Brief

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, call Unit 2 at 2434 or page the Unit 2 Unit Operator.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

Ask for and answer questions.

Appendix D	Turnover sheet	Form ES-D-2

[X] Unit 1　　[ ] Unit 2		Shift:	Date
Off-going SS	Oncoming SS	[ ] N　[X] D	Today

Part I – To be reviewed by the oncoming Supervisor prior to assuming the shift.
Security Keys A, S, D, SW, X on key ring .____SS

Unit Status　29% power, 998 ppm, MOL 10000 MWD/MTU
MK-5 actions and ramp down is in progress

STPs/Evolutions:	A Train On-Service – A Train
STP-27.1 completed 1 hour ago	Protected

1.0___;　109.1 ____　No adj. ;　63.7 ____;　FSP-20,0 _____;

Status of Special Testing

General Information

1.	1-2A DG is T/O due to the crankcase being cracked and oil draining out of DG.
2.	1A MDAFW pump has a cracked pump casing, was leaking and is tagged out.
3.	Current Risk Assessment is YELLOW and projected is YELLOW due to the 1A MDAFW pump and 1-2A DG issues.
4.	Earthquake recovery is in progress. The seismic printout has been obtained and an ALERT classification has been declared. Emergency callout has just been performed. MK5 actions are in progress. The plant walk downs are in still progress.
5.	UOP-3.1 is complete through step 8.16 and UOP-2.1 is at step 5.3.2. ACC has given permission to remove the generator from the grid.
6.	Plans are to continue the ramp down at 2 MW/min and be off line in the next hour.
7.	
8.	
9.	

Equipment Status

1-2A DG T/O due to crankcase crack	1A MDAFW pump T/O due to cracked casing	Maintain VCT gas pressure 25-30 psig

Reactivity Plan

Reactivity Plan	Waste Management Status	
50 gal every 10 minutes, as required.	#3 RHT – On Service	
	WGS – secured	

LCO Status

3.8.1 condition B, STP-27.1 completed 1 hour ago	
3.7.5 Condition B	

Night Orders

No New Night Orders

Part II	Review Shift Complement
	LCOs Reviewed ___SS___ (initials) reviewed as early in shift as possible

Part III:	STP-1.0 Reviewed/Signed	Operator Logs Reviewed	Cond. Report Queue Reviewed	Autolog Reviewed	ELDS & GEN Spreadsheet verified	Keys Turned Over
	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes

RESPONSE SPECTRA ANALYSIS FOR SAA-3 RECORDER A (S/N 31281) EVENT A001
EVENT DATE: 6/DD/2012 HH:MM:SS, FREEFIELD
SELECTED EXCEEDANCE CRITERIA: OBE SV, CAV and OBE PSA SPECTRA

CHANNEL 1: L=S
  Computed CAV = 0.017 g-s, CAV Design Limit = 0.000 g-s *** **CAV EXCEEDED***
    OBE Limit Value = 0.050 g, OBE SV Limit = 0.081 m/s. Damping = 0.050
    Spectral acceleration exceeded OBE design criteria at 6 periods
    Spectral acceleration greater than 2/3 OBE design criteria at 1 periods
    Spectral velocity exceeded OBE design criteria at 0 periods.

CHANNEL 2: V=UP
  Computed CAV = 0.010 g-s, CAV Design Limit = 0.000 g- s *** **CAV EXCEEDED***
    OBE Limit Value = 0.033 g, OBE SV Limit = 0.054m/s. Damping = 0.050
    Spectral acceleration exceeded OBE design criteria at 7 periods
    Spectral acceleration greater than 2/3 OBE design criteria at 1 periods
    Spectral velocity exceeded OBE design criteria at 0 periods

CHANNEL 3: T=W
  Computed CAV = 0.016 g-s, CAV Design Limit = 0.000 g-s *** **CAV EXCEEDED***
    OBE Limit Value = 0.050 g, OBE SV Limit = 0.081 m/s, Damping = 0.050
    Spectral acceleration exceeded OBE design criteria at 9 periods
    Spectral acceleration greater than 2/3 OBE design criteria at 1 periods
    Spectral velocity exceeded OBE design criteria at 0 periods

```
************************************************
*OBE CRITERIA HAS BEEN EXCEEDED                *
*Both CAV & at least one of OBE response spectral *
*acceleration or spectral velocity criteria must be *
*exceeded to trigger OBE alarm.                *
************************************************
```

Spectral Acceleration

Period	Ch. 1		Ch. 2		Ch. 3		Ch. 4
(sec)	Design	Meas.	Design	Meas.	Design	Meas.	Unused
0.030	0.050	0.773*	0.033	0.583*	0.050	0.963*	
0.033	0.050	0.689*	0.033	0.461*	0.050	0.792*	
0.040	0.050	0.289*	0.033	0.357*	0.050	0.334*	
0.050	0.050	0.279*	0.033	0.267*	0.050	0.475*	
0.067	0.050	0.190*	0.033	0.164*	0.050	0.343*	
0.083	0.053	0.138*	0.033	0.116*	0.053	0.248*	
0.100	0.060	0.525*	0.044	0.210*	0.065	0.435*	
0.125	0.085	0.471*	0.057	0.138*	0.085	0.343*	
0.150	0.105	0.664*	0.070	0.088*	0.105	0.419*	
0.200	0.105	0.606*	0.070	0.055+	0.105	0.384*	
0.250	0.105	0.753*	0.070	0.034	0.105	0.412*	
0.333	0.105	0.730*	0.070	0.017	0.105	0.435*	
0.400	0.105	0.462*	0.070	0.018	0.105	0.277*	
0.500	0.105	0.202*	0.070	0.008	0.105	0.137*	
0.667	0.080	0.233*	0.054	0.004	0.080	0.172*	
0.800	0.065	0.192*	0.044	0.004	0.065	0.124*	
1.000	0.052	0.000	0.035	0.003	0.052	0.069*	

Design Values vs. Measured Values (units=g)
* indicates OBE design exceeded, + indicates >2/3 OBE design value

Spectral Velocity

OBE Design Values vs. Calculated Values (units = m/s)						
* indicates OBE design exceeded						
Period	Ch. 1		Ch. 2		Ch. 3	Ch. 4
(sec)	Design		Design		Design Meas.	Unused
		Meas.		Meas.		
0.500	0.081	0.032	0.054	0.019	0.081	0.044	
0.540	0.081	0.036	0.054	0.017	0.081	0.043	
0.583	0.081	0.037	0.054	0.016	0.081	0.043	
0.630	0.081	0.035	0.054	0.017	0.081	0.044	
0.680	0.081	0.031	0.054	0.019	0.081	0.046	
0.735	0.081	0.026	0.054	0.022	0.081	0.048	
0.794	0.081	0.021	0.054	0.025	0.081	0.051	
0.857	0.081	0.017	0.054	0.027	0.081	0.053	
0.926	0.081	0.019	0.054	0.029	0.081	0.055	
1.000	0.081	0.024	0.054	0.030	0.081	0.055	

Southern Nuclear
J.M. Farley Nuclear Plant

Operations Training
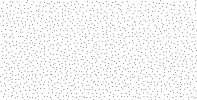# Simulator Exam Scenario
BOOTH INSTRUCTOR GUIDE

ILT-35 NRC EXAM SCENARIO #5

Validation time: 120 minutes Validated by David Shipman, Todd Smith and Doug Jimmerson The week of February 13, 2012			
TRN Supervisor Approval:	Gary Ohmstede	Date:	3/2/12
NRC Chief Examiner	SEE NUREG 1021 FORM ES-301-3		

SOUTHERN
COMPANY
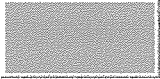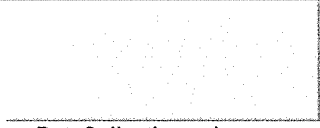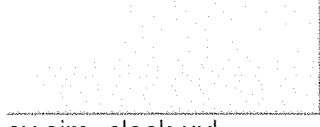
Facility:	Farley Nuclear Plant		Scenario No.: 5		Op-Test No.:	FA2012-301

Examiners: _____   Operators: _____ SRO

_____   _____ RO

_____   BOP

_____

Initial Conditions: 100% power, 58 ppm, EOL, steady state.

Turnover:
- 1C DG T/O for governor work. (OOS 2 days, ETR 4 hrs)
- 1A MDAFW Pump is T/O for impeller replacement. (OOS for 20 hours, ETR 2 days)
- Current Risk Assessment is YELLOW and projected is YELLOW.
- **B** Train On-Service – **B** Train Protected.
- Thunderstorm warnings in effect for Southeast Alabama & Western Georgia.

			SPLIT TRAIN ALIGNMENT

Event No.	Malf. No.	Event Type*	Event Description
1	Imf pt447	I (RO) **TS (SRO)**	PT447, Turbine first stage impulse pressure, fails LOW. **T.S. 3.3.1 Condition U and 3.3.2 Condition D**
2	Imf MAL-FWM9	C (BOP)	1A HDT pump trips due to the HDT dump valve failing open.
3	Imf Ncvp0 1a-b	C (RO) **TS (SRO)**	1A charging pump sheared shaft. **T.S. 3.5.2 Condition A** TRM 13.1.5 admin (mandatory while swapping charging pump trains) Place letdown on service if secured
4	Imf pt464	I (BOP)	PT-464, STM HDR PRESS fails LOW. SGFP speed decreases.
5		R (RO) N (BOP)	Bus duct cooling alarm, NC5, ramp unit to approx. 63% power in 45 minutes. Fast ramp required AOP-17.1 entry.
6	imf fk488-b	M (ALL)	1B FRV fails shut slowly while ramping down. Start when 90% power reached. Manual Rx trip due to LO LO SGWL (CT)
7	Imf mal-esp1 preset	M (ALL) C (RO)	LOSP – 1C DG is tagged out, 1-2A DG will not auto start or start from EPB, and 1B DG starts and trips. 2C DG will not start. Enter ECP-0 here. TDAFWP will not auto start but will start from MCB. (CT)
8		C (BOP)	When at ECP-0 step 10.2, after the MSIVs have been closed, then restore off site power to the SU Transformer(s). Use step 5 to restore power. (CT)

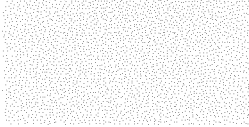(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
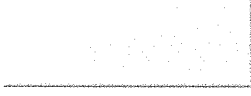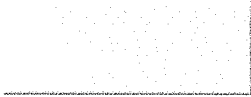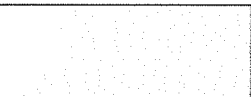
EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
0	0	**Load in IC-215 and sim IC snap directory** **Base IC is IC-76**	
		RUN	 RUN simulator
0	0	Generic setup: bat generic_setup_HLT.txt	
0	0	Quick setup (all items with * are included): bat 2012nrcexam_05.txt	
		1B-2ADG fails to auto start: Set jdgblk1b = true	If the box = TRUE than the 1-2A DG will NOT auto start
		PRESETS	
0	0	Block Auto Reactor Trips imf cbkrxtrp_cc5 open imf cbkrxtrp_cc6 open	*
7	6	1-2A DG fails to auto start set jdgblk1a = true or lmf mal-dsg016	*
7	6	1B DG trips on AUTO start imf mal-eps4b (2 30)	Trg 2
7	7	TDAFW pump will not auto start imf cms3235b_cc1 open imf cms3235b_cc2 open imf cms3235a_cc1 open imf cms3235a_cc2 open	*
2	2	Block 1A Cond pump from auto start imf ccfcn1a_cc8 open imf ccfcn1a_cc9 open imf ccfcn1a_cc10 open	*
0	0	Fail Normal Air Pressure light OFF on 1C DG Malf / D / mal-dsg004	
7	6	1-2A DG fails to start from EPB irf loa-epb001 false	*
0	0	Tag Out 1A MDAFW Pump irf cafp01a_d_cd1 open	*
0	0	2C DG will not start from EPB. irf loa-epb005 false	*
0	0	Tag out 1C DG irf cbk1dh07_d_cd1 open	*

EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
		irf cbk2dh07_d_cd1 open	
		Triggers and Commands	
2	2	Event trigger 1 - degrade 1C CND pmp when HDT pump trips trgset 1 " li4010a < 10" trg 1 "imf ncfcn1a-d_th 10 120"	*
7	6	Trigger 2: 1B DG will trip when it starts. trgset 2 "xg1ba02"	*

		MCB setup	
		1C DG MSS	Place in Mode 3
		Place HOLD Tag on 1C DG MSS	1 HOLD TAG
		Place HOLD Tag on 1C DG DG output breakers DHO7-1 and DHO7-2	2 HOLD TAGS
		1A MDAFW pump handswitch	1 HOLD TAG
		Place Unit 1 and unit 2 Bypass and inoperable panel lights to the up position (EMERGENCY POWER SYSTEM)	Unit 1 A-Train Unit 2 A Train
		Place Unit 1 Bypass and inoperable panel light to the up position (AUXILIARY FEEDWATER SYSTEM)	Unit 1 A-Train
		DEH	Clear DEH alarms
		Select POWER OPS PRIMARY on MCB monitor Acknowledge computer alarms	IPC
		IPC: IF FF5 is in alarm, update rods	Ensure FF5 clear or update rods on IPC
		Setup spreadsheet on OATC computer to resemble reactivity spreadsheet provided	Set up computer
		Recorders	Verify memory disks cleared
			FREEZE simulator
		Perform Booth Operators Setup Checklist	
		Open Simview file to be used for plant parameter data collection: Simview / sv DataCollection.uvl	sv DataCollection.uvl
		If needed, adjust sim time back to 00:00:00 SIMVIEW / Sim_Clock.uvl Hours: clock(3) = 0 Minutes: clock(2) = 0 Seconds: clock(1) = 0	sv sim_clock.uvl
		VERIFY MICROPHONES READY	Batteries installed
		TURNOVER SHEET AVAILABLE	
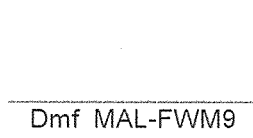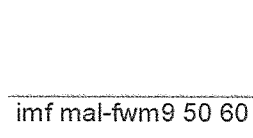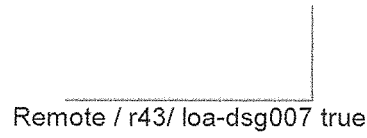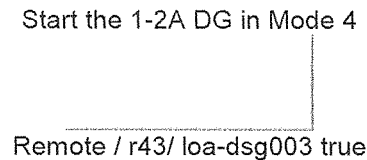
EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
Prior to RUN	0		
		Start data collection for Simview file **On DataCollection.uvl file press DATA for drop down and then COLLECT to start collecting data**	
	0	**Begin Exam**	RUN simulator
		Verify Horns ON: hornflag HORNS ON = TRUE	**Turn Horns ON/OFF** **ann horn**
1	NRC CUE	PT447, Turbine first stage impulse pressure, fails LOW. IMF PT447 0 /20	
2	NRC CUE	1A HDT pump trips due to the HDT dump valve failing open. imf MAL-FWM9 / 100 / 50 <u>When</u> 1A HDT pump is restarted then delete degraded head on 1C cond pump pmps/ dmf ncfcn1c-d_th	
3	NRC CUE	1A charging pump sheared shaft. Imf Ncvp01a-b	
4	NRC CUE	PT-464, STM HDR PRESS fails LOW. SGFP speed decreases. Imf pt464 0 / 100	
5	NRC CUE	Bus duct cooling alarm, NC5, ramp unit to approx. 63% power in 45 minutes. Imf NC5 failon	
6	NRC CUE 90% power	1B FRV fails shut slowly while ramping down. Start when 90% power reached. imf fk488-b 0 120	
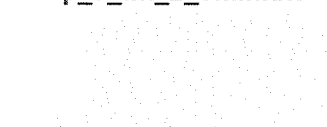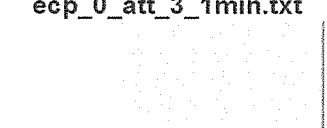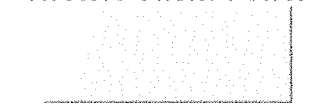
EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
7	NRC CUE When SGFPs tripped	LOSP imf mal-eps1 1 3 TDAFWP will not auto start but will start from MCB	
8	Phone call at step 10.2	When at ECP-0 step 10.2, after the MSIVs have been closed, then restore off site power to either 1A or 1B SU Transformer. Use step 5 to restore power. (CT)	
		End of Exam	HORNS OFF
			FREEZE simulator
		Stop data collection for Simview file **sv DataCollection.uvl**	
		Export data to file with the name of NRC exam01 grpX.txt *NOTE: Substitute grpX with grp1, grp2, or grp3 as appropriate.* *NOTE: file will be saved in the OPENSIM directory.*	Ensure data file created.

Local operator actions:

EVENT NO.	TIME	ACTIONS
1		NONE REQUIRED
2	WHEN REQUESTED to perform step 6.2 RNO	Close 1A HDT dump valve V915A per step 6.2.3 RNO. Use the button below to restore automatic control.

<div align="center">

Dmf MAL-FWM9

</div>

If desired to manually control the dump valve then click on the below button. The valve will go to 50% and then the booth operator can adjust the valve to maintain the level on the IS screen.

<div align="center">

imf mal-fwm9 50 60

</div>

3		NONE REQUIRED
4		NONE REQUIRED
5		NONE REQUIRED
6		NONE REQUIRED
7	Place each DG in mode 4 and report the DG cannot be started from the DG LCP	

<div align="center">

Start the 2C DG in Mode 4

Remote / r43/ loa-dsg007 true

Start the 1-2A DG in Mode 4

Remote / r43/ loa-dsg003 true

</div>

Local operator actions:

EVENT NO.	TIME	ACTIONS
8	WHEN REQUESTED	**Defeat Auto Starts** **Attachment Two** **ecp_0_att_2_5min.txt**

(INSTRUCTOR MUST PERFORM THE LOCAL ACTIONS OF THE ATTACHMENT AT HSPs)

Place LOCAL/REMOTE switches for A train ESF equipment in LOCAL.

- CHG PUMP 1A and 1B (A TRN)
- CCW PUMP 1C and 1B (A TRN)
- MDAFWP 1A

Place LOCAL/REMOTE switches for B train ESF equipment in LOCAL.

- CHG PUMP 1B (B TRN) and 1C
- CCW PUMP 1B (B TRN) and 1A
- MDAFWP 1B

| 8 | WHEN REQUESTED | **RCP Seal Isolation** **Attachment Three** **ecp_0_att_3_1min.txt** |

8		**Instructor Note**: *No action to be taken for isolating Hotwell Fill per step 9 of ECP-0.0 (no simulator capability)*
8	No action	**Reduce DC Loads** **Attachment Four** **(Delay any action on this)**
8	IF REQUESTED	crew may direct N2 aligned to PORVs **cae n2_porvs_align.cae**
8	This is a required action for event 8 – NRC direction	**Restore Offsite Power** **Malf / E / MAL-EPS1 / 100**
8	Note	Crew takes actions of ECP-0.0 to power emergency busses

Local operator actions:

EVENT NO.   **TIME**   **ACTIONS**

Energizes dead bus per ECP-0.0, step 5.9.2 or SOP-36.2
When emergency busses energized, go to step 24 of ECP-0.0

Communications sheet

EVENT NO.	TIME	Communication:

1   WHEN REQUESTED

SSS-plant, SM and Dispatcher: (PT-447)
Dispatcher for CR and for placing bistables in trip,
Shift manager informed and acknowledge.

2   WHEN REQUESTED

TB SO:
called to check out the 1A HDT level.
- TB SO reports: "The HDT is low".
- TB SO later reports "Dump valve V915A is failed open."

TB SO will be asked to jack the valve closed.
- Ensure TBSO calls BOP operator to inform them that the dump valve is being closed.
- TB SO reports: I am closing the valve. I am at the 50% position.

Ask for directions and stay on the phone with the BOP to facilitate a controlled HDT level rise.
By deleting the malfunction the HDT dump will automatically modulate to maintain level. Reassure the BOP that you have control.

If asked DD07 has normal indications and 1A HDT pump looks good

2   IF REQUESTED

IF TWIP alarm (LC1) comes in, then say, "#5 FWH EXTR LINE LEVEL HI ALARM is in on the TWIP."

3   WHEN REQUESTED

Radside SO:
called to check 1A charging pump
- Radside SO reports: "the 1A charging pump motor is running'
- Lube oil temperatures have decreased.
- There is no discharge pressure on the local discharge pressure gage.
- Making a grinding noise and pump is NOT rotating.

SM and Dispatcher:
Dispatcher for CR
Shift manager informed and acknowledge.

4   WHEN REQUESTED

SM and Dispatcher: (PT-464)
Dispatcher for CR
Shift manager informed and acknowledge.

5   WHEN REQUESTED

SM and Dispatcher: (Bus duct cooling)
Dispatcher for CR
Shift manager informed and acknowledge.
TB SO:
If asked to check bus duct cooling report the following:
- The fan belt is broke and the fan is not running

ACC:
Ramping to 50% POWER

6   None required   1B FRV fails closed

EVENT NO.	_TIME_	_Communication:_

**SEE LOCAL OPERATOR ACTION PAGE for actions taken
and provide the below feedback when requested**

	WHEN REQUESTED	**DBSO:** - 1B DG has several alarms in: #35 – ESSENTIAL GENERATOR PROTECTION GEN DIFF #43 – EMERGENCY ENGINE SHUTDOWN
7	**2C DG**	- 2C DG looks good, alarm is due to SW pressure low. - After the 2C DG is tried to be started, then tell the CR that there is no obvious problem with the 2C DG. - I have placed the 2C DG Mode select switch to the MODE 4 position (**see LOA page to do this action**)
	1-2A DG	- 1-2A DG looks good, alarm is due to SW pressure low. - After the 1-2A DG is tried to be started, then tell the CR that there is no obvious problem with the 1-2A DG. - I have placed the 1-2A DG Mode select switch to the MODE 4 position (**see LOA page to do this action**)
	WHEN REQUESTED	**If called about off-site power:** ACC: it may be an hour before we get off-site power restored.
7	WHEN REQUESTED after the TDAFW pump handswitches have been taken to Start and the pump is running	**ROVER:** TDAFW pump looks good and is running. As appropriate. If the handswitches have not been taken to start and held long enough, report the TDAFW pump is not running and there is no obvious problem with the pump.
7	IF REQUESTED	Sampling as requested by chemistry and secure ZAS **Radside SO:** I will align N2 to the PORVs (this is not necessary to be done.) **HP:** Perform RCP-25 on MS lines
8	**NRC direction**	**SM:** (when off-site power restored) ACC just called and reported that the grid is stable and offsite power is available to Farley Nuclear Plant.

Initial Conditions: 100% power, 58 ppm, EOL, steady state.

Turnover:
- 1C DG T/O for governor work. (OOS 2 days, ETR 4 hrs)
- 1A MDAFW Pump is T/O for impeller replacement. (OOS for 20 hours, ETR 2 days)
- Current Risk Assessment is YELLOW and projected is YELLOW.
- **B** Train On-Service – **B** Train Protected.
- Thunderstorm warnings in effect for Southeast Alabama & Western Georgia.

Event 1   PT-447 impulse pressure channel fails LOW.

Verifiable actions: Stop rod movement by placing rods in manual; select PT-446 as the controlling channel. Recover rods and power/Tavg to normal. **TS 3.3.1 Condition U and 3.3.2 Condition D**

Event 2   1A HDT pump trips due to the HDT dump valve failing open. Stby Cond. Pump won't start in AUTO.

Verifiable actions: Start the stby cond pump and find the problem with the HDT valve. Possible restart of HDT pump and securing of Stby Cond pump.

Event 3   1A Charging pump shaft will shear. This will cause a loss of charging flow with the pump running. Letdown will be secured and restoration of letdown will be required.

Verifiable actions: Secure the running Chg pump and start either 1B or 1 Chg pump. Place letdown back on service per AOP-16.0. **TS 3.5.2 condition A and TRM 13.1.5 admin (mandatory while swapping the 1B Chg pump to A Train)**

Event 4   PT-464 fails LOW. SGFP speed decreases and SGWLs fall.

Verifiable actions: Take manual control of BOTH SGFP speeds and control speed to control SGWLs. This will be difficult once the fast ramp starts in the next event.

Event 5   Bus duct cooling alarm, NC5, ramp unit to approx. 63% power in 45 minutes. Fast ramp required AOP-17 entry.

Verifiable actions: RO will have to borate and drive rods to maintain Tavg/Tref and flux on target at 7 MW/min ramp rate. BOP will have to set up the ramp on DEH and control SGFP speed in manual during the ramp.

Event 6   1B FRV fails shut slowly while ramping down. Start when 90% power reached. Rx trip due to LO LO SGWL or possible Hi Hi SGWL Rx trip, loss of BOTH SGFPs and Main Turbine.

Verifiable actions: Trip the reactor when SGWLs approach 30% to prevent an Auto Rx trip. (CT) Then when in ESP-0.1 secure the SGFPs.

Event 7   LOSP – 1C DG is tagged out, 1-2A DG will not start automatically or manually, and 1B DG starts and trips. 2C DG will not start. TDAFW pump will not auto start.

Verifiable actions: Start the TDAFW pump from the MCB, (CT) In ECP-0, direct isolating RCP seal injection before a charging pump starts or is started. (CT)

Event 8   At step 10.2, ACC will call the control room and give power back to the unit from offsite. The crew will immediately transition back to step 5.9.3 and realign the startup transformers back to Unit 1. Then the crew would transition to step 25 and continue with ECP-0.0.

Verifiable actions: align breakers to restore off-site power to one emergency bus. (CT)

Terminate the scenario when offsite power is restored to Unit 1.

AOP-100 / ARPs and AOP-13 / AOP-16/ AOP-17 / possible AOP-16 / EEP-0 / ESP-0.1 / ECP-0.0

CRITICAL TASK SHEET

____ 1.   Actuate a manual Rx trip prior to SI (WOG CT E-0 - - A) (PRA - 10.29 1RTOPMANRT--H)

- when all SGWLs are less than 28%, the reactor is required to be tripped in this event in 40 seconds. SEE 10.29 1RTOPMANRT---H Human Reliability Analysis Notebook since this is a almost a worst case FRP-S.1 event except that the Main Turbine trips.

____ 2.   Call to implement isolation of RCP seal injection before a charging pump starts or is started per ECP-0.0 (step 8). (WOG CT ECA-0.0 - -H)

____ 3.   Start the TDAFW pump before SG dryout occurs. (WOG CT ECA-0.0 - - B)

- Start the TDAFW pump from the MCB

____ 4.   Restore power to the emergency busses when Off-site power becomes available after entering steps to isolate equipment and minimize loads. (WOG CT E-0 - - C)

- This applies to this case when off-site power is restored and incorrect alignment or failure to align the off-site power source to the emergency busses could result in continued degraded core cooling conditions should a small LOCA through the seals were to occur.

SCENARIO OBJECTIVE/ OVERVIEW:

With a tornado heading for the plant the crew will have to ramp down due to bus duct cooling problems.
The team should be able to:
- respond to a failed equipment and instruments and complete the appropriate ARPs, AOP-100, AOP-13, AOP-16 (possible) & Tech Specs,
- respond to a loss of bus duct cooling with SGFP speed control in manual and ramp the unit to 63% power in 45 minutes,
- respond to a FRV that fails closed and manually trip the reactor,
- respond to a loss of off-site power for which no DG will start. When ECP-0 is in progress off-site power will be restored and the crew will restore power to one emergency bus and then exit ECP-0.0.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	7
2.	Malfunctions after EOP entry (1–2)	1
3.	Abnormal events (2–4)	5
4.	Major transients (1–2)	2
5.	EOPs entered/requiring substantive actions (1–2)	1
6.	EOP contingencies requiring substantive actions (0–2)	1
7.	Critical tasks (2–3)	4

Op Test No.: FA2012301	Scenario # 5	Event # 1	Page 1 of 31

Event Description: **PT447, Turbine first stage impulse pressure, fails LOW**

PT447, Turbine first stage impulse pressure, fails LOW. Rods are in AUTO and begin stepping IN. HF3 comes into alarm and the crew will be looking to see if a load rejection has occurred.

Indications Available:

Annunciators:	Indications of PT-447 failing low:
- TAVG / TREF DEV (HF3) - HI STM FLOW ALERT (JB4)	- PI-447 decreases to 0 psig - TI-408A TAVG – TREF increases to +5°F - TR-408 HIGH TAVG / TREF - TREF Decreases to 547 °F - Loss of Load Interlock C-7A light on BYP and Permissive Panel lights up - TSLB4 channel 4 bi-stable lights 16-3; 17-3; 18-3, for loops 1; 2; & 3 Hi Steam Flow Illuminate - Control Rods step in at 72 steps per minute IF ROD CONTROL IN AUTO - Steam Dump Loss of Load Controller is armed.

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100, Instrumentation Malfunction, section 1.3, ver 11.0	
	RO	Announces annunciators or abnormal indications	
	SRO	Directs Immediate Operator Actions of AOP-100 for Turbine Impulse Pressure Instrumentation.	Note: Steps 1 and 2 are immediate operator action
	RO	(Step 1) **Check no load rejection in progress**	Note: If rods are in auto rods will be stepping in at 72 steps per minute. After no load rejection is verified rods should be placed in manual.
	RO	(Step 2) **Check no ROD motion.** - Place rod control in Manual	

Op Test No.: FA2012301	Scenario # 5	Event # 1	Page 2 of 31

Event Description: **PT447, Turbine first stage impulse pressure, fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3) **IF the selected channel of Pimp has failed, THEN select the unaffected channel.** FIRST STG IMPULSE PRESS SEL SWITCH PS/446Z [ ] PT-446 (CH-III) selected **Check** C5 permissive light on. LOW TURB IMPULSE PRESS AUTO ROD WDRL [ ] BLOCKED C-5- lit	
	RO/ BOP	(Step 4) **IF required, THEN restore Tavg to programmed value.**	

NOTE: PT-446 and PT-447 are the two inputs to P13. Tech Spec 3.3.1 Table 3.3.1-1 Function 17f requires two channels operable in mode 1. The one hour required action for condition U states, "Verify interlock is in required state for existing unit conditions." With either PT-446 or PT-447 disabled P13 would still be in the required state (above 10% power) as indicated by the P13-LOW TURBINE IMPULSE PRESSURE PERMISSIVE Bypass and Permissive window not illuminated.

	SRO	(Step 5) **Refer** to Tech Spec 3.3.1 & 3.3.2 for LCO requirements. T.S. 3.3.1 Condition U	17f will be verified that the interlock is in the required state and at 100% power it will be.
		TS 3.3.2 Condition D	Due to this PT is used to develop the MSL isolation setpoint.

TECHNICAL SPECIFICATION 3.3.1, *Reactor Trip System (RTS) Instrumentation*
The RTS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.

Table 3.3.1-1 Reactor Trip System Instrumentation
Function 17f - Turbine Impulse Pressure, P-13   *Applicable in Mode 1*
2 required channels   condition U

	SRO	CONDITION	REQUIRED ACTION	COMPLETION TIME	
		U. One channel inoperable.	U.1 Verify interlock is in required state for existing unit conditions. OR M.2 Be in Mode 2.	1 hour 7 hours	

| Op Test No.: FA2012301 | Scenario # 5 | Event # 1 | Page 3 of 31 |

Event Description: **PT447, Turbine first stage impulse pressure, fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
		TECHNICAL SPECIFICATION 3.3.2, Engineered Safety Feature Actuation System (ESFAS) Instrumentation *The* ESFAS instrumentation for each Function in Table 3.3.2-1 *shall be OPERABLE.*	
		Table 3.3.2-1 ESFAS Instrumentation Function 4e – High Steam Flow in Two steam lines　　　*Applicable in Mode 1* *required channels- 2 per steam line　　　condition D*	

	SRO		

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One channel inoperable.	----------------NOTE---------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. ------------------------- D.1 Place channel in trip. OR D.2.1 Be in mode 3 AND D.2.2 Be in mode 4	 72 hours 78 hours 84 hours

	SRO	(Step 6) **Notify** the Shift Manager	
	RO	(Step 7) **[CA] WHEN** Tavg is within ±1°F of Tref AND plant conditions permit, THEN return rod control to auto.	
	SRO	(Step 8) **Submit** a condition report documenting the failure and notify the Work Week Coordinator of the condition report.	
	SRO	**IF** PT-447 failed, AND it is desired to reset C-7A, THEN go to SOP-18.0, STEAM DUMP SYSTEM.	Note: C-7A should not be reset in the event of a failure of PT-447 which actuates C-7A without consultation with the Operations manager
		C-7A will not be reset	

At the discretion of the Lead Examiner move to Event #2.

| Op Test No.: FA2012301 | Scenario # 5 | Event # 2 | Page 4 of 31 |

Event Description: **1A HDT pump trips due to the HDT dump valve failing open**

V915A, HDT dump valve, will fail open. This will cause the level in the 1A HDT to fall and the 1A HDT to trip on low level.

Indications Available:	
Annunciators: - 1A OR 1B HDT PUMP TRIPPED (LA1) - SGFP SUCT PRESS LO (KB4) probable	Indications: - SGFP suction pressure ↓ - 1A HDT level ↓ - 1A HDT pump amber light LIT

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.11, version 50.0 **LA1**	
	BOP	(step 1) Monitor SGFP suction pressure. IF low suction pressure annunciator KB4 alarms, THEN refer to ARP-1.10.	
		ARP-1.10, version 70.0 **KB4**	
	BOP	(step 1) WHEN low pressure alarm comes in, THEN observe suction pressure on MCB recorder PR-4039 or plant computer	
			Step 2 is not applicable
		(step 3) IF a feedwater heater malfunction is indicated, THEN go to AOP-13.0, Condensate And Feedwater Malfunction	AOP-13 steps are on page 6
	BOP	(step 4) IF pressure continues to decrease below 300 PSIG, THEN verify both heater drain pumps are running.	
	BOP	(step 5) IF a heater drain pump has tripped, THEN perform the following: - Check the MCB level indication for the appropriate heater drain tank. - Dispatch personnel to turbine building to check the heater drain tank dump valve and jack it closed if necessary. - Restart the heater drain pump if there is sufficient level in the heater drain tank.	
			Steps 6 & 8 are not applicable

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Event Description: **1A HDT pump trips due to the HDT dump valve failing open**

Time	Pos.	Expected Actions/Behavior	Comments
		(step 7) IF suction pressure continues to decrease, THEN start the standby condensate pump prior to reaching 275 PSIG.	
	BOP	(step 9) IF operation with three condensate pumps is required, THEN carefully monitor Tave, reactor power, pressurizer level and pressure, and S/G level due to effects of colder feedwater.	
		ARP-1.11, version 50.0 **LA1**	
	BOP	(step 2) Determine which pump has tripped by observing red/ green/amber status lights above pump handswitches on MCB.	
			Steps 3-4 are not applicable
	BOP	(step 5) Observe Heater Drain Tank level indicators on MCB - IF level is low, THEN dispatch personnel to check affected HDT dump valve and Heater Drain Tank to attempt to determine cause of pump trip. - A Heater Drain Tank dump valve N1N26V915A - B Heater Drain Tank dump valve N1N26V915B	
	SRO	(step 6) Have personnel in Turbine Bldg. to perform the following: - Verify cause of trip. - Observe Pump and Heater Drain Tank during any restart attempt pump.	
	BOP	(step 7) IF a Heater Drain Pump restart is to be attempted, THEN restart IAW SOP-21.0, Condensate And Feedwater System.	
			Step 8 is not applicable
	BOP	IF suction pressure continues to decrease, THEN start the standby condensate pump prior to reaching 275 PSIG. Restore condensate/heater drain system to normal operating conditions as soon as possible per 21.0, Condensate And Feedwater System.	

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Event Description: **1A HDT pump trips due to the HDT dump valve failing open**

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-13, Condensate and Feedwater, ver 32.0 Step 6.1	
	BOP	(step 6.1) Check SGFP suction pressure stabilizes above 275 psig.	
	BOP	(step 6.1 RNO) Verify standby condensate pump started	When the cond pump is started the suction pressure will rise.
	BOP	(step 6.2) Check required number of HDT pumps running.	Go to RNO
	BOP	(step 6.2.1) Reduce turbine load at ≤5 MW/min to restore reactor power within limits as req'd	
	BOP	(step 6.2.2) Dispatch operator to investigate affected HDT 6.2.3 IF HDT dump valve failed open, THEN restore tank level. • N1N26V915A(B) - affected heater drain pump dump valve jacked closed • Verify heater drain tank level restored • Start affected heater drain pump • Verify level control - normal	When the HDT dump valve is closed it can cause the 5A FWH (MOV502A) to close due to rising HDT level. If this occurs then step 5 of AOP-13 may be entered to check Rx power and reduce turbine load.
	BOP	(step 6.3) Check required number of condensate pumps running.	
	BOP	(step 6.4) Verify proper position of condensate and feedwater system valves.	
	BOP	(step 6.5) Check LESS THAN three condensate pumps running.	
	BOP	(step 6.5.1)IF required to allow operation with two condensate pumps, THEN reduce turbine load to ≤840 MW. (step 6.5.2) WHEN operation with two condensate pumps acceptable, THEN stop one condensate pump and place in AUTO.	
		When HDT pump restarted and at the discretion of the Lead Examiner move to event #3.	

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Event Description: **1A charging pump sheared shaft**

1A Charging pump will experience a shaft shear. Due to the alignment of charging, this pump will be secured and a pump in the other train will be started.

Indications Available:

Annunciators:	Recognize indications of sheared shaft
- CHG HDR FLOW HI-LO (EA2) - RCP SEAL INJ FLOW LO (DD1) - LTDN ORIF ISO VLV REL LINE TEMP HI (DE3)	- FI-122A decreasing to 0 gpm - 1C Chg pump amps decrease to 52 amps - SI flow decreases to 0 gpm on all 3 RCPs - VCT level will ↓ - Przr level will ↓ slowly - FK-122 demand will go to approx. 0 - LK-459F will ↑ slowly

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-16, CVCS Malfunction, ver 17.0	
		EA2 will direct the crew to AOP-16.0	
	SRO	Determine a charging system malfunction is occurring and direct entry into AOP-16.	
	RO	- Monitor VCT level - Observe CHG HDR PRESS and MOTOR AMPS to ensure proper charging pump operation - PI-121 and ammeter for chg pump - Actual amps will be lower than normal	
	RO	(Step 1) **Verify** charging flow adequate to cool letdown. RNO – close all LTDN ORIF ISO's [] Q1E21HV8149A [] Q1E21HV8149B [] Q1E21HV8149C	Letdown flow is secured
	RO	(Step 2) **Stop any load change in progress**	
	RO	(Step 3) **Monitor VCT level to ensure proper level is maintained**	

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Event Description: **1A charging pump sheared shaft**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 4) **[CA] Observe CHG HDR PRESS and MOTOR AMPS to ensure proper charging pump operation.** [] PI-121 [] AMMETER FOR RUNNING CHG PUMP	Amps will be lower than normal
	RO	(Step 5) Check charging pump – RUNNING	YES but since the shaft is sheared the answer is NO
		RNO for step 5	
	RO	(step 5) RNO **Start** an available charging pump as follows: (step 5.1) **Check** VCT level and pressure adequate. 5.2 Verify charging suction flowpath aligned: ☐ VCT OUTLET ISO valves [] Q1E21LCV115C - OPEN [] Q1E21LCV115E - OPEN OR ☐ RWST TO CHG PUMP valves [] Q1E21LCV115B - OPEN [] Q1E21LCV115D – OPEN (step 5.3) **Check** auxiliary oil pump running for charging pump to be started as indicated by white light illuminated on MCB.	1A charging pump may be stopped at any time but will not be procedurally directed to be secured.
	RO	(step 5.4) Check open miniflow isolation for charging pump to be started: ☐ 1A CHG PUMP MINIFLOW ISO, Q1E21MOV8109A ☐ 1B CHG PUMP MINIFLOW ISO, Q1E21MOV8109B ☐ 1C CHG PUMP MINIFLOW ISO, Q1E21MOV8109C (step 5.5) **Verify** CHG PUMP MINIFLOW ISO, Q1E21MOV8106, is open.	

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Event Description: **1A charging pump sheared shaft**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 5.6) **Verify** the following are closed: [] CHG FLOW FK 122 [] SEAL WTR INJECTION HIK 186 (step 5.7) **Verify** a CCW pump is running in same train aligned to supply charging pump to be started.	
	RO	(step 5.8) **Start** selected charging pump. (step 5.9) **Observe** CHG HDR PRESS indicator PI 121 and motor ammeter to check proper pump operation. (step 5.10) **WHEN** charging pump comes up to speed, **THEN** check auxiliary oil pump stops as indicated by white light NOT being illuminated on MCB.	
	RO	(step 5.11) **Adjust** SEAL WTR INJECTION HIK 186 to maintain 6-13 gpm seal injection flow to each RCP.	
	RO	(Step 6) Check Charging flow FK-122 controlling in AUTO with flow indicated	
	RO	(Step 7) Check DE3 clear	
	RO	(Step 8) **Determine Status of Normal Letdown:** Check normal CVCS letdown - AFFECTED BY MALFUNCTION - LTDN HX OUTLET FLOW, FI-150, NO FLOW INDICATED (Step 8.2) Minimize RCS makeup: Manually close charging flow control: CHG FLOW [] FK-122 (Step 8.2.2) Minimize seal injection between 6-13 gpm (Step 8.2.3) Direct Chemistry to shutdown the zinc addition system (ZAS) (Step 8.3) Dispatch personnel to investigate cause of the Letdown malfunction	Letdown will have been removed from service so it will be placed in service. NA – this is known

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Event Description: **1A charging pump sheared shaft**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 9) **Determine if normal letdown should be re-established:** Check normal letdown malfunction(s) - CORRECTED	
		<u>Restore letdown with the following steps:</u>	
	RO	(Step 9.2) Verify all letdown orifice isolation valves - CLOSED LTDN ORIF ISO 45 GPM [] Q1E21HV8149A LTDN ORIF ISO 60 GPM [] Q1E21HV8149B [] Q1E21HV8149C (Step 9.3) Place LP LTDN PRESS PK 145 on service: [] Place controller in MANUAL [] Adjust demand signal to 50% or less (Step 9.4) Place LTDN HX OUTLET TEMP TK 144 on service: [] Place controller in AUTO [] Set to maintain temperature 90 to 115°F	
	RO	(Step 9.5) Verify VCT HI LVL DIVERT VLV LCV-115A alignment: [] Position indicator VCT light - LIT [] Handswitch in - AUTO	

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Event Description: **1A charging pump sheared shaft**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 9.6) Verify LTDN HI TEMP DIVERT VLV Q1E21TCV143: [] DEMIN light - LIT [] Handswitch in – AUTO (Step 9.7) IF necessary, THEN OPEN both LTDN LINE PENE RM ISO's from the PRIP. [] Q1E21HV8175A [] Q1E21HV8175B (Step 9.8 Verify LTDN LINE CTMT ISO Q1E21HV8152 - OPEN (Step 9.9 Verify LTDN LINE ISO valves - OPEN [] Q1E21LCV459 [] Q1E21LCV460	
	RO	(Step 9.10) Initiate minimum charging flow: (Step 9.10.1) Verify CHG FLOW FK 122 in - MAN (Step 9.10.2) Establish minimum charging flow based on orifices to be placed on service: ☐ 1 Orifice - 18 gpm OR ☐ 2 Orifices - 40 gpm (Step 9.11) Establish approximately 60 gpm letdown flow by OPENING: [] Q1E21HV8149B OR [] Q1E21HV8149C	
	RO	(Step 9.12) [CA] IF all backup heaters energized due to pressurizer level deviation, THEN verify two sets of backup heaters in ON prior to level deviation clearing. (Step 9.13) Adjust LP LTDN PRESS PK 145 to maintain desired letdown pressure - BETWEEN 260-450 PSIG	

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Event Description: **1A charging pump sheared shaft**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 9.13.1) Set controller between 4.3 and 7.5 (Step 9.13.2) Check letdown flow – STABLE (Step 9.13.3) Place PK 145 in AUTO (Step 9.13.4) Control Letdown pressure as desired (Step 9.14) Control LTDN HX OUTLET TEMP,TK 144 to maintain LTDN temp 90 to 115°F. [] TI-116 VCT TEMP [] TI-143 DIVERT LTDN HX TEMP [] TI-144 CCW LTDN HX TEMP (Step 9.15) Refer to SOP-2.1, CVCS system PLANT STARTUP AND OPERATION, for further guidance on Letdown system control	
	RO	(step 10) **Determine** status of letdown flow: Check letdown flow - established	
	RO	(step 10.2) Go to procedure and step in effect	
	SRO	Evaluate Tech Specs Refer to Technical Specifications LCOs 3.5.2, and Technical Requirements TR 13.1.5 3.5.2 **Mandatory** LCO Condition A; since the 1B chg pump is aligned to B Train. 72 hour LCO until the 1B chg pump is placed on A Train and the 1A CHG pump is either racked out or has a jumper installed to allow 1B chg pump to auto start 13.1.5 **Admin** LCO Condition A. Two charging pumps shall be operable. 72 hour LCO	

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Event Description:	**1A charging pump sheared shaft**		

TECHNICAL SPECIFICATION 3.5.2, ECCS—Operating
Two ECCS trains shall be OPERABLE.
APPLICABILITY: MODES 1, 2, and 3.

	SRO	CONDITION	REQUIRED ACTION	COMPLETION TIME	
		A. One or more trains inoperable. AND At least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available.	A.1 Restore train(s) to OPERABLE status	72 hours	

TECHNICAL REQUIREMENT 13.1.5, Charging Pumps - Operating
Two charging pumps shall be FUNCTIONAL.
APPLICABILITY: MODES 1, 2, 3, and 4

This is an ADMIN LCO except during the pump swap placing 1B charging pump on A Train					
	SRO	CONDITION	REQUIRED ACTION	COMPLETION TIME	
		A. One required charging pump nonfunctional.	A.1 Restore at least two charging pumps to FUNCTIONAL status.	72 hours	
	SRO	Submit a Condition Report and notify the Work Week Coordinator (Maintenance ATL on backshifts) Notify the Shift Manager			
At the discretion of the Lead Examiner move to Event #4.					

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Event Description: **PT-464, STM HDR PRESS, fails LOW**

PT-464, STM HDR PRESS, will fail LOW. SGFP speed will decrease causing FRVs to open due to lower Feed flow than steam flow. SG NR levels will decrease to a trip setpoint if SGFP speed is not controlled in a timely manner.

Indications Available:

Annunciators:	Indications of PT-464 failure:
- 1A SG LVL DEV (JF1) - 1B SG LVL DEV (JF2) - 1C SG LVL DEV (JF3)	- PI-464A decreasing to 0 psig - Rx power ↓ - SGFP speed ↓ - SGWLs ↓

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100, section 1.4, version 11	
	SRO	Directs RO or BOP to address ARPs as time permits • 1A, 1B, & 1C SG LVL DEV (JF1, 2 & 3)	
	SRO	Directs entry into AOP-100, section 1.4, and performance of immediate actions, then directs subsequent actions	
	BOP	(step 1) Maintain SG level at the referenced level of 65%. Take manual control of SGFP speed control SK-509A taken to manual and increases speed	Step 1 is an Immediate Operator action **NOTE:** Step 1 is a continuing action step
	SRO	(step 1.3) IF a loss of main feedwater has occurred, THEN perform the actions required by AOP-13.0, LOSS OF MAIN FEEDWATER.	
	SRO	(step 2) Set manual trip criteria on SG level	(high and low trip setpoints are 82% & 28% respectively)
	BOP	(step 3) IF a ramp is in progress, THEN place turbine on HOLD.	

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Event Description: **PT-464, STM HDR PRESS, fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 4) Adjust speed of SGFPs to maintain approximate DP for the existing power level Approximate ΔP can be determined from the following MCB indications. ○ SGFP DISCH PRESS PI-4003 ○ SG Pressure indications: | □/G	CH II	CH III	CH IV
A S/G	PI-474	PI-475	PI-476
B S/G	PI-484	PI-485	PI-486
C S/G	PI-494	PI-495	PI-496		See table below

- Unit 1 NO LOAD ΔP is 50 psid from 0-28.1%. PROGRAM ΔP is linear from 50-190 psid from 28.1% to 100%. TABLE 1 provides approximate ΔP values for varying power levels.

% POWER	DP
70	132 psid
80	151 psid
90	171 psid
100	190 psid

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 5) Check Stm Dumps in the Tavg mode	
	SRO	(step 6) Notifies Shift Manager	
	SRO	(step 8) Submits a CR & Notifies the Work Week Coordinator	

At the discretion of the Lead Examiner move to Event #5.

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Event Description: **Bus duct cooling alarm, NC5, ramp unit to approx. 63% power in 45 minutes. Fast ramp required AOP-17 entry.**

NC5, GEN BUS CLG ALARM, will come into alarm. The report from the TB SO will be that the belt for the bus duct cooling system has broken. The ARP response is to ramp the unit to 13,200 amps w/i 45 minutes, which is less than 63% power. Normal 100% amperage is approx. 22,500 amps.

Indications Available:	
Annunciators: - GEN BUS CLG ALARM (NC5)	- Indications: NONE Verbal report of Bus Duct cooling is not operating correctly

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.13, MCB Annunciator Panel N, VERSION 18.1	
	SRO	(step 1) Notify the Load Dispatcher (GENCOMM) of the problem Request the SM to call PCC via SYSTAT.	
	BOP	(step 2) call TBSO to determine the cause of the alarm.	NOTE: When information received that the Bus Duct Cooling fan belt is broke and the fan is NOT running then continue to step 3
	SRO	(step 3) Directs ramp to approx. 63% power using AOP-17.1 and UOP-3.1. - Call SM and SRC to inform of ramp	If forced cooling is lost from the bus duct cooling fan then ramp down to 13,200 amps (AM 4077, 4078, 4079) w/i 45 minutes
		AOP-17.1, Rapid Turbine Load Reduction, version 1	
	SRO	(step 1) **Perform a rapid ramp briefing** - Use attachment 1 as time permits - Contact Rx Engineering as soon as practical for fast ramp recovery recommendation - Notify SRC of power reduction if it will will result in greater than 15% Rx power change in 1 hour to perform STP-746 (SR 3.4.16.2)	

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Event Description: **Bus duct cooling alarm, NC5, ramp unit to approx. 63% power in 45 minutes. Fast ramp required AOP-17 entry.**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 2) Reduce turbine load at desired rate in OPERATOR AUTO (DEH) - Desired rate will be between 7 and 10 MW/min On the DEH panel: - Press SETPOINT - Set desired TARGET - Select desired RATE - Verify the HOLD light is LIT. - Press the GO pushbutton and ensure the GO light is LIT - Ensure the Main Turbine starts to ramp UP, GVs start to open.	
	RO	(step 3) RO will maintain Tavg w/i ±5°F of Tref by adjusting rod position or boron concentration. Verify rods are in AUTO or MANUAL as desired	Continuing action step
	RO	(step 3.2) If required **Initiate** a manual boration per SOP-2.3 below:	See next page for SOP-2.3 actions
	RO	(step 3.2.1) IF desired the Boration response can be optimized by: - Placing a second letdown orifice in service. OR - Use of the Emergency Borate valve MOV 8104. (step 3.2.2) Start additional pressurizer heaters as required. - To aid in maintaining pressurizer pressure. - To increase Boron mixing	
		(step 3.3) RO will adjust rod position to maintain Delta I w/I limits	

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Event Description: **Bus duct cooling alarm, NC5, ramp unit to approx. 63% power in 45 minutes. Fast ramp required AOP-17 entry.**

Time	Pos.	Expected Actions/Behavior	Comments
		(step 3.4) **check** proper operation of the Steam Dumps. - **Check** LOSS OF LOAD INTERLOCK C-7A on the BYP & PERMISSIVES panel is illuminated. - **Check** STM DUMP MODE SEL TRAINS A B in TAVG. - **Check** STM DUMP INTLK TRAIN A and B in ON. - **Check** steam dumps properly responding to TAVG/TREF deviation	
		SOP-2.3, CVCS Rx Makeup Control System **version 57**	
	RO	(Step 1.0) Borating per SOP-2.3 appendix B • Set the boric acid integrator to the desired quantity • Adjust LTDN TO VCT FLOW LK 112 setpoint as desired • M/U mode selector to STOP • MKUP MODE SEL SWITCH to BOR • MKUP MODE CONT SWITCH to START. (Step 1.6) Verify proper boration operation by observing the following: • On service boric acid pump started. • MKUP TO CHG PUMP SUCTION HDR FCV113B opens. • BORIC ACID TO BLENDER FCV113A opens. • Boric acid flow is displayed on FI-113 MAKEUP FLOW TO CHG/VCT.	**NOTE:** A continuous boration is allowed by appendix C which maintains the BA system lined up and the RO will take the MSS to START each time a boration is required.
		AOP-17.1 version 1 actions CONTINUED below:	
	BOP/ RO	(step 4) Control secondary parameters - SG NR levels maintained at 65% - Pzr level trending to or maintained on program - Pzr pressure = to 2235 psig	Continuing action step

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Event Description: **Bus duct cooling alarm, NC5, ramp unit to approx. 63% power in 45 minutes. Fast ramp required AOP-17 entry.**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 5) Check parameters w/l limits for continued operation - PZR level >15% - Pzr press > 2100 psig - SG NR levels 35-75% - Tavg 541 – 580°F - Control bank LO-LO position clear (FE2) - Delta I w/l limits	Continuing action step
	RO	(step 6) when power reduction completed then restore Tavg to programmed value	Continuing action step
When power reduction to approximately 85%-90% power has been accomplished and per Lead Examiner move to Event #6.			

Event Description: **At 85- 90% power, 1B FRV fails shut slowly while ramping down**

1B FRV fails closed causing the crew to evaluate tripping the reactor.

Indications Available:	
Annunciators: - 1B SG STM FLOW > FEED FLOW (JB2) - 1B SG LVL DEV (JF2)	Recognize indications of 1B FRV closing: - 1B FRV controller going to 100% demand - Steam flow > Feed Flow - 1B SGWL NR ↓ -

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-13, Condensate and Feedwater Malfunction, Ver 32, step 4	
	SS	Directs AOP-13 entry	
	RO	(Step 4) **Check main feed regulating valve(s) automatic control inadequate.** (step 4.1) Take manual control of the affected main feedwater regulating valves as necessary to control SG level. [ ] 1A SG FW FLOW FK-478 [ ] 1B SG FW FLOW FK-488 [ ] 1C SG FW FLOW FK-498	
	RO	(Step 4.2) Maintain SG narrow range level approximately 65%.	
	SRO	**RNO** (step 4.2) IF SG narrow range levels NOT maintained greater than 28%, THEN trip the reactor and go to EEP-0, REACTOR TRIP OR SAFETY INJECTION.	Direct the reactor trip and enter EEP-0 **Critical task- when all SGWLs are less than 28%, the reactor is required to be tripped in this event in 40 seconds.**
			SEE 10.29 1RTOPMANRT---H Human Reliability Analysis Notebook
		EEP-0, Reactor Trip or Safety Injection, version 43	

Event Description: **At 85- 90% power, 1B FRV fails shut slowly while ramping down**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	Immediate Operator actions of EEP-0 (step 1) **Check reactor trip.** Check all reactor trip breakers and reactor trip bypass breakers - OPEN. Check nuclear power - FALLING. Check rod bottom lights - LIT. (step 2) **Check turbine - TRIPPED.** TSLB2 14-1 thru 4 lit (step 3) **Check power to 4160 V ESF busses.** 4160 V ESF busses - AT LEAST ONE ENERGIZED A Train (F 4160V bus) power available lights lit OR B Train (G 4160V bus) power available lights lit Verify operating diesel generators are being supplied from at least one SW pump.	**Immediate Action steps of EEP-0**
		(step 4) **Check SI Status.** Check any SI actuated indication. BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit	
		When ESP-0.1 entered then put in LOSP at step 3 of ESP-0.1 **Steps 1 – 6 of ESP-0.1 below**	
		ESP.0.1, Reactor Trip Response, version 32	
	SRO	Directs actions in ESP-0.1 per RO/BOP Actions listed below	

Event Description: **At 85- 90% power, 1B FRV fails shut slowly while ramping down**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 1) Check RCS temperature - Stable at or approaching 547°F - TAVG 1A(1B,1C) RCS LOOP [] TI 412D [] TI 422D STM DUMP [] TI 432D	NOTE: this is a continuing action step
	BOP	(step 1 RNO) Verify steam dumps closed. STM DUMP INTERLOCK [] A TRN in OFF RESET OR [] B TRN in OFF RESET	RCS temperature will be decreasing due to the RCP trips and AFW flow
	BOP	Verify atmospheric reliefs closed 1A(1B,1C) MS ATMOS REL VLV [] PC 3371A [] PC 3371B [] PC 3371C	
	BOP	(step 1.1.3) IF MSIVs are open, THEN isolate turbine building steam loads while continuing with RNO step 1.1.4.	Directs TB SO to wrap up the TB completing steps 1.1.3.1 – 1.1.3.3
	BOP	(step 1.1.4) IF cooldown continues, THEN minimize total AFW flow. AFW FLOW TO 1A(1B,1C) SG [] FI 3229A [] FI 3229B [] FI 3229C AFW TOTAL FLOW [] FI 3229 ☐ Control MDAFWP flow. MDAFWP FCV 3227 RESET [] A TRN reset [] B TRN reset MDAFWP TO 1A/1B/1C SG B TRN [] FCV 3227 in MOD Control TDAFWP flow.	Adjusts pots for AFW flow to maintain > 395 gpm if SG NR levels are <31%
	BOP	(step 1.1.5) IF cooldown continues, THEN close main steam isolation and bypass valves.	Cooldown should be under control by this time

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 2) WHEN RCS average temperature less than 554°F, THEN verify feedwater status. - Verify FRVs closed (step 2.2) MDAFWP AUTO/DEFEAT [] 1A in DEFEAT [] 1B in DEFEAT (step 2.3) -Verify BOTH SGFPs tripped (step 2.4) -Verify total AFW flow to the SGs >395 gpm	NOTE: this is a continuing action step
	RO	(step 3) Verify ALL RX TRIP breakers OPEN	
	RO	(step 4) Check emergency Boration not required - All rods FULLY INSERTED - RCS Tavg >525°F	
	BOP	(step 5) Announce Unit 1 Reactor Trip	
	BOP/ RO	(step 6) Check AFW status - Check secondary heat sink available Check total AFW flow > 395 gpm OR Check any SG narrow range level – GREATER than 31% **RNO ACTONS** Verify all available AFW pumps started Verify AFW flow > 395 gpm OR any SG level > 31%	

When ESP-0.1 step 3 started OR if EEP-0.0 entered; then at step 5, and at the discretion of the Lead Examiner, move to Event 7.

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Event Description: **Loss of ALL AC power while in ESP-0.1 / TDAFWP does not auto start.**

A LOSP event occurs. 1C DG is tagged out, 1-2A DG will not start and 1B DG starts but trips. 2C DG will not start.

Indications Available:

Annunciators:	Recognize indications of Loss of ALL AC power
- Many and various - EPB power indication lights not LIT	- RCPs tripped - Components not running

Time	Pos.	Expected Actions/Behavior	Comments
		ECP-0.0, Loss of ALL AC Power version 25	
	SRO	Recognize Loss of all AC and direct IOAs of ECP-0.	
	RO/ BOP	(step 1) Check reactor tripped. [] Check reactor trip and reactor trip bypass breakers - OPEN. [] Nuclear power – FALLING (step 1.1 RNO) Manually trip reactor. (step 1.2) IF reactor can NOT be tripped, THEN trip both MG set supply breakers. [] N1C11E005A [] N1C11E005B (step 2) Check turbine tripped. [] TSLB2 14-1 lit [] TSLB2 14-2 lit [] TSLB2 14-3 lit [] TSLB2 14-4 lit	Immediate Operator actions of ECP-0 are steps 1 and 2 **No power** **YES**

	RO	(step 3) **Verify RCS isolated.**	
		(step 3.1) Verify normal letdown isolated.	
		3.1.1 Verify all letdown line orifice isolation valves - CLOSED.	
		LTDN ORIF ISO 45 GPM	
		[] Q1E21HV8149A	
		LTDN ORIF ISO 60 GPM	
		[] Q1E21HV8149B	
		[] Q1E21HV8149C	
		OR	
		3.1.2 Verify letdown line isolation valves - CLOSED.	
		LTD LINE ISO	
		[] Q1E21LCV459	
		[] Q1E21LCV460	
		(step 3.2) WHEN RCS pressure less than 2335 psig, THEN verify both PRZR PORVs closed.	
		(step 3.3) Verify excess letdown line - ISOLATED.	
		EXC LTDN ISO VLV	
		[] Q1E21HV8153 closed	
		[] Q1E21HV8154 closed	
		(step 3.4) Verify all reactor vessel head vent valves - CLOSED.	
		RX VESSEL HEAD VENT OUTER ISO	
		[] Q1B13SV2213A	
		[] Q1B13SV2213B	
		RX VESSEL HEAD VENT INNER ISO	
		[] Q1B13SV2214A	
		[] Q1B13SV2214B	

Op Test No.: FA2012301   Scenario # 5   Event # 7   Page 26 of 31

Event Description: Loss of ALL AC power while in ESP-0.1 / TDAFWP does not auto start.

	RO	(step 4) **Verify total AFW flow GREATER THAN 395 gpm.** AFW TOTAL FLOW [] FI 3229 **RNO** (step 4) Verify TDAFWP running. TDAFWP STM SUPP FROM 1B(1C) SG [] MLB-4 1-3 lit [] MLB-4 2-3 lit [] MLB-4 3-3 lit TDAFWP SPEED [] SI 3411A > 3900 rpm TDAFWP SPEED CONT [] SIC 3405 adjusted to 100% Place TDAFWP STM SUPP FROM 1B SG HV3235A/26 AND TDAFWP STM SUPP FROM 1C SG to the START position	**Critical task – start the TDAFW pump**
	BOP	(step 5) [CA] Restore power to any emergency bus. (step 5.1) Verify supply breakers for major loads on emergency 4160 V busses - OPEN. [] BKR DF01 (1A S/U XFMR TO 1F 4160 V BUS) [] BKR DF15 (1B S/U XFMR TO 1F 4160 V BUS) [] BKR DF-13-1 (1F 4160 V BUS TIE TO 1H 4160 V BUS) [] BKR DG01 (1A S/U XFMR TO 1G 4160 V BUS) [] BKR DG15 (1B S/U XFMR TO 1G 4160 V BUS	On EPB

	BOP/ RO	[] 1C CCW PUMP BKR DF-04-1 [] 1B CCW PUMP BKR DF-05-1 [] 1B CCW PUMP BKR DG-05-1 [] 1A CCW PUMP BKR DG-04-1 [] 1A SW PUMP BKR DK-03-1 [] 1B SW PUMP BKR DK-04-1 [] 1C SW PUMP BKR DK-05-1 [] 1C SW PUMP BKR DL-05-1 [] 1D SW PUMP BKR DL-03-1 [] 1E SW PUMP BKR DL-04-1 [] #4 RW PUMP BKR DJ-03-1 [] #5 RW PUMP BKR DJ-04-1 [] #8 RW PUMP BKR DH-03-1 [] #9 RW PUMP BKR DH-04-1 [] #10 RW PUMP BKR DH-05-1 [] 1B CRDM CLG FAN BKR ED-11-1 [] 1A CRDM CLG FAN BKR EE-13-1 [] 1A CS PUMP BKR DF-11-1 [] 1B CS PUMP BKR DG-11-1 [] 1A RHR PUMP BKR DF-09-1 [] 1B RHR PUMP BKR DG-09-1 [] 1A CHG PUMP BKR DF-06-1 [] 1B CHG PUMP A TRN BKR DF-07-1 [] 1B CHG PUMP B TRN BKR DG-07-1 [] 1C CHG PUMP BKR DG-06-1 [] 1A MDAFWP BKR DF-10-1 [] 1B MDAFWP BKR DG-10-1	Load shed list continued from above Components on MCB and may be verified by RO

	BOP	**Check 1-2A, 1C or 1B diesel generator running for Unit 1.**
		
		Perform 2C DG SBO start:
		  o MSS in MODE 1
		  o USS in UNIT 1
		  o When load shed has been competed then depress START PB
			NO

			2C DG will NOT start
	SRO	(step 5.8) IF 1F OR 1G 4160 V bus energized THEN go to procedure and step in effect and implement function restoration procedures as necessary.	
	SRO	**RNO** (step 5.8) Continue efforts to start at energized, least one diesel generator.	

| Event Description: | **Loss of ALL AC power while in ESP-0.1 / TDAFWP does not auto start.** |

	SRO	(step 5.9) Restore offsite power to any emergency bus.	
	SRO	**RNO** (step 5.9) 5.9 Continue efforts to energize any 4160 V emergency bus and proceed to Step 6. OBSERVE NOTE PRIOR TO STEP 6.	
	SRO	(step 5.9.1) Request Shift Manager coordinate efforts to restore offsite power to at least one startup transformer.	
	NOTE: Step 6 ensures that proper recovery actions are taken in a timely manner.		
	SRO	(step 6) **Perform the following.** 6.1 [CA] WHEN power is restored to any emergency bus, THEN proceed to step 25. 6.2 [CA] WHEN an SI signal is present, THEN reset SI signal.	
	SRO	(step 7) **Defeat** auto start of safeguards equipment using ATTACHMENT 2.	
	SRO	(step 8) **Isolate** RCP seals using ATTACHMENT 3.	**Critical task – call to ensure Attach 3 is performed**
	BOP	(step 9) **Locally** close HOTWELL FILL INLET ISO N1P11V501 and HOTWELL FILL MAN BYP N1P11V506. (137 ft, TURB BLDG)	Call TB SO

	BOP	(step 10) **Check SG status** - Verify MSIVs and Bypass valves closed 1A(1B,1C) SG MSIV – TRIP [] Q1N11HV3369A [] Q1N11HV3369B [] Q1N11HV3369C [] Q1N11HV3370A [] Q1N11HV3370B [] Q1N11HV3370C 1A(1B,1C) SG MSIV - BYPASS [] Q1N11HV3368A [] Q1N11HV3368B [] Q1N11HV3368C [] Q1N11HV3976A [] Q1N11HV3976B [] Q1N11HV3976C	
	BOP	(step 10.2) Verify main feedwater flow control and bypass valves - CLOSED. 1A(1B,1C) SG FW FLOW [] FCV 478 [] FCV 488 [] FCV 498 1A(1B,1C) SG FW BYP FLOW [] FCV 479 [] FCV 489 [] FCV 499	
	BOP	**RNO** (step 10.2) Locally isolate main feedwater flow path(s). - Locally close main feedwater stop valves with handwheels. (127 ft, AUX BLDG main steam valve room)	Call Rover/SSS to close these valves
	BOP	(step 10.3) Verify blowdown - ISOLATED. 1A(1B,1C) SGBD ISO [] HV7614A closed []HV7614B closed []HV7614C closed	
This is where off site power is restored and ACC calls to control room to inform them the grid is stable.			

29

	BOP	(Step 11) **Check SGs not faulted** Check no SG pressure - FALLING IN AN UNCONTROLLED MANNER OR < 50 psig.	
	SRO	(step 5.9.2) Consult the PCC to ensure that the grid is stable and reliable prior to realigning emergency buses to offsite power.	
			Phone call to SM precedes this step.
	SRO	Direct the BOP to restore power to one emergency bus per step 5.9.3 below:	
	BOP	(step 5.9.3) WHEN any startup transformer energized, THEN close associated S/U transformer output breaker. - DF01 – 1F 4160V bus - DG15 – 1G 4160V bus	
	BOP	(step 5.9.5) WHEN 1F or 1G 4160 V bus energized from any startup transformer, THEN verify the associated river water bus breaker closed.	NOTE: The SYNCH BYPASS switch must be held in the BYPASS position when performing the following step.
Per step 6.1, the crew will go to step 25 as shown below:			
	SRO	(step 25) **Check at least one train of** **4160 V ESF busses - ENERGIZED.** [] A Train (F & K) power available lights lit [] B Train (G & L) power available lights lit	

		(step 26) **Verify SW system operating.**
		- Verify at least one SW train - HAS TWO
		     SW PUMPs RUNNING.
		[] A Train (1A,1B or 1C)
		[] B Train (1D,1E or 1C)
		
		- Verify SW flow through at least one train
		     of containment coolers - > 0 gpm.
		SW THROUGH CTMT CLRS INLET
		[] FI 3013A
		[] FI 3013B
		- Verify SW to DG BLDG valves - OPEN.
		SW TO/FROM DG BLDG - A HDR
		[] Q1P16V519/537
		SW TO/FROM DG BLDG - B HDR
		[] Q1P16V518/536	

		(step 27) **Verify electrical alignment** Verify battery charger in at least one train - ENERGIZED. [] A Train (1A or 1C) amps > 0 [] B Train (1B or 1C) amps > 0	
		(step 27.2) IF A train 4160 V buses NOT energized, THEN proceed to step 28.	
		(step 27.3) Verify 1C air compressor in service.	
		(step 28) **[CA] Maintain** intact SG pressures stable at current value.	No action required since the ARVs were not manipulated
		(step 29) **Check** all Condensate Pump power supplies - ENERGIZED	These will be at this time
		(step 30) **Restore** intact SG AFW flow control valve jacking devices to normal position.	No action required
		(step 31) **Evaluate plant conditions** - Check SCMM indication - > 16°F SUBCOOLED IN CETC MODE. - Check pressurizer level - > 13% - Check SI equipment - HAS NOT ACTUATED UPON AC POWER RESTORATION such that SI flow occurred.	**RNO** (step 31.1) Go to ECP-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED.
		(step 31.2) Go to ECP-0.1, LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED.	
		Terminate the scenario when offsite power is restored to Unit 1 **OR at the discretion of the Lead Examiner**	

Brief

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, call Unit 2 at 2434 or page the Unit 2 Unit Operator.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

Ask for and answer questions.

[X] Unit [ ] Unit 2 1		Shift:	Date
Off-going SS	**Oncoming SS**	[ ] N [X] D	Today

Part I – To be reviewed by the oncoming Supervisor prior to assuming the shift.

Security Keys A, S, D, SW, X on key ring .___SS

Unit Status   100% power, 58 ppm, EOL, steady state

STPs/Evolutions: STP-27.1 completed 2 hours ago		**B** Train On-Service – **B** Train Protected

1.0___; 109.1 _____ No adj. ; 63.7 ____; FSP-20,0 _____;

Status of Special Testing

General Information

1. 1C DG T/O for governor work. (OOS 2 days, ETR 4 hrs)
2. 1A MDAFW pump is tagged out for impeller replacement. (OOS for 20 hours, ETR 2 days)
3. Current Risk Assessment is YELLOW and projected is YELLOW due to the 1A MDAFW pump and 1C DG issues.
4. Thunderstorm warnings in effect for Southeast Alabama & Western Georgia.
5.
6.
7.
8.
9.

Equipment Status

1C DG T/O for governor work	1A MDAFW pump T/O for impeller replacement	Maintain VCT gas pressure 25-30 psig

Reactivity Plan	**Waste Management Status**
	#3 RHT – On Service
	WGS – secured

LCO Status

3.8.1 condition B, STP-27.1 completed 2 hours ago	
3.7.5 Condition B	

Night Orders

No New Night Orders

Part II	Review Shift Complement

LCOs Reviewed ___SS___ (initials) reviewed as early in shift as possible

Part III:	STP-1.0 Reviewed/Signed	Operator Logs Reviewed	Cond. Report Queue Reviewed	Autolog Reviewed	ELDS & GEN Spreadsheet verified	Keys Turned Over
	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes

Southern Nuclear
J.M. Farley Nuclear Plant

Operations Training
Simulator Exam Scenario
BOOTH INSTRUCTOR GUIDE

ILT-35 NRC EXAM SCENARIO #6

Need to pre-brief the STA NOT to prompt the Foldout page entry to ECP-1.1

Validation time: 100 minutes Validated by David Shipman, Todd Smith and Doug Jimmerson The week of February 13, 2012			
TRN Supervisor Approval:	Gary Ohmstede	Date:	3/2/12
NRC Chief Examiner	SEE NUREG 1021 FORM ES-301-3		

SOUTHERN
COMPANY

| Facility: | Farley Nuclear Plant | | Scenario No.: | 6 | Op-Test No.: | FA2012-301 |

Examiners:	_____	Operators:	_____	SRO
	_____		_____	RO
	_____		_____	BOP

Initial Conditions: Mode 3, MOL, Shutdown banks are pulled, Xe decreasing from its peak following the reactor trip. The reactor tripped 21 hours ago as a result of the loss of both SGFPs, A Train On-Service – A Train Protected

Turnover:
- 0% RTP, MOL, 893 ppm Cb, 10,000 MWD, Xe concentration is slowly decreasing,
- Reactor tripped 21 hours ago as a result of loss of both SGFPs & repairs are in progress,
- Reactor Startup planned in 12 hours, ECC being calculated by Reactor Engineering,
- Current Risk Assessment is GREEN and projected is GREEN,
- A Train On-Service – A Train Protected
- Thunderstorm warnings in effect for Southeast Alabama & Western Georgia.

SPLIT TRAIN ALIGNMENT

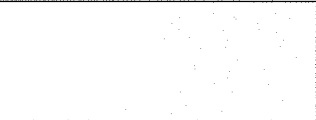| Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP)	Perform STP-11.11, 1A RHR Pump Operability Check.
2	preset	C (RO)	Initiate an entry into AOP-27 for emergency boration (SSS phone call due to SDM OOS). Boric acid pump 1A will not start and MOV 8104 will not open. TS will be handled by SSS per the phone call.
3	Imf HIC3227CA-O	C (BOP) TS (SRO)	AFW FCV-3227C fails open, alternate means of isolation required to prevent SG overfill. **TS 3.7.5 Condition C**
4	Imf pk444a-d	I (RO)	PK- 444A fails HIGH.
5	imf cccp01c_d_co1	C (BOP) TS (SRO)	1C CCW pump trips on Overcurrent. 1B CCW pump does not auto start. **TS 3.7.7 Condition A**
	imf Mal-ccw2B		CCW leak when 1B CCW pump starts- Leak can be isolated locally at the 1C CCW pump due to relief valve lifting. Makeup to CCW surge tank.
6	imf pk145-a	C (RO)	PK-145 fails HIGH.
7	Imf mal-rcs2a	M(ALL)	A LBLOCA occurs
		C (RO)	Automatic SI fails to actuate, manual actuation required. (CT)
		C (BOP)	1A & 1B CTMT coolers fail to auto start, manual start of at least one required
		C (RO)	1B RHR pump fails to auto start, manual start required. (CT)

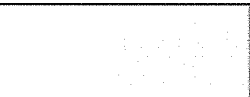| 8 | preset | C (RO) | During the LB LOCA, power to MOV8811B (CTMT SUMP to 1B RHR Pump) will be lost. |
	preset	C (BOP)	1A RHR pump automatically starts, but will trip when RWST level reaches 30 feet.
			The combination of problems will prevent the crew from transferring to CL recirc. The crew should transition to ECP-1.1 per step 14.1 RNO **OR** FO page of EEP-1 -Makeup to the RWST and minimize RWST outflow (CT)
			When ECP-1.1 is entered and evaluation of equipment running complete, then restore power to 8811B and transition to EEP-1.0 or ESP-1.3.
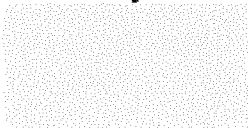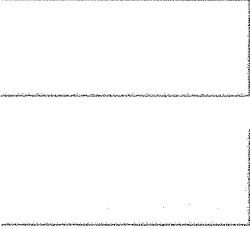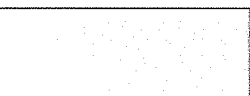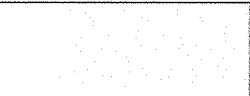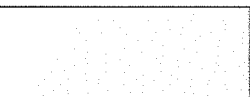
(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
0	0	**Load in IC-216 and sim IC snap directory** Hotwell flush at 0.20 UOP-1.3, v. 62, at step 5.17 21 hours after trip, MOL, 893 ppm boron Xe -2969 1 Letdown orifice on service **Base IC- 019**	
		RUN	RUN simulator
0	0	Generic setup: bat generic_setup_HLT.txt	
0	0	Quick setup (all items with * are included): bat 2012nrcexam_06.txt	
		PRESETS	
2	0	Boric Acid Pump A fails to start in Manual. Cmfmalf / ccvp005a_cr2	*
7	0	auto SI A Train and B Train fails CMFmalf / csftyinj_cc1 / open CMFmalf / csftyinj_cc11 / open	*
5	0	1B CCW pump will not auto start. imf cccp02a_d_cc7 open imf cccp02a_d_cc8 open	*
5	0	CCW leak when df04 opens imf Mal-ccw2B (3 1) 150 60	TRG 3
7	0	1B RHR pump fails to auto start on SI. Manual start allowed. CMFmalf / crhp01b_d_cc9 / open	*
7	0	1A & 1B ctmt crls do not auto start on LOSP or ESF sequencer CMFmalf / cchf1al_d_cc3 / open CMFmalf / cchf1bl_d_cc3 / open CMFmalf / cchf1al_d_cc4 / open CMFmalf / cchf1bl_d_cc4 / open	*
2	0	MOV-8104 will not open Imf ccvh104_d_cr1	*
8	0	1A RHR pump trips on overload after auto start imf crhp01a_d_co1 (5 0)	TRG 5
8	0	MOV8811B breaker trips during LB LOCA 10 minutes CMFremote / irf crh8811b_d_cd1 open	TRG 4

	0	Triggers and Commands	
3	0	Trigger 1 - flash JK1 A MDAFWP SUCT PRESS LO, event 3 when FCV3227C > 0.6 trgset 1 "raf3227c > 0.6" trg 1 "imf jk1 failon"	*
3	0	Trigger 2 - part of flash from trig 1, event 3 trgset 2 "raf3227c > 0.9" trg 2 "dmf jk1"	*
6	0	Trigger 3: start a CCW leak when 1B CCW pump is started Event trigger 3 monitors breaker dfo4 open trgset 3 "cccp01c_d_co1"	*
7	0	Trigger 4 - trigger on LB LOCA Event: trgset 4 "jmrcs2a"	*
8	0	Trigger 5 - RWST LI 4075a < 30, event 8 trgset 5 "bsis4075 < 30"	*

		MCB setup	
		Ensure letdown has 1 orifice on service and charging flow is stable at a low minimum value	
		Turn ON scaler-timer	ON
		DEH	Clear DEH alarms
		Select CRITICAL STARTUP PARAMETERS on MCB monitor Acknowledge computer alarms	**IPC**
		IPC: IF FF5 is in alarm, update rods	Ensure FF5 clear or update rods on IPC
		Setup spreadsheet on OATC computer to resemble reactivity spreadsheet provided	Set up computer
		Recorders	Verify memory disks cleared
		Provide a marked up copy of UOP-1.3 version 69 through step 5.16 complete. The following steps should be signed off: P&L: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 2.10 Steps: 5.3, 5.6, 5.7, 5.8, 5.9, 5.11, 5.12, 5.14, 5.15, 5.16	**UOP-1.3 copy**
		Provide STP-11.11, 1A RHR Pump Operability Check	STP-11.11
			FREEZE simulator
		Perform Booth Operators Setup Checklist	
		Open Simview file to be used for plant parameter data collection: Simview / **sv DataCollection.uvl**	**sv DataCollection.uvl**
		If needed, adjust sim time back to 00:00:00 **SIMVIEW / Sim_Clock.uvl** **Hours: clock(3) = 0** **Minutes: clock(2) = 0** **Seconds: clock(1) = 0**	**sv sim_clock.uvl**
		VERIFY MICROPHONES READY	Batteries installed
		TURNOVER SHEET AVAILABLE	

EXAM

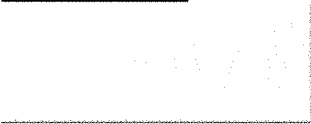| EVENT#	TIME	EVENT DESCRIPTION	COMMAND
Prior to RUN	0		
		Start data collection for Simview file On DataCollection.uvl file press DATA for drop down and then COLLECT to start collecting data	
	0	**Begin Exam**	 RUN simulator
		Verify Horns ON: hornflag HORNS ON = TRUE	**Turn Horns ON/OFF** **ann horn**
1	Start of exam	Perform STP-11.11, 1A RHR Pump Operability Check.	STP-11.11 provided
2	NRC CUE	Initiate an entry into AOP-27 for emergency boration (SSS phone call due to SDM OOS).	Phone call
3	NRC CUE	AFW FCV-3227C fails open Imf HIC3227CA-O 4 20 Reflash JK1 as required	
4	NRC CUE	PK- 444A fails HIGH Imf pk444a-d 0 35	
5	NRC CUE	1C CCW pump trips on Overcurrent imf cccp01c_d_co1	
	preset	CCW leak when 1B CCW pump starts TRG 3 imf Mal-ccw2B 150 60	
6	NRC CUE	PK-145 fails HIGH. imf pk145-a 10 30	
7	NRC CUE	A LBLOCA occurs Imf mal-rcs2a	

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
8	preset	MOV8811B de-energizes 10 minutes after LBLOCA	TRG 4
	preset	1A RHR pump automatically starts, but will trip when RWST level reaches 29- 30 feet by MCB indication.	TRG 5
		Termination: when power is restored to 8811B and transition to EEP-1.0 or ESP-1.3 has been determined irf crh8811b_d_cd1 close	
		End of Exam	HORNS OFF
			FREEZE simulator
		Stop data collection for Simview file sv DataCollection.uvl	
		Export data to file with the name of NRC exam01 grpX.txt *NOTE: Substitute grpX with grp1, grp2, or grp3 as appropriate.* *NOTE: file will be saved in the OPENSIM directory.*	Ensure data file created.

Local operator actions:

EVENT NO.	TIME	ACTIONS

EVENT NO.   **TIME**   **ACTIONS**

1   NONE REQUIRED

2   WHEN REQUESTED   Open v185 locally

                                        lrf loa-cvc033 1 25

3   WHEN REQUESTED   **ROVER If requested to isolate HV3227C Locally:**

                                        NOTE: *If a local operation is requested for AFW isolation* **delay**
                                        isolation for at least 3 minutes. *This is to allow the crew to take*
                                        action from the control room.

                                        Note: The response here is dependent on if isolation is asked for
                                        locally.

                                        Manually close FCV-3227c
                                        imf raf3227c-m 0 25

                            OR

                                        irf caf0335c_cd1

                            OR

                                        Q1N23V017F is manually isolated."
                                        REMOTE / N23 / LOA-AFW010 / 0 / 30 ramp

4   NONE REQUIRED

5   NONE REQUIRED

5   Wait 5 minutes **after**   Isolate CCW leak
           makeup is initiated, then
           STOP the leak

                                        dmf Mal-ccw2B

6   NONE REQUIRED

Local operator actions:

EVENT NO.	TIME	ACTIONS
7	WHEN REQUESTED	**SSS / RADSIDE:** "I have performed steps 1 and 2 of attachment 1 of EEP-1 and need you to perform step 3 of attachment 1."

Button goes here
CAE ECCS_disc_delayed.cae

7	WHEN REQUESTED	**Unit Two UO:** RESET FIRE ALARM MH1

ANN / MH1 failoff

"Fire alarm is reset. Fire alarm was 1A-22 in Unit One CTMT"

8	When ECP-1.1 is entered and evaluation of equipment running complete, then restore power to 8811B.	

irf crh8811b_d_cd1 close

Communications sheet

EVENT NO.	TIME	ACTIONS
1	WHEN REQUESTED	**Radside SO:** Report that RHR pump looks normal, normal oil levels and other requested information, report all are normal. Report that **FIS602A reads 570 gpm.**
2	As Directed by NRC	**SSS:** • An extra operator has performed a SDM IAW STP-29.1. There is insufficient SDM and requires an emergency boration of 500 gallons. • I will write the LCO on Tech Spec 3.1.1. • **If asked**, after 500 gallons they can secure the boration and SSS will call for a sample. **Radside SO:** May be requested to check FAC4. The breaker is closed. • **If asked**, there is no visible problem with the 1A BAT pump or MOV-8104 **SSS-plant, SM and Dispatcher:** MOV-8104 will not open and 1A BAT pump will not start, CRs written.
3	WHEN REQUESTED	**SSS / ROVER**: "FCV-3227C is full open, the air line was broken and leaking. I isolated air to the valve to stop the air leak." **When requested to close the valve locally:** I have closed the valve manually and the handwheel broke. FCV-3227C cannot be opened at this time.
4	WHEN REQUESTED	**SSS-plant, SM and Dispatcher:** Recognize and repeat back PK-444A failure, CR in the cue and that type of communications.
5	WHEN REQUESTED	**ROVER:** - The 1C CCW pump motor has an acrid smell in the area. - DF04 has an overcurrent trip flag.
5	WHEN REQUESTED	**ROVER:** • acknowledges and goes to look for leak
	Wait 5 minutes **after** makeup is initiated, then STOP the leak from the LOA page	• The relief on the 1C CCW pump was lifting. The relief has reseated but the relief is still leaking slightly. No valves were closed.
6	WHEN REQUESTED	**SSS-plant, SM and Dispatcher:** Recognize and repeat back PK-145 failure, CR in the cue and that type of communications.

Communications sheet

EVENT NO.	TIME	ACTIONS
7	WHEN REQUESTED	**SM:** "I will make the classifications and notifications." **EXTRA CONTROL ROOM OPERATOR:** "Both CRACS mode selector switches are in ON." **Turbine Bldg SO:** Back up cooling to the condensate pumps are aligned. **SM / SSS:** "I will get someone to perform step 6 of EEP-1." "I will get an extra operator to secure the 1B DG" **ANY CALL TO SHIFT CHEMIST:** Acknowledge to requirement for sampling
7	WHEN REQUESTED	**RADSIDE SO:** "The A RHR pump has a burnt insulation smell in the room, and the motor is hot to the touch".
	2 minutes after REQUESTED	"I don't see any problem with the MOV-8811B (CTMT SUMP TO 1B RHR PUMP) breaker FV-B5, except that it's tripped".
	WHEN REQUESTED	**ROVER:** "The A RHR pump breaker, DF-09, is tripped on overcurrent."
8	AS DIRECTED	**RADSIDE SO:** I have reset Breaker FV-B5 for MOV 8811B, CTMT sump to 1B RHR pump.

Initial Conditions: Mode 3, MOL, Shutdown banks are pulled, Xe decreasing from its peak following the reactor trip, The reactor tripped 21 hours ago as a result of loss of both SGFPs, **A** Train On-Service – **A** Train Protected.

Turnover:
* 0% RTP, MOL, 893 ppm Cb, 10,000 MWD, Xe concentration is slowly decreasing,
* Reactor tripped 21 hours ago as a result of loss of both SGFPs & repairs are in progress,
* Reactor Startup planned in 12 hours, ECC being calculated by Reactor Engineering,
* Current Risk Assessment is GREEN and projected is GREEN
* **A** Train On-Service – **A** Train Protected
* Thunderstorm warnings in effect for Southeast Alabama & Western Georgia.

Event 1   Perform STP-11.11, 1A RHR Pump Operability Check.

Verifiable actions: Start 1A RHR pump and record indicated flow, then secure the pump.

Event 2   Initiate an entry into AOP-27 for emergency boration (SSS phone call due to SDM OOS). Boric acid pump 1A will not start and MOV 8104 will not open. 1B Bat pump will start.

Verifiable actions: Start the other BAT pump, align Boration flow path after MOV-8104 will not open, then align another orifice on service for letdown and increase charging flow. When the boration is complete, then secure the lineup.

Event 3   AFW FCV-3227C fails OPEN. **TS 3.7.5 Condition C** for inoperable MDAFW Flowpath to 1C SG (2 MD trains inop. to C SG. STP-22.8 says'" Performance of this procedure affects the operability of both MDAFW pumps briefly while MOV-3764A, B, C, D, E & F are stroked closed."

Verifiable actions: Close BOP MOV3764C (B train) **OR** MOV3764F (A train) **OR** Jacking closed locally HV3227C **OR** Isolating HV3227C locally with manual isolation valve **OR** power up MOV3350C and close it.

Event 4   PK- 444A fails HIGH. RCS pressure will increase to PORV setpoints to open. AOP-100 entry to restore RCS pressure.

Verifiable actions: Take manual control of Sprays and Heaters to control RCS pressure manually.

Event 5   1C CCW pump trips on Overcurrent. 1B CCW pump does not auto start. AOP-9 will be entered. **TS 3.7.7 Condition A**

Verifiable actions: Start the 1B CCW pump.
CCW leak when 1B CCW pump starts-

Verifiable actions: Makeup to the CCW surge tank.
When the 1B CCW pump trips the relief valve will lift and stick open. The relief will reseat when makeup is started to the CCW surge tank per the ARP.

Event 6   PK-145 fails HIGH.

Verifiable actions: Take manual control of PK-145 and reduce controller to open PCV-145. Due to the letdown relief opening letdown may be removed from service. Then PK-145 taken to manual and closed and then either restore letdown or place excess letdown on service per the ARP and AOP-16.

Event 7   A LB LOCA occurs. Auto SI fails to actuate. 1A and 1B CTMT coolers do not start in slow speed. 1B RHR pump will not auto start but can be manually started.

Verifiable actions: Actuate a reactor trip and safety injection. (CT) Start BOTH CTMT coolers in A Train.

Start 1B RHR pump. (CT) This is critical since when the RWST gets to 30 feet, 1A RHR pump will trip.

Event 8   1A RHR pump automatically starts, but will trip when RWST level reaches 30 feet and MOV8811B (CTMT SUMP to 1B RHR Pump) will be de-energized.

Verifiable actions: Transition to ECP-1.1 and secure the CS pumps and CTMT coolers to meet step 10.2 table alignment and call to makeup to the RWST per step 12. (CT)

When step 12 is complete the TSC will call to inform the crew that MOV-8811B is powered up, then the crew can exit ECP-1.1 and return to either EEP-1.0 or ESP-1.3 depending on RWST level.

Procedures used :

Isolation of FCV-3227C will be per OPS policy for skill of the craft, NMP-AP-003, Procedure and work Instruction Use and Adherence, in combination with AOP-6.0, Loss of Instrument air step 8.2 that allows use of MOVs being cycled to control SGWL 35-69% or SOP-22 step 4.12.1.

STP-11.11/ AOP-27 / AOP-100 / AOP-9.0 / ARP / AOP-16 / EEP-0 / EEP-1.0 / ECP-1.1

CRITICAL TASK SHEET

____ 1. Manually actuate at least one train of SIS-actuated safeguards before any of the following: Manually actuate at least one train of SIS-actuated safeguards before any of the following: (WOG CT E-0 - - D)

- Transition to any E-1 series procedure or
- Transition to any FRP
  - Manually Actuate SI

____ 2. Manually start at least one low head ECCS pump before transition out of E-0. (WOG CT E-0 - - H)

____ 3. Makeup to the RWST and minimize RWST outflow. (WOG CT ECA-1.1 - - B)

- Begin makeup to the RWST using the makeup system in the manual mode per SOP-2.3 or Direct the TSC to begin evaluating alternate makeup methods, and
- Establish the required number of CS pumps running in of ECP-1.1 per step 10.2 table alignment

SCENARIO OBJECTIVE/ OVERVIEW:

Mode 3 with component and instrumentation failures, SBLOCA and LBLOCA, failure of CTMT cooling and RHR systems, ECP-1.1 entry required.

The team should be able to:
- recognize and respond to failures of various instruments and components per ARPs, AOP-6.0, AOP-27, AOP-100, AOP-9.0, AOP-16 & Tech Specs
- identify a LBLOCA and initiate a manual SI,
- recognize that the required Containment Cooling System components are not operating and start Ctmt coolers and 1B RHR pump
- and then enter ECP-1.1 when MOV-8811B is de-energized and 1A RHR pump trips, then secure running CS pumps per the table in ECP-1.1 and call to have RWST makeup aligned.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	9
2. Malfunctions after EOP entry (1–2)	3
3. Abnormal events (2–4)	6
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	1
7. Critical tasks (2–3)	3

| Op Test No.: FA2012301 | Scenario # 6 | Event # 1 | Page 1 of 42 |

Event Description: **Perform STP-11.11, 1A RHR Pump Operability Check**

| STP-11.11 will be completed satisfactorily. |
| **Indications Available:** |

| none | none |

Time	Pos.	Expected Actions/Behavior	Comments
		STP-11.11, 1A RHR PUMP OPERABILITY CHECK **Version 11.0**	
		Initial conditions will be signed off as completed	Sign-off 3.1 through 3.4
	BOP	(step 4.1) IF 1A RHR pump is NOT running, THEN start RHR PMP 1A	1A RHR pump is started
		(step 4.2) Verify that pump motor amps are stable and that discharge pressure has increased	
		ACCEPTANCE CRITERIA: 1A RHR pump can be manually started from the control room.	
		(step 4.3) Verify 1A RHR pump has indicated flow on Q1E11FIS602A. Q1E11FIS602A _____ gpm	
		ACCEPTANCE CRITERIA: 1A RHR pump has indicated flow on Q1E11FIS602A.	
		(step 4.4) IF 1A RHR pump is NOT running for cooldown requirements, THEN stop the 1A RHR PUMP.	1A RHR pump is secured
		When the 1A RHR pump is secured and at the discretion of the Lead Examiner move to Event #2.	

| Op Test No.: FA2012301 | Scenario # 6 | Event # 2 | Page 2 of 42 |

Event Description: **Initiate an entry into AOP-27 for emergency boration**

A phone call from the SSS will initiate this event; that an extra operator has performed a SDM IAW STP-29.1 and the result is positive. This requires emergency boration of 500 gallons.

Indications Available:

Annunciators:	Recognize indications of AOP-27 entry
- NONE	- Phone call

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-27.0, Emergency Boration version 16	
	RO	(step 1) **Start** a BAT pump [ ] 1A BAT pump handswitch turned to START [ ] 1B BAT pump started	1A BAT pump will not start
	RO	(step 2) **Align** normal emergency boration flow path. [ ] Open MOV 8104	MOV8104 will not open
	RO	RNO (step 2) **Align** manual emergency boration flow path BORIC ACID TO BLENDER [ ] Q1E21FCV113A open MAN EMERG BORATION [ ] Q1E21V185 open (100 ft, AUX BLDG rad-side chemical mixing tank area)	
NOTE: IF emergency boration is being aligned to the manual emergency boration flow path, THEN consideration should be given to starting a boration through the blender via FCV113A & B in accordance with SOP-2.3, CVCS REACTOR MAKEUP CONTROL SYSTEM, while personnel are being dispatched to locally open Q1E21V185.			
	RO	(step 3) Verify one chg pump started	
	RO	(step 4) **Establish** adequate letdown [ ] Verify 8149A and either 8149B or C open	

Op Test No.: __FA2012301__ Scenario # __6__ Event # __2__ Page __3__ of __42__

Event Description: **Initiate an entry into AOP-27 for emergency boration**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 5) **Establish** charging flow rate > 40 gpm (step 6) **Verify** boration flow > 30 gpm on FI-113	
	RO	(step 7) Secure ZAS – Chemistry called	
			Step 8 is N/A
	SRO	(step 9) <u>WHEN</u> 500 gallons has been injected, <u>THEN</u> proceed to step 10 and secure the emergency boration.	
	RO	(step 10) Stop running boric acid transfer pump.	
	RO	**RNO** step 11 Secure manual emergency boration flow path. BORIC ACID TO BLENDER [ ] Q1E21FCV113A closed MAN EMERG BORATION [ ] Q1E21V185 closed	
	RO	(step 12) **Direct** Chemistry to sample RCS for boron concentration using CCP-651, SAMPLING THE RCS	
	RO	(step 13) **Verify** reactor makeup control system aligned for auto makeup using SOP-2.3	
	SRO	(step 14) **Check** Shutdown Margin verified > Technical Specification requirement	
	SRO	May identify LCO on TRM 13.1.3 Boration flow path due to MOV-8104 will not open	Possible admin LCO
When the emergency boration is in progress and at the discretion of the Lead Examiner move to Event #3.			

Op Test No.: FA2012301	Scenario # 6	Event # 3	Page 4 of 42

Event Description: **AFW FCV-3227C fails open**

FCV-3227C will fail open. In this mode, SG level will be maintained using AFW. The crew will have to make a decision on control of AFW flow to the 1C SG.

LCO 3.7.5 applies and evaluate the operability of the AFW system with one flowpath potentially inoperable.

Indications Available:	
Annunciators: - 1A MDAFWP SUCT PRESS LO (JK1)	Indications of FCV-3227C failing open: - AFW flow to 1C SG (FI-3229C) ↑ - AFW flow to 1A and 1B SG (FI-3229A and FI-3229B) ↓ - Total AFW flow indicator FI-3229 ↑ - AFW pump discharge pressure ↓ - AFW pump suction pressure ↓ - MDAFW flow indicator FI-3402A ↑ - AFW pump amps slightly ↑ - FCV-3227C position indication GREEN lamp extinguishes

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.9, MCB ANNUNCIATOR PANEL J, JK1 **version 47.0**	
	SRO	Directs ARP Performance when alarm comes in: - JK1, 1A MDAFWP SUCT PRESS LO	
	BOP	(step 1) Determine actual suction pressure as indicated by PI-3211A and the CST level.	Determines actual suction pressure by PI-3211A is LOW & CST level is adequate
	BOP	(step 2) IF an actual low suction pressure condition exists, THEN stop 1A MDAFW Pump	
	BOP	(step 3) IF auxiliary feedwater flow is required AND condensate storage tank level is NOT low, THEN start Motor Driven Auxiliary Feedwater Pump 1B OR the Turbine Driven Auxiliary Feedwater Pump.	
	BOP	(step 4) Determine the cause of the alarm	Determines FCV3227C is full open & won't go closed when demanded by potentiometer

Op Test No.: FA2012301　　Scenario # 6　Event # 3　　　Page 5 of 42

Event Description:　　　AFW FCV-3227C fails open

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	Directs isolating MDAFW flow to 1C SG by one of the following methods: - Closing BOP MOV3764C (B train) OR MOV3764F (A train) - Jacking closed locally HV3227C - Isolating HV3227C locally with manual isolation valve - closing v017F locally - power up MOV-3350C and close the MOV	AOP-6.0 step 8.2 has actions that could be used here as well. Starting and stopping the MDAFW pumps and/or TDAFWP is allowed as well. **If MOV-3350C is closed then Condition D will be the LCO until the MOV is reopened.**
	BOP	(step 5) IF the alarm is due to an improper valve lineup, THEN verify a correct valve lineup AND return the Auxiliary Feedwater System to operation.	
	SRO	(step 7) Refer to Technical Specifications, sect 3.7.5 for LCO Requirements	

TS 3.7.5 Condition C for inoperable MDAFW Flowpath to 1C SG (2 MD trains inop. to C SG.) STP-22.8 says'" Performance of this procedure affects the operability of both MDAFW pumps briefly while MOV-3764A, B, C, D, E & F are stroked closed."

TECHNICAL SPECIFICATION 3.7.5, AFW System
LCO 3.7.5 Three AFW trains shall be OPERABLE.
APPLICABILITY: MODES 1, 2, and 3.

	SRO	CONDITION	REQUIRED ACTION	COMPLETION TIME	
		C. Two AFW trains inoperable.	C.1 Be in MODE 3. AND C.2 Be in MODE 4.	6 hours 12 hours	
	SRO	CONDITION	REQUIRED ACTION	COMPLETION TIME	This would be the condition to enter if MOV-3350C is closed
		D. Three AFW trains inoperable.	D.1 --------------NOTE--- LCO 3.0.3 and all other LCO Required Actions requiring MODE changes are suspended until one AFW train is restored to OPERABLE status. ------------------------------- Initiate action to restore one AFW train to OPERABLE status.	immediately	

Op Test No.: FA2012301	Scenario # 6	Event # 3	Page 6 of 42

Event Description: **AFW FCV-3227C fails open**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	- *Notify the Shift Manager* - *Requests a CR be written & Work Week Coordinator notified of the failure* - *Requests SSS write LCO 3.7.5, Condition C for inoperable MDAFW Flowpath to 1C SG (2 MD trains inop. to 1C SG)*	
At the discretion of the Lead Examiner move to Event #4.			

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Event Description: **AFW FCV-3227C fails open**
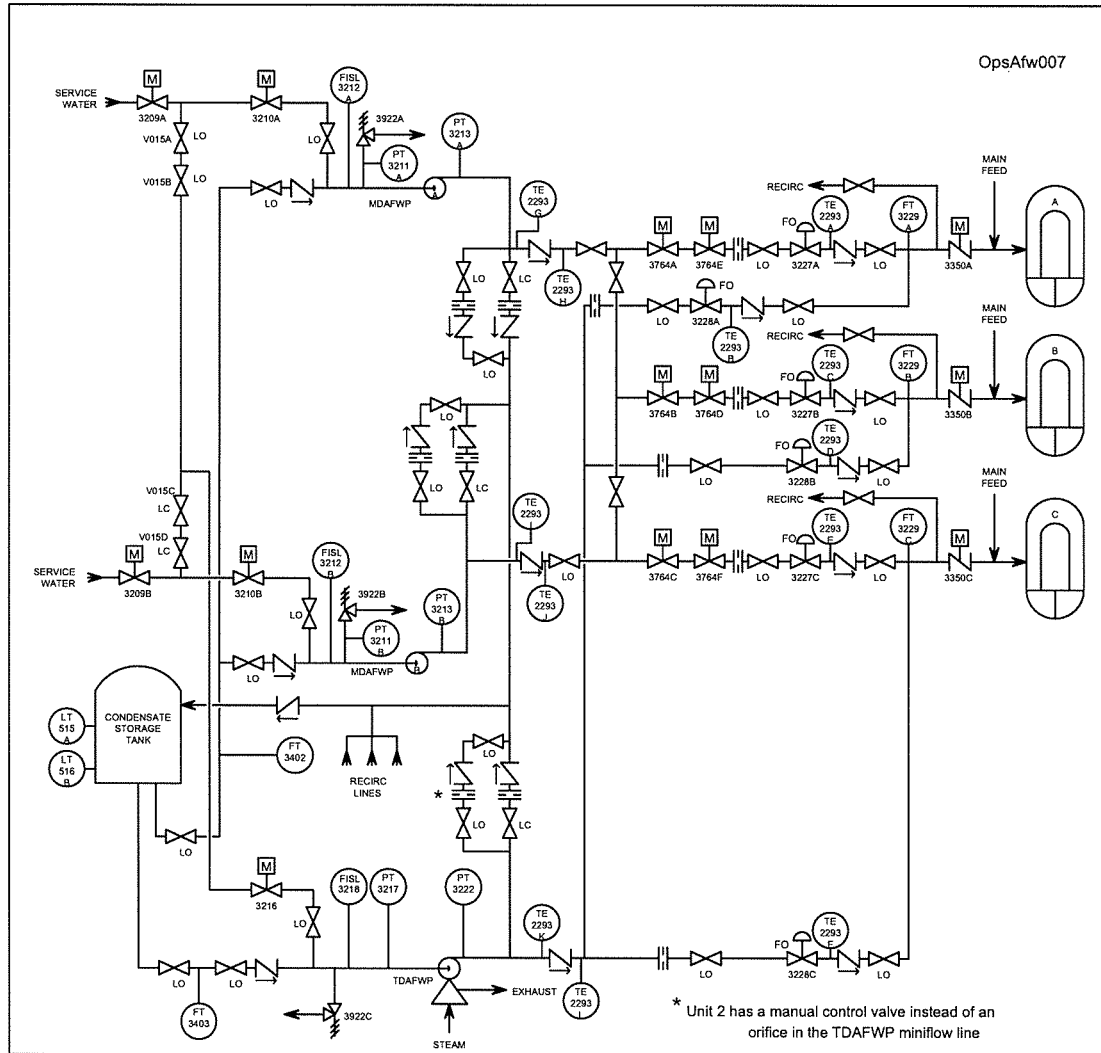
FIGURE 1 - Auxiliary Feedwater System

Op Test No.: FA2012301	Scenario # 6	Event # 4		Page 8 of 42

Event Description: **PK-444A, Pzr pressure controller, fails HIGH**

PK-444A will go to 100% demand, Sprays will close and all heaters will be demanded ON. Actual pressure will increase, but the sprays and PORV-444B will not respond. If manual control of individual components is not taken, PORV-445A will open. Manual control of PK-444A is not possible due to the failure.

Indications Available:	
Annunciators:	Recognize indications of PK-444A FAILING
- PRZR PRESS REL 445A OR B/U HTRS ON (HD1)	HIGH - PK-444A demand ↑ - All BU Htrs ON - RCS pressure ↑

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-100, Instrumentation Malfunction, ver. 11, section 1.1	
	SRO	Check RCS pressure stable or rising Set control band for RCS pressure.	RCS pressure ↑
	SRO	SRO will direct entry to AOP-100.	
	RO	(step 1) Verify RCS pressure is stable. Take manual control of the PK-444A, PRZR PRESSURE REFERENCE CONTROLLER. Due to the failure mode, the RO can NOT take manual control of PK-444A • Take manual control of the spray valves • Take manual control heaters Control PRZR pressure	**NOTE:** Step 1 and 2 are immediate operator action steps
		Steps 2 and 3 do not apply	
	RO	(step 4) IF an alarm was caused by a component failure, THEN perform the following as required to restore RCS pressure to desired value. Take manual control of the following as Required: • PORVs • Heaters • Spray valves	

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Event Description: **PK-444A, Pzr pressure controller, fails HIGH**

Time	Pos.	Expected Actions/Behavior	Comments
		Steps 5 and 6 do not apply	
	SRO	(step 7) Inform the SM of the failure.	
	SRO	(step 9) Submit a condition report on the failed component, and notify the Work Week Coordinator (Maintenance ATL on backshifts) of the condition report.	
	SRO	(step 10) IF the pressurizer PORVs operated, THEN perform the following: • Refer to SOP-1.2, REACTOR COOLANT PRESSURE RELIEF SYSTEM, for cooldown of the PRT • Refer to SOP-0.0, General Instructions To Operations Personnel, for reporting requirements.	
When Pzr pressure is being controlled and at the discretion of the Lead Examiner move to Event #5.			

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Op Test No.: FA2012301	Scenario #	6	Event #	5	Page	10 of	42

Event Description: **1CCW pump trips on overload**

When the CCW pump trips a leak will start in the CCW surge tank. Level will be slowly decreasing and eventually the Surge tank low level alarm will alert the operator to this event. AOP-9 will be used to combat the tripped CCW pump and the ARP will take care of the leak.

Indications Available:

Annunciators:	Indications of a Tripped CCW pump and loss of CCW flow
- 1C CCW PUMP OVERLOAD TRIP (AA3) - CCW FLOW FROM RCP OIL CLRS LO (DD3)	- No flow on FI3043CA - Temperature rising on running components

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.1, MCB ANNUNCIATOR PANEL A, AA3 **version 52.0**	
	SRO	Reference ARP AA3 and decide the standby CCW pump did not auto start. Direct entry into AOP-9 to get the 1B CCW pump running.	
	BOP	(step 1) Check 1C CCW PUMP has tripped.	
	BOP	(step 2) Check auto start of standby pump	
	SRO	(step 3) Perform the actions required by AOP-9.0, LOSS OF CCW	
		AOP-9.0, Loss of CCW **Version 23.0**	
	BOP	(step 1) Verify CCW pump started in affected train: - handswitch for 1B CCW pump taken to START	

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Event Description: **1CCW pump trips on overload**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(step 2) **Check** CCW system adequate for continued plant support. - Check CCW flow adequate in affected train. - Check RCP motor bearing temperatures less than 195°F. - Check CCW pump not cavitating. Stop any cavitating CCW pump. - CCW Surge tank level being maintained at or above 13 inches. - RCP seal injection to all RCPs greater than 6 gpm.	
	BOP	(step 3) **Verify** SW flow supplied to the ON SERVICE train CCW HX SW DISCH [ ] Q1P16FI3009AA 1A CCW HX DISC [ ] Q1P16FI3009BA 1B CCW HX DISC [ ] Q1P16FI3009CA 1C CCW HX DISC	
	SRO	(step 4) **Check ON SERVICE train affected.**	Go to step 9
	BOP	(step 9) Check both RHR pumps stopped -	
	SRO	(step 10) Inform the SM to evaluate event classification and notification requirements using EIP-8, NON-EMERGENCY NOTIFICATIONS <u>AND</u> EIP-9, EMERGENCY CLASSIFICATION <u>AND</u> ACTIONS	
	BOP	(step 11) Check SFP cooling aligned to an operating CCW train (step 12) Check on service CCW train operating	Go to procedure and step in effect
			Return to ARP AA3
	SRO	(step 4) IF 1B CCW Pump is aligned to A Train, THEN rack out 1C CCW Pump supply breaker DF04. (step 5) Refer to Technical Specification 3.7.7 for LCO requirements with a loss of the on service train of component cooling water.	

Op Test No.:	FA2012301	Scenario #	6	Event #	5	Page	12	of	42

Event Description: **1CCW pump trips on overload**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	IF 1B CCW Pump is aligned to A Train, THEN rack out 1C CCW Pump supply breaker DF04. - Notify Plant Personnel to determine and correct the cause of the fault. Refer to Technical Specification 3.7.7 for LCO requirements Due to the loss of the 1C CCW pump and the 1B CCW pump did not autostart, maintenance personnel will have to determine if the 1B CCW pump is OPERABLE based on the autostart feature (SR 3.7.7.3). Until that time, the CCW system is INOPERABLE until the 1C CCW pump is racked out and may be INOPERABLE when the results of troubleshooting are known. Mandatory LCO until the 1C CCW pump is racked out and 3.7.7 condition A restore within 72 hours is in effect.	

TECHNICAL SPECIFICATION 3.7.7, CCW System
LCO 3.7.7 Two CCW trains shall be OPERABLE
APPLICABILITY: MODES 1, 2, 3, and 4.

	SRO	CONDITION	REQUIRED ACTION	COMPLETION TIME	
		A. One CCW train inoperable.	A.1 -------NOTE------ Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops—MODE 4," for residual heat removal loops made inoperable by CCW. ---------------- Restore CCW train to OPERABLE status	72 hours	

The CCW Leak will start when the 1C CCW pump trips. Go to page 13 for actions and return here for Tech Spec actions after leak response is completed.

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Event Description: **CCW leak when the 1B CCW pump starts**

The relief valve on the CCW pump that started will lift and stick open and CCW surge tank level will decrease.

Indications Available:

Annunciators:
- BOP PANELS ALARM (BE5)
- BOP panel L and N (LH2 and NH2)
  CCW SUMP NORTH AND SOUTH HI-HI
- CCW SRG TK LVL A TRN and B TRN
  HI-LO (AA4 and AB4)
	Indications:
	- LI-3027A and B decreasing rapidly

	Pos.	Expected Actions/Behavior	Comments
		ARP-1.1, MCB ANNUNCIATOR PANEL A, AA4 **version 52.0**	
	SRO	**Direct** actions required by AA4	
	BOP	(step 1) Check A Train CCW SURGE TANK level indication and determine whether level is HIGH or LOW.	
	SRO	(step 2) Dispatch personnel to locate and isolate the source of leakage.	5 minutes after makeup has been initiated the leak will be secured and a phone call will come in from the ROVER
		(step 3) IF CCW Surge Tank level is LOW, THEN perform the following: 3.1.1 Notify Shift Chemist that the CCW surge tank is to be made up to. 3.1.2 Verify open CCW SRG TK VT valves: (MCB) • Q1P17SV3028A • Q1P17SV3028B 3.1.3 Monitor CCW surge tank level indications. • LI-3027A • LI-3027B	
		(step 3.1.5/.6) OPEN MKUP TO CCW FROM DW STOR TK MOV3030A to add makeup to A portion of CCW surge tank. OPEN MKUP TO CCW FROM DW STOR TK MOV3030B to add makeup to B portion of CCW surge tank.	

| Op Test No.: | FA2012301 | Scenario # | 6 | Event # | 5 | | Page | 14 of 42 |

Event Description: **CCW leak when the 1B CCW pump starts**

	Pos.	Expected Actions/Behavior	Comments
		(step 3.1.7) WHEN makeup addition is completed, THEN close appropriate valve(s). - MKUP TO CCW FROM DW STOR TK MOV3030A. - MKUP TO CCW FROM DW STOR TK MOV3030B.	

Remember CCW TS information on page 12
When the leak is secured and the CCW makeup is secured, and
at the discretion of the Lead Examiner, go to event 7.

Op Test No.: FA2012301	Scenario # 6	Event # 6	Page 15 of 42

Event Description: **PK-145 fails high in automatic, letdown pressure controller failure causes PCV-145 to close**

This controller will fail high slowly. The Letdown relief valve may open and DE3 will come into alarm. If the RO or BOP takes manual control per DE4 and reduces pressure, then letdown will not be secured. Once DE3 comes into alarm, DE3 will direct letdown to be secured and AOP-16 entered as shown below.

Indications Available:

Annunciators:	Recognize indications of PK-145 failing:
- LTDN ORIF ISO VLV REL LINE TEMP HI (DE3) - LTDN HX OUTLET PRESS HI (DE4) Comment: The Letdown relief valve lifts to the PRT.	- Letdown HX outlet pressure (PI-145) increases to 600 psig - Letdown flow (FI-150) decreases to zero - Letdown orifice isolation relief line to PRT temperature (TI-141) ↑ - LI-112/115, VCT level, ↓

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.4, MCB ANNUNCIATOR PANEL D, DE4 version 52.1	
	SRO	Direct entry into DE4.	
	RO	(step 1) Monitor LTDN HX Outlet Flow (FI-150) and LTDN HX Outlet Press (PI-145).	
	RO	(step 2) Ensure proper orifice isolation valve selection.	
	RO	(step 3) IF the high pressure is due to LP LTDN PRESS PK-145 malfunction, THEN place valve controller in manual and attempt to reduce the pressure.	PK-145 placed in manual and controlled manually.
	RO	(step 4) IF pressure can NOT be controlled manually with LP LTDN PK-145, THEN close LTDN ORIF ISO 45 (60) GPM Q1E21HV8149A, B, and C.	
	RO	(step 5) IF a ramp is in progress, THEN place turbine load on HOLD.	
	RO	(step 6) Go to AOP-16.0, CVCS MALFUNCTION to address the loss of letdown flow.	

| Op Test No.: FA2012301 | Scenario # 6 | Event # 6 | Page 16 of 42 |

Event Description: **PK-145 fails high in automatic, letdown pressure controller failure causes PCV-145 to close**

Time	Pos.	Expected Actions/Behavior	Comments
		ARP-1.4, MCB ANNUNCIATOR PANEL D, DE3	
		version 52.1	
	SRO	Direct entry into DE3	If required
	RO	(step 1) Monitor the LTDN ORIF ISO REL line to PRT Temperature (TI-141) and LTDN HX Outlet Press (PI- I45).	
	RO	(step 2) If the high temperature is due to LP LTDN press PK-145 malfunctions, THEN place valve controller in manual and adjust as required.	
	RO	IF temperature continues to rise rapidly indicating a lifted relief valve, THEN close LTDN ORIF ISO 45 (60) GPM Q1E21HV8149A, B AND C.	
	RO	(step 4) IF a ramp is in progress, THEN place turbine load on HOLD. (step 5) Go to AOP-16.0, CVCS MALFUNCTION to address the loss of letdown flow.	
		Entry into DE3 may or may not require letdown to be isolated	
		If letdown is secured then AOP-16 guidance is below:	
		AOP-16, CVCS Malfunction, ver 17.0	
	RO	(Step 1) **Verify** charging flow adequate to cool letdown. RNO – close all LTDN ORIF ISO's [] Q1E21HV8149A [] Q1E21HV8149B [] Q1E21HV8149C	Letdown flow is secured
	RO	(Step 2) **Stop any load change in progress**	
	RO	(Step 3) **Monitor VCT level to ensure proper level is maintained**	

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Event Description: **PK-145 fails high in automatic, letdown pressure controller failure causes PCV-145 to close**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 4) **[CA] Observe** CHG HDR PRESS and MOTOR AMPS to ensure proper charging pump operation. [] PI-121 [] AMMETER FOR RUNNING CHG PUMP	
	RO	(Step 5) Check charging pump – RUNNING	
	RO	(Step 6) Check Charging flow FK-122 controlling in AUTO with flow indicate	
	RO	(Step 7) Check DE3 clear	May or may not be clear
	RO	(Step 8) **Determine Status of Normal Letdown:** Check normal CVCS letdown - AFFECTED BY MALFUNCTION - LTDN HX OUTLET FLOW, FI-150, NO FLOW INDICATED (Step 8.2) Minimize RCS makeup: Manually close charging flow control: CHG FLOW [] FK-122 (Step 8.2.2) Minimize seal injection between 6-13 gpm (Step 8.2.3) Direct Chemistry to shutdown the zinc addition system (ZAS) (Step 8.3) Dispatch personnel to investigate cause of the Letdown malfunction	Letdown will have been removed from service so it will be placed in service.
	RO	(Step 9) **Determine if normal letdown should be re-established:** Check normal letdown malfunction(s) - CORRECTED	Yes PCV-145 is in manual control
		Restore letdown with the following steps:	

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Event Description: **PK-145 fails high in automatic, letdown pressure controller failure causes PCV-145 to close**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 9.2) Verify all letdown orifice isolation valves - CLOSED LTDN ORIF ISO 45 GPM [] Q1E21HV8149A LTDN ORIF ISO 60 GPM [] Q1E21HV8149B [] Q1E21HV8149C (Step 9.3) Place LP LTDN PRESS PK 145 on service: [] Place controller in MANUAL [] Adjust demand signal to 50% or less (Step 9.4) Place LTDN HX OUTLET TEMP TK 144 on service: [] Place controller in AUTO [] Set to maintain temperature 90 to 115°F	
	RO	(Step 9.5) Verify VCT HI LVL DIVERT VLV LCV-115A alignment: [] Position indicator VCT light - LIT [] Handswitch in - AUTO	
	RO	(Step 9.6) Verify LTDN HI TEMP DIVERT VLV Q1E21TCV143: [] DEMIN light - LIT [] Handswitch in – AUTO (Step 9.7) IF necessary, THEN OPEN both LTDN LINE PENE RM ISO's from the PRIP. [] Q1E21HV8175A [] Q1E21HV8175B (Step 9.8 Verify LTDN LINE CTMT ISO Q1E21HV8152 - OPEN (Step 9.9 Verify LTDN LINE ISO valves - OPEN [] Q1E21LCV459 [] Q1E21LCV460	

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Event Description: **PK-145 fails high in automatic, letdown pressure controller failure causes PCV-145 to close**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 9.10) Initiate minimum charging flow: (Step 9.10.1) Verify CHG FLOW FK 122 in - MAN (Step 9.10.2) Establish minimum charging flow based on orifices to be placed on service: ☐ 1 Orifice - 18 gpm OR ☐ 2 Orifices - 40 gpm (Step 9.11) Establish approximately 60 gpm letdown flow by OPENING: [] Q1E21HV8149B OR [] Q1E21HV8149C	
	RO	(Step 9.12) [CA] IF all backup heaters energized due to pressurizer level deviation, THEN verify two sets of backup heaters in ON prior to level deviation clearing. (Step 9.13) Adjust LP LTDN PRESS PK 145 to maintain desired letdown pressure - BETWEEN 260-450 PSIG	
	RO	(Step 9.13.1) Set controller between 4.3 and 7.5 (Step 9.13.2) Check letdown flow – STABLE (Step 9.13.3) Place PK 145 in AUTO (Step 9.13.4) Control Letdown pressure as desired (Step 9.14) Control LTDN HX OUTLET TEMP,TK 144 to maintain LTDN temp 90 to 115°F. [] TI-116 VCT TEMP [] TI-143 DIVERT LTDN HX TEMP [] TI-144 CCW LTDN HX TEMP (Step 9.15) Refer to SOP-2.1, CVCS system PLANT STARTUP AND OPERATION, for further guidance on Letdown system control	
	RO	(step 10) **Determine** status of letdown flow: Check letdown flow - established	

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Event Description: **PK-145 fails high in automatic, letdown pressure controller failure causes PCV-145 to close**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 10.2) Go to procedure and step in effect	
	SRO	Submit a Condition Report and notify the Work Week Coordinator (Maintenance ATL on backshifts) Notify the Shift Manager	
When letdown is restored and **at the discretion of the Lead Examiner move to Event #8.**			

Event Description:			**Large Break LOCA, Auto SI fails to actuate, 1B RHR pump does not start, 1A and 1B CTMT coolers do not shift to SLOW speed**							

The Large Break LOCA will cause RCS pressure to decrease and Ctmt pressure to increase. The safety injection will not automatically initiate, the 1B RHR pump will not start and the A Train ctmt coolers will not shift to slow speed.

Indications Available:	
Annunciators: - Various and numerous	Indications of LB LOCA - Pzr level ↓ - RCS pressure ↓ - Radiation monitor ↑ (R-2/7/11/12) - Ctmt pressure ↑

Time	Pos.	Expected Actions/Behavior	Comments
		EEP-0, Reactor Trip or Safety Injection, rev 43	
	RO/ BOP	Immediate Operator actions of EEP-0 (step 1) **Check reactor trip.** Check all reactor trip breakers and reactor trip bypass breakers - OPEN. Check nuclear power - FALLING. Check rod bottom lights - LIT. (step 2) **Check turbine - TRIPPED.** TSLB2 14-1 thru 4 lit (step 3) **Check power to 4160 V ESF busses.** 4160 V ESF busses - AT LEAST ONE ENERGIZED A Train (F 4160V bus) power available lights lit OR B Train (G 4160V bus) power available lights lit Verify operating diesel generators are being supplied from at least one SW pump.	**Immediate Action steps of EEP-0** **NOTE:** 3 DGs will be running when the SI is initiated manually. OATC will check SW header pressure, ctmt cooler flows and CCW Hx SW flows and SW pump lights.
	RO/ BOP	(step 4) **Check SI Status.** Check any SI actuated indication. BYP & PERMISSIVE SAFETY INJECTION [] ACTUATED status light lit [] MLB-1 1-1 lit [] MLB-1 11-1 lit	**CRITICAL TASK to initiate SI**

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Event Description: **Large Break LOCA, Auto SI fails to actuate, 1B RHR pump does not start, 1A and 1B CTMT coolers do not shift to SLOW speed**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 5) Directs continuing into EEP-0 at step 5. **Directs the BOP to perform Attachment 2.**	See Tab at end of scenario for Attachment 2 and 4 actions. **One CRITICAL TASK is in Attachment 2 starting on page 34 below**
	RO	(step 6) Check containment pressure- HAS REMAINED LESS THAN 27 psig	**NOTE:** [CA] step –For a LB LOCA ctmt pressure will rise >27 psig
	RO	(step 6.1 RNO) Verify Phase B CTMT ISOL – ACTUATED [] MLB-3 1-1 lit [] MLB-3 6-1 lit	MLB-3 1-1 and 6-1 will be LIT
	RO	(step 6.2) Stop all RCPs. RCP [] 1A [] 1B [] 1C	Secures ALL RCPs
	RO	(step 6.3) Verify PHASE B CTMT ISO alignment. (step 6.3.1) Check All MLB-3 lights lit. IF any MLB-3 light NOT lit, THEN verify PHASE B CTMT ISO using ATTACHMENT 5, PHASE B CONTAINMENT ISOLATION.	All MLB-3 lights will be LIT
	RO	(step 6.4.1) Check containment spray flow in both trains greater than 0 gpm. CS FLOW [] FI 958A [] FI 958B	Both CS pumps will be running and flow will be >0 gpm
	RO	(step 7) Announce "Unit 1 reactor trip and safety injection".	

Event Description:	**Large Break LOCA, Auto SI fails to actuate, 1B RHR pump does not start, 1A and 1B CTMT coolers do not shift to SLOW speed**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 8) **Check AFW status.** Check secondary heat sink Available o Check total AFW flow > 395 gpm [] FI 3229A [] FI 3229B [] FI 3229C o Total Flow FI 3229 OR Check any SG NR level > 31% {48%} WHEN all SG narrow range levels less than 31%{48%}, THEN maintain total AFW flow greater than 395 gpm. WHEN at least two SG narrow range levels greater than 28% AND TDAFWP NOT required, THEN stop TDAFWP.	
	RO	(step 8.4) WHEN SG narrow range level greater than 31%{48%}, THEN maintain SG narrow range level 31%-65%{48%-65%}. • Control MDAFWP flow. MDAFWP FCV 3227 RESET [] A TRN reset [] B TRN reset MDAFWP TO 1A/1B/1C SG B TRN [] FCV 3227 in MOD Control TDAFWP flow. TDAFWP FCV 3228 [] RESET reset TDAFWP SPEED CONT [] SIC 3405 adjusted	**NOTE:** [CA] step –
	RO	(step 9) **Check RCS temperature.** IF any RCP running, THEN check RCS average temperature – STABLE AT OR APPROACHING 547°F. TAVG 1A(1B,1C) RCS LOOP [] TI 412D [] TI 422D [] TI 432D	

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Event Description:	**Large Break LOCA, Auto SI fails to actuate, 1B RHR pump does not start, 1A and 1B CTMT coolers do not shift to SLOW speed**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 9 RNO) IF RCS temperature less than 547°F and falling, THEN perform the following. (step 9.1.1) Verify steam dumps closed. STM DUMP INTERLOCK [] A TRN in OFF RESET [] B TRN in OFF RESET (step 9.1.2) Verify atmospheric reliefs closed on MCB [] Demand at 0 and minimum red light LIT (step 9.1.3) Control total AFW flow to minimize RCS cooldown, AFW FLOW TO 1A(1B,1C) SG [] FI 3229A [] FI 3229B [] FI 3229C AFW TOTAL FLOW [] FI 3229 IF MSIVs are closed THEN proceed to step 9.1.8 IF MSIVs are open, THEN isolate steam loads in the turbine building while continuing with RNO step 9.1.6.	**NOTE:** RNO column since RCS temp will be <547°F **If MSIVs are closed then RNO column requires breaking condenser vacuum** **NOTE: Will call TBSO to accomplish this task**

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Event Description: **Large Break LOCA, Auto SI fails to actuate, 1B RHR pump does not start, 1A and 1B CTMT coolers do not shift to SLOW speed**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(step 10) **Check pressurizer PORVs and spray valves.** WHEN pressurizer pressure less than 2335 psig, THEN verify both PRZR PORVs closed. Verify both PRZR PORVs indicate CLOSED Check PRZR PORV temperature STABLE OR FALLING. [] PORV Temp TI-463 Check PRT parameters STABLE or FALLING. [] PRT PRESS PI 472 [] PRT LVL LI-470 [] PRT TEMP TI-471 WHEN pressurizer pressure less than 2260 psig, THEN verify normal pressurizer spray valves closed OR in the process of closing. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D Check any PRZR PORV ISO - OPEN	**NOTE:** [CA] step – **NOTE:** [CA] step –
	RO	(step 11) **Check RCP criteria.** Check SUB COOLED MARGIN MONITOR indication – GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE	
	RO	(step 12) **Monitor charging pump miniflow criteria.** Control charging pump miniflow valves based on RCS pressure. 1C(1A) LOOP RCS WR PRESS [] PI 402A [] PI 403A	**NOTE:** Based on RCS pressure, close miniflows < 1300 psig.
		Diagnostics The SRO will direct the parameters to be reviewed and will determine appropriate procedure to transition to.	
	SRO	(step 13) **Check SGs not faulted.** [] Check no SG pressure – FALLING IN AN UNCONTROLLED MANNER OR LESS THAN 50 psig.	

Event Description: **Large Break LOCA, Auto SI fails to actuate, 1B RHR pump does not start, 1A and 1B CTMT coolers do not shift to SLOW speed**

Time	Pos.	Expected Actions/Behavior	Comments
	SRO	(step 14) **Check SGs not ruptured.** [] Check secondary radiation indication - NORMAL. [] Checks rad monitors R-15, 19, 23A and B, 15B and C, and 60 A, B, C, D [] No SG level rising in an uncontrolled manner.	
	SRO	(step 15) **Check RCS intact.** Check containment radiation - [] R-2 CTMT 155 ft [] R-7 SEAL TABLE [] R-27A CTMT HIGH RANGE (BOP) [] R-27B CTMT HIGH RANGE (BOP) [] Check containment pressure – LESS THAN 3 psig. [] Check containment ECCS sump level – LESS THAN 0.4 ft.	**NOTE:** Phase B Ctmt isolation signal will be in and transition to EEP-1.0 required **Transition to EEP-1.0**
		FRP-P.1 **Response to Imminent Pressurized Thermal Shock Conditions, rev 19**	
		(step 1) **Check RCS Pressure >435 psig** 1C(1A) LOOP RCS NR PRESS [] PI402B [] PI403B	**RNO HERE**
		(step 1 RNO) IF LHSI flow > 1500 gpm, then return to procedure and step in affect: 1A(1B) RHR HDR FLOW [] FI605A [] FI605B	**RETURN to EEP-1.0**

EEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, Rev 30

		MOV-8811B will be de-energized and 1A RHR pump will trip at 30 feet in the RWST	FO page requirement to transition to ECP-1.1 or step 14 of EEP-1.0- go to page 29 for ECP-1.1
	RO	(step 1) **Check RCP criteria.** Check SUB COOLED MARGIN MONITOR indication - GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE.	RCPs will already be secured
	BOP	(step 2) **Check SGs not faulted.** Check no SG pressure – FALLING IN AN UNCONTROLLED MANNER OR LESS THAN 50 psig.	
	BOP	(step 3) **Check intact SG levels.** Check any intact SG narrow range level – GREATER THAN 31%{48%}. WHEN SG narrow range level greater than 31%{48%}, THEN maintain SG narrow range level 31%-65%{48%-65%}. Control MDAFWP flow. MDAFWP FCV 3227 RESET [] A TRN reset [] B TRN reset MDAFWP TO 1A/1B/1C SG B TRN [] FCV 3227 in MOD Control TDAFWP flow. TDAFWP FCV 3228 [] RESET reset TDAFWP SPEED CONT [] SIC 3405 adjusted	**NOTE:** [CA] step –
	BOP	(step 4) **Check secondary radiation indication - NORMAL.** Checks rad monitors	[] R-15 [] 19 [] 23A and B [] 15B and C, [] 60 A, B, C, D

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Event Description: **1A RHR pump trips when RWST level reaches 30 feet and MOV-8811B is de-energized**

	RO	(step 5) **Check pressurizer PORVs** **Check any PRZR PORV ISO – power available** WHEN pressurizer pressure less than 2335 psig, THEN verify pressurizer PORVs closed with no leakage. [] Verify both PRZR PORVs – CLOSED Check PRZR PORV temperature STABLE OR FALLING. [] PORV Temp TI-463 Check PRT parameters STABLE or FALLING. [] PRT PRESS PI 472 [] PRT LVL LI-470 [] PRT TEMP TI-471 [] Check at least one PRZR PORV ISO - OPEN	**NOTE:** [CA] step –
	SRO	(step 6) **Perform the following within 1 hour of start of event.** [] Close recirculation valve disconnects using ATTACHMENT 1. [] Establish 1A and 1B post LOCA containment hydrogen analyzers IN SERVICE USING ATTACHMENT 2, POST LOCA CONTAINMENT HYDROGEN ANALYZER OPERATION. [] Plot hydrogen concentration on FIGURE 1. Check containment hydrogen concentration [] LESS THAN 3.5%. [] Less than 0.5%	**NOTE:** These steps will be passed off to the Shift Manager

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	SRO	(step 7) <u>**Evaluate SI termination criteria**</u> [] Check SUB COOLED MARGIN MONITOR indication – GREATER THAN 16°F{45°F} SUBCOOLED IN CETC MODE. Check secondary heat sink available. [] >395 gpm AFW flow OR [] > 31%{**48%**} SGNR level [] Check RCS pressure - STABLE OR RISING [] Check pressurizer level GREATER THAN 13%{**43%**}. <u>**Continue to step 8 since a known LOCA exists**</u>	
	RO	(step 8) **Check containment spray system.** Check any CS PUMP - STARTED. Reset containment spray signals. CS RESET [] A TRN [] B TRN WHEN containment spray recirculation flow has been aligned for at least 8 hours, AND containment pressure is less than 16 psig, THEN stop both CS PUMPs.	**NOTE:** [CA] step – **NOTE:** [CA] step –
	RO	(step 9) **Check if LHSI Pumps should be stopped.** - Check RCS pressure – GREATER THAN 275 psig{**435 psig**} [] PT-402 AND 403 (step 9.1.1 RNO) Establish CCW flow to RHR Hxs CCW TO 1A(1B) RHR HX [] Q1P17MOV3185A open [] Q1P17MOV3185B open	**NOTE:** [CA] step – RCS pressure will be < 435 psig
	BOP	(step 10) Check no SG pressure - FALLING IN AN UNCONTROLLED MANNER.	

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Event Description:		**1A RHR pump trips when RWST level reaches 30 feet and MOV-8811B is de-energized**	
	RO	(step 11) Check RCS pressure [] PT-402 AND 403 If pressure is rising then return to step 1.	LB LOCA
Perform <u>Attachment 4</u> to Verify 4160 V busses energized.			
	BOP	(step 12) **Attachment 4** Check DF01 closed – YES Verify DF02 closed - YES Check DG15 closed - YES Verfiy DG02 closed - YES Verify all RCP busses - ENERGIZED. [] 1A 4160 V bus- YES [] 1B 4160 V bus- YES [] 1C 4160 V bus- YES Check 1E 4160V bus–ENERGIZED-YES Check 1D 4160V bus- ENERGIZED-YES	
	BOP	(step 13) **Check diesel generators.** Monitor any loaded diesel generator for proper voltage, frequency and load. Secure any unloaded diesel generators using FNP-0-SOP-38.0, DIESEL GENERATORS.	**NOTE:** [CA] step – **NOTE:** Securing unloaded DGS will be accomplished by the extra operator or the BOP if time permits. This is generally not the case and the DGs will continue to run.
		MOV-8811B will be de-energized and 1A RHR pump will trip at 30 feet in the RWST	**FO page requirement to transition to ECP-1.1 or step 14 of EEP-1.0**

| Event Description: | **1A RHR pump trips when RWST level reaches 30 feet and MOV-8811B is de-energized** |

	SRO	(step 14) **Begin evaluation of plant status.** Verify cold leg recirculation capability - AVAILABLE. **Train A equipment available:** [] 1A RHR Pump [] CTMT SUMP TO 1A RHR PUMP Q1E11MOV8811A [] CTMT SUMP TO 1A RHR PUMP Q1E11MOV8812A [] 1A RHR HX TO CHG PUMP SUCT Q1E11MOV8706A [] CCW TO 1A RHR HX Q1P17MOV3185A **OR** **Train B equipment available:** [] 1B RHR Pump [] CTMT SUMP TO 1B RHR PUMP Q1E11MOV8811B [] CTMT SUMP TO 1B RHR PUMP Q1E11MOV8812B [] 1B RHR HX TO CHG PUMP SUCT Q1E11MOV8706B [] CCW TO 1B RHR HX Q1P17MOV3185B	**NOTE:** This is Foldout page criteria as well 1A RHR pump has tripped MOV-8811B has no power

ECP-1.1, Loss Of Emergency Coolant Recirculation, Rev 28

	RO	(step 1) **Verify** ECCS pumps not affected by sump blockage. [CA] Monitor ECCS pump suction conditions - NO INDICATION OF CAVITATION	
	SRO	(step 2) **[CA] WHEN** emergency coolant recirculation capability is restored, THEN go to procedure and step in effect.	

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Event Description: **1A RHR pump trips when RWST level reaches 30 feet and MOV-8811B is de-energized**

	RO	(step 3) Check cold leg recirculation equipment - AVAILABLE. **Train A equipment available:** [] 1A RHR Pump [] CTMT SUMP TO 1A RHR PUMP Q1E11MOV8811A [] CTMT SUMP TO 1A RHR PUMP Q1E11MOV8812A [] 1A RHR HX TO CHG PUMP SUCT Q1E11MOV8706A [] CCW TO 1A RHR HX Q1P17MOV3185A **OR** **Train B equipment available:** [] 1B RHR Pump [] CTMT SUMP TO 1B RHR PUMP Q1E11MOV8811B [] CTMT SUMP TO 1B RHR PUMP Q1E11MOV8812B [] 1B RHR HX TO CHG PUMP SUCT Q1E11MOV8706B [] CCW TO 1B RHR HX Q1P17MOV3185B	1A RHR pump has tripped MOV-8811B has no power
	RO	(step 4) **Verify** SI - RESET. [] MLB-1 1-1 off (A TRN) [] MLB-1 11-1 off (B TRN)	
	RO	(step 5) **Check** PHASE B CTMT ISO - RESET [] MLB-3 1-1 not lit [] MLB-3 6-1 not lit	
		(step 6) **Verify containment spray signals - RESET.** CS RESET [] A TRN [] B TRN	
		(step 7) **Reset containment sump to RHR valve switches.** CTMT SUMP TO RHR PUMP RESET [] A TRN [] B TRN	

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Event Description: **1A RHR pump trips when RWST level reaches 30 feet and MOV-8811B is de-energized**

		(step 8) **Verify containment fan cooler alignment.** 8.1 Verify all available containment fan coolers - STARTED IN SLOW SPEED. CTMT CLR FAN SLOW SPEED [] 1A [] 1B [] 1C [] 1D	
		(step 9) **[CA] Check RWST level - GREATER THAN 4.5 ft.**	
		(step 10) **Evaluate containment spray requirements.** Check containment spray pumps - ALIGNED TO RWST. RWST TO 1A(1B) CS PUMP [] Q1E13MOV8817A open [] Q1E13MOV8817B open Determine number of CS pumps required based on the Table below.	

RWST LEVEL	Ctmt PRESSURE	FAN COOLERS RUNNING IN EMERGENCY MODE	CS PUMPS REQUIRED
>12.5 FEET	> 54 PSIG	-	2
	27 to 54 PSIG	0 , 1	2
		2 , 3	1
		4	0
	<27 PSIG	-	0
BETWEEN 4.5 AND 12.5 FEET	> 54 PSIG	-	0
	27 to 54 PSIG	1 , 2	1
		3 , 4	0
	<27 PSIG	-	0

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Event Description: **1A RHR pump trips when RWST level reaches 30 feet and MOV-8811B is de-energized**

		(step 11) **[CA] Check** status of containment spray. 11.1 Check any containment spray pump - STARTED. CS PUMP [] 1A [] 1B CS FLOW [] FI 958A [] FI 958B	
		(step 11.2) Check containment sump level - GREATER THAN 3.8 ft{4.2 ft}. CTMT SUMP LVL [] LI 3594A POST ACCIDENT CTMT WTR LVL [] LR 3594B	
		(STEP 11.3) [CA] Align containment spray for recirculation mode. 11.3.1 Open cs pump 1A and 1B Containment sump suction isolation valves. CTMT SUMP TO 1A(1B) CS PUMP [] Q1E13MOV8826A [] Q1E13MOV8826B [] Q1E13MOV8827A [] Q1E13MOV8827B 11.3.2 Close CS pump 1A and 1B RWST suction isolation valves. RWST TO 1A(1B) CS PUMP [] Q1E13MOV8817A [] Q1E13MOV8817B	
		(step 12) **Makeup to the RWST as necessary.** 12.1 Makeup to the RWST IAW SOP-2.3, CVCS REACTOR MAKEUP CONTROL SYSTEM. OR 12.2 Consult TSC staff to determine alternate method of makeup to the RWST.	**CRITICAL TASK** to call for RWST makeup OR direct RWST makeup per SOP-2.3

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Event Description:	**1A RHR pump trips when RWST level reaches 30 feet and MOV-8811B is de-energized**

		(step 13) **Monitor CST level.** 13.1 [CA] Check CST level greater than 5.3 ft. CST LVL [] LI 4132A [] LI 4132B 13.2 Align makeup to the CST from water treatment plant OR demin water system using SOP-5.0, DEMINERALIZED MAKEUP WATER SYSTEM, as necessary.	
When RWST makeup Critical Task step has been implemented, then the Radside SO will call the control room and FV-B5 will have been reset and power restored to MOV-8811B. Per Step 2 of ECP-1.1 Transition to EEP-1.0 will be required to complete the scenario, step 14.2 below:			
		EEP-1.0 continued here	
	SRO	(step 14.2) Direct extra operator to begin taking ECCS logs.	
	SRO	(step 14.2) Evaluate RCS sampling requirements. Consult TSC staff to evaluate need for RCS sampling. IF RCS sample required, THEN direct Chemistry to sample RCS using FNP-0-CCP-1300, CHEMISTRY AND ENVIRONMENTAL ACTIVITIES DURING A RADIOLOGICAL ACCIDENT	Notifies SM
	SRO BOP	(step 14.4) Check no intersystem LOCA outside CTMT. [] Check auxiliary building radiation - NORMAL.	[] R-3 RADIOCHEMISTRY LAB [] R-4 1C CHG PUMP RM [] R-5 SFP RM [] R-6 SAMPLE RM AREA [] R-8 DRUMMING STATION [] R-10 PRF [] R-17A OR R-17B CCW
When the decision to transfer back to EEP-1.0 announced, then terminate the exam.			

Event Description: **Attachment 2 of EEP-0**

Cue: BOP will accomplish when at step 5 of EEP-0

<u>Attachment 2 of EEP-0</u>
AUTOMATIC ACTIONS VERIFICATION

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	**(Step 1) Verify one CHG PUMP in each train - STARTED.** [] A train (1A or 1B) amps > 0 [] B train (1C or 1B) amps > 0	
	BOP	**(Step 2) Verify RHR PUMPs - STARTED.** RHR PUMP [] 1A amps > 0 [] 1B amps > 0	**CRITICAL TASK after 1A RHR pump trips at 30 feet RWST level**
	BOP	**(Step 3) Verify Safety Injection Flow.** **(Step 3.1)** Check HHSI flow - GREATER THAN 0 gpm. [] FI 943	
	BOP	**(Step 3.2)** Check RCS pressure - LESS THAN 275 psig{**435 psig**}.	
	BOP	**(step 3.3)** Check LHSI flow – greater than 1.5 X10^3 gpm [] 1A RHR HDR FLOW FI-605A [] 1B RHR HDR FLOW FI-605B	
	BOP	**(Step 4) Verify each SW train - HAS TWO SW PUMPs STARTED.** [] A train (1A,1B or 1C) [] B train (1D,1E or 1C)	

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	**(Step 5) Verify each train of CCW - STARTED.** (Step 5.1) Verify one CCW PUMP in each train- STARTED. A train HX 1C or 1B CCW FLOW [] FI 3043CA > 0 gpm OR [] FI 3043BA > 0 gpm B train HX 1A or 1B CCW FLOW [] FI 3043AA > 0 gpm OR [] FI 3043BA > 0 gpm Verify SW flow to associated CCW HX's SW FROM 1A(1B, 1C) CCW HX [] Q1P16FI3009AA > 0 gpm [] Q1P16FI3009BA > 0 gpm [] Q1P16FI3009CA > 0 gpm	
		(Step 5.3) Check instrument air available. Verify at least one air compressor started. AIR COMPRESSOR [] 1A [] 1B [] 1C Check INST AIR PRESS PI 4004B greater than 85 psig.	

Event Description:	**Attachment 2 of EEP-0**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 6) **Verify containment ventilation isolation.** Verify containment purge dampers - CLOSED. [] 3197 [] 3198D [] 3198C [] 3196 [] 3198A [] 3198B Verify containment mini purge dampers - CLOSED. CTMT PURGE DMPRS MINI-2866C & 2867C FULL-3198A & 3198D [] 2866C [] 2867C CTMT PURGE DMPRS MINI-2866D & 2867D FULL-3196 & 3197 BOTH-3198B & 3198C [] 2866D [] 2867D Stop MINI PURGE SUPP/EXH FAN.	**Will place HS to STOP**
	BOP	(step 7) **Verify containment fan cooler alignment.** Verify at least one containment fan cooler per train - STARTED IN SLOW SPEED. CTMT CLR FAN SLOW SPEED A train [] 1A [] 1B B train [] 1C [] 1D Verify associated emergency service water outlet valves - OPEN. EMERG SW FROM 1A(1B,1C,1D) CTMT CLR [] Q1P16MOV3024A [] Q1P16MOV3024B [] Q1P16MOV3024C [] Q1P16MOV3024D	**Ctmt cooling fans 1A and 1B will not be in correct alignment.**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 8) **Verify AFW Pumps - STARTED.** Verify both MDAFW Pumps - STARTED [] 1A MDAFW Pump amps > 0 [] 1B MDAFW Pump amps > 0 AND [] FI-3229A indicates > 0 gpm [] FI-3229B indicates > 0 gpm [] FI-3229C indicates > 0 gpm	
		(Step 8.2) Check TDAFW Pump start required. ☐Condition ☐TSLB ☐Setpoint ☐Coincidence☐ RCP Bus TSLB2 1-1 ☐2680 V 1/2 Detectors Undervoltage 1-2 1-3 on 2/3 Busses Low Low SG TSLB4 28% 2/3 Detectors Water Level 4-1,4-2,4-3 on 2/3 SGs In Any 5-1,5-2,5-3 2/3 SGs 6-1,6-2,6-3	
	BOP	(step 8.3) Verify TDAFWP started. [] MLB-4 1-3 lit [] MLB-4 2-3 lit [] MLB-4 3-3 lit TDAFWP SPEED [] SI 3411A > 3900 rpm TDAFWP SPEED CONT [] SIC 3405 adjusted to 100% Verify TDAFW flow path to each SG. TDAFWP TO 1A(1B,1C) SG [] Q1N23HV3228A in MOD [] Q1N23HV3228B in MOD [] Q1N23HV3228C in MOD TDAFWP TO 1A(1B,1C) SG FLOW CONT [] HIC 3228AA open [] HIC 3228BA open [] HIC 3228CA open	

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 9) **Verify main feedwater status.** Verify main feedwater flow control and bypass valves - CLOSED. 1A(1B,1C) SG FW FLOW [] FCV 478 [] FCV 488 [] FCV 498 Verify both SGFPs - TRIPPED. Verify SG blowdown - ISOLATED. 1A(1B,1C) SGBD ISO [] Q1G24HV7614A closed [] Q1G24HV7614B closed [] Q1G24HV7614C closed 9.4 Verify SG blowdown sample - ISOLATED MLB lights lit. 1A(1B,1C) SGBD SAMPLE STEAM GEN ISO [] MLB1 19-2 lit Q1P15HV3328 closed [] MLB1 19-3 lit Q1P15HV3329 closed [] MLB1 19-4 lit Q1P15HV3330 closed	
	BOP	(Step 10) **Check no MSL isolation actuation signal present.** Signal Setpoint coincidence TSLB LO SG PRESS < 585 psig 2/3 TSLB4 19-2,3,4 Hi stm flow >40% ½ on 2/3 TSLB4 16-3,4 and and 17-3,4 18-3,4 Lo-Lo Tavg <543°F 2/3 TSLB2 10-1,2,3 HI-HI ctmt press >16.2 psig 2/3 TSLB1 2-2,3,4	
	BOP	(Step 11) **Verify PHASE A CTMT ISO.** (Step 11.1) Verify PHASE A CTMT ISO - ACTUATED. [] MLB-2 1-1 lit [] MLB-2 11-1 lit 11.2 Check all MLB-2 lights - LIT.	**RNO** Step 11.2 Verify PHASE A CTMT ISO alignment using ATTACH 3, PHASE A CTMT ISO
	BOP	(step 12) **Check all reactor trip and reactor trip bypass breakers – OPEN** Reactor trip breaker A Reactor trip breaker B Reactor trip bypass breaker A Reactor trip bypass breaker B	

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(step 13) **Trip CRDM MG set supply breakers.** 1A(1B) MG SET SUPP BKR [] N1C11E005A [] N1C11E005B	
	BOP	(step 14) **Secure secondary components.** Stop both heater drain pumps. HDP [] 1A [] 1B Check any condensate pump started. IF started, THEN stop all but one condensate pump. [] 1A [] 1B If NO condensate pumps are started then place all HSs to STOP 14.3 IF condensate pump operating, THEN verify backup cooling aligned to condensate pumps per FNP-0-SOP-0.0, APPENDIX B, TB SO Actions Following A Reactor Trip Or Safety Injection.	**Will call TBSO to accomplish this.**
	BOP	(step 15) **Verify both CRACS mode selector switches in the ON position.** CRACS Mode Selector Switch [] A TRAIN [] B TRAIN Will call BOOTH to have this accomplished since this is not in the simulator	
	BOP	(step 16) **WHEN at least 30 seconds have passed since turbine trip, THEN check main generator tripped.** 230 KV BKR [] 810 - OPEN [] 914 - OPEN	
	BOP	(step 17) **Verify two trains of ECCS equipment aligned.** **Perform ATTACHMENT 4, Two Train ECCS Alignment Verification.**	
End of Attachment 2			

Time	Pos.	Expected Actions/Behavior	Comments
		Attachment 4 of EEP-0 **TWO TRAIN ECCS ALIGNMENT VERIFICATION**	
		(Step 1) Verify two trains of ECCS equipment aligned. [] Check DF01 closed [] Verify DF02 closed [] Check DG15 closed [] Verfiy DG02 closed [] Verify two trains of battery chargers – energized Amps > 0 (Step 1.6) Verify two trains of ESF equipment aligned. [] Check all MLB-1 lights LIT Verify charging pump suction and discharge valves - OPEN. CHG PUMP DISCH HDR ISO [] Q1E21MOV8132A [] Q1E21MOV8132B [] Q1E21MOV8133A [] Q1E21MOV8133B CHG PUMP SUCTION HDR ISO [] Q1E21MOV8130A [] Q1E21MOV8130B [] Q1E21MOV8131A [] Q1E21MOV8131B	
		(Step 1.7) Verify all post accident containment air mixing system fans - STARTED. (BOP) POST ACCIDENT MIXING FAN [] 1A [] 1B [] 1C [] 1D RX CAV H2 DILUTION FAN [] 1A [] 1B (Step 1.8) WHEN power restored to any de-energized emergency bus, THEN verify alignment of associated equipment.	
	BOP	(Step 1.9) Verify SFP Cooling in service per SOP-54.0, Spent Fuel Pit Cooling And Purification System.	Call Radside SO
		End of Attachment 4	

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Brief

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, call Unit 2 at 2434 or page the Unit 2 Unit Operator.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

Ask for and answer questions.

[X] Unit 1 [ ] Unit 2		Shift:	Date
Off-going SS	**Oncoming SS**	[ ] N [X] D	Today

Part I – To be reviewed by the oncoming Supervisor prior to assuming the shift.

Security Keys A, S, D, SW, X on key ring .___SS___

Unit Status   Mode 3, MOL, 893 ppm boron, Shutdown banks are pulled, Xe decreasing from its peak following the reactor trip. The reactor tripped 21 hours ago as a result of the loss of both SGFPs.

STPs/Evolutions: STP-11.11	**A** Train On-Service – **A** Train Protected

1.0___ ; 109.1 _____ No adj. ; 63.7 ____; FSP-20,0 _____;

Status of Special Testing

Perform STP-11.11, 1A RHR Pump Operability Check immediately upon taking the shift.

General Information

1.   Reactor Startup planned in 12 hours, ECC being calculated by Reactor Engineering
2.   Currently in UOP-1.3, v69, step 5.17
3.   Current Risk Assessment is GREEN and projected is GREEN
4.   Thunderstorm warnings in effect for Southeast Alabama & Western Georgia.
5.   Hotwell flush is in progress.
6.
7.
8.
9.

Equipment Status

		Maintain VCT gas pressure 25-30 psig

Reactivity Plan	**Waste Management Status**
	#3 RHT – On Service
	WGS – secured

LCO Status

Night Orders

No New Night Orders

Part II   Review Shift Complement
LCOs Reviewed ___SS___ (initials) reviewed as early in shift as possible

Part III:	STP-1.0 Reviewed/Signed	Operator Logs Reviewed	Cond. Report Queue Reviewed	Autolog Reviewed	ELDS & GEN Spreadsheet verified	Keys Turned Over
	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes	[X] Yes