

Final Submittal

**FARLEY JAN. 2005 EXAM
50-348 & 50-364/2005301**

**JANUARY 10 - 14, 2005
JANUARY 18, 2005 (written)**

1. As Given Simulator Scenario Operator Actions ES-D-2 & ES D-1

**Farley
Operating
Exam
Final**

Southern Nuclear J.M. Farley Nuclear Plant

Operations Training Simulator Exam Scenario

HLT-29 NRC EXAM SCENARIO #1

Technical Review: _____ *Date:* _____

*Training Department
Approval:* _____ *Date:* _____



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Facility: Farley Scenario No.: 1 Op-Test No.: HLT-29 NRC

Examiners: _____ Operators: _____

Initial Conditions: 57% power, ramping to 100%. 1227 ppm, MOL; B train on service. B Train protected.

Turnover: 1C D/G T/O for piston replacement, 1A MDAFW PUMP T/O for bearing replacement, 8 gpd SG tube leak in A SG, Steady for 3 weeks. AOP-21, Severe Weather, is in effect due to Severe thunderstorms in the area.

Event No.	Malf No.	Event Type*	Event Description
1		C (BOP) TS (SRO)	1B SW pump has a broken shaft.
2		C (RO)	Letdown PCV-145 Fails closed (DE4 comes in)
3		I (BOP) TS (SRO)	Steam flow transmitter on 1B SG FT-485 channel IV (selected FT for 1B SG fails low)
4a			1A RCP seal leak 6-8 gpm.
4b		R (RO)	Ramp down due to seal failure.
5a		TS (SRO) N (BOP)	Raise RCP seal leak rate to 90 gpm.
5b			Rods fail to move in manual
6		C (RO)	BA controller FK113 blown fuse in driver card
7		C (ALL)	1A RCP shaft shears. EEP-0 entry (Need to initiate prior to power <33%).
8		M (ALL)	After entry into ESP-0.1 (when 1A SGFP is tripped) Increase the RCS leak to 300 gpm. Terminate scenario in ESP-1.2 after normal charging established
			Team will start the 1A or 1B chg pump and close MOV-8100.

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Event No.	Malfunction No.	Event Type*	Event Description
0	**	Preset	1A SW pump has degraded head. (set to make SW header pressure less than 60# in that train) – linked to 1B SW pump broken shaft
0		Preset	1D SW pump has degraded head. (set to make SW header pressure less than 60# in opposite train) – linked to 1B SW pump broken shaft
0		preset	1A SG tube leak 20 gpd.
0		preset	Raise R-70A alarm setpoint to clear alarm per AOP-2
0		Preset	Rx trip breakers fail to open
0		Preset	1A CHG PUMP does not AUTOSTART but can be started from the MCB.
0		Preset	MOV-8100 (Seal water return) does not close on Phase A isolation
0		Preset	MOV-8112 (Seal water return) does not close on Phase A isolation
0		Preset	Automatic rod control failure
0		Preset	Auto actuation of train A SI failure
0		Preset	Auto actuation of train B SI failure
0		Preset	FRV-488 for 1B SG fails closed in auto control
0		Preset	Tag Out 1C DG
0		Preset	Tag Out 1A MDAFW pump

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

SCENARIO 1 Summary sheet

Initial Conditions: 57% power, MOL, B Train O/S, B Train protected RCS boron concentration is 1227 ppm.

- 1A MDAFW PUMP T/O for bearing replacement. (OOS 5 hrs) Expected RTS in 2 days.
- 1A S/G tube leak approximately 8 gpd. Steady for 3 weeks.
- 1C D/G T/O for piston replacement. (OOS for 3 days, Expected RTS in 5 days)
- AOP-21, Severe Weather, is in effect due to severe thunderstorms in the area.

Set in:

- 1A SG tube leak 20 gpd.
- Reset R-70 Alarm setpoint to clear alarm per ARP FG1 & AOP-2.0 (must be done independent of simulator bat file setup)
- 1C D/G is tagged out.
- 1A MDAFP tagged out.
- 1A Chg Pump fails to auto start.
- MOV 8100 fails to auto close.
- MOV 8112 will not auto close.
- Auto rod control failure
- Auto actuation on train A SI failure
- Auto actuation on train B SI failure
- FRV-488 for 1B SG fails closed in auto control
- 1A SW pump has degraded head. (set to make SW header pressure < 60# A train)
- 1D SW pump has degraded head. (set to make SW header pressure < 60# in B train)
- Rx trip breakers fail to open.

Event 1 – 1B SW pump has a broken shaft. 1A and 1D SW pumps will have degraded head to decrease SW pressure below 60 psig. The crew will enter AOP-10 after ARP guidance. Containment temps will be increasing. The crew will go thru AOP-10 and reduce some SW loads.

Event 2 – PCV-145 fails closed. DE4 comes in. PCV-145 taken to manual and controlled properly. Control charging flow.

Event 3 – FT-485 (selected steam flow FT for 1B SG fails low) fails to 0. This will cause the BOP operator to take manual control of the FRV and restore and control level. If in progress, the crew should stop the ramp long enough to address the problem.

Event 4a – 1A RCP seal leak 6-8 gpm. DC2 ARP guidance will have controlled shutdown commenced to be offline in 8 hours. When Rx is secured, the RCP will be s/d.

Event 4b – Ramp down for seal failure

Event 5a – Raise seal leak rate to 90 gpm. Entry into AOP-1.0, T. S. limit, 50 gpm limit for declaration of Alert, but well within the limits of plant control and should not require Trip and Safety injection.

Event 5b – Rods fail to move in manual. Implemented after most actions of AOP-1.0 have been initiated.

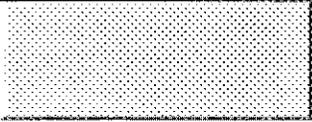
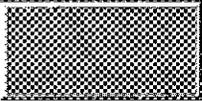
Event 6 – Boric Acid Flow controller failure. FK113 driver card develops blown fuse. FK113 on MCB will go dark and FCV-113B will fail closed.

Event 7 – 1A RCP shaft shears above 30% power (P-8). The crew should recognize reactor trip criteria and attempt to manually trip the reactor using the handswitches and then with the CRDMs MG set handswitches. Since the CRDM MG set breakers open, no entry into S.1 is required. Since the Rx trip breakers do not open, the main turbine will not trip and will need to be manually tripped. If not, an SI setpoint may be reached, but auto SI is blocked. AOP-4.0 actions will be required to close the A loop pressurizer spray valve and control feed to the 1A SG at minimum.

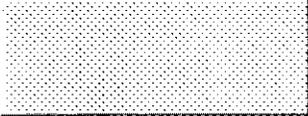
Event 8 – After entry into ESP-0.1 (when 1A SGFP is tripped) RCS leak will increase to 300 gpm. The crew will re-enter E-0; E-1; ESP-1.2. Terminate scenario in ESP-1.2 after normal charging established. The crew should detect 1A chg pump does not start on the SI signal and 8100 & 8112 do not go closed.

AOP-10/ AOP-4/AOP-1.0/EEP-0/ESP-0.1/EEP-0/ EEP-1/ESP-1.2

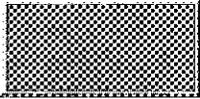
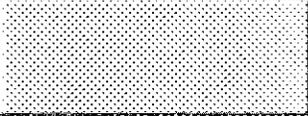
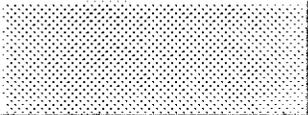
SETUP

EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
		Quick Setup IC (all items with # are included in IC)	NONE
0	0	Base IC-51 57% RTP, MOL, A Train O/S Exam IC-260, 57% RTP, MOL, B Train O/S, Cb=1227, Xe (-263 pcm) building in	
		RUN	 RUN simulator
0	0	Quick setup (all items with * are included): bat exam_nrc01.txt	
		Event trigger 1 – actuates when SW pressure on PI3001A is less than 86 psig: Event: pi3001a < 86	* #
0	0	1A SW pump degraded head PMPS/ NNCPSW1A-D / 50 / 0 ramp / Event trigger 1	* #
0	0	1D SW pump degraded head PMPS/ NNCPSW1E-D / 100 / 0 ramp / Event trigger 1	* #
0	0	Rx trip breakers fail to open CMF MALF/ cBKRRXTRP_cc21 / closed	* #
0	0	Rx trip breakers fail to open CMF MALF/ cBKRRXTRP_cc22 / closed	* #
0	0	Chg pump 1A fail to auto start on LOSP sequencer CMF MALF/ cCVP01A_d_cc3 / open	* #
0	0	Chg pump 1A fail to auto start on ESF sequencer CMF MALF/ cCVP01A_d_cc6 / open	* #
0	0	8100 does not close on Phase A isolation CMF MALF/ cCVH100_d_cc8 / open	* #
0	0	8112 does not close on Phase A isolation CMF MALF/ cCVH112_d_cc8 / open	* #
0	0	Rods fail to move in automatic: MALF / C / MAL-CRF2	* #
0	0	SI auto actuation A train failure: CMFmalf / cSFTYINJ_cc1 / open	* #
0	0	SI auto actuation B train failure: CMFmalf / cSFTYINJ_cc11 / open	* #
0	0	1B SG FRV-488 fails closed in auto: CNH / FK488-A / 1.7 start / 0 final / 180 ramp / Event trigger 4	* #
0	0	1A SGTL of 8 gpd (must setup value to below number to achieve 8 gpd indicated): Remote / B21 / LOA-RDS001 / 20	* #

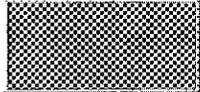
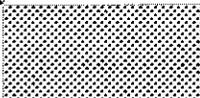
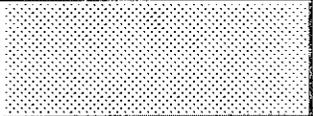
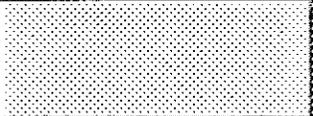
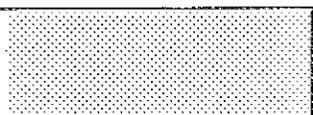
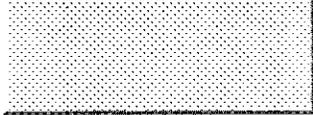
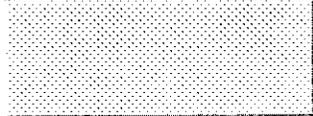
SETUP

EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
0	0	Tag out 1C DG output bkr unit 1 Cmfremote / cBK1DHO7_d_cd1 / open	* #
0	0	Tag out 1C DG output bkr unit 2 Cmfremote / cBK2DHO7_d_cd1 / open	* #
0	0	Rack out 1A MDAFW pmp: CMFremote / cAFP01A_d_cd1 / open	* #
0	0	Event trigger 2 – RCS leak increases to 300 gpm over 5 minute time frame when 1A SGFP rpms < 1000: Event: oats(1) < 1000 Command: imf mal-rcls1a 300 300	* #
0	0	Fail R15A high bistable off to prevent actuation during scenario. BST / JR15H-O / reset	* #
0	0	Fail power to boric acid controller FK-113 controller: CNH / FK113-V / Event trigger 3	* #
0	0	Event trigger 3 – actuates when FCV113A goes open: Event: rcvf113a > 0.1	* #
0	0	Event trigger 4 – actuates when FCV-488 < 20% Event: rmffk488 < 0.17	* #
		Place Bypass & Inop status switches in up position	<ul style="list-style-type: none"> ▪ AFW A Trn ▪ Emergency power both units A Trn
		Check Train On Service and protected signs	B TRN BOTH
		Check DEH for limiter limiting	DEH set correctly
		Check 3009 C set	approx 90%
		Check 3009 A set	approx 52%
		Place DANGER tags on DH07-1 and -2	2 DANGER tags
		Place 1C DG MSS in Mode 3	MSS in Mode 3
		Place DANGER tag on 1C DG MSS in Mode 3	DANGER tag
		Place DANGER tag on 1A MDAFW pump	DANGER tag
		Raise R-70A alarm setpoint to clear alarm per AOP-2.0 and SOP-69.0	Raise R70A setpoint to approx. 13
		Place Rods in MANUAL	MANUAL
		AUTO rod control does not work. Caution Tag on rod con. HS	Caution tag rod cont HS
0	0	DEH	Clear DEH alarms
0	0	ARDA	RESET ARDA
0	0	PPC	Place Grp 1 on MCB CRT
		PPC	Check for correct FLUX target
			
			Acknowledge annunciators
			Verify HORNS ON

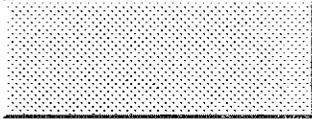
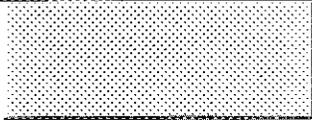
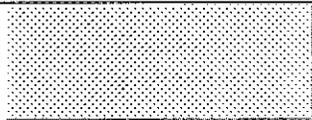
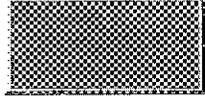
SETUP

EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
			 FREEZE simulator
		Open Simview file to be used for plant parameter data collection: Simview / 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
0	0	VERIFY MICROPHONES READY	Batteries installed
0	0	TURNOVER SHEET AVAILABLE	

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
Prior to RUN	0		
		Start data collection for Simview file DataCollection.uvl	
	0	Begin Exam	 RUN simulator
		Verify Horns ON: hornflag 	 Verify Horns On
1		1B SW pump has a broken shaft: PMPS/ inNCPSW1B-B	
2		PCV-145 fails closed: CNH / PK145-a / 0	
3		FT-485 channel IV (selected FT for 1B SG fails low [0]) XMT / FT485 / 0	
4a		1A RCP seal leak: MAL / MAL-CVC27A / 5 / 60 sec ramp	
4b		Ramp down for seal failure	
5a		RCS leak increases to 90 gpm: MALF / R / MAL-RCS1A / 90 / 0 ramp	
5b		Rods fail to move in manual: MALF / C / MAL-CRF3 <i>NOTE: IMPLEMENT AFTER MOST OF THE ACTIONS OF AOP-1.0 HAVE BEEN INITIATED.</i>	

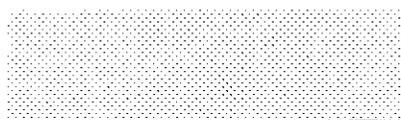
EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
6		Boric acid flow controller FK-113 driver card fuse failure: CNH / FK113-V	
7		1A RCP shaft shears: PMPS / NRCRCPI-B	
8		RCS leak increases to 300 gpm over 5 minute time frame.	Set in bat file to auto actuate after 1A SGFP is tripped.
		End of Exam	 HORNS OFF
		End of Exam	 FREEZE simulator
		Stop data collection for Simview file DataCollection.uvl	
		Export data to file with the name of NRC exam01 grpX.txt <i>NOTE: Substitute grpX with grp1, grp2, or grp3 as appropriate.</i> <i>NOTE: file will be saved in the OPENSIM directory.</i>	Ensure data file created.
		AFTER LAST SCENARIO OF THE DAY RESET R70A SETPOINT BACK TO 5 GPD.	

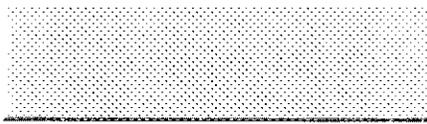
Local operator actions:

Event 1 – Loss of SW pumps

If requested, rack out 1A and 1B SW pump bkr:



CMFmalf / cncpsw1a_d_cp2



CMFmalf / cncpsw1b_d_cp2

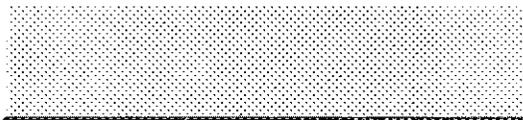
Place 1C SW pump to A train – initiate below actions approx. 20 minutes after being requested



cae swap_1C_SW_pmp_B_trn_to_A_trn_SOP24_app_24C_part1.cae

After disconnects for MOV-506 and MOV-507 indicate closed then call control room and have them perform steps 2.4 and 2.5 of SOP-24.0 Appendix 24C.

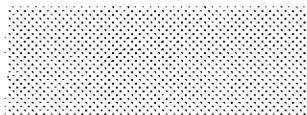
After control room has swapped valves finish the lineup below:



cae swap_1C_SW_pmp_B_trn_to_A_trn_SOP24_app_24C_part2.cae

If requested to reset annunciator KF2 then:

Fail off annunciator KF2 to simulate locally resetting the alarm.



ANN / FK2 / 2-Fail OFF

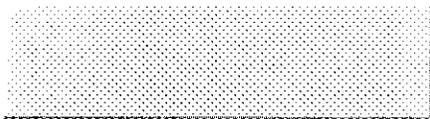
If requested to restore SGBD then:

Open FCV-1152



REMOTE / G24 / LOA-SGB005 / 1

Open RCV-23B



REMOTE / G24 / LOA-SGB006 / 1

Event 6 – Adjust RCS boron to force crew to borate RCS

If needed to raise RCS temperature to get examinees to borate RCS then perform the following:

- Open file CoreBoron.uvl (using Simview program) to monitor boron changes
- In CoreBoron.uvl file change JMLRCS7 to TRUE – ensures boron changes will take effect
- From EXPERT command window use the following to make small changes to RCS boron:
 - ramp xrcsbor [current boron value] [desired boron value] [ramp time in seconds – should be 60]
 - Example: ramp xrcsbor 1227 1226 60
- After boron change has been made change JMLRCS7 to FALSE

Event 7 – Locally open reactor breakers



CMFmalif / cBKRXTRP_cc21 / open



CMFmalif / cBKRXTRP_cc22 / open

Communications sheet

Event 1 – Outside SO – 1B SW pump motor is running but the shaft to the pump is not turning.

Outside SO – 1A SW pump has no discharge pressure and the pump is running.

Radside SO– SGBD alarm in is due to blowdown is tripped due to high SGBD surge tank level; SGBD panel alarm 52. Refer to Operator Actions section for actions to restore SGBD.

Outside SO/ SSS – Swap of 1C SW pump to A train if requested. See Local Operator Actions section 1C SW pump to A train for actions to take and operator response.

Event 2 – None.

Event 3 – Dispatcher –acknowledges when informed that the CR is in the queue and I & C is needed to trip bistables within 6 hours for FT-485 failing.

Event 4a – None.

Event 4b –Shift Manager & Chemistry informed & acknowledge. Gencom & Systat informed of the power reduction & acknowledge.

SM report: “I will classify the event. Continue ramping off line to be in Mode 3 in 2 hours.”

Event 5a – AOP-1.0 communications- HP and shift radiochemist, counting room, and SM will all be notified.

Event 5b – None.

Event 6 – Dispatcher – acknowledges when informed that the CR is in the queue. When requested by I&C to investigate report: “The driver card for FK-113 has a failed power supply on it.”

Event 7 –Rover asked to trip Rx trip breakers open locally. (wait 3 minutes and then open Rx trip breakers.) See Local Operator Actions section for opening trip breakers.

Event 8 – Call for recirc valve disconnects, H2 analyzers and H2 concentration..

Unit No. One

Offgoing Supv.	Oncoming Supv.	<input type="checkbox"/> N <input checked="" type="checkbox"/> D <input type="checkbox"/> E Date
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Part I - To be reviewed by the oncoming Supervisor prior to assuming the shift.

Keys turned over [X] Security Keys A, S, D, SW, X, on key ring SS

Unit Status 57% RTP, MOL, 1227 ppm Cb, 10,000 MWD, Xe, (-263 pcm) building in

STPs/Evolution's (completed/in progress/planned)

Ramping to 100% power

Rods in manual control

General Information and Equipment Status

UOP-3.1 in progress up to step 5.1.4.13

AOP-21.0, Severe Weather, is in effect due to severe thunderstorms in the area.

8 gpd SG tube leak in 1A SG, steady for the past 3 weeks. All actions of AOP-2.0 completed.

1C DG tagged out for piston replacement (OOS for 3 days, RTS in 5 days)

1A MDAFW PUMP tagged out for bearing replacement (OOS for 5 hrs, RTS in 2 days)

Automatic rod control does not work. CR has been generated and I&C called to work on the problem.

Current Risk Assessment is **YELLOW**

B train is the Protected Train

B train is on service

Unit 2 is 100% power w/ no threats

Waste Management Status #3 RHT O/S

LCO Status - 3.8.1 (1C DG) 3.7.5 (1A MDAFWP)

Night Orders - No New Night Orders

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

<input checked="" type="checkbox"/> Part III	STP-1.0 Reviewed/signed <input checked="" type="checkbox"/> Yes	Operator Logs Reviewed <input checked="" type="checkbox"/> Yes	Cond Rpt Queue Rev. <input checked="" type="checkbox"/> Yes	AutoLog Reviewed <input checked="" type="checkbox"/> Yes
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Event Description: 1B SW Pump has a broken shaft with 1A SW Pump having degraded head

Initiating event: Time (2 min)

Time	Position	Applicant's Actions or Behavior
<p><u>Indications of SW pressure dropping:</u> PI-3001A and B pressure decreasing.</p> <p><u>Annunciators:</u> SW PRESS A TRN LO (AD4) SW PRESS B TRN LO (AD5) TURB BLDG MISC ALARMS (KF2) 1B DG TRBL (VA3)</p>		
	RO	Check for the cause: <ul style="list-style-type: none"> ▪ SW pump tripped ▪ PI-3001A and B ▪ Temperatures stable for different equipment
	BOP	Refer to ARP-AD4 and 5. <ul style="list-style-type: none"> ▪ Call Outside SO to check SW pumps ▪ Stop the ramp in progress
<p>NOTE: Due to the way the ARP and AOP-10 is worded, 1C SW pump may be started at this time. If so, AOP-10 may not be continued in as shown.</p>		
<p>OSSO reports: 1B SW pump motor is running but the shaft to the pump is not turning. 1A SW pump has no discharge pressure Radside SO reports– SGBD alarm in is due to blowdown is tripped due to high SGBD Hx temp.</p>		
	BOP	Perform actions of AOP-10 <ul style="list-style-type: none"> • Verify affected 4160V supply breakers closed. • Check pressure in both trains >60 psig. • Check DGs secured. • Start 1C SW pump to increase pressure. • Reduce SW loads on that train. -secure SGBD -close MOV3149 -Stop ctmt coolers A and B

Event Description: 1B SW Pump has a broken shaft with 1A SW Pump having degraded head

	SRO	<ul style="list-style-type: none"> - Enter AOP-10 to restore SW pressure and reduce SW loads as necessary. - Direct swapping the 1C SW pump to A Train.
	SRO	<p>Investigate and call for repairs. Look at Tech Specs (3.7.8) action statement A. Inform SM to classify the event.</p>

EVENT 6 - FK 113 power supply failure may come in any time in the scenario when the crew Borates

Event Description: PCV-145 Fails closed

Initiating event: When directed by NRC examiner

Time	Position	Applicant's Actions or Behavior
<p><u>Annunciators:</u></p> <ul style="list-style-type: none"> - LTDN HX OUTLET PRESS HI (DE4) - LTDN ORIF ISO VLV REL LINE TEMP HI (DE3) <p><u>Indications-</u></p> <p>controller demand goes high PI-145 goes high FI-150 goes low</p>		
	RO	<p>Recognize indications of PCV-145 failure</p> <p>Announce PCV-145 failure</p> <ul style="list-style-type: none"> ▪ Place controller for PCV-145 in manual and control Letdown flow and pressure. ▪ Take manual control of Charging flow, as necessary, to control Przr level. ▪ Verify relief line temperature is decreasing.
<p>The following may be done if the crew believes they can not get PCV-145 controlled and are concerned about the letdown relief temperature increasing.</p>		
	RO	<p>The RO may secure letdown due to the relief line temperature increasing. If this is done, then the team will have to place letdown back in service or place excess letdown in service IAW AOP-16. AOP-16 should be entered if letdown is secured.</p>
	BOP	<p>Place turbine load increase on HOLD if in progress.</p>
	SRO	<p>Refer to ARP and direct supplementary actions.</p> <ul style="list-style-type: none"> ▪ Place controller for PCV-145 in manual and control Letdown flow and pressure. ▪ Take manual control of Charging flow, as necessary, to control Przr level.

EVENT 6 - FK 113 power supply failure may come in any time in the scenario when the crew Borates

Event Description: FT-485 fails low – selected steam flow FT for 1B FRV

This also has a failure of the FRV controller that when the FRV is placed in AUTO, the FRV will close.

Initiating event: When directed by NRC examiner

Time	Position	Applicant's Actions or Behavior
Indications:		
<ul style="list-style-type: none"> ▪ FT-485 fails low slowly - meter slowly dropping to 0 ▪ FRV position opening ▪ SGWL deviations 		
Annunciators:		
<ul style="list-style-type: none"> - 1B SG FEED FLOW > STM FLOW (JG2) - 1B SG LVL DEV (JF2) possible 		
	BOP	Take manual control of 1B FRV.
	SRO	Ensure board operators take ARP actions. <ul style="list-style-type: none"> ▪ Ensure FRV manual control taken and control SGWL is maintained.
	BOP	<ul style="list-style-type: none"> ▪ Select channel III, FT-484. ▪ Place 1B FRV back in AUTO ▪ Ensure FRV is controlling properly- FRV will close down ▪ Take manual control of the FRV and diagnose the FRV controller failure.
	SRO	Direct proper control of FRV in manual Conduct a brief on FRV manual control. Restart ramp. Consult Tech Specs 3.3.2 Hi Stm Flow/Lo-Lo Tavg Condition D – <ul style="list-style-type: none"> ▪ Place the channel in trip in 6 hours or be in Mode 3 in 12 hours
Report from Dispatcher when called:		
Acknowledges that CR is in the queue and I&C is needed to trip the B/Ss w/I 6 hours.		

EVENT 6 - FK 113 power supply failure may come in any time in the scenario when the crew Borates.

Event Description: 1A RCP seal leak of approx. 7.2 gpm

Initiating event: When directed by NRC examiner

Time	Position	Applicant's Actions or Behavior
<p><u>Annunciators:</u></p> <ul style="list-style-type: none"> ▪ RCP #1 SEAL LKOF FLOW HI (DC2) <p><u>Indications:</u></p> <p>RCP seal leakoff will be increasing on trend recorder</p>		
	RO	Read Flow recorder to indicate which pump has a problem. Determine 1A RCP seal leak - Check seal leakoff flow at 7 gpm and report.
	SRO	Instruct team by following through ARP for DC2. -instruct team to check temps of RCPs
	RO	Check DA5 is clear Adjust seal injection flow to >9gpm for the 1A RCP.
	BOP	Check RCP seal water bearing and seal water outlet temperatures < 225°F
	SRO	Instruct team to perform a controlled shutdown in the next 8 hours to have RCP secured and seal isolated.

Event Description: 1A RCP seal leak of approx. 7.2 gpm - RAMP DOWN IN POWER

Time	Position	Applicant's Actions or Behavior
	BOP	Place the ramp rate and MW in DEH computer
	RO	Co-ordinate the ramp at 2 MW/min to 40 MW By maintaining Tavg / Tref close and keeping all parameters in spec
<u>1A RCP will not be stopped until it trips in EVENT 7</u>		
	RO	When RCP stops, then close HV8141A Close Przr spray valve for 1A RCP when pump is stopped
	SRO	May refer to Tech Spec 3.5.5 condition A for Seal injection flow requirements.

EVENT 6 - FK 113 power supply failure may come in any time in the scenario when the crew Borates.

Event Description: RCS leak increases to 90 gpm

Initiating event: When directed by NRC examiner

Time	Position	Applicant's Actions or Behavior
<p><u>Annunciators:</u></p> <ul style="list-style-type: none"> - RMS HI RAD (FH1) - R-2,7,11 and 12 will alarm - CHG HDR FLOW HI-LO (EA2) - PRZR LVL DEV LO (HB2) <p><u>Indications:</u> Containment parameters will start to increase: Temp. humidity and pressure.</p>		
	RO	Refer FH1: <ul style="list-style-type: none"> ▪ Secure the Ctmt minipurge supply and exhaust fan ▪ Close the dampers for Ctmt minipurge supply and exhaust fan
	SRO	Instruct team to implement AOP-1.0: <ul style="list-style-type: none"> - Maintain Przr level on program by increasing chg flow or decreasing letdown - Control VCT level or roll to RWST - Determine the leak rate
	RO	Reduce Letdown by taking one orifice off service Control Charging to keep Przr level in programmed band
	RO	Control Auto makeup to keep VCT level >20% Determine the leak rate
	SRO	<ul style="list-style-type: none"> - Consider classifications – ALERT –Turn over to Shift Manager - Consult Tech Specs – 3.4.13 RCS operational leakage - Consult SM and make a decision to shutdown the plant
	BOP	Call to have post LOCA H2 analyzers placed on service Direct counting room to sample for activity LAW CCP-31
<p>Shift Manger should be called: Report: Follow your procedures and shutdown the plant. Gencom and SYSTAT will be notified of power reduction and will acknowledge</p>		

Event Description: Rods fail to move in Manual

Initiating event: When directed by NRC examiner when most actions of AOP-1.0 are complete

	RO	Inform CR team of rod control problem. Brief reactivity management using boration, possible emergency boration to continue ramping off line.
	SRO	May enter AOP-19 for rod control failure but this will not help this situation. Determine the best way to control reactivity and ramp.
	RO	Control Tavg / Tref on program and borate while shutdown in progress.
	BOP	Continue the ramp by placing DEH in GO.

EVENT 6 - FK 113 power supply failure may come in any time in the scenario when the crew Borates.

Event Description: FK 113 power supply failure

Initiating event: When directed by NRC examiner or when crew borates

This event may come in any time in the scenario when the crew Borates.

Time	Position	Applicant's Actions or Behavior
<p><u>Annunciators:</u></p> <ul style="list-style-type: none"> - PROC CAB PWR FAILURE (EC1) - BA FLOW DEV HI-LO (DK2) – if borating - TSLB 1 CAB 6 POWER FAILURE LIGHT <p><u>Indications:</u></p> <p>No flow on boric acid flow FCV-113B goes closed</p>		
	RO	Stop the boration Use rods to control Tavg and Delta I
	SRO	Call Dispatcher to get a team to investigate card in racks
	RO	Take Manual control of the Boric acid system IAW SOP-2.3 and control flow to RCS <ul style="list-style-type: none"> ▪ Verify BA pump running ▪ Open FCV113A ▪ Open FCV113B ▪ After desired amount borated, then close above valves Recognize Loss of Auto makeup capabilities RO may also emergency Borate or roll to the RWST to control RCS Tavg.
<p>The team may call for a reactor trip at this time with no normal reactivity control, the FRV in manual and degrading RCS conditions. This would be a conservative decision and satisfactory response.</p>		
	SRO	Devise a reactivity control plan.

Event Description: 1A RCP shaft shears -

Initiating event: When directed by NRC examiner or when the team elects to manually trip the reactor. **This event needs to be done quickly after the decision to manually trip the reactor is made.**

Time	Position	Applicant's Actions or Behavior
<u>Annunciators:</u>		
<ul style="list-style-type: none"> ▪ 4160 Volt BKR TRIPPED (MF4) ▪ 1A RCS LOOP FLOW LO OR 1A RCP BKR OPEN (EF1) 		
<u>Indications:</u>		
<ul style="list-style-type: none"> ▪ RCS loop 1A flow is decreasing ▪ 1A SGWL is increasing ▪ 1A RCP breaker trip flag is lit. 		
	RO	Recognize Rx trip criteria and announce to the team <ul style="list-style-type: none"> - Trip the reactor with handswitches - Trip the Rx with CRDM handswitches
	BOP	<ul style="list-style-type: none"> - Recognize Main Turbine did not trip - Trip Main Turbine
	SRO	Ensure board operators take Immediate actions of EEP-0 <ul style="list-style-type: none"> - Recognize a need for a Reactor Trip - <u>Direct trip of Reactor -- both handswitches</u> - <u>Direct trip of CRDM MG sets supply breakers</u> - <u>Direct Turbine Trip</u> DO NOT enter into FRP-S.1 Perform actions of AOP-4.0 <ul style="list-style-type: none"> ▪ Close 1A RCP spray valve ▪ Minimize AFW to 1A SG
Rover called to open Rx trip breakers		
Rover responds and the calls OATC when Rx trip breakers are open - 3 minutes		

Event Description: 1A RCP shaft shears

Initiating event: When directed by NRC examiner

Time	Time	Time
<u>*</u> Critical	RO	<ul style="list-style-type: none"> - <u>Check Rx tripped</u> <ul style="list-style-type: none"> ▪ RTB's & associated bypass bkrs open - Trip of Reactor – both handswitches - Trip of CRDM MG sets supply breakers
	BOP	<ul style="list-style-type: none"> - Check turbine tripped - Verify at least one train of 4160 V ESF busses energized - Check SI actuated
If the main turbine is not tripped in a timely manner a safety injection will occur.		
	SRO	<ul style="list-style-type: none"> - Exit EEP-0 enter ESP-0.1, Reactor trip response OR Continue in EEP-0 if a SI is determined to be required. Crew should stop 1A RCP and close 1A RCP Seal leakoff valve shortly after Rx trip
	RO	Secure 1A RCP and close 1A RCP Seal leakoff valve (8141A) shortly after Rx trip
The following procedure may not need to be done if an SI occurs.		
	RO	ESP-0.1 actions ⇒ Check RCS temperature stable at or approaching 547°F
	BOP	<ul style="list-style-type: none"> ⇒ Verify Feedwater status ⇒ Check emergency boration not required ⇒ Check AFW status ⇒ Check 4160V busses
		Proceed to event 8

Event Description: 300 GPM RCS leakInitiating event: will automatically be inserted on the Main Turbine trip and ramp in over 5 min.

Time	Position	Applicant's Actions or Behavior
	SRO	Recognize entry back to EEP-0 IAW foldout page requirements ⇒ Monitor SI criteria Pzr level >7% and 16°F Subcooled in the CETC mode
	SRO	Re-enter EEP-0 from ESP-0.1 FO page on Pzr level decreasing. Perform actions of EEP-0: (if reentered from ESP-0.1)
	RO	Check Rx tripped
	BOP	- Check turbine tripped TSLB 2 14-1 thru 14-4 - Verify at least one train of 4160 V ESF busses energized - Check SI actuated or required
	RO	- Verify SW pumps -- 2 in each train - Verify CCW started CCW flow and SW flow - Verify Chg pumps started - <u>1A Chg did not start and needs to be started here</u> - Verify RHR pumps started - Verify SI flow FI-943 - Verify Ctmt Ventilation isolation - Verify CTMT fan cooler alignments 1 CTMT fan in slow in each train with Emerg SW supplied

Event Description: 300 GPM RCS leak

	BOP	<ul style="list-style-type: none"> - Verify AFW status - Verify Main FW status - Check NO MSL isolation signal present
	RO	- Check Ctmt pressure <27 psig PR 950
<u>*</u> Critical	BOP	<p>Verify Phase A ctmt iso Verify Ph A ctmt iso actuated Check all MLB-2 lights lit- <u>Initiate action to make all MLB-1 lights lit MOV-8100 and 8112 did not close</u></p>
	RO	<p>Announce "Unit 1 reactor trip and Safety Injection" - Verify all Rx trip and bypass bkrs open Trip CRDM MG set supply breakers</p>
	BOP	<p>Check AFW status Total AFW flow > 395 gpm or any NR level >30% Control MDAFWP and TDAFWP flow for 30% to 60% NR level When two SG NR levels >25% and TDAFWP not required, stop TDAFWP</p>

Event Description: 300 GPM RCS leak

	BOP	Secure secondary components Both heater drain pumps All but one cond pump Align backup cooling to cond pumps
	RO	<ul style="list-style-type: none"> - Check RCS avg temp stable at or approaching 547°F - If heatup is in progress attempt to dump steam to condenser - If heat up continues, dump steam to atmosphere - Direct counting room to perform CCP-645, Main Steam Abnormal Environmental Release. - Check Pzr pressure & PORVs PRT parameters - Check RCP trip criteria; subcooling > 16 deg - Monitor chg pump miniflow criteria
	SRO	<p><u>DIAGNOSTICS</u></p> <ul style="list-style-type: none"> - Check SGs not faulted; no SG falling in uncontrolled manner or less than 50 psig - Check SGs not ruptured (Step 27) Secondary rad indication normal – No SG level rising in uncontrolled manner – *- Check RCS intact – NO – Ctmt rad in alarm / ctmt press increasing <p>Check Transition criteria to EEP-1.0</p>
	BOP	<ul style="list-style-type: none"> - Check SGs not faulted; no SG falling in uncontrolled manner or less than 50 psig - Check SGs not ruptured (Step 27) Secondary rad indication normal – No SG level rising in uncontrolled manner – *- Check RCS intact – NO – Ctmt rad in alarm / ctmt press increasing

Event Description: 300 GPM RCS leak

Time	Position	Applicant's Actions or Behavior
	SRO	Direct transition to EEP-1, Loss of Reactor or Secondary Coolant Direct actions in EEP-1
	RO	Check RCP trip criteria - all tripped
	BOP	- Check SGs not faulted - no SG pressure falling uncontrolled - Check intact SG levels Control AFW flow to get SG NR levels >30% {50%} - Check secondary radiation indications
	RO	Check Pzr PORVs- power avail to iso vlvs, at least one iso vlv open, both PORVs closed
	SRO	Direct that the following be performed within one hour of start of event: Close recirc vlv disconnects Establish 1A and 1B post LOCA ctmt H2 analyzers Plot H2 concentration If H2 concentration <4%, place both recombiners in service
	SRO	Check SI termination criteria: Subcooling > 16 {45} deg in CETC mode - Secondary heat sink available - RCS pressure stable or rising - Pzr level > 7% {50%} -

Event Description: 300 GPM RCS leak

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> - Check CS system - Check RHR system - Check NO SG pressure falling in an uncontrolled manner - Check RCS pressure
	BOP	<ul style="list-style-type: none"> - Verify 4160 V busses - Check DGs and secure since they are running unloaded <ul style="list-style-type: none"> • Check AB sump pumps NOT running and sump HI level alarms • Check AB radiation normal Check PRF in operation IAW SOP-60
	SRO	<ul style="list-style-type: none"> • Begin evaluation of plant status • Evaluate RCS sampling requirements • Check for intersystem LOCA • Check LHSI flow in progress - Check RCS pressure < 265 (430) – NO <ul style="list-style-type: none"> • Go to ESP-1.2, Post LOCA cooldown and depressurization

Event Description: 300 GPM RCS leak

Time	Position	Applicant's Actions or Behavior
	SRO	Transition to ESP-1.2 Complete the following: <ul style="list-style-type: none"> ▪ All initial steps to step 9:
<u>*</u> Critical	BOP	- Begin RCS cooldown to cold shutdown Commence a cooldown of the RCS using either the Steam dumps if available or the Atmospherics.
<u>*</u> Critical	RO	- Reduce Pzr pressure to refill the pressurizer - Check to secure RCPs Stop chg pumps
		<u>Anytime after the depressurization is complete would be a good time to secure the scenario</u>

Final of scenario #2 2005 NRC exam

Southern Nuclear
J.M. Farley Nuclear Plant

Operations Training
Simulator Exam Scenario

HLT-29 NRC EXAM SCENARIO #2

Technical Review: _____ *Date:* _____

Training Department
Approval: _____ *Date:* _____



DRAFT COPY

Facility: Farley Scenario No.: 2 Op-Test No.: HLT-29 NRC

Examiners: _____ Operators: _____

Initial Conditions: 71% reactor power ramping in MODE 3 in 2 hours due to Hurricane warnings in effect. Winds in excess of 75 mph expected at the plant site in 4 hours.

MOL, B Train O/S; B Train protected

Turnover: 1C D/G T/O for piston replacement, I&C is working on PT-457 which failed low last shift. 8 gpd SG tube leak in 1A SG, AOP-21, Severe Weather, is in effect due to Hurricane warning and high winds in the area. LT-112 failed low - I&C working on it.

Event No.	Malf No.	Event Type*	Event Description
1		R (RO) N (BOP)	Ramp down in power.
2		I (BOP)	PT464, Steam header pressure, fails low.
3		I (RO) TS (SRO)	LT-459, Przr level, fails low.
4a		N (RO)	Place letdown back in service.
4b			SI on Unit 2 [cSFTYINJ (cc21)] under CMFmalf
5		I (RO) TS (SRO)	PT-445 fails high PORV will stick open. MOV isolation will have to be closed.
6		C (BOP) TS (SRO)	1A inverter fails and does not automatically transfer to the bypass source.
7		M (ALL)	LOSP for BOTH units
			Recover from the spurious SI, terminate when charging flow restored in ESP-1.1.
0	**	Preset	1B DG will not auto start on LOSP or SI
0		Preset	1A Inverter does not transfer to the bypass source
0		Preset	PT-457 input to SCMM disabled
0		Preset	LT-112 failed low.
0		Preset	Tag Out 1C DG
0		preset	1A SG tube leak 20 gpd.
0		Preset	R15A high bistable prevented from alarming
0		preset	Raise R-70A alarm setpoint to clear alarm per AOP-2

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

OPERATING TEST HLT-29 NRC

SCENARIO 2 Summary sheet

Initial Conditions: 71% power, ramping to be in Mode 3 in 2 hours due to Hurricane warnings in effect. Winds in excess of 75 mph expected at the plant site in 4 hours. EOL, B Train O/S, B Train protected. RCS boron concentration is 1192 ppm.

- 1A S/G tube leak approximately 8 gpd. Steady for 3 weeks.
- I&C is working on PT-457 which failed low last shift.
- LT-112 has failed low. I&C is working this failure.
- 1C D/G T/O for piston replacement. (OOS for 3 days, Expected RTS in 5 days)
- AOP-21, Severe Weather, is in effect due to Hurricane warning and high winds in the area.

Set in:

- 1A SG tube leak 20 gpd.
- R15A high bistable prevented from tripping – minimizes nuisance alarm due do very small SGT
- 1B DG will not tie on bus on AUTOSTART.
- 1A inverter does not transfer automatically to the bypass source
- PT-457 failed low.
- LT-112 failed low.
- PORV will not close from MCB

Event 1 – Ramp down in power at 5-6 MW/min to be off line in 2 hours.

Event 2 – PT464 fails low. Take manual control of the SGFP speed.

Event 3 – LT-459 fails low. This will cause Pzr heaters to turn off, letdown to secure and charging to increase. Take manual control of FCV-122.

Event 4a – Place letdown back in service and control charging and Pzr heaters.

Event 4b – Unit 2 Safety Injection

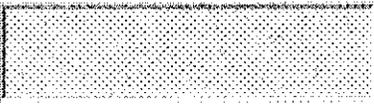
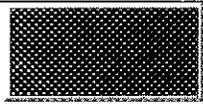
Event 5 – PT-445 fails high. PORV will stick open. MOV isolation will have to be closed.

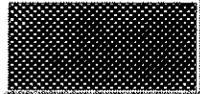
Event 6 – 1A inverter fails and does not automatically transfer to the bypass source. The control room will have the Rover transfer to the bypass manually. This will also cause LCV-115B and D to roll open causing the team to ramp faster until the inverter is swapped to the bypass source.

Event 7– Dual unit LOSP. A Unit 2 SI has occurred that will dedicate the 1-2A DG to unit 2 on the LOSP. This will cause a complete loss of power on Unit 1 due to 1-2A DG supplying U-2 and 1B DG does not automatically start. ECP-0.0 entry is required. The team can start 1B D/G or start 2C DG to restore power.

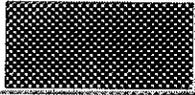
Recover from the spurious SI, terminate when charging flow restored in ESP 1.1.

AOP-16/ EEP-0/ ECP-0/ EEP-0/ESP-1.1

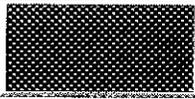
SETUP			
EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
		Quick Setup IC (all items with # are included in IC)	NONE
0	0	IC-057, 71 % RTP, MOL, B Train O/S	RESET IC-057
0	0	Quick setup (all items with * are included): bat exam_nrc02.txt	
0	0	LT-112 has failed low XMT / LT112xmt failure / 0	*
0	0	PT-457 has failed low XMT / PT457 / 1700	*
0	0	1A Inverter does not transfer to the bypass source MALF / E / MAL-FPS-INVSA	*
0	0	1B DG will not auto start on SI or LOSP SET JDGBLK1B = TRUE for DG 	*
0	0	1A SGTL of 20 gpd (gives an indicated 8 gpd leak): REMOTE / B21 / LOA-RDS001 / 20	*
0	0	Tag out 1C DG output bkrs unit 1 CMFremote / cBK1DHO7 d cd1 / open	*
0	0	Tag out 1C DG output bkrs unit 2 CMFremote / cBK2DHO7 d cd1 / open	*
0	0	PORV-445A sticks open and will not close trgset 1 "rrc445a > 0.7" trg 1 "imf rrc445a-s 50"	*
0	0	Defeat PT547 input to B train ICCMS: REMOTE / B14 / LOA-ICCB09 / True	*
0	0	R15A high bistable prevented from alarming: (Prevents alarm due the small SGTL and limited simulator run time.) BS1 / JR15-O / reset	*
			*
			 RUN simulator

SETUP			
EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
		Place DANGER tags on DH07-1 and -2	2 DANGER tags
		Place 1C DG MSS in Mode 3	MSS in Mode 3
		Place DANGER tag on 1C DG MSS in Mode 3	DANGER tag
		Place Bypass & Inop status switches in up position	Emergency power both units A Trn
		Check Train On Service and protected signs	B TRN BOTH
		Check DEH for limiter limiting	DEH set correctly
		Raise R-70A alarm setpoint to clear alarm per AOP-2.0 and SOP-69.0	Raise R70A setpoint to approx. 13
0	0	DEH	Clear DEH alarms
0	0	ARDA	RESET ARDA
0	0	PPC	Place Grp 1 on MCB CRT
		PPC	Check for correct FLUX target
			Acknowledge annunciators
			Verify HORNS ON
			 FREEZE simulator
		Open Simview file to be used for plant parameter data collection: Simview / 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
0	0	VERIFY MICROPHONES READY	Batteries installed
0	0	TURNOVER SHEET AVAILABLE	Paperwork provided by evaluators

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
		Start data collection for Simview file DataCollection.uvl	
	0	Begin Exam	 RUN simulator
		Verify Horns ON: hornflag 	Verify Horns On
1		Ramp down in power	
2		PT464 fails low over 25 seconds XMT / PT464 / 0 / 25 ramp	
3		LT-459 fails low XMT / LT459 / 0	
4a		Restore letdown	
4b		SI on Unit 2: CMFmalf / cSFYINJ_cc21 / closed NOTE: THIS EVENT WILL MOST LIKELY BE INITIATED SOMETIME DURING RECOVERY OF LETDOWN.	
5		PT-445 fails high (2500 psig): XMT / PT445 / 2500 PORV-445A will stick open. MOV isolation will have to be closed	
6		1A inverter fails and does not transfer to the bypass source. MALF / E / MAI.-EPS-INVA NOTE: IF TEAM DECIDES TO MANUALLY TRIP THE REACTOR THEN INITIATE EVENT 7 AS SOON AS THE REACTOR IS TRIPPED TO ENSURE TEAM DISCOVERS AC PROBLEMS WHILE IN EEP-0.	

EXAM

EVENT#	TIME	EVENT DESCRIPTION	COMMAND
7		Dual unit LOSP: MALF / E / MAL-EPS1 / 1 / 2 ramp	
		Restore Off-site power at step 10 of EEP-0 (Verify CTMT ventilation isolation.): MALF / E / MAL-EPS1 / 100	
		Recover from spurious SI, terminate when charging flow restored	
		End of Exam	HORNS OFF
			 FREEZE simulator
		Stop data collection for Simview file DataCollection.uvl	
		Export data to file with name of NRC exam02 grpX.txt <i>NOTE: Substitute grpX with grp1, grp2, or grp3 as appropriate.</i> <i>NOTE: File will be saved in the OPENSIM directory.</i>	
		AFTER LAST SCENARIO OF THE DAY RESET R70A SETPOINT BACK TO 5 GPD.	

LOCAL OPERATOR ACTIONS:

Operator actions that may be called for or need to be done:

Event 5 -- Remove control power from MOV-8000A.

REMOTE / cRC800A_d_cd1 / open

Event 6 -- Restore 1A Inverter from the bypass source.



REMOTE / R21 / IOA-EPS001 / True

Event 7 – Align nitrogen to PORVs if requested:



cae N2_PORVs_align.cae

Communications sheet

Event 1 – Shift manager, Chemistry, GenCom & Systat notified of the ramp down and acknowledge.

Event 2 – Dispatcher for CR & Shift Manager notified of failure and acknowledge.

Event 3 – Dispatcher for CR, I & C for tripping Bistables, & Shift Manager notified of failure and acknowledge.

Event 4a – Rad side SO acknowledges verify open PRIP Letdown isolation valves.

Radside SO reports back:

- “LTDN LINE PENE RM ISO's Q1E21HV8175A and B are open”.

Event 4b – **Booth: Announce Unit 2 Reactor Trip and Safety Injection.**

SM / Unit 2 SS: “We had a reactor trip and safety injection – still investigating what caused it.

Event 5 – Dispatcher for CR, I & C for tripping bistables, & Shift Manager notified of failure and acknowledge.

Event 6 – Rover sent to check 1A Inverter and acknowledge.

Rover Reports –

- “The inverter is did not swap to the Bypass source and the BYPASS SOURCE AVAILABLE light is LIT”.
- If asked to check breakers to power up Inverter. “All are closed. “
- Report back that the Inverter is on the Bypass source when re-energized.

Event 7 – Radside SO acknowledges aligning N2 to PORVs.

Unit No. One

Offgoing Supv.	Oncoming Supv.	<input type="checkbox"/> N <input checked="" type="checkbox"/> D <input type="checkbox"/> E Date
----------------	----------------	---

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

Keys turned over [X] Security Keys A, S, D, SW, X, on key ring SS

Unit Status 71% RTP, MOL, 1192 ppm Cb, 10,000 MWD, Xe building in

STPs/Evolution's (completed/in progress/planned)

Due to hurricane warnings in effect AOP-21.0, Severe Weather, has been implemented. OPS Manager direction is to be in Mode 3 in 2 hours.

General Information and Equipment Status

8 gpd SG tube leak in 1A SG, steady for the past 3 weeks. All actions of AOP-2.0 completed.

1C DG tagged out for piston replacement (OOS for 3 days, RTS in 5 days).

LT-112 failed low. I&C is working the transmitter.

PT-457 failed low 30 minutes ago. I&C has been called to place B/S in trip.

PT-457 input to SCMM has been disabled IAW SOP-68.0.

B train is the Protected Train

B train is on service

Current Risk Assessment is **YELLOW**

Unit 2 is 40% power and ramping down to mode 3.

Waste Management Status #3 RHT O/S

LCO Status 3.8.1 (1C DG) 3.3.1 and 3.3.2 (PT-457)

Night Orders - No New Night Orders

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

<input checked="" type="checkbox"/> Part III	STP-1.0 Reviewed/signed <input checked="" type="checkbox"/> Yes	Operator Logs Reviewed <input checked="" type="checkbox"/> Yes	Cond Rpt Queue Rev. <input checked="" type="checkbox"/> Yes	AutoLog Reviewed <input checked="" type="checkbox"/> Yes
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Op-Test No.: HLT-29 NRC	Scenario No.: 2	Event No.: 1	Page 1 of 1
Event Description: <u>Commence ramp down in power</u> Initiating event: start of scenario			
Time	Position	Applicant's Actions or Behavior	

The control room will call the shift chemist, switchboard operator and/or Gencom, systat and possibly the shift manager.		
	BOP	Put in Ramp rate of 5-6 MW/min Co-ordinate with OATC to ramp and Press GO -potentially remove 1 SGFP from service depending on how long ramp goes.
	RO	<ul style="list-style-type: none"> ▪ Control reactivity on the ramp IAW UOP-3.1 ▪ Use Rods or borate - If delta I is low the crew will probably borate to lower RCS temp - If delta I is high the crew will probably use rods to lower RCS temp
	SRO	Ensure board operators take actions required by UOPs. Enter AOP-17 if >5 MW/min reached

Op-Test No.: HLT-29 NRC

Scenario No.: 2

Event No.: 2

Page 1 of 1

Event Description: PT-464, Steam header pressure, fails Low.Initiating event: NRC direction

Time	Position	Applicant's Actions or Behavior
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Indications:

- SGFP speed drops to 3200 rpm

Annunciators:

- 1A, B, C SG STM FLOW > FEED FLOW (JG1,2,3)
- 1A, B, C SG LVL DEV (JF1,2,3)

	BOP	Take manual control of BOTH SGFPs and restore speed <ul style="list-style-type: none"> ▪ Place SK-509A in manual and reduce speed ▪ Check SGWL and FF/SF for matched values Place Turbine on HOLD
	RO	Refer to ARPs
	SRO	Direct placing Main Turbine on HOLD. Direct taking Manual control of the SGFP speed control.
	SRO	Refer to ARP and direct supplementary actions.

The SM and the dispatcher will be notified of the failure and request help.

Op-Test No.: HLT-29 NRC

Scenario No.: 2

Event No.: 3

Page 1 of 1

Event Description: LT-459, Przr level transmitter, fails low

Initiating event: NRC direction

Time	Position	Applicant's Actions or Behavior
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Annunciators:

- PRZR LVL LO HTRS OFF LTDN SEC (HA3)
- PRZR LVL DEV LO (HB2)
- PRZR HTR CONTROL TRBL (HD4)

Indications:

- Charging flow rising
- VCT level will decrease
- Przr level will increase
- All heaters will go OFF
- Letdown will secure
- Letdown flow decreases

	RO	<ul style="list-style-type: none"> ▪ Take manual control of charging and decrease flow. ▪ Adjust Seal injection flow
	RO	<ul style="list-style-type: none"> ▪ Select Przr level selector switch to a position that LT-459 will not affect control. III/II position ▪ Place 1C Pzr heaters to ON
	SRO	Direct Manual control of FCV-122. Direct placing Turbine on HOLD.
	BOP	Place main Turbine on HOLD.
	SRO	Refer to TS 3.3.1 Condition M Call Dispatcher to investigate and repair

Op-Test No.: HLT-29 NRC Scenario No.: 2 Event No.: 4a and 4b Page 1 of 1

Event Description: Place Letdown on service IAW AOP-16
(May also use SOP-2.1)

UNIT 2 Safety Injection – insert this in the middle of placing Letdown on service.

Time	Position	Applicant's Actions or Behavior
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Event 4a		
	SRO	<p><u>Direct the following actions:</u></p> <ul style="list-style-type: none"> - Restore Normal Letdown per SOP-2.1 or AOP-16 - Tech Spec evaluation in SOP-2.1 TS 3.5.5 for seal injection flow
The Radside SO will be called to check open HV8175A and B.		
	RO	<p>Reestablish charging and letdown flow per SOP-2.1, CVCS Startup & Operation, Section 4.4 or AOP-16.0</p> <p>Place normal Letdown in service.</p> <ul style="list-style-type: none"> - Place PCV-145 in manual and 50% - Open LCV-459/460 - Open 8149 A and C - Place PCV-145 in Auto
	RO	<ul style="list-style-type: none"> ▪ Restore PRZR heater control if not done previously ▪ Restore Charging to normal by taking FCV-122 to auto
	BOP	Direct CHM to remove ZAS from service
Event 4b		
<p><u>Announcement of UNIT 2 Rx trip and SI</u> when actuated during this event</p> <p><u>NOTE to examiner:</u></p> <p>As a result of the unit 2 Safety Injection, 1-2A DG will align to Unit 2 and stay there. This will aid in the loss of power to Unit 1 in Event 7.</p>		

Op-Test No.: HLT-29 NRC	Scenario No.: 2	Event No.: 5	Page 1 of 1
Event Description: PT-445 fails High – PORV will stick open Initiating event: NRC direction			
Time	Position	Applicant's Actions or Behavior	

Annunciators:		
<ul style="list-style-type: none"> - PRZR SAFETY VLV TEMP HI (HA4) - PRZR PORV TEMP HI (HA5) - PRZR PRESS HI-LO (HC1) - REL VLV 444B/445A OPEN (HE1) - PRZR PRESS REL VLV 445A OR B/U HTRS ON (HD1) 		
Indications:		
<ul style="list-style-type: none"> - PRT temp rising - Przr pressure dropping. - Sprays closing down 		
	RO	<ul style="list-style-type: none"> ▪ Attempt to close the PORV ▪ Close the MOV- 8000B to isolate the leak ▪ Ensure Przr heaters ON and RCP sprays are CLOSED
	BOP	<ul style="list-style-type: none"> - Obtain ARPs for guidance - Check Przr pressure
	SRO	Direct actions required to stop Przr pressure decrease.
	SRO	Consult TS for low pressure – TS 3.4.1 RCS pressure, temperature and DNB limits Condition A Restore w/i- 2 hours
	SRO	Consult TS for PORV OPRABILITY – TS 3.4.11 PORVs - Condition B – close block valve w/1 hour and remove power and restore PORV to operable in 72 hours.

Op-Test No.: HLT-29 NRC Scenario No.: 2 Event No.: 6 Page 1 of 3

Event Description: 1A Inverter fails and does not transfer to the Bypass source
 Initiating event: NRC direction

Time	Position	Applicant's Actions or Behavior
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Annunciators:

- 1A INV FAULT (WD1)
- PR HI FLUX RATE ALERT (FC3)
- LTDN TO DEMIN DIVERTED- TEMP HI (DF1)
- LTDN DIVERTED TO RHT – VCT LVL HI (DF2)
- ESS VLVS OFF NORM (BJ4 and BH5)

Indications:

NI41 fail has no power

Auto makeup starts

1ABat pump is running and both RMW pumps are running

Cannot pull rods due to rod stop in. Can put rods in.

LCV115B/D open – boration of RCS

	BOP	<ul style="list-style-type: none"> • Stop the ramp if in progress • Call the Rover to check on the inverter • Check ARP for WD1 among others.
<p>Rover reports: The 1A Inverter did not swap to the bypass source and the BYPASS SOURCE AVAILABLE LIGHT is LIT. When asked about breakers: The breakers for the 1A Inverter are closed. Report back when the Inverter has been swapped.</p>		
	SRO	<p>Direct the following:</p> <ul style="list-style-type: none"> • Decrease charging flow and letdown to decrease boron and temperature drop. • Direct a ramp to maintain Tavg/Tref on target • Direct closing RWST and opening VCT suction when inverter restored.
	SRO	<p>Direct actions of ARP to swap the inverter using the manual Bypass switch</p>

Op-Test No.: HLT-29 NRC

Scenario No.: 2

Event No.: 6

Page 2 of 3

Event Description: 1A Inverter fails and does not transfer to the Bypass source
 Initiating event: NRC direction

Time	Position	Applicant's Actions or Behavior
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	RO	<p>The following may be accomplished to reduce boron addition:</p> <ul style="list-style-type: none"> - Reduce letdown to a minimum and reduce charging to a minimum due to RWST valves open - May decrease Seal injection to a minimum - Stop auto makeup in progress
	BOP	<ul style="list-style-type: none"> • Set in a ramp to decrease load to maintain Tavg and Tref on target.
	SRO	<ul style="list-style-type: none"> ▪ TS 3.8.7 Inverters- OPERATING Condition A Restore W/I 24 hours ▪ 3.8.9 Distribution systems operating - while the vital panel is de-energized -- Condition A restore w/I 8 hours <p>These TS items may not be addressed due to the rapid rate this scenario will precede.</p>
When the Inverter is returned to service and power restored, the following will need to occur.		
	BOP	<ul style="list-style-type: none"> ▪ Stop the ramp in progress by pressing the HOLD push button on DEH

Op-Test No.: HLT-29 NRC

Scenario No.: 2

Event No.: 6

Page 3 of 3

Event Description: 1A Inverter fails and does not transfer to the Bypass source
 Initiating event: NRC direction

Time	Position	Applicant's Actions or Behavior
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	RO	<ul style="list-style-type: none"> ▪ Open VCT outlet valves LCV115C & E ▪ Close the RWST valves LCV115B & D ▪ Restore Makeup system to normal - Stop the BA pumps and place 1 in AUTO - Restore BA flow path to normal - Place the RMW system to AUTO ▪ Match Tavg/Tref while maintaining RCS temp >541°F
		<p>If the crew does not take timely action, a conservative decision to Trip the reactor should be made here.</p>

Op-Test No.: HLT-29 NRC	Scenario No.: 2	Event No.: 7	Page 1 of 6
Event Description: <u>LOSP entry into ECP-0.0 (1B DG does not start)</u>			
Initiating event: NRC Direction OR If the TEAM decides to manually trip the reactor, initiate event 7 as soon as the reactor is tripped.			
Time	Position	Applicant's Actions or Behavior	

	SRO	<u>Enter ECP-0 directly or enter EEP-0 and transition to ECP-0.</u>
	BOP	<ul style="list-style-type: none"> ▪ Recognize Loss of ALL AC ▪ Report to the team
	SRO	<p>Enter into ECP-0 and direct the following:</p> <ul style="list-style-type: none"> ▪ Check Rx tripped ▪ Check turbine tripped ▪ Verify RCS isolated - isolate letdown ▪ Verify AFW flow > 395 gpm ▪ Verify load shed <p><u>Start 1B DG or 2C DG and align as necessary.</u></p> <ul style="list-style-type: none"> ▪ <u>Check 1G 4160V bus energized</u> ▪ <u>Verify SW adequate to DG running.</u> <p>Return to procedure and step in effect.</p>
	RO	<ul style="list-style-type: none"> ▪ Check Reactor tripped ▪ Isolate Letdown
	BOP	<ul style="list-style-type: none"> ▪ Check turbine tripped ▪ Verify AFW flow > 395 gpm ▪ Verify load shed <p><u>Start 2C DG and align as necessary.</u></p> <ul style="list-style-type: none"> ▪ <u>Check 1G 4160V bus energized</u> ▪ <u>Verify SW adequate to DG running.</u>
	*	
	Critical	

Op-Test No.: HLT-29 NRC	Scenario No.: 2	Event No.: 7	Page 2 of 6
Event Description: <u>LOSP entry into ECP-0.0 (1B DG does not start)</u>			
Initiating event: NRC Direction OR If the TEAM decides to manually trip the reactor, initiate event 7 as soon as the reactor is tripped.			

Time	Position	Applicant's Actions or Behavior
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	SRO	Re-enter EEP-0 from ECP-0.0 Perform actions of EEP-0:
	RO	<ul style="list-style-type: none"> - Check Rx tripped <li style="padding-left: 20px;">RTBs & associated bypass bkrs open <li style="padding-left: 20px;">NI power falling <li style="padding-left: 20px;">Rod bottom lights lit- - Check for a SI signal
	BOP	Check turbine tripped TSLB 2 14-1 thru 14-4 <ul style="list-style-type: none"> - Check 4160V busses energized - Check for a SI signal
	RO	Verify SW pump -- 2 in each train <ul style="list-style-type: none"> - Verify CCW started <li style="padding-left: 20px;">CCW flow and SW flow - Verify Chg pump started - Verify RHR pump started - Verify SI flow FI-943

Op-Test No.: HLT-29 NRC

Scenario No.: 2

Event No.: 7

Page 3 of 6

Event Description: LOSP entry into ECP-0.0 (1B DG does not start)Initiating event: NRC Direction **OR** If the TEAM decides to manually trip the reactor, initiate event 7 as soon as the reactor is tripped.

Time	Position	Applicant's Actions or Behavior
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Booth operator: RESTORE OFF SITE POWER		
	RO	<ul style="list-style-type: none"> - Verify Ctmt Ventilation isolation - Verify CTMT fan cooler alignment - 1 CTMT fan in slow in one train with Emerg SW supplied
	BOP	<ul style="list-style-type: none"> - Verify AFW status - Verify Main FW status - Check NO MSL isolation signal present - Check Ctmt pressure <27 psig PR 950 - Verify Phase A ctmt iso <li style="padding-left: 20px;">Verify Ph A ctmt iso actuated <li style="padding-left: 20px;">Check all MLB-2 lights lit- No - one train power supply - Announce "Unit 1 reactor trip and Safety Injection"
	RO	<ul style="list-style-type: none"> - Verify all Rx trip and bypass bkrs open - Trip CRDM MG set supply breakers

Op-Test No.: HLT-29 NRC Scenario No.: 2 Event No.: 7 Page 4 of 6

Event Description: LOSP entry into ECP-0.0 (1B DG does not start)

Initiating event: NRC Direction **OR** If the TEAM decides to manually trip the reactor, initiate event 7 as soon as the reactor is tripped.

Time	Position	Applicant's Actions or Behavior
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	BOP	<ul style="list-style-type: none"> • Check AFW status Total AFW flow > 395 gpm or any NR level >30% Control MDAFWP and TDAFWP flow for 30% to 60% NR level When two SG NR levels >25% and TDAFWP not required, stop TDAFWP • Verify two trains of ECCS equipment aligned One train of SI actuated due to power loss Bkrs DF01, DF02, DG15, & DG02 closed Two trains of battery chargers energized - one Two trains of ESF equip aligned -- one All MLB-1 lights lit -- one train <ul style="list-style-type: none"> - Chg pump suction and discharge vlvs open - One train post accident ctmt air mixing fans started • Secure secondary components ALL secured due to loss of power
	RO	<ul style="list-style-type: none"> ▪ Check RCS avg temp stable at or approaching 547°F <ul style="list-style-type: none"> - If heatup is in progress attempt to dump steam to condenser - If heat up continues, dump steam to atmosphere ▪ Direct counting room to perform CCP-645, Main Steam Abnormal Environmental Release. ▪ Check Pzr pressure & PORVs PRT parameters ▪ Check RCP trip criteria; subcooling > 16 deg ▪ Monitor chg pump miniflow criteria

Op-Test No.: HLT-29 NRC Scenario No.: 2 Event No.: 7 Page 5 of 6

Event Description: LOSP entry into ECP-0.0 (1B DG does not start)

Initiating event: NRC Direction **OR** If the TEAM decides to manually trip the reactor, initiate event 7 as soon as the reactor is tripped.

Time	Position	Applicant's Actions or Behavior
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	SRO	<p><u>DIAGNOSTICS</u></p> <ul style="list-style-type: none"> ▪ Check SGs not faulted; no SG falling in uncontrolled manner or less than 50 psig ▪ Check SGs not ruptured ▪ Secondary rad indication normal – No SG level rising in uncontrolled manner ▪ Check RCS intact – <p>Continue on in EEP-0 to ESP-1.1 transition, SI Termination</p>
	RO	<p>Check SI termination criteria: Subcooling > 16 {45} deg in CETC mode - Secondary heat sink available -- RCS pressure stable or rising - Pzr level > 7% {50%} -</p>
	SRO	<p><u>Direct transition to ESP-1.1, SI Termination</u></p> <p>Direct actions in ESP-1.1</p>
	RO	<p>Check SI, Phase A and B reset</p>
	BOP	<p>If Instrument Air available, then restore IA to CTMT</p> <ul style="list-style-type: none"> • Start one Air comp. • Open IA to CTMT valves HV 3825, 3611 and 3885
	RO	<p>Stop all but 1 chg pump Verify RCS pressure stable or rising</p>

Op-Test No.: HLT-29 NRC Scenario No.: 2 Event No.: 7 Page 6 of 6

Event Description: LOSP entry into ECP-0.0 (1B DG does not start)

Initiating event: NRC Direction **OR** If the TEAM decides to manually trip the reactor, initiate event 7 as soon as the reactor is tripped.

Time	Position	Applicant's Actions or Behavior
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	BOP	Verify 4160V busses energized
	RO	Isolate HHSI flow <ul style="list-style-type: none"> • Verify Miniflows open • Close MOV 8803A/B • Close FCV 122 manually • Verify charging flow path aligned • Adjust FCV-122 to control Pzr level
<u>*</u> Critical	SRO	Failure to PREVENT lifting the code safeties with water. (i.e., PRZR is solid and code safeties lift to discharge water to PRT.
<u>Anytime in this area would be a good time to secure the scenario</u>		

Southern Nuclear J.M. Farley Nuclear Plant

Operations Training Simulator Exam Scenario

HLT-29 NRC EXAM SCENARIO #3

Technical Review: _____ *Date:* _____

*Training Department
Approval:* _____ *Date:* _____



Appendix D

Scenario Outline

Form ES-D-1

DRAFT COPY

Facility: Farley Scenario No.: 3 Op-Test No.: HLT-29 NRC

Examiners: _____ Operators: _____

Initial Conditions: 100% power EOL; rods in AUTO; A Train O/S; B Train protected

Turnover: 1C D/G T/O for piston replacement, 1A MDAFW PUMP T/O for bearing replacement, 8 gpd SG tube leak in 1A SG, AOP-21, Severe Weather, is in effect due to severe thunderstorms in the area.

Event No.	Malf . No.	Event Type*	Event Description
1		I (BOP) TS (SRO)	PT-447 impulse pressure channel fails low.
2		C (BOP)	1A HDT pump trips due to the HDT dump valve failing open.
3		N (BOP) R (RO) TS (SRO)	1C SG tube leak increases to 10 gpm over 5 min.
4		I (RO)	1A charging pump high lube oil temperature
5		I (RO)	PK444C demand fails high (in auto and manual) and 1A RCP spray valve sticks open mechanically.
6		M (ALL)	1C SGTR 500 gpm ramped in over 5 min. This is linked to FI414 <80% when RCS flow in A loop drops below 80%.
		C (ALL) C (BOP)	Phase A isolation will not occur on SI. Main Turbine has to be manually tripped.
			Terminate scenario when RCS pressure reduction complete and normal chg established
0	**	preset	Block auto trip of Main Turbine.
0		preset	Block auto start of 1C Cond Pump on low SGFP Suction Pressure (will still start manually).
0		preset	Block auto Phase A both trains (will actuate from handswitch).
0		preset	1A SG tube leak 20 gpd.
0		preset	Raise R-70A alarm setpoint to clear alarm per AOP-2
0		preset	1C DG DH07-1 and DH07-2 control power off
0		preset	1A MDAFW pump control power off
0		Preset	1B Chg pump does not auto start
0		Preset	Block auto reactor trip

Facility: Farley Scenario No.: 3 Op-Test No.: HLT-29 NRC

Examiners: _____ Operators: _____

Initial Conditions: 100% power EOL; rods in AUTO; A Train O/S; B Train protected

Turnover: 1C D/G T/O for piston replacement, 1A MDAFW PUMP T/O for bearing replacement, 8 gpd SG tube leak in 1A SG, AOP-21, Severe Weather, is in effect due to severe thunderstorms in the area.

Event No.	Malf . No.	Event Type*	Event Description
0		Preset	1A condensate pump has degraded head when 1A HDT pump trips

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

OPERATING TEST HLT-29 NRC
SCENARIO 3 Summary sheet

Initial Conditions: 100% power; EOL, rods in AUTO; A Train O/S, B Train protected; RCS boron concentration is 56 ppm.

- 1C D/G T/O for piston replacement. (OOS for 3 days, Expected RTS in 5 days)
- 1A MDAFW PUMP T/O for bearing replacement. (OOS 5 hrs) Expected RTS in 2 days.
- 1A S/G tube leak approximately 8 gpd. Steady for 3 weeks.
- AOP-21, Severe Weather, is in effect due to severe thunderstorms in the area.

Set in:

- Block auto trip of Main Turbine.
- Block auto start of 1C Cond Pump on low SGFP Suction Pressure but will start manually.
- 1A SG tube leak 20 gpd.
- Phase A will not occur but will actuate from handswitch.
- 1A MDAFW pump T/O.
- 1C DG T/O.
- 1B charging pump does not auto start

Event 1 – PT-447 impulse pressure channel fails low. The OATC should place rods in manual; BOP will select PT-446 as the controlling channel. Recover rods and power/Tavg to normal.

Event 2 – 1A HDT pump trips due to the HDT dump valve failing open. Stby Cond. Pump won't start in auto. Start the stby cond pump and find the problem with the HDT valve. TB SO reports.

Event 3 – 1C SG tube leak increases to 10 gpm over 5 min. AOP-2.0 entry and ramp due to increased leak.

Event 4 – 1A charging high lube oil temperature. If 1A pump trips, then 1B pump will not auto start.

Event 5 – PK444C demand fails high in auto and man. 1A Spray valve sticks open mechanically.

Event 6 – 1C SGTR 500 gpm SI ramped in over 5 min. Terminate scenario when RCS on normal chg. Linked to 1A RCS loop flow less than 80%.

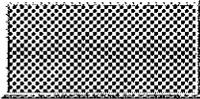
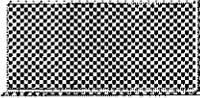
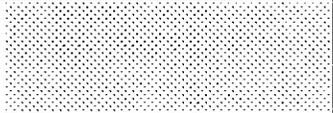
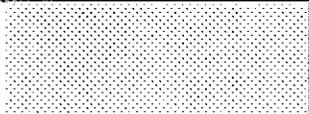
Phase A does not automatically occur. Main Turbine trip does not automatically occur.

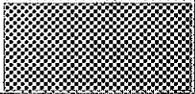
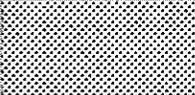
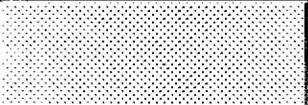
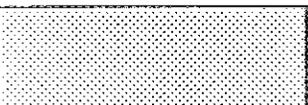
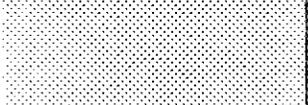
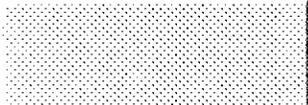
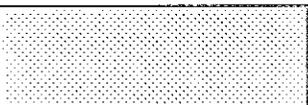
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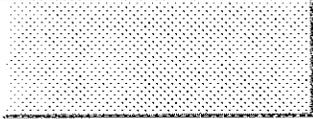
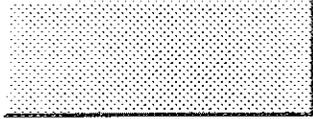
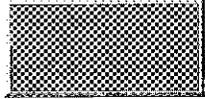
SETUP

EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
		Quick Setup IC (all items with # are included in IC)	NONE
0	0	Baseline IC: IC-075 100% RTP, EOL, 56 ppm	RESET IC-075
0	0	Quick setup (all items with * are included): bat exam_nrc03.txt	
0	0	Phase A will not occur but will actuate from handswitch Block Phase A train A isolation occurring on SI CMFmalf / cSFTYINJ_cc7 / open	*
		Phase A will not occur but will actuate from handswitch Block Phase A train B isolation occurring on SI CMFmalf / cSFTYINJ_cc17 / open	
0	0	Block auto trip of Main Turbine CMFmalf / MAL-TUR2	*
0	0	1A SGTJ of 20 gpd: REMOTE / B21 / LOA-RDS001 / 20	*
0	0	Tag out 1C DG output bkrs unit 1 CMFremote / cBK1DH07_d_cd1 / open	*
0	0	Tag out 1C DG output bkrs unit 2 CMFremote / cBK2DH07_d_cd1 / open	*
0	0	Rack out 1A MDAFW pmp: CMFremote / cAFP01A_d_cd1 / open	*
0	0	1C Cond pump will not auto start CMFmalf / cCFCN1C_cc8 / open CMFmalf / cCFCN1C_cc9 / open CMFmalf / cCFCN1C_cc10 / open	*
0	0	Prevent 1B charging pump from auto starting: CMFmalf / cCVP01BA_d_cc7 / open	*
0	0	Prevent Auto reactor trip: CMFmalf / cBKRXTRP_cc5 / open CMFmalf / cBKRXTRP_cc6 / open	*
0	0	300 gpm SGTR on 1C SG with 5 minute ramp when RCP flow FI414 < 80%: Event trigger 1: Event: FI414 < 80 Command: imf mal-rs4c 500 300	*
0	0	1A condensate pump has degraded head when 1A HDT pump trips with 2 minute ramp: Event trigger 2: Event: jmfw9 Command: imf nfcfn1a-d 10 120	*

SETUP

EVENT#	TIME	EVENT DESCRIPTION / ACTION LIST	ACTIONS
			 RUN simulator
		Place DANGER tags on DH07-1 and -2	2 DANGER tags
		Place 1C DG MSS in Mode 3	MSS in Mode 3
		Place DANGER tag on 1C DG MSS in Mode 3	DANGER tag
		Place DANGER tag on 1A MDAFW pump	DANGER tag
		Raise R-70A alarm setpoint to clear alarm per AOP-2.0 and SOP-69.0	Raise R70A setpoint to approx. 13
		Place Bypass & Inop status switches in up position	<ul style="list-style-type: none"> ▪ Emergency power both units A Trn ▪ A Train AFW
		Check Train On Service and protected signs	A TRN On Service B TRN Protected
0	0	Check DEH for limiter limiting	DEH set correctly
0	0	ARDA	RESET ARDA
0	0	PPC	Place Grp 1 on MCB CRT
0	0	PPC	Check for correct FLUX target
			 Acknowledge annunciators
			Verify HORNS ON
			 FREEZE simulator
		Open Simview file to be used for plant parameter data collection: Simview / 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
0	0	VERIFY MICROPHONES READY	Batteries installed
0	0	TURNOVER SHEET AVAILABLE	Paperwork provided

EXAM			
EVENT#	TIME	EVENT DESCRIPTION	COMMAND
		Start data collection for Simview file DataCollection.uvl	
	0	Begin Exam	 RUN simulator
		Verify Horns ON: hornflag 	 Verify Horns On
1		PT-447 impulse pressure channel fails low. XMT / PT447 / 0	
2		1A HDT pump trips due to the HDT dump valve failing open: MALF / MAL-FWM9 / 100	
3		1C SG tube leak increases to 10 gpm over 5 min. MALF / R / MAL-RCS4C / 10 / 300 sec ramp	
4		1A charging pump high L.O. temperature -- achieved by closing CCW supply valve V310A: REMOTE / P17 / LOA-CCW057 / 0 Monitor 1A charging pump L.O. temperature:  tchspoil(1) If 1A charging pump L.O. temperature exceeds 170°F, then trip the pump: CMFmalf / cCVP01A_d_co1	 
5		PK444C fails high and sticks open mechanically. 1A RCP spray valve full open. CNH / PK444C-B / 10	

EXAM			
EVENT#	TIME	EVENT DESCRIPTION	COMMAND
6		1C SGTR 500 gpm ramped in 5 min. MALF / MAL-RCS4C / 500 / 300 sec ramp Linked to RCS flow < 80% in BAT file	
		End scenario when RCS depressurized and on normal chg. End of Exam	 HORNS OFF
		End of Exam	 FREEZE simulator
		Stop data collection for Simview file DataCollection.uvl	
		Export data to file with the name of NRC exam03 grpX.txt <i>NOTE: Substitute grpX with grp1, grp2, or grp3 as appropriate.</i> <i>NOTE: File will be saved in the OPENSIM directory.</i>	Ensure data file created.
		AFTER LAST SCENARIO OF THE DAY RESET R70A SETPOINT BACK TO 5 GPD.	

Local Operator Actions:

Event 2 – 1A HDT dump valve failed open

Close 1A HDT dump valve V915A



MALF / MAL-FWM9 / 1

Communications sheet

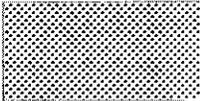
Event 1 – Dispatcher for CR, I & C for placing bistables in trip, & Shift manager informed and acknowledge.

Event 2 – 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.
TB SO reports: "The HDT dump valve is jacked closed."

Event 3 – None

Event 4 – Radside SO called to check 1A charging pump L.O. temperature.

Radside SO reports: "L.O. temperature is . Cannot find any obvious problem with the pump."

Dispatcher for CR, I & C for placing bistables in trip, & Shift manager informed and acknowledge.

Event 5 – None.

Event 6 – None.

Unit No. One

Offgoing Supv.	Oncoming Supv.	<input type="checkbox"/> N <input checked="" type="checkbox"/> D <input type="checkbox"/> E Date
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Part I - To be reviewed by the oncoming Supervisor prior to assuming the shift.

Keys turned over [X] Security Keys A, S, D, SW, X, on key ring SS

Unit Status 100% RTP, EOL, 56 ppm Cb, 19,450 MWD, Eq Xe

STPs/Evolution's (completed/in progress/planned)

Remain at 100% power

General Information and Equipment Status

AOP-21.0, Severe Weather, is in effect due to severe thunderstorms in the area.

8 gpd SG tube leak in 1A SG, steady for the past 3 weeks. All actions of AOP-2.0 completed.

1C DG tagged out for piston replacement (OOS for 3 days, RTS in 5 days)

1A MDAFW PUMP tagged out for bearing replacement (OOS for 5 hrs, RTS in 2 days)

Current Risk Assessment is **YELLOW**

B train is the Protected Train

A train is on service

Unit 2 is 100% power w/ no threats

Waste Management Status #3 RHT O/S

LCO Status 3.8.1 (1C DG) 3.7.5 (1A MDAFWP)

Night Orders - No New Night Orders

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

<input checked="" type="checkbox"/> Part III	STP-1.0 Reviewed/signed <input checked="" type="checkbox"/> Yes	Operator Logs Reviewed <input checked="" type="checkbox"/> Yes	Cond Rpt Queue Rev. <input checked="" type="checkbox"/> Yes	AutoLog Reviewed <input checked="" type="checkbox"/> Yes
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Op-Test No.: HLT-29 NRC Scenario No.: 3 Event No.: 1 Page 1 of 1

Event Description: PT-447, Selected Turbine 1st Stage Pressure Xmtr Fails LOW
 Initiating event: 2 minutes

Time	Position	Applicant's Actions or Behavior
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Annunciators:

- MS LINE HI STM FLOW ALERT (JB4)
- TAVG/TREF DEV (HF3)
-

Recognize indications of 1st Stage Press failure

- Rods stepping inward in Auto
- MW electrical stable
- Pressure indicator low

	RO	Determine 1 st stage pressure instrument failure Shift rod control to Manual
	SRO	Direct rods restored to normal rod height
	RO	Restore rods to normal
	BOP	Select other 1 st stage press channel for control
	SRO	Refer to ARP and direct supplementary actions: Steam dumps are armed -- Do not reset per SOP-18 Refer to: - T.S. 3.3.1 / 17 f condition T Verify the interlock is in the required state in 1 hour or be in M-2 in 7 hours - T.S. 3.3.2 / 4 e condition D Place the channel in trip in 6 hours and be in reduce power to < or equal to 75% in 12 hours or Place the channel in trip in 6 hours and do a QPTR in 12 hours or be in mode 3 in 12 hours

Op-Test No.: HLT-29 NRC

Scenario No.: 3

Event No.: 2

Page 1 of 1

Event Description: 1A HDT pump trips due to V915A failing open
 Initiating event: NRC signal

Time	Position	Applicant's Actions or Behavior
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Annunciators in alarm:

- 1A OR 1B HDT PUMP TRIPPED (LA1)
- SGFP SUCT PRESS LO (KB4) probable

Indications:

- SGFP suction pressure dropping
- 1A HDT level dropping or low
- 1A HDT pump amber light lit

	BOP	Determines HDT pump tripped Send TBSO to check out HDT level and pump and dump valve, V915A.
	SRO	Reference the ARPs and find the problem
	BOP	Observe SGFP suction pressure and prior to reaching 275 psig: - Start the 1C Cond pump Then: - Get level raised in the HDT - Restart the HDT pump - Secure the Cond pump when everything settles down
	RO	If Condensate pump is started, then: Monitor Reactor power SG water levels Tavg Due to colder FW temp

Op-Test No.: HLT-29 NRC

Scenario No.: 3

Event No.: 3

Page 1 of 2

Event Description: 1C SGT leak 10 gpm ramped in over 5 minutes
 Initiating event: NRC signal

Time	Position	Applicant's Actions or Behavior
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Annunciators:

- (FG1) SG TUBE LEAK ABOVE SETPOINT
- (FH1) RMS HI-RAD

Indications of Tube leak

- Radiation alarms

	SRO	Enter AOP-2.0, SG tube leak
	RO	<ul style="list-style-type: none"> ▪ Maintain Przr level on program by reducing letdown or control charging ▪ Maintain VCT level >20%
	RO	Determine RCS leak rate
	SRO	<ul style="list-style-type: none"> ▪ Inform SM for EIP entry ▪ Apply action level 3 Step 6 and commence Ramp to 50% in 1 hour and to mode 3 in 2 hours after that. Use AOP-17 to conduct ramp
	BOP	<ul style="list-style-type: none"> ▪ Monitor leak rate ▪ Insert ramp rate of 6 -7 MW/min to decrease load to 50% in 1 hour. ▪ Call ACC and PCC about ramp.
	RO	<ul style="list-style-type: none"> ▪ Control reactivity on the ramp IAW UOP-3.1 ▪ Use Rods or borate - If delta I is low the crew will probably borate to lower RCS temp - If delta I is high the crew will probably use rods to lower RCS temp
	BOP	<ul style="list-style-type: none"> ▪ Call TB SO to verify SJAE filtration on service ▪ Initiate ramp on Main turbine ▪ Call Chemistry and HP

Op-Test No.: HLT-29 NRC

Scenario No.: 3

Event No.: 3

Page 2 of 2

Event Description: 1C SGT leak 10 gpm ramped in over 5 minutes
 Initiating event: NRC signal

Time	Position	Applicant's Actions or Behavior
	BOP	Identify affected SG <ul style="list-style-type: none"> ▪ Align atmospherics for 1C SG to 8.25 and AUTO
	BOP	Call to have TDAFW pump isolated at HSD panel and close 3234B on BOP
	SRO	Ensure Tech Specs addressed 3.4.13 RCS operational leakage Condition A – Reduce leakage within limits in 4 hours or be in M-3 in 6 hours and M-5 in 36 hours.

Op-Test No.: HLT-29 NRC

Scenario No.: 3

Event No.: 4

Page 1 of 1

Event Description: 1A Charging Pump Hi Lube Oil Temperature
 Initiating event: NRC signal

Time	Position	Applicant's Actions or Behavior
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Annunciators:

- CHG PUMP LUBE OIL TEMP HI (EA3)

	BOP	Call Radside SO to check the 1A chg pump
	RO	When report received >160°F, evaluate Lube oil temp and: <ul style="list-style-type: none"> ▪ Secure the 1A charging pump ▪ Start the 1B chg pump ▪ Check FT-122 for proper flow
	SRO	Ensure ARP actions completed.
	SRO	<ul style="list-style-type: none"> ▪ Initiate investigation and repair. ▪ Discuss TS actions of 1A chg pump OOC and 1B chg pump did not auto start ▪ Call dispatcher and SM

Op-Test No.: HLT-29 NRC Scenario No.: 3 Event No.: 5 Page 1 of 2
 Event Description: Continue ramp off line until ramp requirements met then go to event 5 event 5 PK-444C fails high and sticks open mechanically
 Initiating event: NRC signal

Time	Position	Applicant's Actions or Behavior
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<u>Ramp down actions</u>		
	RO	Control Tavg/ Tref on program by <ul style="list-style-type: none"> ▪ Using rods ▪ Borating Depending delta I
	BOP	Depress DEH GO pushbutton
<u>Spray valve fails open</u>		
Annunciators		
<ul style="list-style-type: none"> - PRZR PRESS HI-LO (HC1) - PRZR PRESS REL VLV 445A OR B/U HTRS ON (HD1) 		
Recognize indications PK-444C		
<ul style="list-style-type: none"> - Green light off below PK444C - RCS pressure dropping - 1B spray full closed 		
	RO	Try to close the spray valve
	BOP	Stop the ramp
	RO	<ul style="list-style-type: none"> ▪ Trip the reactor prior to 2100 psig. ▪ Trip of Reactor – one handswitch ▪ When the reactor is tripped, secure 1A and 1B RCPs, then close the spray valves.
If the BOP does not trip the Main Turbine in a timely manner, an SI and MSIV closure will occur.		
	BOP	<ul style="list-style-type: none"> ▪ Recognize Main Turbine did not trip Trip Main Turbine <ul style="list-style-type: none"> - TSLB 14-1 thru 14-4 LIT

Op-Test No.: HLT-29 NRC Scenario No.: 3 Event No.: 5 Page 2 of 2
 Event Description: Continue ramp off line until ramp requirements met then go to event 5
event 5 PK-444C fails high and sticks open mechanically
 Initiating event: NRC signal

Time	Position	Applicant's Actions or Behavior
	ALL	Perform immediate actions of EEP-0 without reference
	RO	- Check Rx tripped RTB's & associated bypass bkrs open NI power falling Rod bottom lights lit
	BOP	- Check turbine tripped - Verify at least one train of 4160 V ESF busses energized - Check SI actuated - Cmt pressure less than 4 psig - SG pressure - SG D/P - Pzr pressure low
	BOP	- Control FW to 1A / 1B SGs to control SGWL
*	SRO	Ensure board operators take ARP actions. - Direct operators to trip the reactor and stop 1A and 1B RCPs. - Do IA of EEP-0 - Control AFW flow to SGs
Critical		

Op-Test No.: HLT-29 NRC Scenario No.: 3 Event No.: 6 Page 1 of 5
 Event Description: SGTR 500 gpm over 5 minutes
Initiating event: Linked to RCS flow in A loop < 80% or Immediately after RCPs are secured

Time	Position	Applicant's Actions or Behavior
	SRO	Exit EEP-0 enter ESP-0.1, Reactor trip response
	RO	ESP-0.1 actions (if needed, may continue in EEP-0) ⇒ Check RCS temperature stable at or approaching 547°F
	BOP	⇒ Verify Feedwater status ⇒ Check emergency boration not required ⇒ Check AFW status ⇒ Check 4160V busses
	SRO	<u>The team should recognize SGTR and take action to manually SI the plant- If not an AUTO SI will occur</u> If in ESP-0.1: Recognize entry back to EEP-0 IAW foldout page requirements ⇒ Monitor SI criteria Pzr level >7% and 16°F Subcooled in the CETC mode
	SRO	Re-enter EEP-0 or continue in EEP-0 if SI occurs
	RO	- Check Rx tripped RTB's & associated bypass bkrs open NI power falling Rod bottom lights lit
	BOP	- Check turbine tripped - Verify at least one train of 4160 V ESF busses energized - Check SI actuated - Ctmt pressure less than 4 psig - SG pressure - SG D/P - Pzr pressure low
	RO	Verify SW pumps -- 2 in each train

Op-Test No.: HLT-29 NRC Scenario No.: 3 Event No.: 6 Page 2 of 5
 Event Description: SGTR 500 gpm over 5 minutes
Initiating event: Linked to RCS flow in A loop < 80% or Immediately after RCPs are secured

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> - Verify CCW started CCW flow and SW flow - Verify Chg pumps started - Verify RHR pumps started - Verify SI flow FI-943 - Verify Ctmt Ventilation isolation - Verify CTMT fan cooler alignments 1 CTMT fan in slow in each train with Emerg SW supplied
	BOP	<ul style="list-style-type: none"> - Verify AFW status - Verify Main FW status - Check NO MSL isolation signal present
	RO	Check Ctmt pressure <27 psig PR 950
* Critical	BOP	Verify Phase A ctmt iso Verify Ph A ctmt iso actuated – use HS to actuate Phase A <u>Check all MLB-2 lights lit – NO AUTO actuation of Phase A</u> - Announce “Unit 1 reactor trip and Safety Injection”
	RO	Verify all Rx trip and bypass bkrs open Trip CRDM MG set supply breakers
	BOP	Check AFW status Total AFW flow > 395 gpm or any NR level >30% Control MDAFWP and TDAFWP flow for 30% to 60% NR level When two SG NR levels >25% and TDAFWP not required, stop TDAFWP
	BOP	Verify two trains of ECCS equipment aligned Both trains of SI actuated Bkrs DF01, DF02, DG15, & DG02 closed Two trains of battery chargers energized Two trains of ESF equip aligned All MLB-1 lights lit Chg pump suction and discharge vlvs open

Op-Test No.: HLT-29 NRC Scenario No.: 3 Event No.: 6 Page 3 of 5
 Event Description: SGTR 500 gpm over 5 minutes
Initiating event: Linked to RCS flow in A loop < 80% or Immediately after RCPs are secured

Time	Position	Applicant's Actions or Behavior
		All post accident ctmt air mixing fans started - Secure secondary components Both heater drain pumps All but one cond pump Align backup cooling to cond pumps
	RO	- Check RCS avg temp stable at or approaching 547°F - If heatup is in progress attempt to dump steam to condenser - If heat up continues, dump steam to atmosphere - Direct counting room to perform CCP-645, Main Steam Abnormal Environmental Release. - Check Pzr pressure & PORVs PRT parameters - Check RCP trip criteria; subcooling > 16 deg - Monitor chg pump miniflow criteria
	SRO	<u>DIAGNOSTICS</u> Check SGs not faulted; no SG falling in uncontrolled manner or less than 50 psig *- Check SGs not ruptured (Step 27) Secondary rad indication normal – No SG level rising in uncontrolled manner – YES
	SRO	Transition criteria to EEP-3.0 Inform SM of conditions and direct classifications
	RO	Check RCP criteria; subcooled margin monitor > 16 deg subcooled in CETC mode
	BOP	* Identify ruptured SG - C Isolate flow from ruptured SG

Op-Test No.: HLT-29 NRC Scenario No.: 3 Event No.: 6 Page 4 of 5
 Event Description: SGTR 500 gpm over 5 minutes
Initiating event: Linked to RCS flow in A loop < 80% or Immediately after RCPs are secured

Time	Position	Applicant's Actions or Behavior
* Critical		Align atmos rel vlv and verify closed Attempt to close Atmos Relief in Manual Iso TDAFWP steam supply from 1B SG at HSD pnl Verify blowdown isolated Verify MS iso and bypass vlvs closed When ruptured S/G > 31% Then isolate flow to ruptured S/G by isolating AFW Flow
	RO	Check PORV's closed
	BOP	Check S/G's not faulted Check intact S/G level > 31%
	RO	Reset SI Reset Phase A Reset Phase B
	BOP	Check IA to CONTAINMENT Verify 4160v Buses energized
	RO	Check if LHSI pumps should be stopped - Secure both pumps
	BOP	Check ruptured S/G > 410 psig Perform an RCS cooldown - Use steam dumps at Maximum attainable rate If available - May have to use Atmospherics if MSIVs are closed - 1A and 1B only - Stop cooldown

Op-Test No.: HLT-29 NRC Scenario No.: 3 Event No.: 6 Page 5 of 5
 Event Description: SGTR 500 gpm over 5 minutes
Initiating event: Linked to RCS flow in A loop < 80% or immediately after RCPs are secured

Time	Position	Applicant's Actions or Behavior
		Check Ruptured S/G pressure stable or rising
	RO	Check Subcooled Margin Monitor > 36 deg F Reduce RCS pressure to minimize break flow Use available PORV
	RO	Reduce RCS pressure until 1 of the following 3 conditions occur: - RCS pressure < ruptured S/G pressure and Pzr level > 7% OR - Pzr level > 73% OR - SMM < 16 deg F Close PORV's
	SRO	* SI TERMINATION - Check SMM > 16 deg F - Check Secondary heat sink available - Check RCS pressure stable or rising - Check Pzr level > 7%
	RO	Stop all but one Chg pump Continue with procedure until NRC recommends securing