

Final Submittal

(Blue Paper)

1. Scenario Outline (ES-D-1) and Simulator Scenario Operator Actions (ES-D-2)
2. Final Operating Test Simulator Scenarios
 - A. ES-D-1
 - B. ES-D-2

SURRY EXAM 2002-301

50-280, 281/2002-301

MARCH 18 - 28, 2002

Facility: <u>Surry</u> Scenario No.: <u>1</u> Op-Test No.: <u>1</u>			
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
<p>Initial Conditions:</p> <p>100% Rx Power</p> <p>Known Leakage in 1A S/G</p> <p>Very high grid demand</p> <p>(Note: FC 1113 can be input early)</p> <p>Turnover:</p> <p>Inservice surveillance 1-PT-18.6I on PORV Block valves</p> <p>1C Steam line rad monitor out of service for calibration</p>			
Event No.	Malf. No.	Event Type*	Event Description
1	TBD	N(BOP, SRO)	In-service valve stroke test surveillance (PORV Block valves strokes closed and will not reopen Tech Spec 3.1.6 (Block valve for PCV-1456)) Team will prebrief evolution prior to entering Simulator, but while sequestered.
2	MMS-08	C(BOP)	Steam Generator 1C (CH 4 selected to control) Steam flow transmitter fails low (ARP 1F-G6, 1F-D,) slowly enough for Operators to diagnose. Operator will take manual control of "C" MFRV and control "C" SG level. Time compression will take place to correct channel failure and allow "C" MFRV auto control
3	MTU-14	C(BOP)	Loop seal failure causing degrading condenser vacuum (ARP 1 (1F-B6). Crew performs AP-14 Loss of Condenser Vacuum). After 10% load reduction, vacuum loss cause can be found and corrected.
4		R(RO)	Power Reduction due to degrading vacuum. Slowly enough to let ramp stabilize vacuum after about 10% ramp.
5	MCH-26	C(RO)	FC 1113A fails high (ARP 1D-A5), requiring an alternate boration method. This failure takes place during the 10% ramp.
6	MRC-48	C(RO)	PZR Pressure Controller (PC-444A) fails high (ARP 1C-A8) slowly enough to take manual control without tripping.
7	MRM-02	I(BOP)	"C" Steam Generator Tube Leak increasing to setpoint of Condenser Air Ejector Rad Monitor w/ auto actions of Rad Monitor not occurring.
			Note: Malfunction may need tweaking to make rad monitor respond to Tube leak ramp in and fail to reposition TV-SV-102 and 103
8	MRC-24	M(All)	S/G Tube rupture
9	MEL-01	M(All)	LOSP (after cooldown completed and prior to pressure reduction)
10	??	M(All)	PORV 1455 fails to open when demanded

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

[illegible]

Event Description: Steam Generator 1C (CH 4 selected to control) Steam flow transmitter fails low (ARP 1F-G6, 1F-D,) slowly enough for Operators to diagnose. Operator will take manual control of "C" MFRV and control "C" SG level. Time compression will take place to correct channel failure and allow "C" MFRV auto control

[illegible]

[illegible]

Time	Position	Applicant's Actions or Behavior
	SRO	Coordinates RO and BOP actions
		Dispatch Personnel to check for air ejector ops and place Hoppers in service.
		Dispatch an operator to check High Level Status
		Direct actions of Attachment 2.
	BOP	Reduce power IAW Attachment 2, AP-14
		Check Turbine ramp rate greater than or equal to 1% / min required to maintain vacuum
		Initiate attachment 2
		Remove the turbine from limiter.
		Coordinate with RO turbine load reduction
	RO	Insert Control Rods in AUTO or Manual as necessary to maintain Tave and Tref matched.
		Coordinate with BOP a turbine load reduction.
		Perform an RCS boration:
		1. Place in service BATP in Fast
		2. Open 1-CH-MOV-1350 and verify that charging flow is greater than emergency boration flow.
		3. Close 1-CH-MOV-1350 after 30 to 60 seconds.
		4. Place the in-service BATP in AUTO.
		5. Initiate a continuous normal boration at 10 gpm.

[illegible]

Op-Test No.: <u>1</u> Scenario No.: <u>1</u> Event No.: <u>6</u>		Page 7 of 21
Event Description: Pressurizer Pressure Controller (PC-444A) (Channel 1) fails HIGH slowly enough for crew to take manual control prior to trip		
Time	Position	<div style="text-align: center;">Event 6</div> <div style="text-align: center;">Applicant's Actions or Behavior</div> <div style="text-align: right;">Page 7 of 21</div>
	RO	<p>Diagnoses high failure of either PZR Pressure Transmitter PT 444 or Master Controller</p> <p>Alarms:</p> <ul style="list-style-type: none"> PRZR PRESS CONTR HI (1C-A8) PRZR LO PRESS (1C-B8) PRZR SFTY VV PWR RELIEF VV OPEN (1D-H4) PRZR LO LVL PRZR PWR RELIEF LINE HI TEMP (1C-D7) PRZR RELIEF TK HI PRESS OVTEMP DELTA T TURB RNBK & ROD STOP (1G-F3,F4) <p>Indications:</p> <ul style="list-style-type: none"> MCB meter for PT 444 reads maximum pressure PRZR Master Controller goes to maximum output PRZR Spray valves go full open PORV 1455C opens Actual RCS pressure as indicated by MCB for PT 445 decreasing rapidly
		<p>Takes action IAW ARP 1C-A8 (Note: actions taken for any other ARP will delay actions necessary to avoid a Rx Trip or SI)</p> <p>Place Master Controller in MANUAL and decrease output.</p> <p>Verify closed or close 1-RC-PCV-1455C</p> <p>Verify closed or close PZR spray valves.</p>
	SRO	<p>Directs RO to control pressure IAW 1-AP-31.00. Should note that 1-RC-PCV-1455C is inoperable while control is in manual. This makes BOTH PORV's inoperable. SRO should re-review TS 3.1.6</p> <p>Directs closure of Block valve</p>

Time	Position	<div>Event 6</div> <div>Applicant's Actions or Behavior</div> <div>Page 8 of 21</div>
	RO	Maintains RCS pressure IAW 1-AP-31.00 Check RCS pressure decreasing Place 1-CH-PC-1444J in Manual Decrease demand on PRZR Press master control to raise RCS press. Close or verify close PRZR PORVs Close the Block Valve to isolate a PORV that wil not close. Turn on pressurizer heaters.
	BOP	1. Check Turbine load stable
	SRO	Provide notifications: OMO STA

Op-Test No.: <u>1</u> Scenario No.: <u>1</u> Event No.: <u>7</u>		Page 9 of 21
Event Description: Steam Generator Tube Leak increasing to setpoint of Condenser Air Ejector Rad Monitor w/ auto actions of Rad Monitor not occurring. Steam generator 1C rad monitor fails as is at this point (7 Gal/Min)		
Time	Position	Event 7 Applicant's Actions or Behavior
	BOP	Diagnose worsened Steam Generator Tube leak as evidenced by Condenser Air Ejector alarm. Alarms: 1. PRZR Lo Press (1-CB-8) 2. PRZR Lo Level () 3. CONDENSER AIR EJECTOR ALERT/FAILURE (1-RM-G8) Indications: Upscale on 1-SV-RI-111 Upscale on 1-RM-RR-150B Pen 4
		Verifies alarm reading greater than background or radiation level has trended up by reading 1-SV-RI-111 or 1-RM-RR-150B Pen 4
		Checks ERFCS points using Group 80 Review: R1RM204C, MS-RI-124 R1RM205C, MS-RI-125 R1RM206C, MS-RI-126
		Monitor SG Blowdown Monitors: 1-SS-RI-112 1-SS-RI-113
		SRO
		Directs compensatory actions or physical positioning of TV-SV-102 and TV-SV-103 per ARP 1-RM-G8 Attachment 1
	BOP/RO	Repositions TV-SV-102 and TV-SV-103 per ARP 1-RM-G8 Attachment 1

Time	Position	Event 7 Applicant's Actions or Behavior	Page 10 of 21
	RO	<p>Checks RCS leakrate</p> <p>PRZR level decreasing (slight) Ann 1D-E5 LIT (CHG PP TO REGEN HX HI-LO FLOW) A discernable negative change in VCT level trend has developed.</p> <p>Note: At this point, these indications will be inconclusive due to small magnitude of leak. Also if previous failure of controller 1113 overly complicates controlling primary inventory, we can let I&C repair it before this event.</p>	
	SRO	<p>Directs the following procedures:</p> <p>Initiates 0-OSP-RC-002, STEAM GENERATOR PRIMARY TO SECONDARY LEAKAGE MONITORING</p> <p>Directs Performance of RCS leak rate IAW 1-OPT-RC-10.0, REACTOR COOLANT LEAKAGE - COMPUTER CALCULATED</p> <p>AP-16, Excessive RCS leakage. Step 2 Isolates Letdown Step 3 Verifies CHG Pump Suction adequate VCT level Maintained by blender, this will not be the case.</p>	
		Directs Air Ejector flow rate measuring device to be verified OPERABLE.	
		Notifies OMOC and STA	
	RO	<p>Isolates Letdown at Step 2 of AP-16</p> <p>Closes Normal and excess letdown valves.</p> <p>1460 A, B HCV 1142 HCV 1557A, B, and C</p> <p>No blender operations may use emergency borate valve</p>	
	SRO	Directs the RO to emergency borate the plant using MOV 1350 or opening 1113A and 1113 B. This is not proceduralized.	

Op-Test No.: <u>1</u> Scenario No.: <u>1</u> Event No.: <u>8</u>		Page 11 of 21
Event Description: Significant ramp up of S/G leak leads to S/G Tube rupture in 1C SG		
Time	Position	<div style="text-align: right;">Event # 8</div> <div style="text-align: center;">Applicant's Actions or Behavior</div> <div style="text-align: right;">Page 11 of 21</div>
	All	<p>Diagnose requirement to trip Rx and SI</p> <p>Alarms:</p> <ul style="list-style-type: none"> PRZR Lo Press PRZR Lo Level STM GEN 1A LVL ERROR CHRG PP TO REGEN HX HI-LO FLOW <p>Indications: (pre trip)</p> <ul style="list-style-type: none"> PRZR pressure and level decreasing Tavg stable Charging line flow increasing Decreasing feed flow to 1A SG <p>Indications: (post trip)</p> <ul style="list-style-type: none"> Rx trips on OTDT or Low PRZR Pressure Turbine trip by Rx Trip Rx trip and bypass breakers open Rod bottom lights are lit Generator trip 30 seconds after Rx trip All AFW pumps start HP & LP Heater Drain pumps trip Safety Injection on Low PRZR pressure Phase 1 isolation
	SRO	<p>Directs Rx Trip and Safety Injection Initiates E-0</p> <p>Note manual Rx Trip and SI are functions of how rapidly plant conditions deteriorate and the crew reacts. Would like for transient to be slow enough for crew to manually trip, then manually SI upon evaluation of E-0, step 4</p>
	RO	Verifies Rx tripped
	BOP	Verifies Turbine tripped
		Verifies both AC emergency buses energized
	RO/BOP	Manually initiates SI then Verifies SI initiated
	SRO	<p>Directs manual initiation of SI after Rx Trip</p> <p>Expect an SRO brief after step 4 of E-0</p>
	BOP	<p>Verify feedwater isolation</p> <ul style="list-style-type: none"> MFP discharge valves closed MOV 150 A and B MFP tripped Feed Reg & bypass valves closed (demand at 0) SG Blowdown valves closed

Time	Position	Event # 8 Applicant's Actions or Behavior	Page 12 of 21
	RO	Verify CTMT isolation Phase I Phase I TV's closed 1-CH-MOV-1381 closed 1-SV-TV102A closed PAM Isolation valves closed 1-DA-TV-103A 1-DA-TV-103B	
	BOP	Verify AFW pumps running: MD AFW pumps (Time delayed) TDAFW pump (If necessary) May discuss with SRO at this time, or prior to isolate AFW flow to the 1C S/G.	
	RO	Verify SI Pumps running: CHG pumps LHSI pumps	
		Check CHG pump auxiliaries: CHG pump CC pump CHG pump SW pump	
	BOP	Step 10: Check intake canal level >24 ft and being maintained	
		Step 11: Check Main Steam Isolation required: 1E-F10 - Off 1B-C4 - Off 1B-C5 - Off 1E-H10 - Off	
	RO	Step 12: Check if CTMT Spray required: CTMT pressure should be near pre-event' Goes to the RNO of Step 12.	
		Step 13: Verify SI flow: 1-SI-FI-1961 1-SI-FI-1962 1-SI-FI-1963 1-SI-FI-1943 or 1943A Block HSF SI.	
		Check THREE charging pumps running	
		Reset SI	
		Stop one charging pump and place in AUTO	
		Check RCS pressure > 185	
		Note: RCS pressure should be greater than 185	
		Verify SI reset	
		Stop one LHSI pump and place in AUTO	
	BOP	Verify AFW flow > 350 GPM	
		Check AFW MOV's open, These will NOT be open will have to go to the RNO and will require manual alignment of the valves for the C S/G	

Time	Position	Event # 8 Applicant's Actions or Behavior	Page 13 of 21
	RO/ SRO	Step 17 Verify SI alignment Open: CH MOV 1115 B and D Closed: CH MOV 1115 C and E Closed: CH MOV 1289 A and B Closed: CH HCV 1200 A, B and C Open: SI MOV 1876 C and D Open: SI MOV 1862 A and B Open: SI-MOV 1864 A and B	
	Unit 2 Ops	Step 17 Verify ventilation alignment and AC power alignment IAW Attachment 2 Note: See attached E-0, attachment 2, Only one switch to be manipulated on the Ventilation panel.	
	RO/ SRO	Step 18 Check RCS Average Temperature stable at or trending toward 547 degrees F If greater than 547, then dump steam through Steam Dumps or Atmospherics. If less than 547, then secure dumping steam and reduce AFW if SG levels Permit. (SG levels >11% in at least one SG)	
		Step 19 Check PRZR PORV and Spray Valve status: PORV - closed Spray valves - closed At least one PORV block valve open	
		Step 20 Check RCP trip and miniflow recirc criteria HHSI flow > 0 RCS subcooling > 30 degrees F RCS pressure > 1275	
	BOP/ SRO	Step 21 Check SG's NOT faulted: Pressure in all SG's stable or increasing Pressures in all SG's > 100 psig	
		Step 22 Check SG tubes ruptured: Condenser air ejector radiation > normal SG radiation > normal SG MS radiation > normal TDAFW pump exhaust radiation > normal (if running) 1A SG level increasing in an uncontrolled manner	
	SRO	Directs transition to E-3	
	RO/ SRO	Step 1 E-3 Check RCP trip and miniflow recirc criteria HHSI flow > 0 RCS subcooling < 30 degrees F (NO) will go to RNO and directs to Step 2. RCS pressure > 1275 psig	

Time	Position	Event # 8 Applicant's Actions or Behavior	Page 14 of 21
	Crew	Identifies ruptured 1C SG Level rise SG MS line monitor high SG Blowdown monitor high	
	BOP/ SRO	Step 2 Isolates 1C SG Adjusts SG PORV controller to 1035 Verifies 1C SG PORV closed Verifies 1C SG blowdown TV's closed Directs closure of 1-MS-87 (1A supply to TDAFW)	
		Critical Task to isolate the 1C S/G prior to exiting E-3	
		Step 3: Isolates 1C SG MSTV	
		Step 4: Checks ruptured SG level > 11% Maintains AFW flow until 1C SG level > 11%	
	SRO/ RO	Step 5: Checks status of PRZR PORV's and block valves Power to block valves (Note power should NOT be available for Block valve for PCV-1456 PORV's closed At least ONE block valve open	
	SRO BOP	Step 6: Check if SGs are not faulted: Pressure stable or increasing in ALL SG's Pressure > 100 psig in ALL SG's	
		Step 7: Check intact SG level: Any narrow range level > 11% Check BOTH emergency busses energized Control feed flow to maintaining narrow range level between 17% and 50%.	
	RO	Step 8: Reset BOTH trains of SI	
	BOP	Step 10: Verify Instrument Air available Annunciator 1B-E6 not lit Check at least ONE CTMT Instrument Air compressor running Verify 1-IA-TV-100 - OPEN	
*		Align Condenser Air Ejector to CTMT: Verify 1-SV-TV-102 - OPEN 1-SV-TV-103 - CLOSED OPEN: 1-SV-TV-102A	
	BOP/RO	Step 12: Verify ALL AC busses - Energized by Offsite power	
	RO	Step 13: Check is LHSI pumps should be stopped: RCS pressure > 250 psig Stop LHSI pumps and put in AUTO	
	BOP	Step 14 : Check 1C SG isolated from 1B or 1A SG's 1C SG MSTV or NRV - CLOSED Check 1A SG pressure > 350 psig	
	RO	Stops an LHSI pump and places in automatic.	

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Op-Test No.: <u>1</u> Scenario No.: <u>1</u> Event No.: <u>9</u>		Page 16 of 21
Event Description: Loss of Offsite Power for both units, all EDG's start and load per design and all equipment starts and runs per design		
Time	Position	Event # 9 Applicant's Actions or Behavior
		Page 16 of 21
*	CREW	<p>Diagnose that an LOOP has occurred.</p> <p>Significant alarms:</p> <p>Steam Dump valves trip open (Do these valves really open?)</p> <p>Main transformer trouble</p> <p>4 KV EMERG BUS TIE STUB BUS BKER TRIP</p> <p>4 KV RES SUP BKR OPEN</p> <p>CC PPS DISCH HDR LO PRESS</p> <p>DIESEL FIRE PUMP AUTO START</p> <p>Significant indications:</p> <p>Breakers 15A1, 15B1, 15C1, 15D1, 15E1, 15F1, 15A2, 15B2 and</p> <p>15C2 - OPEN</p> <p>EDG's 1 & 3 auto start and energize the emergency busses.</p> <p>Emergency stub bus breakers open</p> <p>All station service loads are deenergized.</p> <p>RCP's trip</p> <p>CC pumps trip</p>
	SRO	Directs entry to 1-AP-10.07, Loss of Unit 1 Power, RO continues in E-3.
	BOP	Checks that Transfer buses D and F are DE-ENERGIZED
		AND
		All Station Service Buses are DE-ENERGIZED
		Verify 4160V Emergency buses are BOTH ENERGIZED
		Secure AAC DG unless required by Unit 2
		Check Emergence bus 1J voltage > 4280V
		Verify AFW pumps running
		MD AFW
		TD AFW, if necessary
*	RO	Check charging pumps running (??)
	BOP	Check Charging pump auxiliaries running
		CHG pump CC Pump
		Chg pump SW pump
	SRO	Initiate attachment 3
	BOP	Verify communications capability:
		Gaitronics OR Station Radios
	SRO	Restore Instrument Air
		CLOSE 1-SA-SOV-175
		Initiate Attachment 4

[illegible]

Op-Test No.: <u>1</u> Scenario No.: <u>1</u> Event No.: <u>10</u>		Page 18 of 21
Event Description: Only available PORV, 1-PCV-1455, <u>FAILS</u> to open, sending crew to 1-ECA-3.3		
Time	Position	Event # 10 Applicant's Actions or Behavior
		Page 18 of 21
*	All	Diagnose that all pressure control is lost, requiring entry to 1-ECA-3.3.
	SRO	<u>Directs ENTRY to 1-ECA-3.3</u>
	BOP	Step 1: Check 1C SG narrow range level < 75% Note: If 1C SG level > 75%, skip down to step that determines if SI can be terminated
*	SRO/ RO	Step 2: Try to establish Normal Spray Flow: This should be answered NO RCP are running go to the RNO then to Step 3. If crew attempts to open block valve for PCV 1456, delay restoring power to force continuation of ECA 3.3 Will require Crew to go to Step 4 (there is no way to depressurize)
	BOP	Step 4: Check 1A and 1B SG levels Either above 11% Check emergency busses energized Control feed flow to maintain narrow range level between 17% and 50%
	RO,	Check PRZR level > 22% NOTE: If condition not met, return to step that checks 1A SG level and cycle back through to this step.
	CREW, RO	Step 6: Check if SI can be terminated: Check RCS subcooling based on CETCs >30 degrees F Check secondary heat sink AFW>350 gpm OR either 1B or 1C SG > 11% Check RVLIS indication > 63% on Full Range detector Check 1A SG narrow range rising in an uncontrolled manner or off scale high NOTE: On LOSP the C TDAFW pump valves will open causing all S/Gs to fill
		Step 7: Stop all but one chg pump and put in auto

Time	Position	Event # 10 Applicant's Actions or Behavior	Page 19 of 21
	RO	<p>Step 8: Isolate HHSI to Cold Legs Verify: Charging pump suctions from the RWST- OPEN- 1-CH-MOV-1115B 1-CH-MOV-1115D Charging pump miniflow recirc valves OPEN 1-CH-MOV-1275A 1-CH-MOV-1275B 1-CH-MOV-1275C 1-CH-MOV-1373 Close HHSI to Cold Leg <u>NOTE: This action will remove SI FLOW</u> 1-SI-MOV-1867C 1-SI-MOV-1867D 1-SI-MOV-1842</p>	
		<p>Step 9: Establish Charging Flow Close CHG flow control: 1-CH-MOV-1122 Verify CHG line isolation - OPEN 1-CH-HCV-1310A Open CHG line isolation MOV's 1-CH-MOV-1289A 1-CH-MOV-1289B Establish at least 40 gpm charging flow using CHG flow control</p>	
	RO/ SRO	<p>Step 10: Verify SI flow not required: RCS subcooling based on CETC's > 30 degrees F Check RVLIS indication > 63% , full range channel</p>	
		<p>Step 11: Check CC system Status SW to RS HX's - ISOLATED SW to CC HX's - IN SERVICE CC pumps - AT LEAST ONE RUNNING</p>	
		<p>Step 12: Check RCP Cooling: NOTE: RCP's not running (Should adjust to approximately 8 GPM per pump.</p>	
		<p>Step 14: Check if Letdown can be established Put PRZR heaters in PTL</p>	
	SRO	<p>Direct OUTPUT fuses be removed: 1-RP-CAB-7, LC -1- 460C 1-RP-CAB-21, LC-1-459C</p>	

Time	Position	Event # 10 Applicant's Actions or Behavior	Page 20 of 21
	RO	Establish letdown Adjust charging line flow > 40 gpm Open letdown line pressure control valve 1-CH-PCV-1145 Close or verify closed letdown orifice isolation valves 1-CH-HCV-1200A 1-CH-HCV-1200B 1-CH-HCV-1200C Open letdown isolation valves 1-CH-TV-1204A 1-CH-TV-1204B 1-CH-LCV-1460A 1-CH-LCV-1460B Open letdown orifice isolation valve(s) Adjust 1-CH-PCV-1145 to maintain letdown pressure Adjust NRHX outlet temperature control valve to control letdown temperature, 1-CC-TCV-103 Check VCT Makeup controls: Verify on BATP operating and aligned to Unit 1 Verify at least on PG pump operating Verify Boric Acid and PG flow controls set for one of the following: >RCS boron concentration 2300 ppm Verify makeup set for AUTO control	
		Align CHG pump suction to VCT Verify VCT level > 27% Open CHG pump suction from VCT MOV's 1-CH-MOV-1115C 1-CH-MOV-1115E Close CHG pump suction from RWST MOV: 1-CH-MOV-1115B 1-CH-MOV-1115D Check RWST crosstie valves - CLOSED 1-SI-TV-102A 1-SI-TV-102B 2-SI-TV-202A 2-SI-TV-202A	
		Check if CS should be Stopped NOTE: CS not running	
*		Step 18: TRY (???) to establish auxiliary spray: Verify normal letdown - IN SERVICE Establish auxiliary spray flow: Close normal PRZR spray Open HCV-1311, CHG AUX Spray Valve Close 1-CH-HCV-1310A, CHG Line ISOL Valve	

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Conduct shift turnover:

Provide normal shift turnover materials reflecting the below initial conditions:

Initial conditions are as follows:

Unit 1 is at 100% power with the following off-normal conditions present:

- It is a normal day shift.
- The grid is experiencing high demand
- The "A" Steam Generator is experiencing .02 gallons per day primary to secondary leakage. Chemistry is periodically monitoring leak rate.
- You have been requested to perform Periodic Test 1-PT-18.6I, Pressurizer Block Valve Stroke Test. The normal control room timers qualify as an SQC calibrated stopwatch.
- The "C" Steam Generator NRC Rad Monitor is out of service.

Unit 2 is at 100% power with all systems available and operable.

When the team has accepted the shift, proceed to the Session Conduct Section.

Facility: Surry Scenario No.: 2 Op-test No.: _____

Examiners: _____ Operators: _____

Initial Conditions: Holding power at 50% just after placing second feed pump in service, due to Main Turbine vibration problem. PT-446 selected for control.

Turnover: Ramping to 100%, leak in 1A SG, high grid demand, increased vibration noted on Main Turbine during ramp up.

Event No.	Malf. No.	Event Type*	Event Description
1	MMS-14	RO(I)	PT-446 fails low (selected channel)
2	M1502	BOP(C)	B S/G PORV lifts in advertently
3	MMC-04	RO(C)	Loss of CC to NRHX requiring normal letdown to be secured.
4		BOP(N)	Place excess letdown in service
5		BOP (C)	Loss of C Condensate pump, A does not automatically restart.
6	MTU-09	BOP(C)	Main Turbine Governor valve goes shut (Max rate)
	MTU-02	RO&BOP(R)	Main Turbine vibration requiring ramp down per AP 23.
7	MMS-03	M(ALL)	Major SG fault on 1B SG (Max rate)
			Post major event failures
	MEL-11		1FW MOV-151 "C" will thermal out when the operator takes control of the valve to close.
			1-CSP-1A starts with low amps with no discharge pressure.
			1-CSP-1B Containment Spray pump fails to auto start, but can be manually started in the control room.
			1-SIFI963 fails low

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

Observation Aid:

Event: Loss of CC to the NRHX

Expected Responses, the team should:

- The RO acknowledges D-G-3, Demin Inlet Hi Temp.
- The BOP reviews annunciator D-G-3.
 - Verifies letdown diverted.
 - Identifies full demand on 1-CC-TCV-103.
 - Removes letdown from service.
 - o Closes 1-CH-LCV-1460A.
 - o Closes 1-CH-LCV-1460B.
- The RO minimizes charging flow using 1-CH-FCV-1122 in Manual.
- The team dispatches the Aux Building Operator to locally investigate 1-CC-TCV-103.
- The SRO notifies the Shift Supervisor.

Evaluator Notes:

Operation Aid:

Event: Place Excess Letdown In Service

Expected Responses, the team should:

- The BOP obtains a copy of OP-CH-006.
- Reviews Precautions and Limitations.
- Places 1-CH-HCV-1389 to the PDTT position.
- Opens 1-CH-HCV-1201 excess letdown HX isolation.
- Records charging flow.
- Opens 1 Loop drain isolation valve 1-RC-HCV-1557A, B, or C.
- Opens 1-CH-HCV-1137 to establish 15 gallons per minute flow.
- Places 1-CH-HCV-1389 to VCT position.
- Verifies or places 1-CH-PCV-1145 in MANUAL.
- Verifies or closes 1-CH-LCV-1460A and B.
- Verifies or closes 1-CH-PCV-1122.
- Verifies or closes 1-CH-HCV-1200A, B, and C.
- Fully opens 1-CH-PCV-1145.

Evaluator Notes:

Observation Aid:

Event: Loss of Running Condensate Pump

Expected Responses, the team should:

- The BOP acknowledges annunciator K-D-4, 4KV Breaker Auto-Trip.
- The RO reviews annunciator K-D-4.
- The team identifies "C" condensate pump tripped.
- The team identifies "A" condensate pump auto-start failure.
- The BOP starts "A" condensate pump.
- The team dispatches operators to the trip breaker and to the pumps.
- SRO notifies SS.

Evaluator Notes:[illegible]

Observation Aid:

Event: Excessive Turbine Vibrations requiring Unit Ramp

Expected Responses, the team should:

- The BOP acknowledges annunciator J-E-5, Rotor Eccentricity/Vibes.
- The RO looks at turbine supervisory vibration module.
- The RO displays P250 turbine vibration points and identifies increasing vibrations on bearing #1 and #2.
- The BOP implements the J-E-5.
 - Initiate a ramp in accordance with AP-23.00 in order to reduce vibrations.
 - Notifies STA, OMOC.

Evaluator Notes:

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Event: Excessive Turbine Vibrations requiring Unit Ramps (CONT)

- Team implements AP-23.00, Rapid Load Reduction.
 - Reviews precautions and notes.
 - Initiates load reduction at 1% per minute.
 - Performs emergency boration.
 - o Inservice boric acid transfer pump to fast.
 - o Opens 1-CH-MOV-1350.
 - o Monitors emergency borate flow on 1-CH-FI-1110.
 - o Increases charging flow by opening 1-CH-FCV-1122 in Manual.
 - o Stops emergency boration and return lineup to normal.
 - o Initiates 10-gallon continuous normal boration, as required to maintain Tave.
 - Notifies the following:
 - o System Operator
 - o Polishing Building
 - o Chemistry
 - o OMOC
 - The team monitors plant performing a load reduction.

Evaluator Notes:

Observation Aid:

Event: Faulted "B" Steam Generator/Reactor Trip/Safety Injection

Expected Responses, the team should:

- The RO acknowledges annunciators B-A-7 and B-B-7, Containment Partial Pressure positive alarms.
- The RO identifies increasing containment pressure.
- The BOP acknowledges annunciators H-G-6, "B" Steam Generator Level Error.
- The BOP identifies decreasing steam flow on "B" steam generator.
- The SRO directs a Manual trip and safety injection.
- The RO trips the reactor by pushing the reactor trip pushbuttons
- The RO trips the turbine by depressing both turbine trip buttons
- The RO verifies Emergency buses energized
- The RO initiates/verifies SI.
- The RO note 1-SIFI963 failed low

Evaluator Notes:

Event: Faulted "B" Steam Generator/Reactor Trip/Safety Injection

- The SRO/BOP checks if the SGs are faulted
- Team transitions to 1-E-2, Faulted Steam Generator Isolation
- BOP closes or verifies closed MSTV on "B" SG
- Team identifies "B" SG as faulted
- *Critical Step*, The BOP isolates the "B" Steam Generator
- *Aux Feedwater Isolation (1-FW-MOV-151C & D)*
Directs manual isolation of "J" AFW header.
- *Main Steam Trip Valve (1-MS-TV-101B)*
BOP directs closure of 1-MS-120, steam supply to TDAFWP
- BOP adjusts "B" SG PORV to limit RCS heatup after "B" SG is blown dry
- Team transitions to 1-E-1, Loss of Reactor or Secondary Coolant

Evaluator Notes:

Event: Faulted "B" Steam Generator/Reactor Trip/Safety Injection

- BOP controls AFW flow to maintain unaffected SG levels 22% to 50%
- Team verifies SI Termination criteria are met and transitions to 1-ES-1.1, SI Termination
- RO reacts or verifies reset SI
- RO opens IA-TV-100 to establish IA to containment
- RO stops all but one charging pump and places it in AUTO
- RO shuts SI-MOV-1367C & D to isolate HHSI flow
- RO opens CH-MOV-1239A & B and CH-FCV-1122 to establish normal charging flow
- RO stops LHSI pump
- RO stops OSRS, ISRS and CS pumps
- RO closes 1-CS-MOV-101A,B,C,D and 1-CS-MOV-102A,B
- RO stops 1-SW-P-5A,B,C,D and closes 1-SW-MOV-103A,B,C,D
- RO establishes letdown

Evaluator Notes:

Evaluator Notes:

[illegible]

Simulator Setup

Verify the following control room setup:

- ☐ Place the simulator in RUN and verify normal 50% power operation indications.
- ☐ Place RIRM206C out for maintenance.
- ☐ Verify ERPCS and PRODAC operating.
- ☐ Reset ICCMs
- ☐ Verify Component Switch Plugs
- ☐ Verify S/G PORVs set for 1035 psig
- ☐ Verify Turnover materials in place:
- ☐ Advance Charts
 - ☐ Main Control Board Master Advance
 - ☐ S/G Pressure Recorders
 - ☐ NR-45
 - ☐ Power Range Recorders
 - ☐ Radiation Monitors
- ☐ Verify clean copies of the following procedures are in place:
 - ☐ OP-CH-006
 - ☐ OP-RP-001
 - ☐ AP-23.00
 - ☐ E-0
 - ☐ E-2
 - ☐ E-1
 - ☐ ES-1.1

Conduct shift turnover:

Provide normal shift turnover materials reflecting the below initial conditions:

Initial conditions are as follows:

Unit 1 is at 50% power performing a normal startup following maintenance with the following off-normal conditions present:

- It is a normal day shift.
- The grid is experiencing high demand
- The "A" Steam Generator is experiencing .02 gallons per day primary to secondary leakage. Chemistry is periodically monitoring leak rate.
- The "C" Steam Generator NRC Rad Monitor is out of service.
- The ramp on Unit 1 is being held at 50 % power while the turbine group is evaluating increased local vibration readings on the main turbine.

Unit 2 is at 100% power with all systems available and operable.

When the team has accepted the shift, proceed to the Session Conduct Section.

Session Conduct

- Ensure conditions in Simulator Set-up are established.

Event: First Stage Impulse Pressure (Selected), PT446 Fails Low

- When the lead evaluator indicates ready, initiate Trigger 1.

ROLE-PLAYING INFORMATION

- If contacted as Instrument Techs, will gather procedures and come to the Control Room.
- If contacted as SS, acknowledge failure.

Event: "B" Steam Generator PORV Fails Open

- When the lead evaluator indicates ready, initiate Trigger 2.

ROLE-PLAYING INFORMATION

- After 2 minutes as Security, notify the Control Room steam coming out of the top of Unit 1 Safeguards.
- If contacted as the Instrument Techs, report that they will report shortly.
- As SS, acknowledge failure.

Event: Loss of CC to the NRHX

- When the lead evaluator indicates ready, initiate Trigger 3.

ROLE-PLAYING INFORMATION

- If dispatched as Aux Building Operator, report 1-CC-TCV-103 is full closed.
- As SS, acknowledge failure.
- After excess letdown is placed in service, report as the I&C Department the problem with the TCV has been found and corrected.

Event: Place Excess Letdown in Service

ROLE-PLAYING INFORMATION

- Respond as requested.

Event: Loss of Running Condensate Pump

- When the lead evaluator indicates ready, initiate Trigger 4.

ROLE-PLAYING INFORMATION

- As turbine building operator, report no abnormalities noted at the condensate pumps.
- As service building operator, report 15C4 has a "C" phase ground overcurrent.
- As SS, acknowledge failure.

Event: Excessive Turbine Vibrations requiring Unit Ramp

- When the lead evaluator indicates ready, initiate Trigger 5.

ROLE- PLAYING INFORMATION

- As SS, acknowledge ramp required. If needed, direct 1% ramp per AP-23.00.
- As turbine building operator, report no abnormalities of the turbine.

Event: Faulted "B" Steam Generator/Reactor Trip/Safety Injection

- When the lead evaluator indicates ready, initiate Trigger 6.

ROLE- PLAYING INFORMATION

- When directed to isolate the "J" header, use P&ID (AFW 1) to close 1-FW-141/156/171
- When directed to isolate the "B" FW bypass line used P&ID screen MFW2, to close 1-FW-57.
- When directed to isolate the Terry Turbine, use P&ID screen MS2, to close 1-MS-12()
- When directed to investigate "A" CS pump, report the motor to pump coupling is sheared.

Observation Aid:

Event: First Stage Impulse Pressure (Selected), PT446 Fail Low

Expected Responses, the team should:

- The BOP identifies Annunciators H-A-4, Tave Tref Deviation; H-G-5/6/7, Steam Generator level errors; and H-H-7 steam dump trip open.
- The team identifies failure of channel III Pimp.
- The RO places rod control in manual.
- BOP may place main feed reg valves in manual.
- Team identifies the following systems affected:
 - Main Feed Reg Valves will trend to 33% in Auto.
 - AMSAC will be defeated after 6 minutes.
 - Steam dumps have a trip open demand.
 - Rod control has demand to drive in at max rate.

Evaluator Notes:

Event: First Stage Impulse Pressure (Selected), PT446 Fall Low (CONT.)

- SRO reviews Tech Specs and identifies Table 3.7-1, Item 20.e, Operator Action 13 (verifies permissives), Table 3.7-2, Item 1.e, Operator Action 20, (place channel III high steam flow in trip.)
- BOP obtains copy of OP-RP-001. Shifts control channel to channel IV by doing the following:
 - Verifies rods in manual
 - Steam dumps to off
 - Polishing building to defeat
 - Feed reg valves to manual
 - Places A/B/C steam flow and feed flow to channel IV
 - Places first stage impulse pressure to channel IV
- SRO notifies Shift Supervisor.

Evaluator Notes:

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or printed text on the paper.

Observation AId:

Event: "B" Steam Generator PORV Full Open

- The BOP identifies PORV open based on PORV indicating light red; full demand on PORV controller, or security report.
- The BOP places "B" PORV controller in manual, decreases demand, identifies red light out, green light on.
- SRO contacts Shift Supervisor.

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