

Facility:	IP2	Scenario No.:	2	Op Test No.:	1
Examiners:	_____	Candidates:	_____	CRS	
	_____		_____	RO	
	_____		_____	PO	
<p><u>Initial Conditions:</u> 100% power MOL</p> <p>21 Charging Pump OOS</p> <p>21 CCW Pump OOS</p> <p>Small SG Tube Leak < 5 GPD</p> <p><u>Turnover:</u> Turbine 21 rupture disc is leaking. Reduce Power to 250 MWe at 200 MWe per hour and remove Main Turbine and Generator from service</p> <p><u>Critical Tasks:</u> Manual Turbine Trip prior to ECA-2.1 entry or an ORANGE condition on the Integrity CSF</p> <p>Initiate Emergency Boration prior to completion of Step 4 of FR-S.1</p>					
Event No.	Malfunction No.	Event Type*	Event Description		
1		R (OTC) N (BOP) N (CRS)	Reduce load		
2	XMT MSS054A	I (CRS)	First Stage Shell Pressure PT-412B fails low		
3	CCW1 CCW2 CCW3	C (BOP/CRS)	CCW Pump Trip. Standby does not automatically start		
4	CVC6 CCW8 RCP7A	C (ALL)	RCP TBHX leak. RCP vibration		
5	RCP21 PPL3-4	M (ALL)	RCP sheared shaft; ATWS		
6	TCA1-6 PPL43-48	C (OTC)	Turbine Trip failure		
7	CVC9	C (ALL)	Boration failure		

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

Scenario Event Description

IP2 Simulator Scenario 2

The team will assume the shift and initiate a load decrease in accordance with POP-3.1.

First Stage Shell Pressure transmitter PT-412B will fail low. The team will place steam dumps in Pressure Control Mode and trip SI steam flow bistables IAW AOI-28.0 and AOI-28.14. The CRS will refer to Technical Specifications.

A running CCW pump will trip. The standby pump will have to be manually started. The team will respond IAW AOI-4.1.1. Subsequently, a TBHX leak will develop, and action to isolate the TBHX leak will be taken IAW AOI-4.1.2.

During the TBHX tube leak, RCP vibration will rise, eventually resulting in failure of the RCP shaft. The team will respond using AOI-1.3. A reactor trip will be required, but will not automatically occur.

The OTC will attempt to manually trip the reactor, but the reactor will not trip. The turbine must be manually tripped, and emergency boration will fail, requiring an alternate method for emergency boration.

Safety Injection will actuate due to lowering RCS pressure. The team will perform the necessary actions for SI actuation along with FR-S.1 action.

EOP flow path: E-0 – FR-S.1 – E-0 – ES-1.1

Indian Point Unit 2
2003 NRC Initial License Examination
Simulator Scenario Setup
Scenario 2

21 Charging Pump OOS: LOA EPS10 RACKED OUT
Place pump control switch in TPO

21 CCW Pump OOS: LOA EPS13 RACKED OUT
Place pump control switch in TPO

23 CCW Pump auto start fail: MOC CCW3 Option 4

Fail Reactor trip breakers as is: BKR PPL003 Option 5
BKR PPL004 Option 5

Fail Rod Drive MG Set breaker as is: BKR CRF1 Option 5
BKR CRF2 Option 5
BKR EPS31 Option 5
BKR EPS32 Option 5

Fail MOV-333 Closed: MOV-CVC9 Option 5

Fail Auto turbine trip: Run Batch files

FAIL.AUTO.TURB.TRIPS.BAT
MAN.TURB.TRIP.ENABLE.BAT

Materials needed for scenario:

- POP-3.1
- Graph Book
- Tags for tagged equipment
- Reactivity Summary Sheet

Allow team to begin scenario brief approximately 30 minutes prior to entering simulator

Note: None

Scenario built from IC 2

Indian Point Unit 2
2003 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 2

- The plant is at 100% power, steady state conditions exist.
- Middle of Life, C_b is 862 ppm.
- EFPD = 340
- Control Bank D = 214 steps
- $T_{avg} = 559^{\circ}\text{F}$
- RCS Pressure = 2235 psig
- Pressurizer Level = 45%
- A small Steam Generator Tube Leak exists on 23 SG, less than 5 gallons per day.
- Risk Assessment = GREEN
- Daily Risk Factor = 0.94

The following equipment is out of service:

- 21 Charging Pump. Return expected in approximately 6 hours.
- 21 Component Cooling Water Pump. Return to service in approximately 8 hours.

Team instructions:

- The Main Turbine 21 Rupture Disc is leaking approximately 12 SCFM.
- In accordance with POP-3.1, shut down at a rate of 200 MWe per hour and remove the Main Turbine and Generator from service.

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Event Description:		Reduce Load							
Time	Position	Applicant's Actions or Behavior							

	CRS	Refers to POP 3.1
		Note: CRS may call System Operator and also may direct OTC to develop a reactivity plan if not done prior to entering the simulator
	CRS	IF reducing Reactor Power for a maintenance support function, the SM SHALL DETERMINE the desired Reactor Power level <u>OR</u> Turbine load (MWe) to maintain while repairs are made/troubleshooting is performed
	CRS	REQUEST Test Group to determine if Pressurizer Level instrumentation must be re-calibrated.
		Note: Calibration not required
	CRS	VERIFY LCV-1129, Excess Condensate Return to CST, is closed, <u>AND</u> isolated locally per SOP 20.2, Condensate System Operation.
	OTC	BORATE per SOP 3.2, Reactor Coolant System Boron Concentration Control, as necessary to maintain control banks above insertion limits required by GRAPH RPC-6, Cycle 14 Core Operating Limits Report. Note: Actions for boration are on pages 8 and 9 of this scenario guide
	OTC	IF necessary, PLACE rod control in MANUAL to maintain rods above the Insertion Limit.
	OTC	MAINTAIN delta flux within the target band.

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Event Description:		Reduce Load							
Time	Position	Applicant's Actions or Behavior							

	TEAM	<p>IF PICS is <u>NOT</u> operable, PERFORM the following after load changes greater than 10% per AOI 29.12, Loss of PICS Computer:</p> <ul style="list-style-type: none"> ○ Quadrant Power Tilt Calculation using DSR-4B, Quadrant Power Tilt Calculation Sheet (Technical Specification 3.10.10). ○ Log individual rod position indications using DSR-3, Rod Position Verification Log Sheet (Technical Specification 3.10.9).
	BOP	MONITOR condenser sextants for sodium increase.
	OTC	VERIFY T_{AVE} <u>AND</u> Pressurizer Level are maintained on program per Graph RCS-2, Pressurizer Level V.S. T_{AVE} .
	OTC	MAINTAIN steam generator levels between 40 and 50 percent Narrow Range.
	OTC	NULL manual setpoint on feedwater regulating valve control to facilitate rapid transfer from AUTOMATIC to MANUAL control.
	CRS	<p>NOTIFY nuclear and conventional NPOs that load reduction is in progress.</p> <p>Note: Will call NPOs</p>

Op Test No.:	<u>1</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>7</u>	of	<u>33</u>
Event Description:		Reduce Load							
Time	Position	Applicant's Actions or Behavior							

	CRS	<p>DIRECT NPOs to perform the following during load reduction:</p> <ul style="list-style-type: none"> ○ MONITOR Main Turbine Oil Temperatures ○ MONITOR Hydrogen Seal Oil Temperatures ○ MONITOR MBFP Oil Temperatures ○ BALANCE Heater Drain Tank Pump flows between the pump in Auto and Manual per SOP 19.1, Extraction Steam And Heater Drain Systems Operation. ○ IF SJAEs are in service, MAINTAIN Steam pressure per SOP 20.1, Condenser Air Removal System Operation, AND periodically CHECK SJAEs for backfiring. ○ IF FCV-1120, Flowpath A Controller Stop, is in MANUAL, ADJUST to maintain FCV-1113, Gland Steam Condenser Minimum Flow Control Valve, closed. <p>Note: Will call NPOs</p>
<p style="text-align: center;"><u>NOTE</u></p> <p><u>WHEN</u> erratic governor operation is observed, governor oil pressure may be raised above the controlling load limit to avoid adverse Main Turbine operation.</p>		
	OTC	<p>INITIATE load decrease using either of the following as directed by CRS:</p> <ul style="list-style-type: none"> ○ Governor control ○ Load Limit control
	OTC	Refers to SOP-3.2 for boration
	OTC	<p>DETERMINE RCS Boron concentration from reactor coolant sample analysis.</p> <ul style="list-style-type: none"> ○ IF analysis following concentration adjustment is <u>NOT</u> yet available, ESTIMATE Boron concentration based on latest readings.

Op Test No.:	<u>1</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>8</u>	of	<u>33</u>
Event Description:		Reduce Load							
Time	Position	Applicant's Actions or Behavior							

NOTE

Determinations should be based upon rod position, RCS Boron concentration, Xenon level variations, incremental Boron and rod worth, and operating experience.

		DETERMINE magnitude of increase in Boron concentration necessary to accomplish desired reactivity change using one or more of the following references:
	OTC	<ul style="list-style-type: none"> ○ GRAPH CVCS-3A, Boration Nomograph for Hot RCS ○ GRAPH CVCS-3B, Boration Nomograph for Cold RCS ○ GRAPH CVCS-6, Boration - Dilution Tables ○ GRAPH RV-2, Total Power Defect (PCM) as a Function of Power and Boron Concentration at MOL ○ GRAPH RV-3, Differential Boron Worth (Hot Zero Power) at MOL ○ GRAPH RV-4, Total Temperature Defect (PCM) as a Function of Temperature and Boron Concentration at MOL ○ GRAPH RV-9, IP2 Cycle 15 Reactivity Equivalents ○ POP 1.2, Reactor Startup ○ WCR 1, Reactivity Summary
	OTC	IF the change in RCS Boron concentration is anticipated to be greater than or equal to 25 ppm, OPERATE Pressurizer heaters to open spray valve.
	OTC	ESTIMATE total volume of boron required for boration from boration graphs or references listed in step 4.5.2.
	OTC	PLACE the RCS Makeup Control switch to STOP.
	OTC	SET Boric Acid Integrator to amount determined in step 4.5.3.

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Event Description: Reduce Load

Time	Position	Applicant's Actions or Behavior
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	OTC	PLACE the RCS Makeup Mode Selector switch to BORATE.
	OTC	FCV-110A, Boric Acid Flow Control, may be left in AUTO or placed in MANUAL as directed by CRS.
	OTC	VERIFY boric acid transfer pumps are in AUTO.
	OTC	PLACE the RCS Makeup Control switch to START.
<p style="text-align: center;"><u>NOTE</u></p> <p>BATPs shifting to fast speed is verified by both counter operation and by the respective fast speed lights illuminating.</p>		
	OTC	VERIFY BATPs shift to fast speed.
	OTC	<u>IF</u> in manual, ADJUST FCV-110A, Boric Acid Flow Control, to obtain desired boric acid flow rate (may be greater than meter range).
	OTC	<p><u>IF</u> desired to maximize Boron flow, CLOSE the appropriate BATP recirculation valve.</p> <ul style="list-style-type: none"> ○ HCV-104 CVCS/Boric Acid Tank 22 BA Inlet ○ HCV-105 CVCS/Boric Acid Tank 21 BA Inlet

Op Test No.:	<u>1</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>10</u>	of	<u>33</u>
Event Description:		Reduce Load							
Time	Position	Applicant's Actions or Behavior							

	OTC	MONITOR Nuclear Instrumentation, Rod position, and RCS temperature closely during any reactivity changes.
	OTC	<p><u>WHEN</u> boration operation has been completed, PERFORM the following:</p> <ul style="list-style-type: none"> ○ PLACE the RCS Makeup Control switch to STOP. ○ PLACE the Makeup Mode Selector switch to MANUAL. ○ ADJUST FCV-110A, Boric Acid Flow Control, dial setting to the new RCS Boron concentration per applicable CVCS Graph: ○ GRAPH CVCS-1A, Blended Makeup - (0-500) with 120 Gpm PW ○ GRAPH CVCS-1B, Blended Makeup - (0-2000) with 120 Gpm PW ○ GRAPH CVCS-1C, Blended Makeup with Various PW Flows
	OTC	VERIFY FCV-110A control switch in AUTO.
	OTC	PLACE the RCS Makeup Control switch to START.
	OTC	VERIFY approximately 30 gallons of blended makeup flows through blender.
	OTC	PLACE RCS Makeup Control switch to STOP.
	OTC	SELECT AUTO on RCS Makeup Mode Selector switch.

Op Test No.:	<u>1</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>11</u>	of	<u>33</u>
Event Description:		Reduce Load							
Time	Position	Applicant's Actions or Behavior							

	OTC	PLACE the RCS Makeup Control switch to START.
	CRS	<u>IF</u> Reactor is shutdown, REQUEST a sample for RCS Boron concentration within 30 minutes of completing the boration.
	OTC	LOG amount of boric acid added to system for boration in CCR Log Book.
<i>At Lead Evaluator's discretion, proceed to Event 2</i>		

Op Test No.:	<u>1</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>12</u>	of	<u>33</u>
Event Description:		First Stage Shell Pressure PT-412B Fails Low							
Time	Position	Applicant's Actions or Behavior							

Booth Instructor: When directed, insert the following command:
XMT MSS054A SEVERITY 0 RAMP TIME 120 PT-412B Fails low

Indications received:
 SBF-2, 2-6, HIGH STEAM FLOW SI CHANNEL TRIP ALARM
 Loss of Load Interlock Reset lamp extinguished on panel FBF

	CRS	Refers to AOI-28.0, Instrument Failures
	OTC	VERIFY The Following Controls: <ul style="list-style-type: none"> ○ Turbine load - STABLE ○ Rod Control - STABLE ○ PRZR pressure control - NORMAL ○ PRZR level control - NORMAL ○ MBFP Speed - NORMAL ○ S/G levels – NORMAL ○ S/G pressure control - NORMAL
		Note: The instrumentation steps can be performed in any order
	OTC	CHECK PRZR instrumentation - NORMAL: <ul style="list-style-type: none"> ○ PRZR pressures ○ PRZR levels
	OTC	CHECK S/G instrumentation – NORMAL <ul style="list-style-type: none"> ○ S/G levels ○ S/G pressures ○ S/G feedwater flow ○ S/G steam flows

Op Test No.:	<u>1</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>13</u> of <u>33</u>
Event Description:		First Stage Shell Pressure PT-412B Fails Low					
Time	Position	Applicant's Actions or Behavior					

	OTC	CHECK RCS instrumentation: <ul style="list-style-type: none"> CHECK RCS loop temperatures: <ul style="list-style-type: none"> Loop Tavg – NORMAL Actual loop ΔT – NORMAL CHECK Power Range Channels – NORMAL CHECK RCS coolant loop flow channels – NORMAL
	CRS	CHECK Turbine first stage pressure – NORMAL (NO) <ul style="list-style-type: none"> Go to AOI 28.14, 1ST STAGE PRESSURE CHANNEL FAILURE
	OTC	SET steam dump pressure controller for 1005 psig (83%) steam pressure
	OTC	MOVE steam dump control selector switch to Pressure Mode
	TEAM	MINIMIZE transients which will cause Tavg to increase above 559°F
	CRS/BOP	DETERMINE IF tripping Steam Flow SI bistable trip switches will cause an SI

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Event Description: First Stage Shell Pressure PT-412B Fails Low

Time	Position	Applicant's Actions or Behavior
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	BOP	<p><u>IF</u> tripping Steam Flow SI bistables will <u>NOT</u> cause an SI, <u>THEN</u> TRIP bistable for the failed channel</p> <ul style="list-style-type: none">○ Loop 1B High SF SI (White A-11)○ Loop 2B High SF SI (White A-10)○ Loop 3B High SF SI (White A-11)○ Loop 4B High SF SI (White A-10)
		Note: CRS MAY call I&C to determine cause
<i>When Hi Steam Flow bistables have been tripped or at Lead Evaluator's discretion, proceed to Event 3</i>		

Op Test No.: 1 Scenario # 2 Event # 3 Page 15 of 33

Event Description: CCW Pump Trip. Standby pump does not automatically start

Time	Position	Applicant's Actions or Behavior
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*Booth Instructor: When directed, insert the following commands:***MOT CCW2A Option 2** CCW pump 22 shaft seizure**HTX CVC6L VALUE 15 RAMP 15:00** TBHX LEAK

Indications received:

Multiple alarms on Panel SG due to loss of CCW

22 CCW pump Amber and Green indicating lights are lit

SA-1, 3-8, R-47 COMPONENT COOLING WATER HI RAD/TROUBLE (Time delayed)

	CRS	Refers to AOI-4.1.1, Loss of Component Cooling
		Note: The following step is continuously applicable
	Team	<p>If at any time, either of the following conditions are met:</p> <ul style="list-style-type: none"> ○ CCW flow is interrupted and CANNOT be restored within 2 minutes ○ RCP Motor Bearing temperature exceeds 200°F <p>Perform the following:</p> <ul style="list-style-type: none"> ○ Trip reactor ○ Trip all affected RCPs ○ Go to E-0, Reactor Trip or Safety Injection
	BOP	<p>VERIFY CCW Pump discharge pressure is greater than 80 psig with one pump in service or greater than 107 psig with two pumps in service</p> <ul style="list-style-type: none"> ○ <u>IF NOT</u>, START additional CCW Pumps as necessary to provide the required CCW flow (Note: Standby Pump should have started automatically, but did NOT. Manual action required to start) ○ <u>IF</u> CCW Pump discharge pressure can <u>NOT</u> be maintained greater than 107 psig with two pumps in service, INITIATE a plant shutdown in accordance with Technical Specification 3.3.E.2

Op Test No.: 1 Scenario # 2 Event # 3 Page 16 of 33

Event Description: CCW Pump Trip. Standby pump does not automatically start

Time	Position	Applicant's Actions or Behavior
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	CRS	VERIFY the requirements of Technical Specification 3.3.E.1 or 3.3.E.2 are met.

Event 4 is initiated on timer from this event. Proceed to Event 4 when alarms are received for TBHX leakage.

Op Test No.: 1 Scenario # 2 Event # 4 Page 17 of 33

Event Description: RCP TBHX Leak. RCP Vibration

Time	Position	Applicant's Actions or Behavior
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Note: Allow entry to AOI-4.1.2, Leakage into CCW system, prior to initiating the vibration alarm.

SLF RCP7A VALUE 10 RAMP 5:00 21 RCP HIGH VIBRATION WITH 5 MINUTE DELAY

Indications available:

SA-1, 3-8, R-47 COMPONENT COOLING WATER HI RAD/TROUBLE

Rising level in CCW Surge Tank

	CRS	Refer to AOI-4.1.2, Leakage into Component Cooling System
	BOP	VERIFY automatic actions in Section 3 have occurred <ul style="list-style-type: none"> ○ If CC Surge tank level is increasing, close RCV-017
	CRS	DIRECT NPO to CLOSE 831, Surge Tank Makeup Valve Note: Calls NPO. Also may dispatch an NPO to check 22 CCW pump breaker

NOTE

835 Surge Tank Relief Valve is set at 52 psig

	BOP	MONITOR CCW Surge Tank Pressure / Level <u>AND</u> WHUT Level to detect lifting of 835, Surge Tank Relief Valve

Op Test No.: 1 Scenario # 2 Event # 4 Page 18 of 33

Event Description: RCP TBHX Leak. RCP Vibration

Time	Position	Applicant's Actions or Behavior
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NOTE

IF the leaking component is known, Operator may go directly to appropriate Attachment with approval of the SM, to isolate the in-leakage

	TEAM	<p>If surge tank level is increasing, isolate sources of leakage one at a time using the following attachments:</p> <ul style="list-style-type: none"> ○ Attachment 1, RCP Thermal Barrier
		<p>Note: The following actions are from AOI-4.1.2, Attachment 1</p>

NOTE

- IF seal injection is maintained, RCP operation without thermal barrier cooling MAY continue for 24 hours.
- For operation beyond 24 hours, OBTAIN Operations Manager's approval.
- WHEN a component is isolated, MONITOR for possible pressure buildup on available indication.

	BOP	<p><u>IF</u> FCV-625 <u>AND</u> 789 (Reactor Coolant Pump Thermal Barrier Discharge Isolations) are open, OBSERVE RCP Thermal Barrier ΔP on Panel SAF. (NO)</p>

Op Test No.:	<u>1</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>19</u>	of	<u>33</u>
Event Description: RCP TBHX Leak. RCP Vibration									
Time	Position	Applicant's Actions or Behavior							

	TEAM	<p><u>IF</u> FCV-625 is closed PERFORM the following:</p> <ul style="list-style-type: none"> ○ OBSERVE RCP Thermal Barrier ΔP's while momentarily selecting OPEN on FCV-625. ○ ALLOW FCV-625 to stroke open <u>AND</u> re-close automatically. ○ IDENTIFY Reactor Coolant Pump Thermal Barrier with zero ΔP. ○ MAKE a Containment entry per SAO-219 to ISOLATE RCP Thermal Barrier Return Stop on RCP identified
		<p>Note:</p> <p>CRS may also dispatch NPOs to locally check Thermal Barrier Heat Exchanger temperature and CCW heat exchanger temperatures, and adjust Service Water flow if necessary.</p>
<p>Note: When the RCP High Vibration is apparent, the following indications will be available:</p> <p>SFF 3-6, 21 RCP HI VIBRATION</p> <p>21 RCP Vibration will rise to 18.5 mils and stabilize</p>		
	OTC/BOP	Refer to Alarm Response for 21 RCP High Vibration
	OTC/BOP	OBSERVE the Bently Nevada RCP Monitors <u>AND</u> Recorder (YR-498A) on Rack C-9 to determine the vibration amplitude and trend for the affected RCP.

Op Test No.: 1 Scenario # 2 Event # 4 Page 20 of 33

Event Description: RCP TBHX Leak. RCP Vibration

Time	Position	Applicant's Actions or Behavior
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	TEAM	<p>IF the vibrations reach a sustained value of 20 mils, PERFORM the following:</p> <ul style="list-style-type: none"> ○ IF the Reactor is critical, TRIP the Reactor. ○ TRIP the affected RCP. ○ GO TO E-0, Reactor Trip or Safety Injection. <p>Note: Maximum vibration reading should be 18.5 mils</p>
	CRS	Refer to AOI 1.3, Reactor Coolant Pump Malfunction
	CRS	Verify Reactor Trip NOT required (Vibration is below reactor trip limit)
<p><i>Proceed to Event 5 when the CRS determines that RCP vibration is below the limit for reactor trip requirement, or at Lead Evaluator's discretion</i></p>		

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7 Page 21 of 33

Event Description: RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure

Time	Position	Applicant's Actions or Behavior
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*Booth Instructor: When directed, insert the following command:***MOT RCP5 OPTION 1 21 RCP Shaft break****REMOVE CCW Pump 23 AUTO START FAILURE (MOC CCW3)**

Indications available:

Reactor Trip First Out Annunciator with NO automatic reactor trip

Loop 21 RCP flow indication dropping and alarm

	TEAM	Determine reactor trip required. Reactor did not trip.
	CRS	Direct reactor trip and entry to E-0, Reactor Trip or Safety Injection
	OTC	Verify reactor trip <ul style="list-style-type: none"> ○ Attempt to manually trip reactor
	CRS	Direct entry to FR-S.1, Response to Nuclear Power Generation/ATWS
	TEAM	Verify reactor trip <ul style="list-style-type: none"> ○ Attempt to manually trip the reactor ○ Manually insert control rods ○ Dispatch NPO to locally trip reactor trip breakers or MG set breakers Will call NPO

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7 Page 22 of 33

Event Description: RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure

Time	Position	Applicant's Actions or Behavior
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Critical Task:

Manually initiate Turbine Trip prior to transition to ECA-2.1 or an Orange path on the Integrity CSF Status Tree, whichever comes first

Critical Task	OTC	Verify Turbine trip <ul style="list-style-type: none"> ○ Manually trip the turbine
	BOP	Check AFW pumps running
	BOP	Initiate emergency boration <ul style="list-style-type: none"> ○ Start Charging pumps ○ Open MOV-333 (Will not Open)

Critical Task:

Establish Emergency Boration flow path prior to completion of FR-S.1, Step 4

Critical Task	BOP	Align one of the following flowpaths <ul style="list-style-type: none"> ○ RWST flow path <ul style="list-style-type: none"> ○ Open LCV-112B ○ Close LCV-112C ○ Place Makeup control switch to STOP ○ Establish maximum charging flow OR ○ Normal boration flow path <ul style="list-style-type: none"> ○ FCV-110 in MANUAL ○ Both boric acid pumps in high speed ○ Adjust FCV-110 for maximum flow
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Booth Instructor: When boration is initiated, remove Reactor trip malfunctions to allow rods to drop

	OTC	Check PRZR pressure less than 2335 psig
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Op Test No.:	<u>1</u>	Scenario #	<u>2</u>	Event #	<u>5, 6, 7</u>	Page	<u>23</u>	of	<u>33</u>
Event Description:		RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure							
Time	Position	Applicant's Actions or Behavior							

<p style="text-align: center;"><u>CAUTION</u></p> <p>Radiation levels and harsh environment conditions should be evaluated prior to performing local actions</p>		
	BOP	Verify containment ventilation isolation <ul style="list-style-type: none"> ○ Containment Purge valves closed ○ Containment pressure relief valves closed
<p style="text-align: center;"><u>CAUTION</u></p> <p>If an SI signal exists or occurs, steps 1-9 of E-0 should be performed while continuing with this procedure</p>		
	BOP	Perform Steps 1-9 of E-0, Reactor Trip or Safety Injection Note: The next 9 steps of this guide will be performed by the BOP OR in progress until the crew transitions back to E-0. The remaining steps of FR-S.1 resume in this guide on page 25
	BOP	Verify reactor trip (YES)
	BOP	Verify turbine trip (YES)
	BOP	Verify power to 480 V busses (YES)
	BOP	Check if SI is actuated (YES)

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7 Page 24 of 33

Event Description: RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure

Time	Position	Applicant's Actions or Behavior
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	BOP	Perform attachment 1 while continuing with this procedure (Attachment 1 actions begin on page 28 of this scenario guide)
	BOP	Verify AFW pumps running
	BOP	Verify total AFW flow greater than 400 GPM
<p style="text-align: center;"><u>CAUTION</u></p> <p>RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to less than 320 psig any RHR pump placed in PULLOUT must be manually started to supply water to the RCS</p>		
	BOP	<p>Verify SI system flow</p> <ul style="list-style-type: none"> ○ RCS pressure less than 1660 psig (YES OR NO) ○ SI pump flow indicated ○ RCS pressure less than 320 psig (NO) <ul style="list-style-type: none"> ○ Place one RHR pump in PULLOUT <p>Note: RCS pressure may be above or below 1660 psig at this point in the procedure. If it is above 1660 psig, SI flow should NOT be indicated.</p>

Op Test No.:	<u>1</u>	Scenario #	<u>2</u>	Event #	<u>5, 6, 7</u>	Page	<u>25</u>	of	<u>33</u>
Event Description:		RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure							
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>Check RCP seal cooling</p> <ul style="list-style-type: none"> ○ 3 CCW pumps running (NO) ○ CCW flow to RCP thermal barriers normal(NO) ○ Service Water system aligned for 3 header operation ○ Locally verify SWN-4 and SWN-5 closed ○ Start one Service Water pump on Non-Essential header on bus supplied by off-site power <p>While determining whether the RCPs have CCW cooling, the BOP may determine that CCW flow is insufficient to maintain long term thermal barrier cooling. He may decide to trip RCPs, but is not required to, because minimal cooling will be available at this time.</p>
	OTC	<p>Check if the following trips have occurred</p> <ul style="list-style-type: none"> ○ Reactor trip ○ Turbine trip <ul style="list-style-type: none"> ○ Dispatch NPO to open MG set output breakers
<p style="text-align: center;">CAUTION</p> <p>City Water for AFW pumps will be necessary if CST level decreases to less than 2 feet</p>		
	OTC	<p>Check SG levels</p> <ul style="list-style-type: none"> ○ NR level in at least one SG greater than 10% (NO) ○ Control feed flow to maintain 10-50%
	OTC	<p>Verify dilution paths isolated</p> <ul style="list-style-type: none"> ○ FCV-111A closed ○ FI-111 no flow indicated

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7 Page 26 of 33

Event Description: RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure

Time	Position	Applicant's Actions or Behavior
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	OTC	Check for reactivity insertion from uncontrolled cooldown <ul style="list-style-type: none"> ○ Check RCS temperature decreasing in an uncontrolled manner ○ Check any SG pressure decreasing in an uncontrolled manner <ul style="list-style-type: none"> ○ Stop controlled cooldown
	BOP	Check core exit TCs less than 1200°F
	OTC	Verify reactor subcritical
	CRS	Return to E-0, step 1
		Evaluator Note: E-0, Steps 1-9 should be in progress or complete. Attachment 1 actions from step 5 of E-0 are included at back of this guide. (page 28)
<p style="text-align: center;"><u>CAUTION</u></p> <p>If adverse containment conditions exist, use wide range cold leg temperatures to determine RCS temperature</p>		
	OTC	Check RCS temperature stable at or trending to 547°F (NO) <ul style="list-style-type: none"> ○ Stop dumping steam
	OTC	Check PRZR PORVs and spray valves closed
	OTC	Check if RCPs should be stopped (NO)

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7 Page 27 of 33

Event Description: RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure

Time	Position	Applicant's Actions or Behavior
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	OTC	Check if any SG is faulted <ul style="list-style-type: none"> ○ Any SG depressurizing in an uncontrolled manner ○ Any SG depressurizing
	TEAM	Check if SG tubes are intact (YES)
	TEAM	Check if RCS is intact (YES)
	TEAM	Check if SI should be terminated (YES)
	CRS	Direct transition to ES-1.1, SI Termination
<i>Terminate scenario when transition is announced to ES-1.1</i>		

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 28 of 33

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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Note

This attachment must be terminated upon CRS transition to ECA-0.0, Loss of All AC Power.

	BOP	<p>Verify proper Charging system operation:</p> <ul style="list-style-type: none"> a. Start at least one charging pump in manual at maximum speed b. Align charging pump suction to the RWST <ul style="list-style-type: none"> • Open charging pump suction valve from RWST <ul style="list-style-type: none"> ○ LCV-112B • Close charging pump suction valve from VCT <ul style="list-style-type: none"> ○ LCV-112C • Place RCS Makeup Control switch to STOP
<p style="text-align: center;"><u>Note</u></p> <ul style="list-style-type: none"> ○ Notify CRS of any automatic actions that failed to occur during performance of this attachment ○ Equipment found misaligned due to operator action should NOT be repositioned. 		
	BOP	Check generator output breakers – OPEN

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 29 of 33

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>Check status of 480 volt busses:</p> <ul style="list-style-type: none"> a. All 480V busses – ENERGIZED BY OFF-SITE POWER b. Dispatch NPO to reset: <ul style="list-style-type: none"> o All lighting o MCC 24A o MCC 27A o MCC 29A c. Stop all Condensate Pumps
	BOP	<p>Verify FW Isolation:</p> <ul style="list-style-type: none"> o Main Boiler Feed Pumps – TRIPPED o Main Boiler Feed Pump Discharge Valves – CLOSED o FW Regulating valves – CLOSED o FW Stop Valves – CLOSED o SG Blowdown Isolation Valves - CLOSED
	BOP	<p>Check if Main Steam Lines should be isolated:</p> <ul style="list-style-type: none"> a. Check for either: <ul style="list-style-type: none"> • High Steam Line flow with EITHER Tave less than 541 deg F OR Steam line pressure less than 525 psig. OR • Containment pressure – EVER GREATER THAN 24 psig b. Verify MSIVs - CLOSED

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 30 of 33

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Verify proper Service Water System operation: <ul style="list-style-type: none"> a. Three Service Water Pumps – Running on Essential Header b. Service Water valves from Diesel Generator - OPEN
	BOP	Verify SI system pumps running: <ul style="list-style-type: none"> a. Three SI pumps – RUNNING b. 22 SI pump discharge isolation MOV-851A AND MOV-851B – OPEN c. Two RHR pumps - RUNNING
	BOP	Verify proper emergency SI System valve alignment: <ul style="list-style-type: none"> a. SI pump cold leg injection valves – OPEN <ul style="list-style-type: none"> o 856A o 856E o 856C o 856D b. RHR HX CCW outlet valves – OPEN <ul style="list-style-type: none"> o 822A o 822B c. RHR HX MOVs – OPEN <ul style="list-style-type: none"> o 746 o 747
	BOP	Verify Containment Fan Coolers – IN SERVICE: <ul style="list-style-type: none"> a. Five fan coolers - RUNNING b. Charcoal Filter valves - OPEN c. Fan normal discharge valves – CLOSED d. TCV-1104 and TCV-1105 – BOTH OPEN

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 31 of 33

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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	BOP	Verify AFW flow to all SGs
	BOP	Verify Containment Ventilation Isolation: <ul style="list-style-type: none">a. Containment Purge Valves – CLOSED<ul style="list-style-type: none">○ FCV-1170○ FCV-1171○ FCV-1172○ FCV-1173b. Containment Pressure Relief Valves - CLOSED<ul style="list-style-type: none">• PCV-1190• PCV-1191• PCV-1192
<p style="text-align: center;"><u>Note</u> Attachment 2 provides a list of Phase A valves</p>		

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 32 of 33

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>Verify Containment Isolation Phase A</p> <ul style="list-style-type: none"> a. Phase A – ACTUATED <ul style="list-style-type: none"> o Train A master relay CA1 (above rack E) o Train B master relay CA2 (above rack F) b. Phase A valves – CLOSED c. IVSW valves – OPEN <ul style="list-style-type: none"> o 1410 o 1413 o SOV-3518 o SOV-3519 d. WCP valves – OPEN: <ul style="list-style-type: none"> o PCV 1238 o PCV 1239 o PCV 1240 o PCV 1241 e. Place personnel and equipment hatch solenoid control switches to INCIDENT on SM panel f. Dispatch NPO to periodically check <ul style="list-style-type: none"> o IVSW Tank <ul style="list-style-type: none"> o Level – GREATER THAN 92% o Pressure – GREATER THAN 57 PSIG o WCP header pressures – GREATER THAN 52 PSIG
<p>Evaluator note: The following step is intended for High Containment pressure condition. It will not be performed if conditions aren't met</p>		

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 33 of 33

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>Check if Containment Spray should be actuated:</p> <ul style="list-style-type: none"> a. Containment Pressure – EVER GREATER THAN 24 PSIG b. Verify spray pumps – RUNNING c. Verify spray pump discharge valves – OPEN <ul style="list-style-type: none"> o MOV-866A o MOV-866B o MOV-866C o MOV-866D d. Verify Containment Isolation Phase B valves – CLOSED e. STOP all RCPs f. Verify IVSW Isolation Valves – OPEN <ul style="list-style-type: none"> o 7864 o 7865 o 7866 o 7867
	BOP	Verify CCR Air Conditioner Train A and B – RUNNING IN INCIDENT MODE 2
	BOP	Notify CRS that Attachment 1 is complete

Facility:	IP2	Scenario No.:	3	Op Test No.:	1
Examiners:	_____	Candidates:	_____	CRS	
	_____		_____	RO	
	_____		_____	PO	
<u>Initial Conditions:</u> 6% power BOL					
Plant startup in progress					
<u>Turnover:</u> Raise power and synchronize the Main Generator					
<u>Critical Tasks:</u> Stop SI pumps prior to water release from SGs					
Isolate steam flow from and feed flow to the ruptured SG prior to transition to ECA-3.1					

Event No.	Malfunction No.	Event Type*	Event Description
1		R (RO) N (BOP) N (CRS)	Raise reactor power. Synchronize Main Generator
2	XMT RCS036A	I (ALL)	Tcold instrument fails high
3	RCS14C	C (ALL)	Steam Generator Tube Leak
4	RCS14C	M (ALL)	SGTR
5	XMT SGN43	C (RO)	Atmospheric Dump valve on ruptured SG fails open
6	SWI PPL030B	C (BOP)	CIA fails to reset. Manual action to bypass and reset CIA

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

Scenario Event Description

IP2 Simulator Scenario 3

The team will assume the shift to raise power and synchronize the Main Generator to the grid IAW POP-1.3 and SOP-26.4.

When the generator is on-line, a Tcold instrument will fail high. IAW AOI-28.0 and 28.1, the OTC will place the running Charging Pump in manual, the BOP will trip bistables, and the CRS will refer to Technical Specifications.

When the plant is stable, a steam generator tube leak will develop, requiring action IAW AOI-1.2. Leak rate is quantified, secondary systems are isolated, and the team will begin a plant shutdown IAW POP-3.1 based on excessive SG tube leakage. The CRS will again refer to Technical Specifications.

While the team is shutting the plant down, the tube leak will increase in severity. The team will determine that pressurizer level cannot be maintained, and a reactor trip will be required.

When the reactor trips, one Atmospheric Dump Valve will fail open, requiring manual action to close it to minimize the radioactive release to atmosphere. Additionally, CIA will fail to reset. The team must bypass and manually reset CIA to provide instrument air to containment, avoiding RCS depressurization using PORVs

EOP flow path: E-0 – E-3 - ES-3.1

Indian Point Unit 2
2003 NRC Initial License Examination
Simulator Scenario Setup
Scenario 3

No equipment Out of Service

CIA Reset Failure:

SWI CFW022A (SOV-1229 SJAE effluent isolation valve failed to AUTO position)

Materials needed for scenario:

- POP-1.3
- SOP-26.4
- Graph Book
- Reactivity Summary Sheet

Allow team to begin scenario brief approximately 30 minutes prior to entering simulator

Note: None

Scenario built from IC 20

Booth Instructor:

Set up monitor and trends to observe 23 SG mass as follows:

- *ASGNTOT(3) Total mass*
- *ASGNLTOT(3) Liquid mass*
- *ASGNSTOT(3) Steam mass*

Indian Point Unit 2
2003 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3

- The plant is at 6% power, ready to synchronize the Main Generator.
- Beginning of Life, C_b is 1275 ppm.
- EFPD = 100
- Control Bank D = 156 steps
- $T_{avg} = 547^{\circ}\text{F}$
- RCS Pressure = 2235 psig
- Pressurizer Level = 37%
- Risk Assessment = GREEN
- Daily Risk Factor = 0.83

The following equipment is out of service:

None

Team instructions:

- In accordance with POP-1.3 and SOP-26.4, synchronize the Main Generator and prepare to raise load to 100%.
- POP-1.3 is complete through step 4.32
- SOP-26.4 step 4.6.7 in progress
- D.O has confirmed that the switchyard is properly aligned and all grounds removed
- D.O directs you to synchronize using breaker 7 and close breaker 9 when ready in accordance with procedure
- Generator is to be synchronized in MANUAL

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>5</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

	CRS	Refer to POP-1.3
	BOP	SYNCHRONIZE the Generator to the bus and CONTINUE with SOP 26.4, Turbine Generator Startup, Synchronizing, Voltage Control and Shutdown, "Initial Loading of the Generator and Closing of the Second Generator Output Breaker", section
		Note: The next 15 steps of this scenario guide cover generator excitation. Synchronization follows.
	BOP	VERIFY DC and the AC are in the MINIMUM VOLTS position (LEDs 8 Lit, 17 Lit - Figure 2).
	BOP	VERIFY all alarms on Panel FBF are clear.
	BOP	VERIFY 345 KV MO Disc. Switch F7-9 is CLOSED.
Indications available when exciting the generator: FBF 4-6, GENERATOR MODE CHANGE, alarm SHF 4-1, UNIT AUX TRANSFORMER TAP CHANGER, will clear		
	BOP	SELECT DC regulator on the DC/AC selector switch.

Op Test No.: 1 Scenario # 3 Event # 1 Page 6 of 39

Event Description: Raise reactor power. Synchronize Main Generator.

Time	Position	Applicant's Actions or Behavior
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CAUTION

During startup the maximum machine terminal voltage SHALL be 22 KV, at 1800 rpm.

NOTE

Flashing the generator field requires the red FIELD EXCITATION ON button to be pressed twice.

- When the button is pressed for the first time, the field shorting breaker OPENS.
- When the button is released, the field shorting breaker RE-CLOSES.
- When pressed the second time, the field shorting breaker OPENS, and the field is FLASHED for approximately 15 seconds.

	BOP	PRESS the Field Excitation OFF button.
	BOP	PRESS and HOLD the Field Excitation ON button, and VERIFY LED 1 is ON and LED 2 is OFF (Figure 2):
	BOP	RELEASE the Field Excitation ON button, and VERIFY LED 1 is OFF and LED 2 is ON.
	BOP	PRESS and RELEASE the Field Excitation ON button again.
	BOP	VERIFY LED 1 is ON and LED 2 is OFF.

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>7</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

	BOP	OBSERVE the field amperage build up, as the field is flashed for approximately 15 seconds.
<p style="text-align: center;"><u>CAUTION</u></p> <p>When using the DC regulator, the volts per hertz limits SHALL <u>NOT</u> be exceeded.</p>		
<p style="text-align: center;"><u>NOTE</u></p> <ul style="list-style-type: none"> ○ The Nominal output voltage for the Generator is 22 KV. ○ Power transformers are <u>NOT</u> equipped with tap-changing-under-load facilities. ○ Regulation of bus voltage on the 345 KV side SHALL be maintained by controlling the Generator field. 		
	BOP	RAISE DC voltage regulator <u>UNTIL</u> Generator terminal voltage is 22 KV.
	BOP	VERIFY the center status light is ILLUMINATED <ul style="list-style-type: none"> ○ Power at the Ring Bus Side of 345 KV MO Disc F7-9 (Center)
	BOP	NULL the AC regulator with the AC RAISE/LOWER Switch (Transfer Volts Meter indicates 0).

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>8</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

CAUTION

When using the AC regulator, the volts per hertz limits SHALL NOT be exceeded.

NOTE

The DC voltage regulator setpoint automatically tracks the AC voltage regulator setpoint, facilitating a quick transfer to the DC mode, if required.

	BOP	TRANSFER to the AC regulator by pushing AC/DC selector switch. <ul style="list-style-type: none"> OBSERVE Automatic Control Regulation LED is ILLUMINATED (LED 3 - Figure 2).
	BOP	ADJUST Generator terminal voltage to 22 KV, using the AC regulator.
		Note: Synchronization steps begin below
	CRS	REQUEST the DO to indicate which generator breaker (7 or 9) is to be used for synchronizing (7)
	BOP	PLACE Bkr 7 or 9 Sync Pot Control Selector switch in the appropriate position (7)
	BOP	VERIFY Synchroscope Switch is in MAN

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>9</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

CAUTION

At synchronization, the Main Transformer Secondary voltage should be 8 to 20 KV greater than system voltage

	BOP	<u>UNLESS</u> directed otherwise by the DO, slowly ADJUST the AC regulator <u>UNTIL</u> 346 to 358 KV (nominally 350 KV) on the high side of the generator main power transformers has been established
	BOP	ADJUST Turbine speed <u>UNTIL</u> the Synchroscope is observed to be rotating slowly in the fast direction

NOTE

Manual synchronization of the Generator may be required because the Auto-Synchronizing Circuitry has been determined to be inoperable

	BOP	VERIFY Synchroscope Switch is in MAN
	BOP	<u>WHEN</u> the Synchroscope is between one minute <u>BEFORE</u> 12, and 12 O'clock (top center), CLOSE the selected generator breaker
	CRS	NOTIFY the SO that Unit 2 is synchronized to the bus
	CRS	RECORD the time in the CRS log book

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>10</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

CAUTION

Do NOT operate the Main Generator above 40 MWe with 6.9 KV Buses 1 through 4 in parallel with the Station Auxiliary Transformer and the Unit Auxiliary Transformer

	TEAM	VERIFY Generator output voltage is within the capability limits in Graph EL-1, Capability Curve Voltage Regulator in Service and Out of Service
<p style="text-align: center;"><u>NOTE</u></p> <ul style="list-style-type: none"> ○ Refer to Graph EL-3, Generator Load Changing Curves. ○ The maximum Generator H₂ heat up rate is 10°C/hr (18°F/hr.) 		
	BOP	COMMENCE turbine generator load increase as plant conditions allow
	BOP	As Generator load increases, VERIFY all phase ammeters approximately equal
	BOP	As directed by the DO, ADJUST Generator AC regulator to obtain Reactive loading (VARs)
Booth Instructor: If asked, D.O. requests 50 MVARs OUT until Generator load is 200 MWe		

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>11</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

NOTE

- Load pickup to obtain 30 to 40 MWe Turbine Generator load should be done slowly, minimizing the effects of swell on SG level and to avoid exceeding the POWER ABOVE P-10 Permissive setpoint.
- The load increase to 40 MWe should be done at a rate at which the operator is comfortable (approximately 10 to 15 minutes).
- Crossover steam temperature increases SHALL NOT exceed 75°F/hr.

	BOP	ADJUST Governor for 30 to 40 MWe Turbine Generator load
	BOP	ALIGN the 25000 Speedomax Bearing Temperature Monitor per Operator Aid 97-02, as directed by the CRS Note: May N/A this step
	BOP	<u>WHEN</u> closure of the other generator output breaker is to be performed, PLACE the Synchroscope Switch to MAN, and PLACE Bkr 7 or 9 Sync Pot Control Selector Switch in the appropriate position

Note:

SEF 4-11, 345 KV BREAKER NOT CLOSED alarm will clear

CAUTION

- The Synchroscope should NOT rotate when the second breaker is selected, since there should be no phase difference across the breaker.
- If the Synchroscope is rotating, do NOT close second breaker

	BOP	CLOSE the second breaker with the DO's permission

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>12</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

	OTC	<p><u>WHEN</u> Reactor power level exceeds 10 percent as indicated by the LOW POWER PERMISSIVE BLOCK NOT ENGAGED alarm and illumination of the POWER ABOVE P-10 light</p> <ul style="list-style-type: none"> ○ BLOCK the intermediate range trip and rod stop ○ OBSERVE the INTERMED RANGE TRIP BLOCKED light is illuminated ○ BLOCK the low power range trip ○ OBSERVE the LOW PWR RANGE TRIP BLOCKED light is illuminated ○ VERIFY the LOW POWER PERMISSIVE BLOCK NOT ENGAGED Alarm clears
	BOP	INITIATE Steam Generator Blowdown per SOP 7.1, Steam Generator Blowdown System Operation
<p style="text-align: center;"><u>CAUTION</u></p> <p>If the Main Generator is carrying greater than 40 MWe, do <u>NOT</u> transfer the auxiliary loads</p>		
	BOP	<u>PRIOR</u> to exceeding 40 MWe, TRANSFER Bus Sections 1 through 4 from the Station Auxiliary Transformer to the Unit Auxiliary Transformer per SOP 27.1.4, 6900 Volt System
	BOP	<p>To transfer 6900V Bus 1 to Unit Auxiliary Transformer, PERFORM the following:</p> <ul style="list-style-type: none"> ○ VERIFY Unit Auxiliary Transformer and Station Auxiliary Transformer are within 50 volts. ○ <u>IF</u> voltages are <u>NOT</u> matched within 50 volts, GO TO Step to match voltage within 50 volts. (Should not be necessary)

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>13</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

	BOP	PLACE 6900V Bus 1 synchroscope switch to BUS 1 - UNIT.
	BOP	VERIFY synchroscope at 12 o'clock.
	BOP	CLOSE Normal Feed Breaker UT-1.
	BOP	OPEN Bus 1-5 Tie Breaker UT1-ST5.
	BOP	PLACE 6900V Bus 1 synchroscope switch to OFF.
	TEAM	<p>VERIFY Station Auxiliary Transformer <u>AND</u> Unit Auxiliary Transformer supplying voltage between 7.0 and 7.2 kV.</p> <ul style="list-style-type: none"> o PLACE the Station Auxiliary Transformer Tap Changer in MANUAL. o Manually ADJUST Station Auxiliary Transformer Tap Changer to maintain supply voltage at 7.0 to 7.2 kV. o RETURN the Tap Changer in AUTO. <p>Note: Bulleted items performed only if necessary</p>

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>14</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>To transfer 6900V Bus 2 to Unit Auxiliary Transformer, PERFORM the following:</p> <ul style="list-style-type: none"> ○ VERIFY Unit Auxiliary Transformer and Station Auxiliary Transformer are within 50 volts. ○ IF voltages are <u>NOT</u> matched within 50 volts, GO TO Step to match voltage within 50 volts. (Should not be necessary)
	BOP	PLACE 6900V Bus 2 synchroscope switch to BUS 2 - UNIT.
	BOP	VERIFY synchroscope at 12 o'clock.
	BOP	CLOSE Normal Feed Breaker UT-2.
	BOP	OPEN Bus 2-5 Tie Breaker UT2-ST5.
	BOP	PLACE 6900V Bus 2 synchroscope switch to OFF.

Op Test No.: 1 Scenario # 3 Event # 1 Page 15 of 39

Event Description: Raise reactor power. Synchronize Main Generator.

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>VERIFY Station Auxiliary Transformer <u>AND</u> Unit Auxiliary Transformer supplying voltage between 7.0 and 7.2 kV.</p> <ul style="list-style-type: none"> o PLACE the Station Auxiliary Transformer Tap Changer in MANUAL. o Manually ADJUST Station Auxiliary Transformer Tap Changer to maintain supply voltage at 7.0 to 7.2 kV. o RETURN the Tap Changer in AUTO. <p>Note: Bulleted items performed only if necessary</p>
	BOP	<p>To transfer 6900V Bus 3 to Unit Auxiliary Transformer, PERFORM the following:</p> <ul style="list-style-type: none"> o VERIFY Unit Auxiliary Transformer and Station Auxiliary Transformer are within 50 volts. o IF voltages are <u>NOT</u> matched within 50 volts, GO TO Step to match voltage within 50 volts. (Should not be necessary)
	BOP	PLACE 6900V Bus 3 synchroscope switch to BUS 3 - UNIT.
	BOP	VERIFY synchroscope at 12 o'clock.
	BOP	CLOSE Normal Feed Breaker UT-3.
	BOP	OPEN Bus 3-6 Tie Breaker UT3-ST6.

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>16</u>	of	<u>39</u>
Event Description: Raise reactor power. Synchronize Main Generator.									
Time	Position	Applicant's Actions or Behavior							

	BOP	PLACE 6900V Bus 3 synchroscope switch to OFF.
	BOP	<p>VERIFY Station Auxiliary Transformer <u>AND</u> Unit Auxiliary Transformer supplying voltage between 7.0 and 7.2 kV.</p> <ul style="list-style-type: none"> o PLACE the Station Auxiliary Transformer Tap Changer in MANUAL. o Manually ADJUST Station Auxiliary Transformer Tap Changer to maintain supply voltage at 7.0 to 7.2 kV. o RETURN the Tap Changer in AUTO. <p>Note: Bulleted items performed only if necessary</p>
	BOP	<p>To transfer 6900V Bus 4 to Unit Auxiliary Transformer, PERFORM the following:</p> <ul style="list-style-type: none"> o VERIFY Unit Auxiliary Transformer and Station Auxiliary Transformer are within 50 volts. o IF voltages are <u>NOT</u> matched within 50 volts, GO TO Step to match voltage within 50 volts. (Should not be necessary)
	BOP	PLACE 6900V Bus 4 synchroscope switch to BUS 4 - UNIT.
	BOP	VERIFY synchroscope at 12 o'clock.
	BOP	CLOSE Normal Feed Breaker UT-4.

Op Test No.: 1 Scenario # 3 Event # 1 Page 17 of 39

Event Description: Raise reactor power. Synchronize Main Generator.

Time	Position	Applicant's Actions or Behavior
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	BOP	OPEN Bus 4-6 Tie Breaker UT4-ST6.
	BOP	PLACE 6900V Bus 4 synchroscope switch to OFF.
	BOP	<p>VERIFY Station Auxiliary Transformer <u>AND</u> Unit Auxiliary Transformer supplying voltage between 7.0 and 7.2 kV.</p> <ul style="list-style-type: none"> ○ PLACE the Station Auxiliary Transformer Tap Changer in MANUAL. ○ Manually ADJUST Station Auxiliary Transformer Tap Changer to maintain supply voltage at 7.0 to 7.2 kV. ○ RETURN the Tap Changer in AUTO. <p>Note: Bulleted items performed only if necessary</p>

When busses are transferred or at Lead Evaluator's discretion, proceed to Event 2

Op Test No.: 1 Scenario # 3 Event # 2 Page 18 of 39

Event Description: Tcold Instrument Fails High

Time	Position	Applicant's Actions or Behavior
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*Booth Instructor: When directed, insert the following command:***XMT RCS036A FIXED OUTPUT: TE-411B RCS LOOP 21 COLD LEG TEMP 600**

Indications available:

SAF 2-6, HIGH TAVE

SAF 4-6, TAVE DEVIATION

SAF 3-8, DELTA T DEVIATION

FCF 4-6, TAVE TREF DEVIATION

	CRS	Refers to AOI-28.0, Instrument Failures
	TEAM	VERIFY The Following Controls: <ul style="list-style-type: none"> ○ Turbine load - STABLE ○ Rod Control – STABLE (Checks rods in manual) ○ PRZR pressure control - NORMAL ○ PRZR level control – NORMAL (NO) ○ MBFP Speed - NORMAL ○ S/G levels – NORMAL ○ S/G Pressure control - NORMAL
	OTC	Places running Charging Pump in MANUAL
	TEAM	CHECK PRZR instrumentation - NORMAL: <ul style="list-style-type: none"> ○ PRZR pressures ○ PRZR levels

Op Test No.: 1 Scenario # 3 Event # 2 Page 19 of 39

Event Description: Tcold Instrument Fails High

Time	Position	Applicant's Actions or Behavior
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	TEAM	CHECK S/G instrumentation – NORMAL <ul style="list-style-type: none"> ○ S/G levels ○ S/G pressures ○ S/G feedwater flow ○ S/G steam flows
	TEAM	CHECK RCS instrumentation: <ul style="list-style-type: none"> ○ CHECK RCS loop temperatures: <ul style="list-style-type: none"> ○ Loop Tavg – NORMAL (NO) ○ Actual loop ΔT – NORMAL (NO) ○ CHECK Power Range Channels – NORMAL ○ CHECK RCS coolant loop flow channels – NORMAL
	CRS	GO to AOI 28.1, NARROW RANGE HOT/COLD LEG TEMPERATURE CHANNEL FAILS HIGH/LOW
		Note: If peer check requested for procedure transition, concur with whatever the recommendation the applicant makes
	OTC	PLACE Rod Control bank selector switch in MAN
	CRS	OBSERVE actual insertion limits. (REFER to GRAPH RPC-6, Cycle 15 Core Operating Limits Report)
	OTC	PLACE charging pump speed control in MANUAL

Op Test No.: 1 Scenario # 3 Event # 2 Page 20 of 39

Event Description: Tcold Instrument Fails High

Time	Position	Applicant's Actions or Behavior
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	OTC	CONTROL Pressurizer level in Normal band. (Refer to GRAPH RCS-2, Pressurizer Level Program vs. Tave, in the Graphs Book)
	BOP	In Foxboro Rack D10, PLACE T AVE DEFEAT switch (T/412A <u>OR</u> T/412B) to DEFEAT LOOP #, for affected loop
	BOP	In Foxboro Rack B8, PLACE DELTA-T DEFEAT switch (T/411A <u>OR</u> T/411B) to DEFEAT LOOP #, for affected loop
	OTC	PLACE Rod Control Bank selector switch in AUTO, <u>UNLESS</u> directed otherwise by the CRS Will leave in MANUAL due to low power/startup condition
	OTC	RETURN charging pump speed control to AUTOMATIC
	CRS	REFER to Technical Specification Tables 3.5-2, 3.5-3, 3.5-4 <u>AND</u> Bistable Trip status lights on Panel SO to determine if tripping Bistable trip switches will cause a Reactor Trip
	BOP	Determine that Bistable Trip switches will NOT cause a reactor trip

Op Test No.: 1 Scenario # 3 Event # 2 Page 21 of 39

Event Description: Tcold Instrument Fails High

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>IF tripping the Bistable Trip Switches will <u>NOT</u> cause a Reactor Trip, <u>THEN</u> TRIP the appropriate Loop Bistable trip switches per Table 1, List of Loop Temperature Bistable Trip Switches</p> <ul style="list-style-type: none"> ○ TC-411A, Overtemperature Delta T trip RED A-4 ○ TC-411C, Overpower Delta T trip RED A-4 ○ TC-411D, Low Tave RED A-4
	CRS	<p>May contact Work Control and request assistance in troubleshooting and repair. (Booth Instructor acknowledge if called)</p>
<p><i>When bistables are tripped or at Lead Evaluator's discretion, proceed to Event 3</i></p>		

Op Test No.: 1 Scenario # 3 Event # 3 Page 22 of 39

Event Description: Steam Generator Tube Leak, 23 SG, approximately 43 GPD

Time	Position	Applicant's Actions or Behavior
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Booth Instructor: When directed, insert the following command:
MAL RCS14C SEVERITY 0.005 SG Tube Leak 23 SG

Indications available:
 SAF-1, 2-5, R55C SG SYSTEM
 SAF-1, 3-9, R45 SJAE
 SAF-1, 3-7, R-49 SG BLOWDOWN

	CRS	Enters AOI-1.2, Steam Generator Tube Leak

Note:
 BOP may direct NPO to check PCV-1227 closed per the ARP for SAF-1, 3-7. Booth Instructor call back and report valve closed

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NOTE

- IF at any time while in this procedure, steam generator leak rate increases above the next action level as specified in Step 2 of FOLDOUT PAGE, this procedure SHALL be re-entered at Step 3
- IF Attachment 8 is used for Leak Rate Estimation, it shall be performed at 15 minute intervals until the leakrate is stable for 1 hour ($\leq 10\%$ increase during a 1 hour period), then the time interval may be relaxed to 2 hours

	CRS	<p><u>IF</u> a significant increase is observed on R-45, PERFORM the following</p> <ul style="list-style-type: none"> ○ NOTIFY Health Physics ○ PERFORM Leak Rate Estimate per Attachment 8

Op Test No.:	1	Scenario #	3	Event #	3	Page	23	of	39
Event Description:		Steam Generator Tube Leak, 23 SG, approximately 43 GPD							
Time	Position	Applicant's Actions or Behavior							

Booth Instructor Note: If requested for leak rate attachment calculation, air In-Leakage is 12 SCFM. RCS activity is 0.06 μ Ci/cc

Note: Expect approximately 45 GPD per the calculation. Should be >30GPD and <75 GPD

	CRS	<p><u>IF</u> steam is available on the secondary side, DIRECT Chemistry to perform Leak Rate Calculation</p> <ul style="list-style-type: none"> ○ MAINTAIN steady state conditions while Chemistry performs Leak Rate Calculation ○ PERFORM Attachment 5, Page , at least once every 15 minutes
<p>NOTE</p> <ul style="list-style-type: none"> ○ The leak rates specified in Step 3 apply to leakage in any one steam generator. <u>IF</u> it is not practical to assign the leakage to an individual steam generator, all leakage should be assumed to be from one steam generator ○ <u>WHEN</u> available, the Nitrogen 16 Monitor SHALL be used for the initial determination of leak rate. (Note: N-16 not available below 30% power) 		
	TEAM	<p>CHECK Primary To Secondary Leak Rate</p> <ul style="list-style-type: none"> ○ Leak Rate - GREATER THAN 5 GPD (YES)
	TEAM	<p>Leak Rate - GREATER THAN OR EQUAL TO 30 GPD (YES)</p>

Op Test No.: 1 Scenario # 3 Event # 3 Page 24 of 39

Event Description: Steam Generator Tube Leak, 23 SG, approximately 43 GPD

Time	Position	Applicant's Actions or Behavior
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NOTE

IF steam generator leak rate is greater than 75 gpd AND has increased by 30 gpd or more in last hour, monitored in at least 30 minutes intervals, Reactor Power should be reduced to less than 50% within 1 hour and placed in hot shutdown within 2 additional hours

	TEAM	Leak Rate - GREATER THAN 75 GPD <u>AND</u> INCREASED BY 30 GPD IN LAST HOUR MONITORED IN AT LEAST 30 MINUTES INTERVALS (NO)
	CRS	Refer to Technical Specification 3.1.F for RCS leakage limits

NOTE

IF performing a Rapid Plant Shutdown, Chemistry HOLD for sampling is NOT required

Booth Instructor Note: Approximately 15 minutes after call for Chemistry sample, report that leak rate estimation per Chemistry sample results indicate a leak rate of 80 GPD.

	TEAM	PERFORM a rapid plant shutdown using POP 3.1, Plant Shutdown from Full Power Operation to Zero Power Condition, concurrently with the rest of this procedure such that reactor power is less than 50% within 1 hour <u>AND</u> in hot shutdown within 2 additional hours.

When decision is made to shut down the unit, proceed to Event 4

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>4, 5, 6</u>	Page	<u>25</u>	of	<u>39</u>
Event Description: SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure									
Time	Position	Applicant's Actions or Behavior							

Booth Instructor: When directed, insert the following command:

MAL RCS14C SEVERITY 5% SGTR 23 SG

XMT SGN43 OUTPUT FAILURE SEVERITY 1600 RAMP 600 23 SG 'C' PRESSURE CHANNEL (AFTER REACTOR TRIP)

Indications available:

Rapid decrease in pressurizer pressure and level

Rapid rise in 23 SG level

Multiple alarms

	CRS	Direct the following: <ul style="list-style-type: none"> ○ Trip reactor ○ Verify reactor trip ○ Manually initiate SI ○ Direct entry to E-0, Reactor Trip or Safety Injection
	OTC	Verify reactor trip
	OTC	Verify turbine trip
	BOP	Verify power to 480 V busses
	OTC	Check if SI is actuated
	BOP	Perform attachment 1 while continuing with this procedure (Attachment 1 actions begin on page 34 of this scenario guide)

Op Test No.: 1 Scenario # 3 Event # 4, 5, 6 Page 26 of 39

Event Description: SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure

Time	Position	Applicant's Actions or Behavior
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	OTC	Verify AFW pumps running
	OTC	Verify total AFW flow greater than 400 GPM
<p style="text-align: center;"><u>CAUTION</u></p> <p>RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to less than 320 psig any RHR pump placed in PULLOUT must be manually started to supply water to the RCS</p>		
	OTC	Verify SI system flow <ul style="list-style-type: none"> ○ RCS pressure less than 1660 psig ○ SI pump flow indicated ○ RCS pressure less than 320 psig (NO) <ul style="list-style-type: none"> ○ Place one RHR pump in PULLOUT
	OTC	Check RCP seal cooling <ul style="list-style-type: none"> ○ 3 CCW pumps running ○ CCW flow to RCP thermal barriers normal ○ Service Water system aligned for 3 header operation ○ Locally verify SWN-4 and SWN-5 closed ○ Start one Service Water pump on Non-Essential header on bus supplied by off-site power
<p style="text-align: center;"><u>CAUTION</u></p> <p>If adverse containment conditions exist, use wide range cold leg temperatures to determine RCS temperature</p>		
	OTC	Check RCS temperature stable at or trending to 547°F (NO) <ul style="list-style-type: none"> ○ Manually close Atmospheric Dump valve for 23 SG (Failed open due to failed pressure transmitter)

Op Test No.: 1 Scenario # 3 Event # 4, 5, 6 Page 27 of 39

Event Description: SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure

Time	Position	Applicant's Actions or Behavior
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	OTC	Check PRZR PORVs and spray valves closed
	OTC	Check Aux Spray closed
	OTC	Check if RCPs should be stopped (NO)
	OTC	Check if any SG is faulted (NO) <ul style="list-style-type: none"> ○ Any SG depressurizing in an uncontrolled manner ○ Any SG depressurizing
	TEAM	Check if SG tubes are intact (NO)
	CRS	Direct transition to E-3, Steam Generator Tube Rupture
		Note: If peer check is requested for procedure transition, concur with whatever is recommended
<p style="text-align: center;">CAUTION</p> <p>FRPs should NOT be implemented prior to completion of E-0, Reactor Trip or Safety Injection, Attachment 1, Automatic Action Verification</p>		
	OTC	Check if RCPs should be stopped

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>4, 5, 6</u>	Page	<u>28</u>	of	<u>39</u>
Event Description: SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure									
Time	Position	Applicant's Actions or Behavior							

CAUTION

Radiation levels and harsh environment conditions should be evaluated prior to performing local actions

	OTC	Identify Ruptured SG <ul style="list-style-type: none"> ○ 23 SG ruptured
<u>CAUTION</u> <ul style="list-style-type: none"> ○ If the turbine driven AFW pump is the only source of feed flow, steam supply to the turbine driven AFW pump should be maintained from one SG ○ At least one SG must be maintained available for RCS cooldown 		
<i>Critical Task:</i> <i>Isolate Steam Flow from and Feed Flow to the ruptured SG prior to any transition to ECA-3.1</i>		
Critical Task (Isolation actions)	OTC	Isolate flow from ruptured SG <ul style="list-style-type: none"> ○ Atmospheric Dump valve in AUTO set at 74% ○ Atmospheric Dump valve closed <p>Note: In manual due to transmitter failure</p>
	BOP	Check 22 and 23 SGs intact (NO) <ul style="list-style-type: none"> ○ Trip 22 ABFP ○ Dispatch NPO to close MS-42 steam to TDAFW pump ○ When MS-42 closed, restart 22 ABFP if necessary (Not necessary)
	BOP	Verify blowdown isolation valves from 23 SG closed

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>4, 5, 6</u>	Page	<u>29</u>	of	<u>39</u>
Event Description:		SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure							
Time	Position	Applicant's Actions or Behavior							

	CRS	Dispatch NPO <ul style="list-style-type: none"> ○ Close steam traps upstream of ruptured SG MSIV ○ Verify ruptured SG MSIV bypass closed Close ruptured SG MSIV (23 SG)
<p style="text-align: center;"><u>CAUTION</u></p> <p>If any ruptured SG is faulted, feed flow to that SG should remain isolated during subsequent recovery actions unless needed for RCS cooldown</p>		
	BOP	Check ruptured SG NR level greater than 10% <ul style="list-style-type: none"> ○ Stop feed flow to 23 SG ○ Places controller in MANUAL and adjusts closed
<p style="text-align: center;"><u>CAUTION</u></p> <p>Isolation of the ruptured SG steamlines from the intact SG steamlines including trip of turbine driven AFW pump or closing the steam supply valve to turbine driven AFW pump from the ruptured SG should be completed before continuing with step 5</p>		
	OTC	Verify ruptured SG pressure greater than 440 psig
<p style="text-align: center;"><u>CAUTION</u></p> <ul style="list-style-type: none"> ○ If RCPs are NOT running, the following steps may cause a false F.0.4, Integrity Status Tree, indication for the ruptured loop. Disregard this ruptured loop Tcold indication until after performing step 27 ○ To prevent steamline isolation, steam dump to condenser should NOT exceed 0.5E6 lbm/hr per SG 		

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>4, 5, 6</u>	Page	<u>30</u> of <u>39</u>
Event Description: SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure							
Time	Position	Applicant's Actions or Behavior					

	OTC	<p>Initiate RCS cooldown</p> <p>Note: Refers to E-3 Step 6 table for value</p> <ul style="list-style-type: none"> ○ Determine required core exit temperature ○ Dump steam to condenser from intact SGs at maximum rate not to exceed 0.5E6 lbm/hr per SG <ul style="list-style-type: none"> ○ Condenser available ○ Steam Dump control to manual with zero output ○ Place steam dump in pressure control ○ Stop cooldown when desired temperature is achieved
	OTC	<p>Check intact SG NR levels greater than 10%</p> <ul style="list-style-type: none"> ○ Control feed to maintain 10-50% NR level
	OTC	<p>Check PRZR PORVs and Block Valves</p> <ul style="list-style-type: none"> ○ Power available to block valves ○ PORVs closed ○ At least one block valve open (NO) <ul style="list-style-type: none"> ○ Open one block valve
<p style="text-align: center;"><u>CAUTION</u></p> <ul style="list-style-type: none"> ○ If offsite power is lost after SI reset, then manually action may be required to restart safeguards equipment ○ Placing key switches to DEFEAT will prevent auto SI actuation 		
	BOP	Reset SI

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>4, 5, 6</u>	Page	<u>31</u>	of	<u>39</u>
Event Description:		SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure							
Time	Position	Applicant's Actions or Behavior							

	BOP	Reset CIA <ul style="list-style-type: none"> Must manually reset train 'A' relay using the Daisy Chain Bypass key.
	BOP	Establish Instrument Air to containment
<p style="text-align: center;"><u>CAUTION</u></p> <p>RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to less than 320 psig any RHR pump placed in PULLOUT must be manually started to supply water to the RCS</p>		
	BOP	Check if RHR pumps should be stopped <ul style="list-style-type: none"> Stop RHR pumps and place in auto
<p style="text-align: center;"><u>CAUTION</u></p> <p>If RWST level decreases to less than 15 feet, charging pumps which are started or running should be monitored for loss of suction which may result in pump damage</p>		
	OTC	Establish charging flow <ul style="list-style-type: none"> At least one charging pump running Align suction to RWST Establish maximum flow
	OTC	Check if RCS cooldown should be stopped <ul style="list-style-type: none"> Core exit TCs less than required
	OTC	Check ruptured SG pressure stable or increasing

Op Test No.:	<u>1</u>	Scenario #	<u>3</u>	Event #	<u>4, 5, 6</u>	Page	<u>32</u> of <u>39</u>
Event Description:		SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure					
Time	Position	Applicant's Actions or Behavior					

	OTC	Check RCS subcooling based on CETs greater than required
	OTC	Depressurize RCS to minimize break flow and refill pressurizer <ul style="list-style-type: none"> ○ Normal spray available ○ Depressurize until pressurizer level is 71%, OR ○ RCS pressure less than SG pressure and PRZR level greater than 14% OR ○ RCS subcooling less than required
	OTC	Stop depressurization
<p style="text-align: center;">CAUTION</p> <p>SI must be terminated when SI termination criteria are satisfied to prevent overfilling the ruptured SG</p>		
	OTC	Check if SI flow can be terminated <ul style="list-style-type: none"> ○ RCS subcooling greater than required on table ○ Secondary heat sink, either 400 gpm AFW flow or 10% NR in at least one SG ○ RCS pressure stable or increasing ○ PRZR level greater than 14%

Op Test No.: 1 Scenario # 3 Event # 4, 5, 6 Page 33 of 39

Event Description: SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure

Time	Position	Applicant's Actions or Behavior
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Critical Task:**Stop SI pumps prior to water release from ruptured SG Atmospheric Dump valve***Note: Booth operator will monitor SGs for water relief from ADV*

Critical Task	OTC	Stop SI pumps and place in AUTO

Terminate scenario when SI pumps are secured

Op Test No.:	<u>1</u>	Scenario #	<u>All</u>	Event #	<u>Attachment 1</u>	Page	<u>34</u>	of	<u>39</u>
Event Description:		Attachment 1, Automatic Action Verification							
Time	Position	Applicant's Actions or Behavior							

Note

This attachment must be terminated upon CRS transition to ECA-0.0, Loss of All AC Power.

	BOP	<p>Verify proper Charging system operation:</p> <ul style="list-style-type: none"> a. Start at least one charging pump in manual at maximum speed b. Align charging pump suction to the RWST <ul style="list-style-type: none"> • Open charging pump suction valve from RWST <ol style="list-style-type: none"> 1. LCV-112B • Close charging pump suction valve from VCT <ol style="list-style-type: none"> 1. LCV-112C • Place RCS Makeup Control switch to STOP
<p style="text-align: center;"><u>Note</u></p> <ul style="list-style-type: none"> ○ Notify CRS of any automatic actions that failed to occur during performance of this attachment ○ Equipment found misaligned due to operator action should NOT be repositioned. 		
	BOP	Check generator output breakers – OPEN

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 35 of 39

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>Check status of 480 volt busses:</p> <ol style="list-style-type: none"> All 480V busses – ENERGIZED BY OFF-SITE POWER Dispatch NPO to reset: <ul style="list-style-type: none"> All lighting MCC 24A MCC 27A MCC 29A Stop all Condensate Pumps
	BOP	<p>Verify FW Isolation:</p> <ul style="list-style-type: none"> Main Boiler Feed Pumps – TRIPPED Main Boiler Feed Pump Discharge Valves – CLOSED FW Regulating valves – CLOSED FW Stop Valves – CLOSED SG Blowdown Isolation Valves - CLOSED
	BOP	<p>Check if Main Steam Lines should be isolated:</p> <ol style="list-style-type: none"> Check for either: <ul style="list-style-type: none"> High Steam Line flow with EITHER Tave less than 541 deg F OR Steam line pressure less than 525 psig. OR Containment pressure – EVER GREATER THAN 24 psig Verify MSIVs - CLOSED

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 36 of 39

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>Verify proper Service Water System operation:</p> <ul style="list-style-type: none"> a. Three Service Water Pumps – Running on Essential Header b. Service Water valves from Diesel Generator - OPEN
	BOP	<p>Verify SI system pumps running:</p> <ul style="list-style-type: none"> a. Three SI pumps – RUNNING b. 22 SI pump discharge isolation MOV-851A AND MOV-851B – OPEN c. Two RHR pumps - RUNNING
	BOP	<p>Verify proper emergency SI System valve alignment:</p> <ul style="list-style-type: none"> a. SI pump cold leg injection valves – OPEN <ul style="list-style-type: none"> o 856A o 856E o 856C o 856D b. RHR HX CCW outlet valves – OPEN <ul style="list-style-type: none"> o 822A o 822B c. RHR HX MOVs – OPEN <ul style="list-style-type: none"> o 746 o 747
	BOP	<p>Verify Containment Fan Coolers – IN SERVICE:</p> <ul style="list-style-type: none"> a. Five fan coolers - RUNNING b. Charcoal Filter valves - OPEN c. Fan normal discharge valves – CLOSED d. TCV-1104 and TCV-1105 – BOTH OPEN
	BOP	Verify AFW flow to all SGs

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 37 of 39

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>Verify Containment Ventilation Isolation:</p> <ul style="list-style-type: none">a. Containment Purge Valves – CLOSED<ul style="list-style-type: none">○ FCV-1170○ FCV-1171○ FCV-1172○ FCV-1173b. Containment Pressure Relief Valves - CLOSED<ul style="list-style-type: none">• PCV-1190• PCV-1191• PCV-1192
<p style="text-align: center;"><u>Note</u></p> <p>Attachment 2 provides a list of Phase A valves</p>		

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 38 of 39

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>Verify Containment Isolation Phase A</p> <ul style="list-style-type: none"> a. Phase A – ACTUATED <ul style="list-style-type: none"> o Train A master relay CA1 (above rack E) o Train B master relay CA2 (above rack F) b. Phase A valves – CLOSED c. IVSW valves – OPEN <ul style="list-style-type: none"> o 1410 o 1413 o SOV-3518 o SOV-3519 d. WCP valves – OPEN: <ul style="list-style-type: none"> o PCV 1238 o PCV 1239 o PCV 1240 o PCV 1241 e. Place personnel and equipment hatch solenoid control switches to INCIDENT on SM panel f. Dispatch NPO to periodically check <ul style="list-style-type: none"> o IVSW Tank <ul style="list-style-type: none"> o Level – GREATER THAN 92% o Pressure – GREATER THAN 57 PSIG o WCP header pressures – GREATER THAN 52 PSIG
<p>Evaluator note: The following step is intended for High Containment pressure condition. It will not be performed if conditions aren't met</p>		

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 39 of 39

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>Check if Containment Spray should be actuated:</p> <ul style="list-style-type: none"> a. Containment Pressure – EVER GREATER THAN 24 PSIG b. Verify spray pumps – RUNNING c. Verify spray pump discharge valves – OPEN <ul style="list-style-type: none"> o MOV-866A o MOV-866B o MOV-866C o MOV-866D d. Verify Containment Isolation Phase B valves – CLOSED e. STOP all RCPs f. Verify IVSW Isolation Valves – OPEN <ul style="list-style-type: none"> o 7864 o 7865 o 7866 o 7867
	BOP	Verify CCR Air Conditioner Train A and B – RUNNING IN INCIDENT MODE 2
	BOP	Notify CRS that Attachment 1 is complete