Facility: IP2 Scenario No.: 1 Op Test No.: 1

Examiners: _____ Candidates: _____ CRS

_____ _____ RO

_____ _____ PO

Initial Conditions: 100% power MOL

21 Charging Pump OOS

21 CCW Pump OOS

Small SG Tube Leak < 5 GPD

Turnover: Reduce load to 900 MWe to remove 23 Condensate Pump from service within 60 minutes

Critical Tasks: Manual reactor trip

Initiate Bleed and Feed Cooling

Event No.	Malf. No.	Event Type*	Event Description
1		R (RO) N (BOP) N (CRS)	Reduce power
2	CNH PCS8D	C (RO) C (CRS)	MFRV fails closed slowly in AUTO
3	XMT RCS20A	I (ALL)	Pressurizer level channel fails high
4	ATS7B	C (ALL)	Feedwater Pump trip requiring rapid load decrease to 700 MWe
5	ATS7A	M (ALL)	Feedwater pump trip. Reactor trip required.
6	BAT ESR.FAIL. RX.TRIP	C (RO)	Auto reactor trip failure. Manual trip required
7	MOC AFW1	C (BOP)	21 MDAFW fails to start
8	MOT AFW1	C (BOP)	21 MDAFW trips
9	ATS5C		TDAFW trips

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

The crew assumes the shift and initiates a power reduction IAW POP-3.1. The RO will commence RCS boration and the BOP will slowly reduce generator load.

23MFRV controller fails in automatic. The controller must be placed in manual IAW AOI 28.0 and/or AOI 21.1.1, and 23 SG level restored to the normal control band. The CRS will refer to Tech Specs.

Pressurizer level channel 460 (controlling channel) will fail high. The crew will respond IAW AOI-28.0 and AOI-28.7. The RO will operate charging pumps and pressurizer heaters manually while the BOP defeats the failed channel inputs and the CRS refers to Technical Specifications.

Subsequently, 22 MBFP will trip, requiring a plant runback to <745 MWe IAW AOI-21.1.1. 23 SG level must be controlled manually and normal boration will be performed for AFD control. If Rod Insertion Limits are exceeded, the RO will commence Emergency Boration.

When the plant is stabilized, 21 MBFP will trip, requiring a reactor trip. The reactor must be tripped manually IAW AOI-21.1.1, because automatic reactor trip is not functional.

Subsequent AFW failures result in the requirement to transition to FR-H.1, and restore Heat Sink using Bleed and Feed.

EOP flow path: E-0 – ES-0.1 – FR-H.1

Indian Point Unit 2
2003 NRC Initial License Examination
Simulator Scenario Setup
Scenario 1

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
AUTO reactor trip failure:	Run Batch File ESR.FAIL.RX.TRIP
21 ABFP fail to auto start:	MOC AFW1 OPTION 4 AUTO CLOSE FAILURE
23 ABFP trips upon starting:	MOT AFW2A OPTION 2 AFW 23 SHAFT SEIZURE

Materials needed for scenario:

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

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

Note: None

Scenario built from IC 3

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

Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
	CRS	Refers to POP 3.1
	CRS	IF reducing Reactor Power for a maintenance support function, the SM SHALL DETERMINE the desired Reactor Power level OR Turbine load (MWe) to maintain while repairs are made/troubleshooting is performed **Evaluator Note: 900 MWe indicated on turnover**
	CRS	REQUEST Test Group to determine if Pressurizer Level instrumentation must be re-calibrated. **Evaluator cue: If asked, no re-calibration necessary**
	CRS	VERIFY LCV-1129, Excess Condensate Return to CST, is closed, AND 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.
	RO	IF necessary, PLACE rod control in MANUAL to maintain rods above the Insertion Limit.
	RO	MAINTAIN delta flux within the target band.

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

Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
	CREW	IF PICS is NOT operable, PERFORM the following after load changes greater than 10% per AOI 29.12, Loss of PICS Computer: o Quadrant Power Tilt Calculation using DSR-4B, Quadrant Power Tilt Calculation Sheet (Technical Specification 3.10.10). o 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.
	RO	VERIFY T_{AVE} AND Pressurizer Level are maintained on program per Graph RCS-2, Pressurizer Level V.S. T_{AVE}.
	RO	MAINTAIN steam generator levels between 40 and 50 percent Narrow Range.
	RO	NULL manual setpoint on feedwater regulating valve control to facilitate rapid transfer from AUTOMATIC to MANUAL control.
	CRS	NOTIFY nuclear and conventional NPOs that load reduction is in progress.

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

Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
	CRS	DIRECT NPOs to perform the following during load reduction: o MONITOR Main Turbine Oil Temperatures o MONITOR Hydrogen Seal Oil Temperatures o MONITOR MBFP Oil Temperatures o BALANCE Heater Drain Tank Pump flows between the pump in Auto and Manual per SOP 19.1, Extraction Steam And Heater Drain Systems Operation. o IF SJAEs are in service, MAINTAIN Steam pressure per SOP 20.1, Condenser Air Removal System Operation, AND periodically CHECK SJAEs for backfiring. o IF FCV-1120, Flowpath A Controller Stop, is in MANUAL, ADJUST to maintain FCV-1113, Gland Steam Condenser Minimum Flow Control Valve, closed.
NOTE WHEN erratic governor operation is observed, governor oil pressure may be raised above the controlling load limit to avoid adverse Main Turbine operation.		
	BOP	INITIATE load decrease using either of the following as directed by CRS: o Governor control o Load Limit control
	OTC	Refers to SOP-3.2 for boration
	OTC	DETERMINE RCS Boron concentration from reactor coolant sample analysis. o IF analysis following concentration adjustment is NOT yet available, ESTIMATE Boron concentration based on latest readings.

Op Test No.: 1	Scenario # 1	Event # 1	Page 8 of 29
Event Description:	Reduce Power		

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.
	OTC	DETERMINE magnitude of increase in Boron concentration necessary to accomplish desired reactivity change using one or more of the following references: o GRAPH CVCS-3A, Boration Nomograph for Hot RCS o GRAPH CVCS-3B, Boration Nomograph for Cold RCS o GRAPH CVCS-6, Boration - Dilution Tables o GRAPH RV-2, Total Power Defect (PCM) as a Function of Power and Boron Concentration at MOL o GRAPH RV-3, Differential Boron Worth (Hot Zero Power) at MOL o GRAPH RV-4, Total Temperature Defect (PCM) as a Function of Temperature and Boron Concentration at MOL o GRAPH RV-9, IP2 Cycle 15 Reactivity Equivalents o POP 1.2, Reactor Startup o 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.

Op Test No.: 1	Scenario # 1	Event # 1	Page 9 of 29
Event Description: Reduce Power			

Time	Position	Applicant's Actions or Behavior
	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.

NOTE

BATPs shifting to fast speed is verified by both counter operation and by the respective fast speed lights illuminating.

	OTC	VERIFY BATPs shift to fast speed.
	OTC	IF in manual, ADJUST FCV-110A, Boric Acid Flow Control, to obtain desired boric acid flow rate (may be greater than meter range).
	OTC	IF desired to maximize Boron flow, CLOSE the appropriate BATP recirculation valve. o HCV-104 Inlet — CVCS/Boric Acid Tank 22 BA o HCV-105 Inlet — CVCS/Boric Acid Tank 21 BA

Op Test No.: 1 Scenario # 1 Event # 1 Page 10 of 29

Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
	OTC	MONITOR Nuclear Instrumentation, Rod position, and RCS temperature closely during any reactivity changes.
	OTC	WHEN boration operation has been completed, PERFORM the following: o PLACE the RCS Makeup Control switch to STOP. o PLACE the Makeup Mode Selector switch to MANUAL. o ADJUST FCV-110A, Boric Acid Flow Control, dial setting to the new RCS Boron concentration per applicable CVCS Graph: o GRAPH CVCS-1A, Blended Makeup - (0-500) with 120 Gpm PW o GRAPH CVCS-1B, Blended Makeup - (0-2000) with 120 Gpm PW o 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.: 1	Scenario # 1	Event # 1	Page 11 of 29
Event Description: Reduce Power			

Time	Position	Applicant's Actions or Behavior
	OTC	PLACE the RCS Makeup Control switch to START.
	CRS	IF 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.
At Lead Evaluator's discretion, proceed to Event 2		

Op Test No.: 1	Scenario # 1	Event # 2	Page 12 of 29
Event Description: MFRV Fails Closed Slowly			

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **CNH PCS8D RAMP START 65 RAMP TIME 300 SEVERITY 25**		
	CRS	Refer to AOI 28.0, Instrument Failures, or 21.1.1, Loss of Feedwater
		Note: The following 2 steps are the actions of AOI-28.0
	OTC	VERIFY The Following Controls: • Turbine load - STABLE • Rod Control - STABLE • PRZR pressure control - NORMAL • PRZR level control - NORMAL • MBFP Speed - NORMAL • S/G levels – NORMAL
	OTC	Place 23 MFRV in MANUAL and restore SG level
		Note: The following steps are the actions of AOI-21.1.1. The crew may use either procedure to stabilize level prior to diagnosing the failure
	CRS	IF Main Feed Regulator Valve(MFRV) has failed, GO TO Section 5.7
	OTC	TRANSFER failed MFRV to MANUAL and RESTORE normal level

Op Test No.: 1	Scenario # 1	Event # 2	Page 13 of 29
Event Description:	MFRV Fails Closed Slowly		

Time	Position	Applicant's Actions or Behavior
	OTC	POSITION MBFP recirculation valve switch at the direction of the CRS o FCV-1115 21 MBFP Recirc Vlv o FCV-1116 22 MBFP Recirc Vlv
	CRS	IF SG Levels can be stabilized, GO TO step 5.13 to stabilize plant
	CREW	ADJUST TURBINE LOAD AS DIRECTED BY THE SM: VERIFY that both PORV block valves (MOV-535 and MOV-536) are closed. VERIFY that the MBFP recirculation valve switches are in AUTO o FCV-1115 21 MBFP Recirc Vlv o FCV-1116 22 MBFP Recirc Vlv ESTABLISH plant conditions as directed by the SM: o SHUT DOWN the Reactor per POP 3.1, Plant Shutdown from Full Power Operation to Zero Power Condition

Op Test No.: 1	Scenario # 1	Event # 3	Page 14 of 29
Event Description:	Pressurizer Level Channel Fails High		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **XMT RCS20A SEVERITY 100 RAMP TIME 180**		
	CRS	Refer to AOI-29.0, Instrument Failures
	OTC	VERIFY The Following Controls: • Turbine load - STABLE • Rod Control - STABLE • PRZR pressure control - NORMAL • PRZR level control - NORMAL • MBFP Speed - NORMAL • S/G levels – NORMAL
	OTC	Place Charging Pump Speed control in manual
	CRS	CHECK PRZR instrumentation – NORMAL o PRZR levels o GO to AOI 28.7 (Fails High), PRZR LEVEL CHANNEL FAILURE
	OTC	IF failed Channel is controlling Pressurizer level o TURN OFF any unnecessary Pressurizer back-up heaters o PLACE charging pump speed control in MANUAL o CONTROL Pressurizer level in normal band. (Refer to Graph, RCS-2, PRESSURIZER LEVEL vs. TAVE, in Graph Book).

Op Test No.: 1 Scenario # 1 Event # 3 Page 15 of 29

Event Description: Pressurizer Level Channel Fails High

Time	Position	Applicant's Actions or Behavior
	BOP	In Foxboro rack B6, PLACE Pressurizer Level Defeat switch (L 460A) to DEFEAT #, for affected channel
	OTC	RETURN charging pump speed control to AUTOMATIC
	OTC	RETURN Pressurizer bulk heater control to AUTOMATIC OR MANUAL as directed by SOP 1.4, Pressurizer Pressure Control
	BOP	PLACE Hi Level Trip Bistable Trip switch for affected channel in TRIP o 460, Rack A-12, WHITE
	CRS	VERIFY requirements of Technical Specification in Table 3.5-2 are met.
When Channel is removed from service, Proceed to Event 4		

Op Test No.: 1	Scenario # 1	Event # 4	Page 16 of 29
Event Description:	Feedwater Pump Trip Requiring Rapid Load Decrease to 700 MWe		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **MAL ATS7B**		
	CRS	Refer to AOI-21.1.1, Loss of Feedwater
	CRS	IF one MBFP has tripped, GO TO Section 5.3
	CREW	IF Turbine Load greater than 745 MWe, VERIFY automatic turbine runback has reduce Turbine Load to approximately 745 MWe o IF NOT, REDUCE Turbine Load to approximately 745 MWe using Load Limits (preferred) or Governor
NOTE The recirculation valve should remain closed UNTIL load has been stabilized		
	OTC	VERIFY the Recirculation Valve for tripped MBFP is closed
	OTC	IF necessary, ADJUST turbine load to MATCH Steam flows to Feedwater flows and MAINTAIN Steam Generator levels on program
CAUTION DO NOT exceed 5500 rpm or 98 percent Startup signal, whichever is reached first		
	OTC	IF necessary, PLACE MBFP Master Speed controller in manual and INCREASE speed to match Feed Flow to Steam Flow

Op Test No.: 1	Scenario # 1	Event # 4	Page 17 of 29
Event Description:	Feedwater Pump Trip Requiring Rapid Load Decrease to 700 MWe		

Time	Position	Applicant's Actions or Behavior
	OTC	VERIFY control rods are in AUTO
	OTC	IF rods are NOT responding, manually DRIVE rods in to control temperature
	BOP	VERIFY that the standby condensate pump is running
	BOP	VERIFY that 21 and 23 AFW Pumps are running
	BOP	VERIFY that the SGBD Isolation Valves are closed
	OTC	VERIFY that the turbine runback has terminated, as follows o Load Limit oil pressure stable o TURBINE RUNBACK ACTUATED alarm on Panel SEF(Window 3-8) extinguished
	OTC	IF the runback has NOT terminated, PLACE the Loss of MBFP Turbine Runback Control Switch in DEFEAT (Panel FAF).
When plant is stable, or at Lead Evaluator's discretion, proceed to Event 5		

Op Test No.: 1	Scenario # 1	Event # 5, 6, 7, 8, 9	Page 18 of 29
Event Description:	Feedwater Pump Trip. Reactor Trip Required. Auto Reactor Trip Failure. Manual Trip Required. TDAFW Trips; MDAFW Fails to Start; MDAFW Trips.		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **MAL ATS7A** **MOT AFW1A OPTION 2 SHAFT SEIZURE**		
	CRS	May refer to AOI-21.1.1
	CRS	Direct entry to E-0, Reactor Trip or Safety Injection
	OTC	Verify reactor trip: o Trip breakers open o Flux decreasing o Rod bottom lights lit o Rod position indicators all less than 7.5 inches
	OTC	Verify Turbine Trip o All stop valves closed
	BOP	Verify power to 480 Volt busses: o At least one energized: o 2A and 3A o 5A o 6A o All Energized

Op Test No.: 1 Scenario # 1 Event # 5, 6, 7, 8, 9 Page 19 of 29

Event Description: Feedwater Pump Trip. Reactor Trip Required. Auto Reactor Trip Failure. Manual Trip Required. TDAFW Trips; MDAFW Fails to Start; MDAFW Trips.

Time	Position	Applicant's Actions or Behavior
	OTC/BOP	Check if SI is actuated: o SI annunciator lit OR o Any SI pumps running
	CREW	Check if SI is required **(NO)**
	CRS	GO to ES-0.1 Reactor Trip Response
	OTC	Check RCS temperature stable at or trending to 547°F
	OTC	Check Generator Output breaker open
	BOP	Verify 480 volt busses energized by offsite power
	OTC	Check pressurizer level control: o Level greater than 18% o Charging and Letdown in service o Any CCW pump running o Level trending to 37%
	OTC	Check pressurizer pressure control: o Pressure greater than 1840 psig o Trending to 2235 psig

Op Test No.: 1	Scenario # 1	Event # 5, 6, 7, 8, 9	Page 20 of 29
Event Description:	Feedwater Pump Trip. Reactor Trip Required. Auto Reactor Trip Failure. Manual Trip Required. TDAFW Trips; MDAFW Fails to Start; MDAFW Trips.		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **MAL ATS5C**		
	CRS	Determine Red Path exists on Heat Sink CSF status tree. Direct transition to FR-H.1, Loss of Heat Sink
	OTC	Check if secondary heat sink is required: o RCS pressure greater than any non-faulted SG pressure o RCS temperature greater than 350°F
CAUTION o If average of the 3 lowest wide range SG levels is less than 41% (54% Adverse containment) due to loss of secondary heat sink, RCPs should be tripped and steps 9 – 15 should be immediately initiated for bleed and feed o City Water for AFW pumps will be necessary if CST level decreases to less than 2 ft o Radiation levels and harsh environment conditions should be evaluated prior to performing local actions		
	CREW	Determine Bleed and Feed criteria is met
	OTC	Trip RCPs
	OTC/BOP	Actuate SI o Train A o Train B

Op Test No.: 1	Scenario # 1	Event # 5, 6, 7, 8, 9	Page 21 of 29
Event Description:	Feedwater Pump Trip. Reactor Trip Required. Auto Reactor Trip Failure. Manual Trip Required. TDAFW Trips; MDAFW Fails to Start; MDAFW Trips.		

Time	Position	Applicant's Actions or Behavior

	OTC/BOP	Verify RCS Feed path
		o Check All SI pumps running
		o 22 SI pump discharge isolation MOV-851A and MOV-851B open
		o Check proper emergency SI valve alignment for operating pumps:
		  o SI pump cold leg injection valves open
		  o RHR HX CCW outlet valves open
		  o RHR HX Motor operated valves open
		o Check feed path established

		CAUTION o If offsite power is lost after SI reset, then manual action may be required to restart safeguards equipment o Placing key switches to DEFEAT will prevent auto SI actuation

	OTC/BOP	Reset SI
		o Check all CCW pumps running
		o Place controls for main and bypass feedwater regulating valves to close
		o Verify automatic safeguards actuation key switches on panel SB-2 in DEFEAT position
		  o Train A SIA-1
		  o Train B SIA-2
		o One at a time, depress safety injection reset buttons
		  o Train A
		  o Train B
		o Verify Train A and B reset

Op Test No.: 1 Scenario # 1 Event # 5, 6, 7, 8, 9 Page 22 of 29

Event Description: Feedwater Pump Trip. Reactor Trip Required. Auto Reactor Trip Failure. Manual Trip Required. TDAFW Trips; MDAFW Fails to Start; MDAFW Trips.

Time	Position	Applicant's Actions or Behavior
	BOP	Reset Containment isolation phase A and Phase B o Place IVSW switches to open on SN panel o Place CNTMT RAD MON WCPS valves control switch to open on SN panel o Verify personnel and equipment hatch solenoid control switches to incident on SN panel o Place control switches for all remaining Phase A isolation valves to close on SN panel o One at a time, depress Phase A reset pushbuttons o CI Phase A Train A o CI Phase A Train B o Verify Train A and B reset
	BOP	Check Phase B actuated (NO)
	BOP	Establish Instrument Air to Containment o Open PCV-128
	OTC	Establish RCS Bleed Path o Verify power to PRZR PORV Block Valves available o Verify PRZR POPRV Block Valves both open o Open both PORVs o Monitor PORV Nitrogen alarms
	OTC	Verify adequate bleed path o Both PORVs open o Both PORV block valves open

Op Test No.: 1	Scenario # 1	Event # 5, 6, 7, 8, 9	Page 23 of 29
Event Description:	Feedwater Pump Trip. Reactor Trip Required. Auto Reactor Trip Failure. Manual Trip Required. TDAFW Trips; MDAFW Fails to Start; MDAFW Trips.		

Time	Position	Applicant's Actions or Behavior
	OTC/BOP	Perform steps 1-9 of E-0, Reactor Trip or Safety Injection
Terminate scenario when RCS Bleed and Feed is established and verified		

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 24 of 29

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	Verify proper Charging system operation: a. Start at least one charging pump in manual at maximum speed b. Align charging pump suction to the RWST • Open charging pump suction valve from RWST 1. LCV-112B • Close charging pump suction valve from VCT 1. LCV-112C • Place RCS Makeup Control switch to STOP
		Note o **Notify CRS of any automatic actions that failed to occur during performance of this attachment** o **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 25 of 29

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Check status of 480 volt busses: a. All 480V busses – ENERGIZED BY OFF-SITE POWER b. Dispatch NPO to reset: o All lighting o MCC 24A o MCC 27A o MCC 29A c. Stop all Condensate Pumps
	BOP	Verify FW Isolation: 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	Check if Main Steam Lines should be isolated: a. Check for either: • 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 26 of 29

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Verify proper Service Water System operation: a. Three Service Water Pumps – Running on Essential Header b. Service Water valves from Diesel Generator - OPEN
	BOP	Verify SI system pumps running: 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: a. SI pump cold leg injection valves – OPEN o 856A o 856E o 856C o 856D b. RHR HX CCW outlet valves – OPEN o 822A o 822B c. RHR HX MOVs – OPEN o 746 o 747
	BOP	Verify Containment Fan Coolers – IN SERVICE: 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 27 of 29
Event Description:	Attachment 1, Automatic Action Verification		

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Containment Ventilation Isolation: a. Containment Purge Valves – CLOSED o FCV-1170 o FCV-1171 o FCV-1172 o FCV-1173 b. Containment Pressure Relief Valves - CLOSED • PCV-1190 • PCV-1191 • PCV-1192
		Note Attachment 2 provides a list of Phase A valves

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

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Containment Isolation Phase A a. Phase A – ACTUATED 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 o 1410 o 1413 o SOV-3518 o SOV-3519 d. WCP valves – OPEN: 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 o IVSW Tank o Level – GREATER THAN 92% o Pressure – GREATER THAN 57 PSIG o WCP header pressures – GREATER THAN 52 PSIG
Evaluator note: The following step is intended for High Containment pressure condition. It will not be performed if conditions aren't met		

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

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Check if Containment Spray should be actuated: a. Containment Pressure – EVER GREATER THAN 24 PSIG b. Verify spray pumps – RUNNING c. Verify spray pump discharge valves – OPEN 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 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.: 2 Op Test No.: 1

Examiners: _____ Candidates: _____ CRS

_____ _____ RO

_____ _____ PO

Initial Conditions: 100% power MOL

21 Charging Pump OOS

21 CCW Pump OOS

Small SG Tube Leak < 5 GPD

Turnover: Turbine 21 rupture disc is leaking. Reduce Power to 250 MWe at 200 MWe per hour and remove Main Turbine and Generator from service

Critical Tasks: Manual Turbine Trip

Initiate Emergency Boration

Event No.	Malf. No.	Event Type*	Event Description
1		R (RO) 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 (RO)	Turbine Trip failure
7	CVC9	C (ALL)	Boration failure

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

The crew 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 crew 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 crew 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 crew will respond using AOI-1.3. A reactor trip will be required, but will not automatically occur.

The RO 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 crew 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 1,0,D Place pump control switch in TPO
21 CCW Pump OOS:	LOA EPS13 1,0,D 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 crew to begin scenario brief approximately 30 minutes prior to entering simulator

Note: None

Scenario built from IC 2

- The plant is at 100% power, steady state conditions exist.
- Middle of Life, C_b is 862 ppm.
- EFPD = 340
- Control Bank D = 220 steps
- Tavg = 559°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.

Crew 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.

Op Test No.: 1	Scenario # 2	Event # 1	Page 5 of 27
Event Description:	Reduce Load		

Time	Position	Applicant's Actions or Behavior
	CRS	Refers to POP 3.1
	CRS	IF reducing Reactor Power for a maintenance support function, the SM SHALL DETERMINE the desired Reactor Power level OR 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, AND 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.
	OTC	IF necessary, PLACE rod control in MANUAL to maintain rods above the Insertion Limit.
	OTC	MAINTAIN delta flux within the target band.

Op Test No.: 1 Scenario # 2 Event # 1 Page 6 of 27

Event Description: Reduce Load

Time	Position	Applicant's Actions or Behavior
	CREW	IF PICS is NOT operable, PERFORM the following after load changes greater than 10% per AOI 29.12, Loss of PICS Computer: o Quadrant Power Tilt Calculation using DSR-4B, Quadrant Power Tilt Calculation Sheet (Technical Specification 3.10.10). o 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} AND 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	NOTIFY nuclear and conventional NPOs that load reduction is in progress.

Op Test No.: 1 Scenario # 2 Event # 1 Page 7 of 27

Event Description: Reduce Load

Time	Position	Applicant's Actions or Behavior
	CRS	DIRECT NPOs to perform the following during load reduction: o MONITOR Main Turbine Oil Temperatures o MONITOR Hydrogen Seal Oil Temperatures o MONITOR MBFP Oil Temperatures o BALANCE Heater Drain Tank Pump flows between the pump in Auto and Manual per SOP 19.1, Extraction Steam And Heater Drain Systems Operation. o IF SJAEs are in service, MAINTAIN Steam pressure per SOP 20.1, Condenser Air Removal System Operation, AND periodically CHECK SJAEs for backfiring. o IF FCV-1120, Flowpath A Controller Stop, is in MANUAL, ADJUST to maintain FCV-1113, Gland Steam Condenser Minimum Flow Control Valve, closed.
NOTE WHEN erratic governor operation is observed, governor oil pressure may be raised above the controlling load limit to avoid adverse Main Turbine operation.		
	OTC	INITIATE load decrease using either of the following as directed by CRS: o Governor control o Load Limit control
	OTC	Refers to SOP-3.2 for boration
	OTC	DETERMINE RCS Boron concentration from reactor coolant sample analysis. o IF analysis following concentration adjustment is NOT yet available, ESTIMATE Boron concentration based on latest readings.

Op Test No.: 1	Scenario # 2	Event # 1	Page 8 of 27
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.
	OTC	DETERMINE magnitude of increase in Boron concentration necessary to accomplish desired reactivity change using one or more of the following references: o GRAPH CVCS-3A, Boration Nomograph for Hot RCS o GRAPH CVCS-3B, Boration Nomograph for Cold RCS o GRAPH CVCS-6, Boration - Dilution Tables o GRAPH RV-2, Total Power Defect (PCM) as a Function of Power and Boron Concentration at MOL o GRAPH RV-3, Differential Boron Worth (Hot Zero Power) at MOL o GRAPH RV-4, Total Temperature Defect (PCM) as a Function of Temperature and Boron Concentration at MOL o GRAPH RV-9, IP2 Cycle 15 Reactivity Equivalents o POP 1.2, Reactor Startup o 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.

Op Test No.: 1 Scenario # 2 Event # 1 Page 9 of 27

Event Description: Reduce Load

Time	Position	Applicant's Actions or Behavior
	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.
		NOTE BATPs shifting to fast speed is verified by both counter operation and by the respective fast speed lights illuminating.
	OTC	VERIFY BATPs shift to fast speed.
	OTC	IF in manual, ADJUST FCV-110A, Boric Acid Flow Control, to obtain desired boric acid flow rate (may be greater than meter range).
	OTC	IF desired to maximize Boron flow, CLOSE the appropriate BATP recirculation valve. o HCV-104 Inlet — CVCS/Boric Acid Tank 22 BA o HCV-105 Inlet — CVCS/Boric Acid Tank 21 BA

Op Test No.: 1 Scenario # 2 Event # 1 Page 10 of 27

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	WHEN boration operation has been completed, PERFORM the following: o PLACE the RCS Makeup Control switch to STOP. o PLACE the Makeup Mode Selector switch to MANUAL. o ADJUST FCV-110A, Boric Acid Flow Control, dial setting to the new RCS Boron concentration per applicable CVCS Graph: o GRAPH CVCS-1A, Blended Makeup - (0-500) with 120 Gpm PW o GRAPH CVCS-1B, Blended Makeup - (0-2000) with 120 Gpm PW o 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.: 1	Scenario # 2	Event # 1	Page 11 of 27
Event Description: Reduce Load			

Time	Position	Applicant's Actions or Behavior
	OTC	PLACE the RCS Makeup Control switch to START.
	CRS	IF 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.
At Lead Evaluator's discretion, proceed to Event 2		

Op Test No.: 1	Scenario # 2	Event # 2	Page 12 of 27
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**		
	CRS	Refers to AOI-28.0, Instrument Failures
	OTC	VERIFY The Following Controls: o Turbine load - STABLE o Rod Control - STABLE o PRZR pressure control - NORMAL o PRZR level control - NORMAL o MBFP Speed - NORMAL o S/G levels – NORMAL
		Note: The instrumentation steps can be performed in any order
	OTC	CHECK PRZR instrumentation - NORMAL: o PRZR pressures o PRZR levels
	OTC	CHECK S/G instrumentation – NORMAL o S/G levels o S/G pressures o S/G feedwater flow o S/G steam flows

Op Test No.: 1	Scenario # 2	Event # 2	Page 13 of 27
Event Description:	First Stage Shell Pressure PT-412B Fails Low		

Time	Position	Applicant's Actions or Behavior
	OTC	CHECK RCS instrumentation: o CHECK RCS loop temperatures: o Loop Tavg – NORMAL o Actual loop ΔT – NORMAL o CHECK Power Range Channels – NORMAL o CHECK RCS coolant loop flow channels – NORMAL
	CRS	CHECK Turbine first stage pressure – NORMAL o 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
	CREW	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

Op Test No.: 1	Scenario # 2	Event # 2	Page 14 of 27
Event Description:	First Stage Shell Pressure PT-412B Fails Low		

Time	Position	Applicant's Actions or Behavior
	BOP	IF tripping Steam Flow SI bistables will NOT cause an SI, THEN TRIP bistable for the failed channel o Loop 1B High SF SI (White A-11) o Loop 2B High SF SI (White A-10) o Loop 3B High SF SI (White A-11) o Loop 4B High SF SI (White A-10)
	CREW	IF it has been determined that the failed component will not effect rod control and/or steam dumps, they may be returned to AUTOMATIC per CR/SM direction o RETURN rod control to AUTOMATIC o RESET loss of load interlock o ENSURE steam dump controller is returned to temperature mode
When Hi Steam Flow bistables have been tripped or at Lead Evaluator's discretion, proceed to Event 3		

Op Test No.: 1	Scenario # 2	Event # 3	Page 15 of 27
Event Description:	CCW Pump Trip.		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following commands: **MOT CCW2 Option 2 CCW pump 22 shaft seizure** **HTX CVC6 Option 1 VALUE 50 RAMP 15:00 TBHX LEAK** **SLF RCP7A VALUE 10 RAMP 10:00 21 RCP HIGH VIBRATION WITH 5 MINUTE DELAY** *Note: Allow entry to AOI-4.1.2, Leakage into CCW system, prior to initiating the vibration alarm. Either select an appropriate timer or wait until after procedure is in use.*		
	CRS	Refers to AOI-4.1.1, Loss of Component Cooling
	BOP	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 o IF NOT, START additional CCW Pumps as necessary to provide the required CCW flow o IF CCW Pump discharge pressure can NOT be maintained greater than 107 psig with two pumps in service, INITIATE a plant shutdown in accordance with Technical Specification 3.3.E.2
	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 16 of 27
Event Description:	RCP TBHX Leak. RCP Vibration		

Time	Position	Applicant's Actions or Behavior
Initiated on timed sequence from previous event:		
	CRS	Refer to AOI-4.1.2, Leakage into Component Cooling System
	BOP	VERIFY automatic actions in Section 3 have occurred o If CC Surge tank level is increasing, close RCV-017
	CRS	DIRECT NPO to CLOSE 831, Surge Tank Makeup Valve
NOTE 835 Surge Tank Relief Valve is set at 52 psig		
	BOP	MONITOR CCW Surge Tank Pressure / Level AND WHUT Level to detect lifting of 835, Surge Tank Relief Valve
NOTE IF the leaking component is known, Operator may go directly to appropriate Attachment with approval of the SWS, to isolate the in-leakage		
	CREW	If surge tank level is increasing, isolate sources of leakage one at a time using the following attachments: o Attachment 1, RCP Thermal Barrier
Evaluator note: Attachment 1 is included at end of scenario guide.		
Proceed to Event 5 when attachment 1 is complete or at Lead Evaluator's discretion		

Op Test No.: 1	Scenario # 2	Event # 5, 6, 7	Page 17 of 27
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
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)**		
	CREW	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 o Attempt to manually trip reactor
	CRS	Direct entry to FR-S.1, Response to Nuclear Power Generation/ATWS
	CREW	Verify reactor trip o Attempt to manually trip the reactor o Manually insert control rods o Dispatch NPO to locally trip reactor trip breakers or MG set breakers
Critical Task	OTC	Verify Turbine trip o Manually trip the turbine
	BOP	Check AFW pumps running

Op Test No.: 1	Scenario # 2	Event # 5, 6, 7	Page 18 of 27
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
	BOP	Initiate emergency boration o Start Charging pumps o Open MOV-333 (Will not Open)
Critical Task	BOP	Align one of the following flowpaths o RWST flow path o Open LCV-112B o Close LCV-112C o Place Makeup control switch to STOP o Establish maximum charging flow **OR** o Normal boration flow path o FCV-110 in MANUAL o Both boric acid pumps in high speed o Adjust FCV-110 for maximum flow
Booth Instructor: When boration is initiated, remove Reactor trip malfunctions to allow rods to drop		
	OTC	Check PRZR pressure less than 2335 psig
CAUTION Radiation levels and harsh environment conditions should be evaluated prior to performing local actions		
	BOP	Verify containment ventilation isolation o Containment Purge valves closed o Containment pressure relief valves closed

Op Test No.: 1	Scenario # 2	Event # 5, 6, 7	Page 19 of 27
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
		CAUTION If an SI signal exists or occurs, steps 1-9 of E-0 should be performed while continuing with this procedure
	BOP	Perform Steps 1-9 of E-0, Reactor Trip or Safety Injection
		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.
	OTC	Check if the following trips have occurred o Reactor trip o Turbine trip o Dispatch NPO to open MG set output breakers
		CAUTION City Water for AFW pumps will be necessary if CST level decreases to less than 2 feet
	OTC	Check SG levels o NR level in at least one SG greater than 10% o Control feed flow to maintain 10-50%
	OTC	Verify dilution paths isolated o FCV-111A closed o FI-111 no flow indicated

Op Test No.: 1	Scenario # 2	Event # 5, 6, 7	Page 20 of 27
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
	OTC	Check for reactivity insertion from uncontrolled cooldown o Check RCS temperature decreasing in an uncontrolled manner o Check any SG pressure decreasing in an uncontrolled manner o 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 22)
	OTC	Check RCS temperature stable at or trending to 547°F (NO) o 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 21 of 27

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

Time	Position	Applicant's Actions or Behavior
	OTC	Check if any SG is faulted o Any SG depressurizing in an uncontrolled manner o Any SG depressurizing
	CREW	Check if SG tubes are intact (YES)
	CREW	Check if RCS is intact (YES)
	CREW	Check if SI should be terminated (YES)
	CRS	Direct transition to ES-1.1, SI Termination

Terminate scenario when transition is announced to ES-1.1

Op Test No.: 1	Scenario # All	Event # Attachment 1	Page 22 of 27
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	Verify proper Charging system operation: a. Start at least one charging pump in manual at maximum speed b. Align charging pump suction to the RWST • Open charging pump suction valve from RWST o LCV-112B • Close charging pump suction valve from VCT o LCV-112C • Place RCS Makeup Control switch to STOP
		Note o **Notify CRS of any automatic actions that failed to occur during performance of this attachment** o **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 23 of 27

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Check status of 480 volt busses: a. All 480V busses – ENERGIZED BY OFF-SITE POWER b. Dispatch NPO to reset: o All lighting o MCC 24A o MCC 27A o MCC 29A c. Stop all Condensate Pumps
	BOP	Verify FW Isolation: 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	Check if Main Steam Lines should be isolated: a. Check for either: • 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 24 of 27

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Verify proper Service Water System operation: a. Three Service Water Pumps – Running on Essential Header b. Service Water valves from Diesel Generator - OPEN
	BOP	Verify SI system pumps running: 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: a. SI pump cold leg injection valves – OPEN o 856A o 856E o 856C o 856D b. RHR HX CCW outlet valves – OPEN o 822A o 822B c. RHR HX MOVs – OPEN o 746 o 747
	BOP	Verify Containment Fan Coolers – IN SERVICE: 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 25 of 27
Event Description:	Attachment 1, Automatic Action Verification		

Time	Position	Applicant's Actions or Behavior
	BOP	Verify AFW flow to all SGs
	BOP	Verify Containment Ventilation Isolation: a. Containment Purge Valves – CLOSED o FCV-1170 o FCV-1171 o FCV-1172 o FCV-1173 b. Containment Pressure Relief Valves - CLOSED • PCV-1190 • PCV-1191 • PCV-1192
		Note Attachment 2 provides a list of Phase A valves

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 26 of 27

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Containment Isolation Phase A a. Phase A – ACTUATED 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 o 1410 o 1413 o SOV-3518 o SOV-3519 d. WCP valves – OPEN: 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 o IVSW Tank o Level – GREATER THAN 92% o Pressure – GREATER THAN 57 PSIG o WCP header pressures – GREATER THAN 52 PSIG
		Evaluator note: The following step is intended for High Containment pressure condition. It will not be performed if conditions aren't met

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 27 of 27

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Check if Containment Spray should be actuated: a. Containment Pressure – EVER GREATER THAN 24 PSIG b. Verify spray pumps – RUNNING c. Verify spray pump discharge valves – OPEN 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 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

Initial Conditions: 6% power BOL

Plant startup in progress

Turnover: Raise power and synchronize the Main Generator

Critical Tasks: Stop SI pumps

Isolate ruptured SG

Event No.	Malf. 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

The crew 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 RO 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 crew 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 crew is shutting the plant down, the tube leak will increase in severity. The crew 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 crew 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 PPL030B 1

Materials needed for scenario:

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

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

Note: None

Scenario built from IC 20

- 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 = 157 steps
- Tavg = 547°F
- RCS Pressure = 2235 psig
- Pressurizer Level = 37%
- Risk Assessment = GREEN
- Daily Risk Factor = 0.83

The following equipment is out of service:

None

Crew 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.: 1	Scenario # 3	Event # 1	Page 5 of 29
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
	CRS	REQUEST the DO to indicate which generator breaker (7 or 9) is to be used for synchronizing
	BOP	PLACE Bkr 7 or 9 Sync Pot Control Selector switch in the appropriate position
	BOP	VERIFY Synchroscope Switch is in MAN
CAUTION At synchronization, the Main Transformer Secondary voltage should be 8 to 20 KV greater than system voltage		
	BOP	UNLESS directed otherwise by the DO, slowly ADJUST the AC regulator UNTIL 346 to 358 KV (nominally 350 KV) on the high side of the generator main power transformers has been established
	BOP	ADJUST Turbine speed UNTIL the Synchroscope is observed to be rotating slowly in the fast direction

Op Test No.: 1 Scenario # 3 Event # 1 Page 6 of 29

Event Description: Raise reactor power. Synchronize Main Generator.

Time	Position	Applicant's Actions or Behavior
		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	WHEN the Synchroscope is between one minute BEFORE 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
		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
	CREW	VERIFY Generator output voltage is within the capability limits in Graph EL-1, Capability Curve Voltage Regulator in Service and Out of Service
		NOTE o Refer to Graph EL-3, Generator Load Changing Curves. o The maximum Generator H_2 heat up rate is 10°C/hr (18°F/hr.)

Op Test No.: 1	Scenario # 3	Event # 1	Page 7 of 29
Event Description:	Raise reactor power. Synchronize Main Generator.		

Time	Position	Applicant's Actions or Behavior
	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		
NOTE o 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. o The load increase to 40 MWe should be done at a rate at which the operator is comfortable (approximately 10 to 15 minutes). o 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

Op Test No.: 1 Scenario # 3 Event # 1 Page 8 of 29

Event Description: Raise reactor power. Synchronize Main Generator.

Time	Position	Applicant's Actions or Behavior
	BOP	WHEN 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
CAUTION o The Synchroscope should NOT rotate when the second breaker is selected, since there should be no phase difference across the breaker. o If the Synchroscope is rotating, do NOT close second breaker		
	BOP	CLOSE the second breaker with the DO's permission
	OTC	WHEN 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 o BLOCK the intermediate range trip and rod stop o OBSERVE the INTERMED RANGE TRIP BLOCKED light is illuminated o BLOCK the low power range trip o OBSERVE the LOW PWR RANGE TRIP BLOCKED light is illuminated o VERIFY the LOW POWER PERMISSIVE BLOCK NOT ENGAGED Alarm clears
	BOP	INITIATE Steam Generator Blowdown per SOP 7.1, Steam Generator Blowdown System Operation
CAUTION If the Main Generator is carrying greater than 40 MWe, do NOT transfer the auxiliary loads		

Op Test No.: 1	Scenario # 3	Event # 1	Page 9 of 29
Event Description:	Raise reactor power. Synchronize Main Generator.		

Time	Position	Applicant's Actions or Behavior
	BOP	PRIOR 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
When busses are transferred or at Lead Evaluator's discretion, proceed to Event 2		

Op Test No.: 1	Scenario # 3	Event # 2	Page 10 of 29
Event Description:	Tcold Instrument Fails High		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **XMT RCS036A FIXED OUTPUT: TE-411B RCS LOOP 21 COLD LEG TEMP 600**		
	CRS	Refers to AOI-28.0, Instrument Failures
	CREW	VERIFY The Following Controls: o Turbine load - STABLE o Rod Control - STABLE o PRZR pressure control - NORMAL o PRZR level control - NORMAL o MBFP Speed - NORMAL o S/G levels – NORMAL
	CREW	CHECK PRZR instrumentation - NORMAL: o PRZR pressures o PRZR levels
	CREW	CHECK S/G instrumentation – NORMAL o S/G levels o S/G pressures o S/G feedwater flow o S/G steam flows
	CREW	CHECK RCS instrumentation: o CHECK RCS loop temperatures: o Loop Tavg – NORMAL o Actual loop ΔT – NORMAL o CHECK Power Range Channels – NORMAL o CHECK RCS coolant loop flow channels – NORMAL

Op Test No.: 1 Scenario # 3 Event # 2 Page 11 of 29

Event Description: Tcold Instrument Fails High

Time	Position	Applicant's Actions or Behavior
	CRS	GO to AOI 28.1, NARROW RANGE HOT/COLD LEG TEMPERATURE CHANNEL FAILS HIGH/LOW
	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
	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 OR T/412B) to DEFEAT LOOP #, for affected loop
	BOP	In Foxboro Rack B8, PLACE DELTA-T DEFEAT switch (T/411A OR T/411B) to DEFEAT LOOP #, for affected loop
	OTC	PLACE Rod Control Bank selector switch in AUTO, UNLESS directed otherwise by the CRS
	OTC	RETURN charging pump speed control to AUTOMATIC

Op Test No.: 1 Scenario # 3 Event # 2 Page 12 of 29

Event Description: Tcold Instrument Fails High

Time	Position	Applicant's Actions or Behavior
	CRS	REFER to Technical Specification Tables 3.5-2, 3.5-3, 3.5-4 AND Bistable Trip status lights on Panel SO to determine if tripping Bistable trip switches will cause a Reactor Trip
	BOP	IF tripping the Bistable Trip Switches will NOT cause a Reactor Trip, THEN TRIP the appropriate Loop Bistable trip switches per Table 1, List of Loop Temperature Bistable Trip Switches
When bistables are tripped or at Lead Evaluator's discretion, proceed to Event 3		

Op Test No.: 1	Scenario # 3	Event # 3	Page 13 of 29
Event Description:	Steam Generator Tube Leak		

Time	Position	Applicant's Actions or Behavior
		Booth Instructor: When directed, insert the following command: **MAL RCS14C ACT,0.005,0,0,0,D**
		NOTE o 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 o 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 (≤10% increase during a 1 hour period), then the time interval may be relaxed to 2 hours
	CRS	IF a significant increase is observed on R-45, PERFORM the following o NOTIFY Health Physics o PERFORM Leak Rate Estimate per Attachment 8
		Booth Instructor Note: If requested for leak rate attachment calculation, air In-Leakage is 12 SCFM. RCS activity is 0.06 µCi/cc
	CRS	IF steam is available on the secondary side, DIRECT Chemistry to perform Leak Rate Calculation o MAINTAIN steady state conditions while Chemistry performs Leak Rate Calculation o PERFORM Attachment 5, Page , at least once every 15 minutes

Op Test No.: 1	Scenario # 3	Event # 3	Page 14 of 29
Event Description:	Steam Generator Tube Leak		

Time	Position	Applicant's Actions or Behavior
		NOTE o The leak rates specified in Step 3 apply to leakage in any one steam generator. IF it is not practical to assign the leakage to an individual steam generator, all leakage should be assumed to be from one steam generator o WHEN available, the Nitrogen 16 Monitor SHALL be used for the initial determination of leak rate. (Note: N-16 not available below 30% power)
	CREW	CHECK Primary To Secondary Leak Rate o Leak Rate - GREATER THAN 5 GPD
	CREW	Leak Rate - GREATER THAN OR EQUAL TO 30 GPD
		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
	CREW	Leak Rate - GREATER THAN 75 GPD AND INCREASED BY 30 GPD IN LAST HOUR MONITORED IN AT LEAST 30 MINUTES INTERVALS
		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.

Op Test No.: 1	Scenario # 3	Event # 3	Page 15 of 29
Event Description:	Steam Generator Tube Leak		

Time	Position	Applicant's Actions or Behavior
	CREW	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 AND in hot shutdown within 2 additional hours.
When decision is made to shut down the unit, proceed to Event 4		

Op Test No.: 1	Scenario # 3	Event # 4, 5, 6	Page 16 of 29
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 ACT,5,0,0,0,D** **XMT SGN43 1,1400,600,0,C,JBKRTA.EQ.0**
	CRS	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 24 of this scenario guide)**
	OTC	Verify AFW pumps running
	OTC	Verify total AFW flow greater than 400 GPM

Op Test No.: 1	Scenario # 3	Event # 4, 5, 6	Page 17 of 29
Event Description:	SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure		

Time	Position	Applicant's Actions or Behavior
		CAUTION 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
	OTC	Verify SI system flow o RCS pressure less than 1660 psig o SI pump flow indicated o RCS pressure less than 320 psig (NO) o Place one RHR pump in PULLOUT
	OTC	Check RCP seal cooling o 3 CCW pumps running o CCW flow to RCP thermal barriers normal o Service Water system aligned for 3 header operation o Locally verify SWN-4 and SWN-5 closed o Start one Service Water pump on Non-Essential header on bus supplied by off-site power
		CAUTION If adverse containment conditions exist, use wide range cold leg temperatures to determine RCS temperature
	OTC	Check RCS temperature stable at or trending to 547°F (NO) o Manually close Atmospheric Dump valve for 23 SG (Failed open due to failed pressure transmitter)
	OTC	Check PRZR PORVs and spray valves closed

Op Test No.: 1	Scenario # 3	Event # 4, 5, 6	Page 18 of 29
Event Description:	SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure		

Time	Position	Applicant's Actions or Behavior
	OTC	Check if RCPs should be stopped (NO)
	OTC	Check if any SG is faulted o Any SG depressurizing in an uncontrolled manner o Any SG depressurizing
	CREW	Check if SG tubes are intact (NO)
	CRS	Direct transition to E-3, Steam Generator Tube Rupture
CAUTION FRPs should NOT be implemented prior to completion of E-0, Reactor Trip or Safety Injection, Attachment 1, Automatic Action Verification		
	OTC	Check if RCPs should be stopped
CAUTION Radiation levels and harsh environment conditions should be evaluated prior to performing local actions		
	OTC	Identify Ruptured SG o 23 SG ruptured
CAUTION o 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 o At least one SG must be maintained available for RCS cooldown		

Op Test No.: 1 Scenario # 3 Event # 4, 5, 6 Page 19 of 29

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

Time	Position	Applicant's Actions or Behavior
Critical Task (Isolation actions)	OTC	Isolate flow from ruptured SG o Atmospheric Dump valve in AUTO set at 74% o Atmospheric Dump valve closed Note: In manual due to transmitter failure
	OTC	Check 22 and 23 SGs intact (NO) o Dispatch NPO to close MS-42 steam to TDAFW pump
	BOP	Verify blowdown isolation valves from 23 SG closed
	CRS	Dispatch NPO o Close steam traps upstream of ruptured SG MSIV o Verify ruptured SG MSIV bypass closed Close ruptured SG MSIV
CAUTION If any ruptured SG is faulted, feed flow to that SG should remain isolated during subsequent recovery actions unless needed for RCS cooldown		
	OTC	Check ruptured SG NR level greater than 10% o Stop feed flow to 23 SG
CAUTION 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		

Op Test No.: 1	Scenario # 3	Event # 4, 5, 6	Page 20 of 29
Event Description:	SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure		

Time	Position	Applicant's Actions or Behavior
	OTC	Verify ruptured SG pressure greater than 440 psig
		CAUTION o 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 o To prevent steamline isolation, steam dump to condenser should NOT exceed 0.5E6 lbm/hr per SG
	OTC	Initiate RCS cooldown o Determine required core exit temperature o Dump steam to condenser from intact SGs at maximum rate not to exceed 0.5E6 lbm/hr per SG o Condenser available o Steam Dump control to manual with zero output o Place steam dump in pressure control o Stop cooldown when desired temperature is achieved
	OTC	Check intact SG NR levels greater than 10% o Control feed to maintain 10-50% NR level
	OTC	Check PRZR PORVs and Block Valves o Power available to block valves o PORVs closed o At least one block valve open o Open one block valve

Op Test No.: 1	Scenario # 3	Event # 4, 5, 6	Page 21 of 29
Event Description:	SGTR, Atmospheric Dump Valve on ruptured SG fails open; CIA reset failure		

Time	Position	Applicant's Actions or Behavior
		CAUTION o If offsite power is lost after SI reset, then manually action may be required to restart safeguards equipment o Placing key switches to DEFEAT will prevent auto SI actuation
	BOP	Reset SI
	BOP	Reset CIA o Must manually reset train 'A' relay.
	BOP	Establish Instrument Air to containment
		CAUTION 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
	BOP	Check if RHR pumps should be stopped o Stop RHR pumps and place in auto
		CAUTION 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
	OTC	Establish charging flow o At least one charging pump running o Align suction to RWST o Establish maximum flow

Op Test No.: 1 Scenario # 3 Event # 4, 5, 6 Page 22 of 29

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

Time	Position	Applicant's Actions or Behavior
	OTC	Check if RCS cooldown should be stopped o Core exit TCs less than required
	OTC	Check ruptured SG pressure stable or increasing
	OTC	Check RCS subcooling based on CETs greater than required
	OTC	Depressurize RCS to minimize break flow and refill pressurizer o Normal spray available o Depressurize until pressurizer level is 71%, OR o RCS pressure less than SG pressure and PRZR level greater than 14% OR o RCS subcooling less than required
	OTC	Stop depressurization
CAUTION SI must be terminated when SI termination criteria are satisfied to prevent overfilling the ruptured SG		

Op Test No.: 1 Scenario # 3 Event # 4, 5, 6 Page 23 of 29

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

Time	Position	Applicant's Actions or Behavior
	OTC	Check if SI flow can be terminated o RCS subcooling greater than required on table o Secondary heat sink, either 400 gpm AFW flow or 10% NR in at least one SG o RCS pressure stable or increasing o PRZR level greater than 14%
Critical Task	OTC	Stop SI pumps and place in AUTO
Terminate scenario when SI pumps are secured		

Op Test No.: 1	Scenario # All	Event # Attachment 1	Page 24 of 29
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	Verify proper Charging system operation: a. Start at least one charging pump in manual at maximum speed b. Align charging pump suction to the RWST • Open charging pump suction valve from RWST 1. LCV-112B • Close charging pump suction valve from VCT 1. LCV-112C • Place RCS Makeup Control switch to STOP
		Note o **Notify CRS of any automatic actions that failed to occur during performance of this attachment** o **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 25 of 29

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Check status of 480 volt busses: a. All 480V busses – ENERGIZED BY OFF-SITE POWER b. Dispatch NPO to reset: o All lighting o MCC 24A o MCC 27A o MCC 29A c. Stop all Condensate Pumps
	BOP	Verify FW Isolation: 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	Check if Main Steam Lines should be isolated: a. Check for either: • 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 26 of 29

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Verify proper Service Water System operation: a. Three Service Water Pumps – Running on Essential Header b. Service Water valves from Diesel Generator - OPEN
	BOP	Verify SI system pumps running: 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: a. SI pump cold leg injection valves – OPEN o 856A o 856E o 856C o 856D b. RHR HX CCW outlet valves – OPEN o 822A o 822B c. RHR HX MOVs – OPEN o 746 o 747
	BOP	Verify Containment Fan Coolers – IN SERVICE: 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 27 of 29
Event Description:	Attachment 1, Automatic Action Verification		

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Containment Ventilation Isolation: a. Containment Purge Valves – CLOSED o FCV-1170 o FCV-1171 o FCV-1172 o FCV-1173 b. Containment Pressure Relief Valves - CLOSED • PCV-1190 • PCV-1191 • PCV-1192
Note Attachment 2 provides a list of Phase A valves		

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

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Containment Isolation Phase A a. Phase A – ACTUATED 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 o 1410 o 1413 o SOV-3518 o SOV-3519 d. WCP valves – OPEN: 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 o IVSW Tank o Level – GREATER THAN 92% o Pressure – GREATER THAN 57 PSIG o WCP header pressures – GREATER THAN 52 PSIG
Evaluator note: The following step is intended for High Containment pressure condition. It will not be performed if conditions aren't met		

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

Event Description: Attachment 1, Automatic Action Verification

Time	Position	Applicant's Actions or Behavior
	BOP	Check if Containment Spray should be actuated: a. Containment Pressure – EVER GREATER THAN 24 PSIG b. Verify spray pumps – RUNNING c. Verify spray pump discharge valves – OPEN 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 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