Facility: IP3 Scenario No.: 3 Op Test No.: 1

Examiners: _____ Candidates: _____ CRS

_____ _____ RO

_____ _____ PO

Initial Conditions: 45% power BOL
32 Charging Pump OOS
32 Heater Drain Pump OOS
Small SG Tube Leak < 25 GPD

Turnover: Reduce Power and remove Main Turbine and Generator from service

Critical Tasks: Restore AC Power
Stop ECCS pumps

Event No.	Malf. No.	Event Type*	Event Description
1		R (RO) N (BOP) N (CRS)	Reduce power.
2	NIS7D	I (ALL)	PR NI failure high
3	MSS4D	C (RO/CRS)	Steam Flow transmitter fails low
4	EPS4F	C (BOP/CRS)	Loss of 6.9 KV bus 6 DG output breaker fail to auto close
5	EPS6 EPS4C	M (ALL)	Loss of Off Site power. Loss of 6.9 KV bus 3. Reactor trip.
6	DSG1B DSG1C OVR EPS29	C (ALL)	Two Running DGs trip. 480 volt bus 3A tie breaker trips open.
7	SIS7A	C (ALL)	Inadvertent SI

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

The crew will assume the shift and commence a load reduction IAW POP-3.1.

Shortly after the power reduction is underway, power range channel N44 will fail high. The RO will take manual control of rods IAW ONOP-NI-1. The BOP will defeat the failed channel inputs. The CRS will determine appropriate Technical Specification action.

A Steam Flow transmitter failure will cause the associated Feedwater Regulating valve to fail in the closed direction. The crew will swap steam flow inputs IAW ONOP-RPC-1.

When the plant is stabilized, 6.9KV bus 6 will de-energize. The crew will check equipment operation IAW ONOP-EL-7. The standby Charging Pump will be started manually. Subsequently, a loss of off-site power and a loss of 6.9KV bus 3 will require reactor trip.

Subsequent to the reactor trip, 32 and 33 DGs will trip, and the tie breaker to 480V bus 3A will fail to close, requiring entry to ECA-0.0, Loss of All AC Power.

An inadvertent SI actuation will occur subsequent to the trip. 480V bus 5A will be restored by local emergency diesel start, allowing exit from ECA-0.0. The crew will then perform the action required to terminate SI.

EOP flow path: E-0 – ECA-0.0 – E-0 – ES-1.1

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

RESET TO IC-38

32 Charging Pump OOS:	OVR CVC47A 2 OVR CVC47C 2 OVR CVC47D 1 OVR CVC47F 2 OVR CVC47G 2
32 HDP Pump OOS:	OVR FWH2A 2 OVR FWH2C 2 OVR FWH2D 1 OVR FWH2F 2 OVR FWH2G 2
EDG 32 Breaker fail to AUTO close:	OVR DSG6A 1 OVR DSG6C 2 OVR DSG6D 1 OVR DSG6E 2 OVR DSG6F 2
EDG trip on reactor trip:	MAL DSG1C ACT,0,C,JPPLP4 MAL DSG1B ACT,0,C,JPPLP4
Bus 3A Tie Breaker fail to close:	OVR EPS29D 1 OVR EPS29F 2

Materials needed for scenario:

- POP-3.1
- Graph Book
- Tags for tagged equipment
- OA-99-29 (Operator Aid)
- Daily Reactivity Sheet

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

Note: Simulator IC data sheet has Condensate Booster Pumps in Trip Pullout

Scenario built from IC 19

- The plant is at 45% power, steady state conditions exist.
- Beginning of Life, C_b is 1581 ppm.
- Burnup = 150 MWD/MTU
- Control Bank D = 166 steps
- Tavg = 556°F
- RCS Pressure = 2235 psig
- Pressurizer Level on program (33%)

The following equipment is out of service:

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

Crew instructions:

- The plant has been at 45% power for 2 days due to Main Generator abnormalities at higher power levels
- In accordance with POP-3.1, reduce power to 20% at 100 MWe per hour in preparation for removing the Turbine Generator from service for material inspection.
- The STA will perform 3PT-V053B, Power Reduction Surveillance Requirements

Op Test No.: 1 Scenario # 3 Event # 1 Page 5 of 35

Event Description: Reduce Power.

Time	Position	Applicant's Actions or Behavior
	CRS	Refers to POP-3.1, step 4.1
	CRS	CONDUCT a brief using Attachment 7, POP-3.1 Briefing Guide
	CRS	INITIATE performance of the following attachments as required: o Attachment 1, Watch Routines/Operating Limits o Attachment 6, POP-3.1 Expected Alarms
	CRS	ENTER starting power level and desired ending power level
	CRS	N/A, initial, and date all inappropriate steps
	CRS	Obtain Shift Manager permission to reduce load and continue performance of this attachment.
	CRS	Notify Entergy system operator of load reduction

Op Test No.: 1	Scenario # 3	Event # 1	Page 6 of 35
Event Description:	Reduce Power.		

Time	Position	Applicant's Actions or Behavior
	CRS	Commence performance of 3PT-V053B, Power Reduction Surveillance Requirements. **Note: STA will perform**
	BOP	Initiate generator load decrease to desired generator load at desired rate using any of the following: o Governor (preferred) o Load Limit 1 o Load Limit 2
	BOP	Adjust Feedwater Regulators manual setpoint to null manual-auto deviation: o Maintain FW Regulators nulled while continuing with this attachment
	RO	WHEN Turbine power is approximately 40%, THEN VERIFY Power Below C-20 lamp illuminates
	RO	Initiates boration IAW SOP-CVCS-3
NOTE Reactivity changes shall be closely monitored by observation of different parameters such as NIs, MWs, Tavg, Tref, Control Rods, and ΔT		
	RO	Determine required increase in boron concentration

Op Test No.: 1 Scenario # 3 Event # 1 Page 7 of 35

Event Description: Reduce Power.

Time	Position	Applicant's Actions or Behavior
	RO	Determine the volume of boric acid required for boration by using any of the following: o CCR Reactivity Summary Sheet o CCR Computer program o CVCS-5, Boration Nomograph Hot RCS o CVCS-6, Boration Nomograph Cold RCS o The Boration/Dilution book from Westinghouse (Operator Aid)
	RO	Set YIC-110, Boric Acid Flow Integrator, for required volume of boron
	RO	Set FCV-110A, Boric Acid Flow Control Blender, controller to desired flow rate
	RO	Ensure Boric Acid Trans Pump speed switches are in slow
	RO	Ensure in-service Boric Acid Transfer Pump is in AUTO
	RO	Place RCS Makeup Mode Selector switch in BORATE
	RO	Turn RCS Makeup Control switch to START and return switch to NORM

Op Test No.: 1 Scenario # 3 Event # 1 Page 8 of 35

Event Description: Reduce Power.

Time	Position	Applicant's Actions or Behavior
	RO	Observe the following as applicable: o IF RX critical, THEN Tavg o IF rods in AUTO, THEN control bank position o IF RX subcritical, THEN count rate
	RO	IF any of the following occurs, THEN immediately STOP boration: o Rod motion is in wrong direction or becomes blocked o Subcritical count rate increases AND a deliberate approach to criticality is NOT in progress o Tavg increases o Axial flux target band is exceeded o RCP seal injection flow becomes erratic
NOTE WHEN boric acid integrator reaches preset value, THEN boration will automatically terminate		
	RO	IF performing additional boration without flushing of lines, THEN DEPRESS Integrator Reset P.B. o Return to Step 4.4.8 (Turn RCS Makeup control switch to START and RETURN switch to NORM)
	RO	WHEN boration operation is complete, THEN FLUSH makeup lines with a minimum of 20 gallons of blended makeup per Step 4.2
Proceed to Event 2 at Lead Evaluator's discretion		

Op Test No.: 1	Scenario # 3	Event # 2	Page 9 of 35
Event Description: PR NI Failure			

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **MAL NIS7D ACT,200,480,0**		
	CRS	Refers to ONOP-NI-1
	RO	May place rod control in MANUAL
	CRS	Go to attachment 3
	RO	Place rod control in MANUAL
	RO	Maintain Tave on program with Tref o Adjust control rods in manual o Adjust turbine load or boron concentration as necessary
CAUTION If core operating above 75% power with one excore nuclear channel out of service, Technical Specifications require that a core quadrant power balance be determined (PER RA-11.1) at least once per day using movable incore instrumentation		
NOTE Refer to Tech Specs Table 3.3.1-1 (Completion times associated with Function 17 have 1 hour completion times)		

Op Test No.: 1	Scenario # 3	Event # 2	Page 10 of 35
Event Description: PR NI Failure			

Time	Position	Applicant's Actions or Behavior
	CREW	Verify only 1 Power Range Channel inoperable
	BOP	Remove affected channel from service as per SOP-NI-1 **(Evaluator Note: Procedure for removing N-44 from service is attached to back of scenario guide)**
	CRS	Refers to Tech Specs 3.2.3, 3.2.4, 3.3.1

Proceed to Event 3 when directed by the Lead Evaluator or upon instruction to place rods in AUTO

Op Test No.: 1	Scenario # 3	Event # 3	Page 11 of 35
Event Description:	Steam Flow Transmitter fails low		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **MAL MSS4D ACT,0,180,0**		
	CRS	Refers to ONOP-RPC-1, 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 SG levels – NORMAL**(NO)**
	CREW	PERFORM the following: o If affected instrument has caused a turbine runback, then perform the following: o OPEN 31 DC Distribution panel, circuit 16 o OPEN 32 DC Distribution panel, circuit 16 o If SG control is affected, then place affected SG transfer switches to non-affected channel (Flight Panel) o **STM GEN NO 32 STM FL CONT TRANSFER** o **STM GEN NO 32 FW FL CONT TRANSFER** o If automatic control has failed, then perform the following: o Place affected control system in MANUAL o Control affected system to stabilize plant conditions

Op Test No.: 1	Scenario # 3	Event # 3	Page 12 of 35
Event Description:	Steam Flow Transmitter fails low		

Time	Position	Applicant's Actions or Behavior
		NOTE o Positive reactivity additions using control rods require CRS or SM approval and shall be made slowly and incrementally o Substeps of step 2 may be performed in any order o If a bistable failure is suspected with no other indications, then entry into the appropriate attachment is permitted
	RO	Check the following instrumentation: o RCS loop temperatures normal o Check ΔT setpoints o Power Range channels o Overpower ΔT o Overtemperature ΔT o RCS coolant loop flow channels o PRZR instrumentation
	RO	Check SG Instrumentation – NORMAL o SG Levels o SG Pressures o SG Feedwater Flow o SG Steam Flow **(NO)**
	CRS	Go to Attachment 11, SG Steam Flow Channel Failures
	BOP	Perform Attachment 11 **(Evaluator note: Attachment 11 is attached to the back of this scenario guide)**
	CRS	Refer to Technical Specification 3.3.2 Condition D for failure of FI-429B

Op Test No.: 1	Scenario # 3	Event # 3	Page 13 of 35
Event Description:	Steam Flow Transmitter fails low		

Time	Position	Applicant's Actions or Behavior

When Attachment 11 is complete or at the discretion of the Lead Evaluator, proceed to Event 4

Op Test No.: 1	Scenario # 3	Event # 4	Page 14 of 35
Event Description:	Loss of 6.9 KV Bus 6; DG Output Breaker Fail to Auto Close		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **MAL EPS4F ACT**		
	CRS	Refers to ONOP-EL-7, Loss of a 480 Volt Bus Above Cold Shutdown
	RO	Check RCP seal cooling o Check charging pumps – ANY RUNNING o Start Charging pump o Control speed to maintain 6-12 gpm seal injection
	BOP	Check Service Water Header Pressure – GREATER THAN 60 psig o Non-Essential Header o Essential Header o Start 34 Service Water Pump
	BOP	Check status of Circ Pumps o At least one per condenser running o All running o Reduce load as necessary to maintain greater than 25.5" vacuum o Refer to ONOP-RW-2 if necessary

Op Test No.: 1	Scenario # 3	Event # 4	Page 15 of 35
Event Description:	Loss of 6.9 KV Bus 6; DG Output Breaker Fail to Auto Close		

Time	Position	Applicant's Actions or Behavior
		NOTE o TSB 3.8.9 states the cross-tie between bus 5A and 2A, and the cross-tie between bus 3A and 6A shall be open above Mode 5 o Rod bottom lights and rod position indicators will only indicate correctly if Bus 2A and MCC-36C are energized o It is acceptable for FCV-111A to be in AUTO and closed
	RO	Check in- service Boric Acid Transfer Pump running
	BOP	Check EDG status o Check EDG for affected 480V bus - energized by EDG **(NO)**
	RO/BOP	Check ABFP status o Check ABFPs – ANY RUNNING (NO)
	CREW	Check any waste release in progress **(NO)**
	BOP	Check Service Water Headers – Between 60 psig and 97.5 psig o Non-Essential o Essential

Op Test No.: 1	Scenario # 3	Event # 4	Page 16 of 35
Event Description:	Loss of 6.9 KV Bus 6; DG Output Breaker Fail to Auto Close		

Time	Position	Applicant's Actions or Behavior
		CAUTION Different CCW pump combinations could result in surge tank levels changes
	BOP	Check Component Cooling Water status: o Check CCW low pressure alarms on panel SGF – CLEAR o Check CCW pumps – 3 running o Verify Thermal Barrier cooling established ▪ Thermal Barrier CCW Header Low flow alarm on panel SGF – CLEAR
	RO	Verify Seal Injection flows – BETWEEN 6 and 12 gpm
	BOP	Check IA header pressure greater than 90 psig
	BOP	Check 480V busses energized by 6.9 KV busses o Check bus 6A – ENERGIZED BY 6.9 KV Bus **(NO)**
	CRS	Go to Attachment 2
	BOP	Performs Attachment 2 **(Evaluator note: Attachment 2 is attached to the back of this scenario guide)**

Op Test No.: 1	Scenario # 3	Event # 4	Page 17 of 35
Event Description:	Loss of 6.9 KV Bus 6; DG Output Breaker Fail to Auto Close		

Time	Position	Applicant's Actions or Behavior
	CRS	Evaluate Tech Spec impact o LCO 3.8.1 o LCO 3.8.9
When NPO is directed to shut down 32 EDG or at discretion of Lead Evaluator, proceed to Event 5		

Op Test No.: 1	Scenario # 3	Event # 5, 6, 7	Page 18 of 35
Event Description:	Loss of Off-Site Power. Running DGs Trip. Inadvertent SI		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **MAL EPS6 ACT (Station Aux Transformer failure)** **MAL EPS4C ACT (Loss of 6.9 KV Bus 3)**		
	CREW	Determine Loss of Off-Site power has occurred. Loss of 6.9 KV Bus 3 has occurred. Reactor Trip.
	CRS	Opens E-0, Reactor Trip or Safety Injection **(May go directly to ECA-0.0)**
	RO	Verify Reactor Trip o Reactor trip and Bypass breakers open o Rod bottom lights lit o Rod position indication less than 20 steps o Neutron flux decreasing
	RO	Verify turbine trip o All turbine stop valves closed
	BOP	Verify all 480V AC Busses energized by offsite power **(NO)**
	CRS	Directs transition to ECA-0.0, Loss of All AC Power

Op Test No.: 1	Scenario # 3	Event # 5, 6, 7	Page 19 of 35
Event Description:	Loss of Off-Site Power. Running DGs Trip. Inadvertent SI		

Time	Position	Applicant's Actions or Behavior
		NOTE o CSF Status Trees should be monitored for information only. FRPs should NOT be implemented. o Normal communication channels may be unavailable without AC power. Radios should be used by watch personnel outside the control room
	RO	Verify Reactor Trip o Reactor trip and Bypass breakers open o Neutron flux decreasing
	RO	Isolate Main Steam o Manually close all MSIVs o Check MSIV Bypass valves closed
		Booth Instructor: *If request has been made to restore EDG Power Supply to 480 volt busses, Start 33 EDG NOW by inserting the following commands, THEN report that 33 EDG is RUNNING:* **MAL DSG1C CLR** **LOA DSG30 T** *If request has NOT been made yet, be prepared to start 33 EDG IMMEDIATELY when requested in step 6.a of ECA-0.0 using the commands above*

Op Test No.: 1 Scenario # 3 Event # 5, 6, 7 Page 20 of 35

Event Description: Loss of Off-Site Power. Running DGs Trip. Inadvertent SI

Time	Position	Applicant's Actions or Behavior
	RO	Check if RCS is isolated: o Check PRZR PORVs closed o Close Letdown Isolation Valves o 459 o 460 o 200A-C o Check Excess Letdown stop valves closed o CH-AOV-213A o CH-AOV-213B o Check Resid HR LP Bypass To Demin closed o CH-HCV-133 o Close sample isolation valves o SP-AOV-956A,C,E,G o SP-AOV-956B,D,F,H o Secure any radwaste release in progress
	BOP	Maintain SG levels using Turbine driven AFW pump o Check 32 AFW pump running o Maintain 32 AFW pump discharge pressure greater than or equal to 150 psi above highest SG pressure o Adjust HC-118, ABFP Turb Speed control o Check SG levels – ANY greater than 9% **(NO)** o Maintain AFW flow greater than 365 gpm until 1 NR SG level is >9% o Preferentially restore level to 32 or 33 SG first o Establish level in 1 SG at a time and maintain feed flow to other SGs less than 100 gpm

Op Test No.: 1	Scenario # 3	Event # 5, 6, 7	Page 21 of 35
Event Description:	Loss of Off-Site Power. Running DGs Trip. Inadvertent SI		

Time	Position	Applicant's Actions or Behavior
		CAUTION An Essential Service Water pump should be kept available to automatically load on its 480V bus to provide diesel generator cooling
	BOP/ RO	Determine status of Bus 2A and 3A o Check bus 2A and 3A – EITHER energized **(YES)** o Attempt to close Bus no. 2A to 3A tie o Check Bus 2A energized o Check the following equipment running o 32 CCW pump o 32 Service Water pump
		CAUTION Use extreme caution whenever attempting AC power restoration from multiple sources simultaneously
		Booth Instructor: When requested, and prior to procedure step 6.d, immediately Emergency start 33 EDG: **MAL DSG1C CLR (Clears malfunction)** **LOA DSG30 T (Resets the trip)** *Report that 33 EDG is RUNNING and that 32 EDG 86 relay would NOT reset*
CRITICAL TASK	CRS	Try to restore power to any 480V AC safeguards bus o Dispatch NPO to emergency start all EDGs and energize any 480V bus per SOP-EL-1 o Contact and inform CON ED D.O. of urgent need for AC power o Attempt to energize any 480V AC bus using any of the following: o EDGs per SOP-EL-1 o Offsite power per SOP-EL-5
	CRS	Check 480V AC Safeguards busses – ANY Energized o 2A and 5A – **(YES)**

Op Test No.: 1	Scenario # 3	Event # 5, 6, 7	Page 22 of 35
Event Description:	Loss of Off-Site Power. Running DGs Trip. Inadvertent SI		

Time	Position	Applicant's Actions or Behavior
	BOP	Verify at least 2 ESW pumps running **(YES)**
Booth Instructor: When BOP verifies 2 ESW pumps running, insert the following command: **MAL SIS7A ACT**		
	CRS	Check ECA-0.0, entered directly (YES OR NO)
	CRS	Go to E-0, Reactor Trip or Safety Injection (Step 1 or 3)
	RO	Verify reactor trip: o Reactor trip and bypass breakers open o Rod bottom lights lit o Rod position indicators less than 20 steps o Neutron flux decreasing
	RO	Verify Turbine Trip: o Verify all turbine stop valves closed
	BOP	Verify 480V AC Busses – All energized by offsite power

Op Test No.: 1	Scenario # 3	Event # 5, 6, 7	Page 23 of 35
Event Description:	Loss of Off-Site Power. Running DGs Trip. Inadvertent SI		

Time	Position	Applicant's Actions or Behavior
	Crew	Determine if SI is actuated o Any SI annunciator lit OR o SI pumps – ANY RUNNING **(YES)** o Manually actuate SI o Close MSIVs
	BOP	Check AFW status: o Verify total AFW flow – greater than 365 gpm o Control feed flow to maintain SG NR levels between 9%(14%) and 50%
CAUTION Starting of equipment must be coordinated with all control room operators to ensure that two components are NOT started at the same time on the same power supply		
	CRS	Direct BOP operator to perform RO-1, BOP operator actions during use of EOPs (steps begin on page 27 of this guide)
	RO	Verify Feedwater Isolation: o Verify MBFPs tripped o Verify MBFP discharge valves closed o BFD-MOV-2-31 o BFD-MOV-2-32 o Verify Main and Bypass feedwater isolated o Main and Bypass FW MOVs closed OR o Main (SNF panel) and Bypass FW FRVs closed

Op Test No.: 1	Scenario # 3	Event # 5, 6, 7	Page 24 of 35
Event Description:	Loss of Off-Site Power. Running DGs Trip. Inadvertent SI		

Time	Position	Applicant's Actions or Behavior
	RO	Check SG Blowdown: o SG Blowdown isolation valves closed o SG Sample isolation valves closed
	RO	Verify SI flow: o Check RCS pressure less than 1650 psig (2000 psig)**(NO)** o Check HHSI pump flow indicators – Flow indicated o Check RCS pressure less than 325 psig (650 psig) **(NO)**
	RO	Verify Containment Spray NOT required: o Check containment pressure has remained less than 22 psig
	RO	Check RCP seal cooling: o Verify CCW flow to RCP thermal barriers o RCP BEARING COOLANT LOW FLOW alarm on panel SGF clear o THERMAL BARRIER CCW HEADER LOW FLOW alarm on panel SGF clear o Trip RCPs
Booth Instructor: When directed to open CH-288, immediately insert the following command: **LOA CVC34 1**		
	RO	Establish charging flow

Op Test No.: 1	Scenario # 3	Event # 5, 6, 7	Page 25 of 35
Event Description:	Loss of Off-Site Power. Running DGs Trip. Inadvertent SI		

Time	Position	Applicant's Actions or Behavior
	RO	Check RCS Tcold temperature stable at or trending to 547°F
	RO	Check if RCPs should be stopped o Already tripped
	RO	Check PRZR PORVs, Safety Valves, and Spray Valves o Check both PRZR PORVs – CLOSED o Check PRZR Safety Valves – CLOSED o Tailpipe temperatures normal o Acoustic monitors normal o Check normal PRZR Spray Valves closed o Check CH-AOV-212 closed
	RO	Determine if SGs are faulted: o Check SG pressures: o ANY DECREASING IN AN UNCONTROLLED MANNER (NO)
	CREW	Determine if SG tubes are ruptured: o Condenser Air ejector radiation recorder trends – NORMAL o SG Blowdown Radiation recorder trends – NORMAL o Main Steam Line radiation recorder trends – NORMAL o All intact SG level response – NORMAL
	CREW	Determine if RCS is intact: o Containment pressure – NORMAL o Containment sump level – NORMAL o Containment radiation – NORMAL

Op Test No.: 1 Scenario # 3 Event # 5, 6, 7 Page 26 of 35

Event Description: Loss of Off-Site Power. Running DGs Trip. Inadvertent SI

Time	Position	Applicant's Actions or Behavior
	Crew	Determine if SI should be terminated: o Check RCS subcooling based on qualified CETs greater than 40°F o Check secondary heat sink o Total AFW to intact SGs greater than 365 psig available, OR o Intact SG NR levels – ANY greater than 9% (14%) o RCS pressure o Greater than 1650 psig (2000 psig) o Stable or increasing o Pressurizer level greater than 14%
	CRS	Go to ES-1.1, SI Termination
	RO/BOP	Reset SI as follows: o Check verification of SI automatic actions of steps 2 – 12 of RO-1 is complete o Press BOTH SI RESET pushbuttons on Panel SBF-2: a. Train 1 SI Reset b. Train 2 SI Reset o Check SI – RESET a. SI ACTUATED light – EXTINGUISHED

Op Test No.: 1 Scenario # 3 Event # 5, 6, 7 Page 27 of 35

Event Description: Loss of Off-Site Power. Running DGs Trip. Inadvertent SI

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Reset Containment Isolation Phase A and Phase B as follows: o Place switches for letdown orifice isolation valves to close: o 200A o 200B o 200C o Reset Phase A o Reset Phase B, if required **(NO)**
	CRS	Direct BOP operator to initiate performance of attachment 3, Re-establishing operator control of valves following phase A reset
	RO	Establish Instrument Air to containment: o Check INST AIR LOW PRESS alarm on panel SJF clear o Press Instr. Air Reset PB 28 on panel SMF o Open IA-PCV-1228, Inst Air to Cont.
Critical task	RO	Stop SI pumps and place in AUTO o SI pumps o RHR pumps
Terminate scenario when SI pumps are off		

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 28 of 35

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
	BOP	Monitor Control Room Annunciators: a. Acknowledge all Supervisory Panel Alarms as time permits b. Report all unusual alarms affecting accident response to CRS c. Monitor status of the following alarms: • HIGH CONT ATMOS TEMP/RTD FAILURE – CLEAR • 480 V SAFEGUARDS UNDERVOLTAGE – CLEAR
		Caution **Starting of equipment must be coordinated with the CRS to ensure that two components are not started at the same time on the same power supply.**
	BOP	Verify SI Pumps – RUNNING a. THREE SI pumps b. TWO RHR pumps
	BOP	Verify Containment FCU status: a. Check FCUs – ALL RUNNING b. Place FCU Damper control switch in – INCIDENT MODE position c. Check FCU dampers for all FCUs – IN INCIDENT MODE POSITION • Dampers A/B – CLOSED (inlet) • Damper C – CLOSED (bypass) • Damper D – OPEN (outlet) d. Place control switches for 1104 and 1105 to OPEN e. Check Service Water Cooling Valves – OPEN • 1104 • 1105
	BOP	Verify SI Valve alignment – Proper Emergency Alignment

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 29 of 35

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
		a. Verify Safeguard Valve Off Normal Position alarm on panel SBF-1 – CLEAR b. Ensure BIT Discharge valves 1835A, 1835B – OPEN c. Ensure BIT Inlet valves 1852A, 1852B – OPEN d. Ensure High Head Stop valves 856J, 856H, 856C, 856E – OPEN e. If RWST purification loop in service, then secure system per SOP-SI-3
	BOP	Verify ABFP status: a. Check Motor Driven Pumps – BOTH RUNNING b. Check Turbine Driven Pump – RUNNING
	BOP	Verify ABFP valve alignment: a. If Motor Driven AFW pump(s) are running, ensure SG Aux FW Reg valve controllers – Set to 0% (full open) • FCV-406A • FCV-406B • FCV-406C • FCV-406D b. Check SG Blowdown Isolation Valves - CLOSED

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 30 of 35

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
	BOP	Verify CCW Pump status: a. Check CCW pumps – ALL RUNNING b. Check RHR HX CCW Shutoff valve – OPEN
	BOP	Verify Essential Service Water Pumps – Three Running
	BOP	Verify Containment Isolation Phase A: a. Check Phase A – ACTUATED b. Check Phase A valves – CLOSED • Refer to Attachment 2, Phase A valve closure list
	BOP	Verify Containment Ventilation Isolation: a. Check Purge Valves – CLOSED • FCV-1170 • FCV-1171 • FCV-1172 • FCV-1173 b. Check Pressure Relief valves – CLOSED • PCV-1190 • PCV-1191 • PCV-1192 c. Check WCCPP low pressure zone alarm – NOT LIT d. Verify IVSW Valves – OPEN • IV-AOV-1410 • IV-AOV-1413 • IV-SOV-6200 • IV-SOV-6201
	BOP	Verify Emergency Diesel Generator status:

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 31 of 35

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
		a. Check EDGs – ALL RUNNING b. Check Both EDG SWS Outlet Flow Control Valves – OPEN • SWN-FCV-1176 • SWN-FCV-1176A c. Dispatch NPO to set switches for both EDG SWS Outlet Flow Control Valves to OPEN: • SWN-FCV-1176 • SWN-FCV-1176A
	BOP	Verify Control Room Ventilation: a. SET Control Room ventilation control switch to – 10% INCIDENT MODE (switch position 3) b. Check Damper status Dampers A, B, F1, F2 • A – DIM • B – BRIGHT • Either F1 OR F2 – BRIGHT Dampers D1 and D2 – BRIGHT c. Verify AC Compressors and fans – ALL RUNNING • ACC 31A ON – BRIGHT • ACC 31B ON – BRIGHT • ACC 32A ON – BRIGHT • ACC 32B ON – BRIGHT • ACF 31 ON – BRIGHT • ACF 32 ON – BRIGHT

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 32 of 35

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Emergency DC Oil Pumps status: • Main turbine emergency bearing oil pump – RUNNING • Dispatch NPO to verify main generator air side seal oil backup pump – RUNNING • MBFP DC emergency oil pump – RUNNING
	BOP	Reset SI as follows: a. Press BOTH SI RESET pushbuttons on Panel SBF-2: • Train 1 SI Reset • Train 2 SI Reset b. Check SI – RESET • SI ACTUATED light – EXTINGUISHED
	BOP	Reset MCCs as follows: a. Dispatch NPO to secure VC sump pumps and RCDT pumps on Waste Disposal panel b. Dispatch NPO to align and reset MCCs per SOP-EL-15

Note to examiner:
The following step is designed to stop actions of RO-1 IF the CRS has transitioned to ES-1.1. The BOP will continue in RO-1 if there is transition to other procedures, but any time ES-1.1 is entered, the BOP will inform the CRS of automatic action verification and RO-1 will be suspended.

Op Test No.: 1	Scenario # All	Event # Attachment 1	Page 33 of 35
Event Description:	RO-1, BOP Operator Actions During EOPs		

Time	Position	Applicant's Actions or Behavior
	BOP	Check if additional SI actions should be performed: a. Check if the CRS has transitioned to – ES-1.1 b. Perform the following: • Inform the CRS of the status of automatic action verification • If E-0 has been exited, THEN continue with step 17 • If E-0 has NOT been exited, then wait until E-0 is exited. When E-0 is exited, then recheck this step
	BOP	Perform the following: a. Dispatch NPO to perform the following: • Close SWN-FCV-1111 and SWN-FCV-1112 b. Check Condensate Pumps – ONLY ONE RUNNING. c. SECURE all but one Condensate Pump d. Initiate the following section of SOP-EL-15 • Alignment of City water Cooling
	BOP	Reset Containment isolation Phase A and Phase B as follows: a. PLACE switches for letdown orifice isolation valves to CLOSE: • 200A • 200B • 200C b. RESET Phase A c. RESET Phase B, if actuated

Time	Position	Applicant's Actions or Behavior
	BOP	Establish Instrument Air and Nitrogen to containment: a. Establish IA to containment: • Check INST AIR LOW PRESS alarm on panel SJF – CLEAR • DEPRESS Inst Air reset pushbutton 28 • CHECK IA-PCV-1228, Inst Air to Cont. – OPEN b. ESTABLISH PRZR PORV N2 supply: • PRESS Accumulator N2 Supply Reset pushbutton 44 • Check 863, Accumulator N2 Supply Valve – OPEN
	BOP	Check if one non-essential Service Water pump should be started: a. Check Off-Site power to at least one Non-Essential service Water Pump – AVAILABLE b. Check SWN-FCV-1111 and SWN-FCV-1112 – CLOSED c. START one Non-Essential Service Water pump
	BOP	Check status of off-site power: a. VERIFY all AC Busses: • Energized by off-site power AND • All 480V tie breakers open

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

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
		NOTE **It is permissible for operators to perform board clean-up actions (steps 22-29 of RO1, BOP OPERATOR ACTIONS DURING USE OF EOPs) while performing actions of other EOPs; provided this does not interfere with other EOPs in progress.** **EVALUATOR NOTE: The remainder of the steps in this attachment are highlighted (High Level) action only.**
	BOP	Re-align secondary plant
	BOP	Check secondary valve position
	BOP	Check Heater Drain Pumps 31 and 32 Tripped
	BOP	Check plant equipment status
	BOP	Determine if Source Range detectors should be energized
	BOP	Start AC Oil Pumps and Stop DC Oil pumps as follows
	BOP	Check Long Term Plant status
	BOP	Inform CRS that RO-1 is complete and advise on the status of actions

Facility: IP3 Scenario No.: 4 Op Test No.: 1

Examiners: _____ Candidates: _____ CRS

_____ _____ RO

_____ _____ PO

Initial Conditions: 94% power EOL

32 Charging Pump OOS

31 AFW Pump OOS

Small SG Tube Leak < 25 GPD

Turnover: Main Condenser rupture disc is leaking. Reduce Power to 50 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	TUR10B	(CRS)	First Stage Shell Pressure PT-412B fails low
3	MSS3	I (RO) I (CRS)	Steam Pressure transmitter 404 fails high
4	CCW1A		CCW Pump Trip.
5	RCS10C RCS7C	C (ALL)	RCP TBHX leak. RCP vibration
6	XMT38 XMT39 XMT40	M (ALL)	RCP sheared shaft; ATWS
7	TUR2A TUR2B	C (RO)	Turbine Trip failure
8	CVC16	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-2.1.

First Stage Shell Pressure transmitter PT-412B will fail low. The crew will place steam dumps in Pressure Control Mode and will bypass AMSAC IAW ONOP-RPC-1. The CRS will refer to Technical Specifications.

When actions are complete, Steam pressure transmitter PT-404 will fail high, causing Feed Pump speed to increase and Feed Regulating Valves to throttle closed. The crew will respond by placing Feed Pump Speed Control and steam dumps in manual IAW ONOP-FW-1.

A running CCW pump will trip. The standby pump will automatically start. The crew will respond IAW ONOP-CC-1. A TBHX leak will develop, and manual action to isolate the TBHX will be taken IAW ONOP-CC-2.

During the TBHX tube leak, RCP vibration will rise, eventually resulting in failure of the RCP shaft. The crew will refer to ARP-13 and ONOP-RCS-5. A reactor trip will be required based on Low RCS Loop Flow, 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 to be used for emergency boration.

EOP flow path: E-0 – FR-S.1 – E-0 – ES-0.1

Indian Point Unit 3
2003 NRC Initial License Examination
Simulator Scenario Setup
Scenario 4

RESET TO IC-39

32 Charging Pump OOS:	OVR CVC47A 2 OVR CVC47C 2 OVR CVC47D 1 OVR CVC47F 2
31 ABFP OOS:	OVR AFW9A 2 OVR AFW9C 2 OVR AFW9D 1 OVR AFW9F 2
ATWS:	MAL RPS2A ACT MAL RPS2B ACT OVR EPS24D,2,0 OVR EPS24G,2,0 OVR EPS17D,2,0 OVR EPS17G,2,0
Boration failure:	OVR CVC16A 1 OVR CVC16C 1 OVR CVC16D 2 OVR CVC16B 2

Materials needed for scenario:

- POP-2.1
- Graph Book
- Tags for tagged equipment
- OA-99-29 (Operator Aid)
- Daily Reactivity Sheet

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

Note: Simulator IC data sheet has Condensate Booster Pumps in Trip Pullout

Scenario built from IC 12

- The plant is at 94% power, steady state conditions exist.
- End of Life, C_b is 14 ppm.
- Burnup = 23135 MWD/MTU
- Control Bank D = 213 steps
- Tavg = 565.3°F
- RCS Pressure = 2235 psig
- A small Steam Generator Tube Leak exists on 33 SG, less than 5 gallons per day.

The following equipment is out of service:

- 32 Charging Pump. Return expected in approximately 6 hours.
- 31 Auxiliary Boiler Feed Pump. Return to service in approximately 8 hours. Action of ITS 3.7.5.b entered 4 hours ago.

Crew instructions:

- One LP Turbine Main Condenser Rupture Disc is leaking.
- In accordance with POP-2.1, reduce generator load to 50 MWe at a rate of 200 MWe per hour and remove the Main Turbine and Generator from service to facilitate rupture disc repair.

Op Test No.: 1 Scenario # 4 Event # 1 Page 5 of 29

Event Description: Reduce Load

Time	Position	Applicant's Actions or Behavior
	CRS	Refers to POP-2.1, step 4.3.1 o Refer to Attachment 1, Watch Routines/Operating Requirements
	CRS	Refers to POP-2.1, step 4.3.2 o Go to Attachment 3, Reactor Power Reduction Checklist, for lowering plant load
	CRS	Enter starting power level and desired ending power level
	CRS	Record reason for load reduction
	CRS	Ensure a reactivity calculation for power reduction is performed. (Attachment 5 may be used as necessary)
	CRS	If reactor power is less than 100%, then N/A, initial, and date all inappropriate steps
	CRS	Obtain Shift Manager permission to reduce load and continue performance of this attachment.
	CRS	Notify Entergy system operator of load reduction

Op Test No.: 1	Scenario # 4	Event # 1	Page 6 of 29
Event Description: Reduce Load			

Time	Position	Applicant's Actions or Behavior
	CRS	Commence performance of 3PT-V053B, Power Reduction Surveillance Requirements.
	CRS	Perform a reactivity briefing for pending load change
	RO	If RCS boron concentration will be changed by 10 ppm or greater, then energize all PRZR backup heaters
	BOP	Initiate generator load decrease to desired generator load at desired rate using any of the following: o Governor (preferred) o Load Limit 1 o Load Limit 2
	BOP	Adjust Feedwater Regulators manual setpoint to null manual-auto deviation: o Maintain FW Regulators nulled while continuing with this attachment
	RO	Initiates boration IAW SOP-CVCS-3
NOTE Reactivity changes shall be closely monitored by observation of different parameters such as NIs, MWs, Tavg, Tref, Control Rods, and ΔT		
	RO	Determine required increase in boron concentration

Op Test No.: 1 Scenario # 4 Event # 1 Page 7 of 29

Event Description: Reduce Load

Time	Position	Applicant's Actions or Behavior
	RO	Determine the volume of boric acid required for boration by using any of the following: o CCR Reactivity Summary Sheet o CCR Computer program o CVCS-5, Boration Nomograph Hot RCS o CVCS-6, Boration Nomograph Cold RCS o The Boration/Dilution book from Westinghouse (Operator Aid)
	RO	Set YIC-110, Boric Acid Flow Integrator, for required volume of boron
	RO	Set FCV-110A, Boric Acid Flow Control Blender, controller to desired flow rate
	RO	Ensure Boric Acid Trans Pump speed switches are in slow
	RO	Ensure in-service Boric Acid Transfer Pump is in AUTO
	RO	Place RCS Makeup Mode Selector switch in BORATE
	RO	Turn RCS Makeup Control switch to START and return switch to NORM

Op Test No.: 1	Scenario # 4	Event # 1	Page 8 of 29
Event Description: Reduce Load			

Time	Position	Applicant's Actions or Behavior
	RO	Observe the following as applicable: o IF RX critical, THEN Tavg o IF rods in AUTO, THEN control bank position o IF RX subcritical, THEN count rate
	RO	IF any of the following occurs, THEN immediately STOP boration: o Rod motion is in wrong direction or becomes blocked o Subcritical count rate increases AND a deliberate approach to criticality is NOT in progress o Tavg increases o Axial flux target band is exceeded o RCP seal injection flow becomes erratic
NOTE WHEN boric acid integrator reaches preset value, THEN boration will automatically terminate		
	RO	IF performing additional boration without flushing of lines, THEN DEPRESS Integrator Reset P.B. o Return to Step 4.4.8 (Turn RCS Makeup control switch to START and RETURN switch to NORM)
	RO	WHEN boration operation is complete, THEN FLUSH makeup lines with a minimum of 20 gallons of blended makeup per Step 4.2
Proceed to Event 2 at Lead Evaluator's discretion		

Op Test No.: 1	Scenario # 4	Event # 2	Page 9 of 29
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: **MAL TUR10B ACT,0,120,0**		
	CRS	Refers to ONOP-RPC-1, 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 SG levels – NORMAL
NOTE o Positive reactivity additions using control rods require CRS or SM approval and shall be made slowly and incrementally o Substeps of step 2 may be performed in any order o If a bistable failure is suspected with no other indications, then entry into the appropriate attachment is permitted		

	RO	Check the following instrumentation:
		o RCS loop temperatures normal
		o Check ΔT setpoints
		  o Power Range channels
		  o Overpower ΔT
		  o Overtemperature ΔT
		o RCS coolant loop flow channels
		o PRZR instrumentation

Op Test No.: 1 Scenario # 4 Event # 2 Page 10 of 29

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

Time	Position	Applicant's Actions or Behavior
	RO	Check SG Instrumentation – NORMAL ○ SG Levels ○ SG Pressures ○ SG Feedwater Flow ○ SG Steam Flow
	CREW	Check Turbine first stage pressure – NORMAL **(NO)**
	CRS	Go to attachment 12, Turbine First Stage Pressure Channel Failures
	RO/BOP	Performs attachment 12 **(Evaluator note: Att. 12 procedure is attached to the end of this scenario guide)**
	CRS	Refer to Technical Requirements Manual 3.1.A for AMSAC

When Steam Dumps are in Pressure Control Mode in accordance with attachment 12, proceed to Event 3

Op Test No.: 1	Scenario # 4	Event # 3	Page 11 of 29
Event Description:	Steam Pressure Transmitter 404 Fails High		

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, insert the following command: **MAL MSS3 ACT,1050,480,0**		
	CREW	Determines that MBFP speed is increasing
	CRS	May refer to ONOP-FW-1 due to feed transient
	RO	Check MBFPs – BOTH RUNNING
	RO	Verify the following controls: o MBFP Speed control stable **(NO)** o All SG levels stable
	RO	If automatic control has failed, then perform the following: o Place affected control system in manual o Control affected system to stabilize plant conditions o Refer to attachment 2, Main Feedwater Regulating valves program DP

Op Test No.: 1	Scenario # 4	Event # 3	Page 12 of 29
Event Description:	Steam Pressure Transmitter 404 Fails High		

Time	Position	Applicant's Actions or Behavior
	RO	Check the following conditions – NORMAL FOR PRESENT POWER LEVEL: ○ Both MBFPs – RUNNING ○ Heater Drain Pumps - RUNNING ○ Condensate Pumps – RUNNING ○ Check MBFP operation ○ MBFP instrumentation – NORMAL ▪ PI-404, Main Steam Header Pressure **(NO)** ▪ PI-408A, Feed Pump Discharge Pressure ▪ PI-408B, Feed Pump Suction Pressure ○ MBFP Speed Control – OPERATING PROPERLY ○ Main Feedwater Regulating valves – MAINTAINING SG PROGRAM LEVEL
	CRS	Go to attachment 4, Loss of MBFP speed control
	RO/BOP	Perform attachment 4 **(Evaluator note: Attachment 4 procedure steps are attached to the end of this scenario guide)**

When steam dump control is placed in manual or at Lead Evaluator's discretion, proceed to Event 4

Op Test No.: 1 Scenario # 4 Event # 4 Page 13 of 29

Event Description: CCW Pump Trip.

Time	Position	Applicant's Actions or Behavior
		Booth Instructor: When directed, insert the following command: **MAL CCW1A ACT,0,0 (31 CCW trip)** **MAL RCS10C ACT,40,180,300 (TBHX tube leak)** **MAL RCS7C ACT,10,600,300 (RCP vibration)**
	CRS	Refer to ONOP-CC-1
		Note: Next event initiation is on time delay from initiation of this event.
	BOP	If one or both of the previously operating CCW pumps have tripped, then verify that the standby pump has started automatically o 32 CCW pump
		NOTE o If a tripped CCW pump is required to maintain the plant in a safe condition, then one breaker re-closure attempt (without investigation) is allowed o Step 5.1.1 through step 5.3.3.2 actions to split CCW headers may be initiated at any time CCW surge tank level can't be maintained, while continuing with this procedure
	BOP	If levels in the CCW surge tanks are decreasing, then initiate primary water makeup to the respective surge tank(s). **(N/A)**
		CAUTION If RCP seal cooling has been lost and the RCS temperature is greater than 350°F then seal injection shall not be re-established and the reactor shall be brought to Mode 5 to minimize any further seal degradation
	BOP	If surge tank levels decrease to less than 5% level in BOTH tanks then trip all CCW pumps **(N/A)**

Time	Position	Applicant's Actions or Behavior
	BOP	Check AFW status: o Verify total AFW flow – greater than 365 gpm o Control feed flow to maintain SG NR levels between 9%(14%) and 50% o May stop feed to 33 SG based on SG level
CAUTION Starting of equipment must be coordinated with all control room operators to ensure that two components are NOT started at the same time on the same power supply		
	CRS	Direct BOP operator to perform RO-1, BOP operator actions during use of EOPs (steps begin on page 22 of this guide)
	RO	Verify Feedwater Isolation: o Verify MBFPs tripped o Verify MBFP discharge valves closed o BFD-MOV-2-31 o BFD-MOV-2-32 o Verify Main and Bypass feedwater isolated o Main and Bypass FW MOVs closed OR o Main (SNF panel) and Bypass FW FRVs closed
Booth Instructor: Approximately 5 minutes after call to open 'B' Reactor Trip Breaker, report that it will NOT open		
	RO	Check SG Blowdown: o SG Blowdown isolation valves closed o SG Sample isolation valves closed

Op Test No.: 1	Scenario # 4	Event # 6, 7, 8,	Page 15 of 29
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
This event was initiated via time delay on the previous event		
	CRS	Refer to ONOP-CC-2 based on CC Surge Tank in-leakage
NOTE AC-FCV-625, RCP Thermal Barrier Return Isolation, may close following the start of a CCW pump due to momentary flow surge		
	BOP	Verify AC-FCV-625 is open o If AC-FCV-625 is closed, then an RCP Thermal Barrier leak may exist
	CREW	Observe the following for abnormal indication: o CCW surge tank level o Letdown flow rate o Charging flow rate o Thermal barrier Delta P o RCP seal injection flows o Pressurizer level trend o RCP thermal barrier return flow (Local) o WHUT levels
	BOP	Close AC-FCV-625
	RO	Investigate RCP vibration alarm (ARP-13) (ONOP-RCS-5 also applies but unlikely action will be taken prior to RCP failure)

Op Test No.: 1	Scenario # 4	Event # 6, 7, 8,	Page 16 of 29
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
		Booth Instructor: When RO is checking RCP vibration, insert the following commands: **FILE RCSFLOW2** (OVR XMT RCS38 85,40,0) (OVR XMT RCS39 85,40,0) (OVR XMT RCS40 85,40,0)
	CREW	Recognize requirement for reactor trip on Low RCS flow
	CRS	Enter E-0, Reactor Trip or Safety Injection. Direct reactor trip.
	RO	Attempt to manually trip reactor.
	BOP	De-energize busses with an energized MG set for at least 5 seconds then re-energize o Bus 2A and 6A
Critical Task	RO	Manually Trip the turbine
	CRS	Go to FR-S.1, Response to Nuclear Power Generation/ATWS
	CRS	Dispatch NPO to trip reactor using posted operator aid
	RO	Verify reactor trip o Reactor trip and bypass breakers open o Rod bottom lights lit o Rod position indicators less than 20 steps o Neutron flux decreasing

Op Test No.: 1	Scenario # 4	Event # 6, 7, 8,	Page 17 of 29
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
	RO	Manually trip reactor o Insert control rods in manual o Dispatch NPO to trip reactor using posted operator aid
NOTE If at any time reactor power decreases to less than 5% with a zero or negative startup rate, then go to step 15, page 13		
	RO	Verify turbine trip (Should have been tripped manually)
	BOP	Check Auxiliary Feedwater pumps running o Motor Driven Both running o Total AFW flow greater than 730 gpm
	RO/BOP	Initiate Emergency Boration of RCS o Check charging pumps – ANY RUNNING o Open CH-MOV-333, Emergency Boration valve **(Will NOT open)**
Critical Task	RO/BOP	Emergency Borate using one of the following methods in order of preference: o Attachment 1 (Normal boration) o Attachment 2 (RWST) o Attachment 3 (Failing air to FCV-110A) **Evaluator note: Attachment 1 is included at the end of this scenario guide**

Op Test No.: 1	Scenario # 4	Event # 6, 7, 8,	Page 18 of 29
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
	BOP	Verify containment ventilation isolation o Check Purge valves closed o Check pressure relief valves closed o Check WCCPP low pressure zone alarms NOT lit
	RO	Check SI actuated o If required, then actuate SI **(NO)**
	RO	Determine if the following trips have occurred: o Reactor trip o Turbine trip
	RO/BOP	Check SG NR levels – ANY greater than 9% o Verify AFW flow greater than 730 gpm until SG NR level is greater than 9%
	RO	Verify all dilution paths isolated o FCV-111A closed o CH-330, Boric acid blender primary water bypass isolation closed

Op Test No.: 1 Scenario # 4 Event # 6, 7, 8, Page 19 of 29

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

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Check for uncontrolled reactivity insertion from uncontrolled RCS cooldown o RCS temperatures decreasing in an uncontrolled manner o Any SG pressure decreasing in an uncontrolled manner o STOP any CONTROLLED Cooldown
Booth Instructor: *Delete RTB malfunctions and report as NPO that reactor trip breakers are open* **MAL RPS2A CLR** **MAL RPS2B CLR**		
	RO	Check CETs less than 1200°F
	RO	Verify reactor subcritical o Power range less than 5% o Intermediate range SUR zero or negative
	RO	Check all rods less than 20 steps
	RO	Secure any emergency boration in progress o Turn makeup control switch to stop o Establish Auto makeup per SOP-CVCS-3
	RO	Place both boric acid transfer pumps to slow speed
	RO	Open BAST recirc control valves to approximately 25% open

Op Test No.: 1	Scenario # 4	Event # 6, 7, 8,	Page 20 of 29
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Check RCP seal cooling o Seal Injection established o Thermal Barrier Cooling established
	RO	Check charging pump status o CCW available o Any charging pump running o Control speed to maintain 6-12 gpm seal injection
	CREW	Verify adequate Shutdown Margin o Verify all control rods less than 20 steps o Direct watch chemist to sample RCS o Check boron concentration greater than required for cold shutdown o Refer to graph 4A, 4B
	CRS	Return to E-0
	RO	Verify reactor trip o Reactor trip and Bypass breakers open o Rod bottom lights lit o Rod position indication less than 20 steps o Neutron flux decreasing
	RO	Verify turbine trip o All turbine stop valves closed

Op Test No.: 1	Scenario # 4	Event # 6, 7, 8,	Page 21 of 29
Event Description:	RCP Sheared Shaft; ATWS; Turbine Trip Failure; Boration Failure		

Time	Position	Applicant's Actions or Behavior
	BOP	Verify all 480V AC Busses energized by offsite power
	RO	Determine if SI is actuated o Any SI annunciator lit OR o SI pumps – ANY RUNNING
	RO	Determine if SI required using posted operator aid o Determines SI NOT required
	BOP	Start Both Motor Driven ABFPs o Starts 31 and 32 ABFP manually
	CRS	Direct transition to ES-0.1, Reactor Trip Response
Terminate scenario upon transition to ES-0.1		

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 22 of 29

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
	BOP	Monitor Control Room Annunciators: a. Acknowledge all Supervisory Panel Alarms as time permits b. Report all unusual alarms affecting accident response to CRS c. Monitor status of the following alarms: • HIGH CONT ATMOS TEMP/RTD FAILURE – CLEAR • 480 V SAFEGUARDS UNDERVOLTAGE – CLEAR
		Caution **Starting of equipment must be coordinated with the CRS to ensure that two components are not started at the same time on the same power supply.**
	BOP	Verify SI Pumps – RUNNING a. THREE SI pumps b. TWO RHR pumps
	BOP	Verify Containment FCU status: a. Check FCUs – ALL RUNNING b. Place FCU Damper control switch in – INCIDENT MODE position c. Check FCU dampers for all FCUs – IN INCIDENT MODE POSITION • Dampers A/B – CLOSED (inlet) • Damper C – CLOSED (bypass) • Damper D – OPEN (outlet) d. Place control switches for 1104 and 1105 to OPEN e. Check Service Water Cooling Valves – OPEN • 1104 • 1105
	BOP	Verify SI Valve alignment – Proper Emergency Alignment

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 23 of 29

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
		a. Verify Safeguard Valve Off Normal Position alarm on panel SBF-1 – CLEAR b. Ensure BIT Discharge valves 1835A, 1835B – OPEN c. Ensure BIT Inlet valves 1852A, 1852B – OPEN d. Ensure High Head Stop valves 856J, 856H, 856C, 856E – OPEN e. If RWST purification loop in service, then secure system per SOP-SI-3
	BOP	Verify ABFP status: a. Check Motor Driven Pumps – BOTH RUNNING b. Check Turbine Driven Pump – RUNNING
	BOP	Verify ABFP valve alignment: a. If Motor Driven AFW pump(s) are running, ensure SG Aux FW Reg valve controllers – Set to 0% (full open) • FCV-406A • FCV-406B • FCV-406C • FCV-406D b. Check SG Blowdown Isolation Valves - CLOSED

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

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
	BOP	Verify CCW Pump status: a. Check CCW pumps – ALL RUNNING b. Check RHR HX CCW Shutoff valve – OPEN
	BOP	Verify Essential Service Water Pumps – Three Running
	BOP	Verify Containment Isolation Phase A: a. Check Phase A – ACTUATED b. Check Phase A valves – CLOSED • Refer to Attachment 2, Phase A valve closure list
	BOP	Verify Containment Ventilation Isolation: a. Check Purge Valves – CLOSED • FCV-1170 • FCV-1171 • FCV-1172 • FCV-1173 b. Check Pressure Relief valves – CLOSED • PCV-1190 • PCV-1191 • PCV-1192 c. Check WCCPP low pressure zone alarm – NOT LIT d. Verify IVSW Valves – OPEN • IV-AOV-1410 • IV-AOV-1413 • IV-SOV-6200 • IV-SOV-6201
	BOP	Verify Emergency Diesel Generator status:

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 25 of 29

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
		a. Check EDGs – ALL RUNNING b. Check Both EDG SWS Outlet Flow Control Valves – OPEN • SWN-FCV-1176 • SWN-FCV-1176A c. Dispatch NPO to set switches for both EDG SWS Outlet Flow Control Valves to OPEN: • SWN-FCV-1176 • SWN-FCV-1176A
	BOP	Verify Control Room Ventilation: a. SET Control Room ventilation control switch to – 10% INCIDENT MODE (switch position 3) b. Check Damper status Dampers A, B, F1, F2 • A – DIM • B – BRIGHT • Either F1 OR F2 – BRIGHT Dampers D1 and D2 – BRIGHT c. Verify AC Compressors and fans – ALL RUNNING • ACC 31A ON – BRIGHT • ACC 31B ON – BRIGHT • ACC 32A ON – BRIGHT • ACC 32B ON – BRIGHT • ACF 31 ON – BRIGHT • ACF 32 ON – BRIGHT

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 26 of 29

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Emergency DC Oil Pumps status: • Main turbine emergency bearing oil pump – RUNNING • Dispatch NPO to verify main generator air side seal oil backup pump – RUNNING • MBFP DC emergency oil pump – RUNNING
	BOP	Reset SI as follows: a. Press BOTH SI RESET pushbuttons on Panel SBF-2: • Train 1 SI Reset • Train 2 SI Reset b. Check SI – RESET • SI ACTUATED light – EXTINGUISHED
	BOP	Reset MCCs as follows: a. Dispatch NPO to secure VC sump pumps and RCDT pumps on Waste Disposal panel b. Dispatch NPO to align and reset MCCs per SOP-EL-15

Note to examiner:
The following step is designed to stop actions of RO-1 IF the CRS has transitioned to ES-1.1. The BOP will continue in RO-1 if there is transition to other procedures, but any time ES-1.1 is entered, the BOP will inform the CRS of automatic action verification and RO-1 will be suspended.

Op Test No.: 1 Scenario # All Event # Attachment 1 Page 27 of 29

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
	BOP	Check if additional SI actions should be performed: a. Check if the CRS has transitioned to – ES-1.1 b. Perform the following: • Inform the CRS of the status of automatic action verification • If E-0 has been exited, THEN continue with step 17 • If E-0 has NOT been exited, then wait until E-0 is exited. When E-0 is exited, then recheck this step
	BOP	Perform the following: a. Dispatch NPO to perform the following: • Close SWN-FCV-1111 and SWN-FCV-1112 b. Check Condensate Pumps – ONLY ONE RUNNING. c. SECURE all but one Condensate Pump d. Initiate the following section of SOP-EL-15 • Alignment of City water Cooling
	BOP	Reset Containment isolation Phase A and Phase B as follows: a. PLACE switches for letdown orifice isolation valves to CLOSE: • 200A • 200B • 200C b. RESET Phase A c. RESET Phase B, if actuated

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

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior
	BOP	Establish Instrument Air and Nitrogen to containment: a. Establish IA to containment: • Check INST AIR LOW PRESS alarm on panel SJF – CLEAR • DEPRESS Inst Air reset pushbutton 28 • CHECK IA-PCV-1228, Inst Air to Cont. – OPEN b. ESTABLISH PRZR PORV N2 supply: • PRESS Accumulator N2 Supply Reset pushbutton 44 • Check 863, Accumulator N2 Supply Valve – OPEN
	BOP	Check if one non-essential Service Water pump should be started: a. Check Off-Site power to at least one Non-Essential service Water Pump – AVAILABLE b. Check SWN-FCV-1111 and SWN-FCV-1112 – CLOSED c. START one Non-Essential Service Water pump
	BOP	Check status of off-site power: a. VERIFY all AC Busses: • Energized by off-site power AND • All 480V tie breakers open

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

Event Description: RO-1, BOP Operator Actions During EOPs

Time	Position	Applicant's Actions or Behavior

NOTE

It is permissible for operators to perform board clean-up actions (steps 22-29 of RO1, BOP OPERATOR ACTIONS DURING USE OF EOPs) while performing actions of other EOPs; provided this does not interfere with other EOPs in progress.

EVALUATOR NOTE: The remainder of the steps in this attachment are highlighted (High Level) action only.

	BOP	Re-align secondary plant
	BOP	Check secondary valve position
	BOP	Check Heater Drain Pumps 31 and 32 Tripped
	BOP	Check plant equipment status
	BOP	Determine if Source Range detectors should be energized
	BOP	Start AC Oil Pumps and Stop DC Oil pumps as follows
	BOP	Check Long Term Plant status
	BOP	Inform CRS that RO-1 is complete and advise on the status of actions