

Scenario Event Description

Scenario 1

Facility: Indian Point 2 Scenario No: 1 Op-Test No: 1

Examiners: _____ Operators: _____

Initial Conditions:

100% power MOL with power reduction in progress.

- 21 ABFP OOS for planned maintenance. Return expected in approximately 6 hours.
- PORV 456 leakage exists. Block valve closed.
- MOV-1802A removed from service 1 hour ago for MOVATS testing. Expected return to service in 4 hours.
- Severe thunderstorms expected over the next 4 hours

Reduce load to 800 MWe to remove 21 Condensate from service within 60 minutes to investigate abnormal noise.

Critical Tasks:

1. Manually initiate Main Steam Line Isolation
2. Isolate AFW to faulted/ruptured SG.

Event No:	Malf. No.	Event Type*	Event Description
1		R (RO), N (BOP) N (CRS)	Reduce power
2	MAL-CRF001AT	C(CRS)	Stuck control rod B-10.
3	XMT-SGN018A (sev.- 0)	I (RO) I (CRS)	22 SG Level 'B' Transmitter fails low during power reduction (~99% power). Trigger 1
4	MOC-CFW001	C (ALL)	21 condensate pumps trips at ~92-94% power Trigger 2
5	MAL-RCS014B	C(ALL)	22 Steam Generator tube leak. (ramped in over 5 minutes 0-40 gpm) Trigger 3
6	MAL-SGN004B (Severity 0-100% over 4 minutes)		Steam Line Break outside containment. Trigger 4
7	RLYPPL 501 & 502 (stuck contacts) and AOV-SGN002A (Fail as is)	C (BOP)	Main Steam Line Isolation failure. Manual initiation required and 22 SG MSIV will not close.
8	MAL-RCS014B	M (ALL)	Steam Generator Tube Rupture and Loss of Off-Site Power (after transition to E-2) trigger 5

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

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The team will assume the shift and commence a power reduction IAW POP-2.1.

During the load reduction, one control rod will stick out; requiring the condition to be evaluated IAW AOP-ROD-1. The CRS will address Technical Specifications as well. Power reduction will continue with boration only.

After power reduction recommences, 22 SG level transmitter 'B' will fail low, requiring manual control of 22 SG level IAW AOP-INST-1. The CRS will refer to Technical Specifications.

At approximately 92-94% power, a loss of the 21 condensate pump will require urgent continuation of the power reduction IAW AOP-FW-1.

When the plant is stable, a 22 Steam Generator tube leak will start requiring reduction of letdown and adjustment of charging IAW AOP-SG-1.

A Steam Line Break will occur, requiring a Reactor Trip and Safety Injection. After the trip a MSLI signal will not actuate and the operators will need to close the MSIV's manually and 22 SG MSIV will not close from CCR. Subsequently, a SGTR occurs in the faulted (22) SG and a Loss of Off-Site power,

EOP flow path: E-0 – E-2 – E-3 – ECA-3.1

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SET UP: RESET SIMULATOR TO IC 16921 ABFP OOS:LOA-AFW005 – Fuse Out
Place 21 ABFP in Pullout and Danger TagMOV-1802A OOS:

LOA RHR001 Fuse Out and Danger Tag

MSLI Failure:RLY PPL501 STUCK
RLY PPL502 STUCK
AOV-SGN002A (fail as is)Seat Leakage on PORV 456:

PLP RCS010 1%

Materials needed for scenario:

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

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

**Indian Point Unit 2
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 1**

- The plant is at 100% power, steady state conditions exist.
- Middle of Life, C_b is 1042 ppm.
- EFPD = 340
- Control Bank D = 214 steps
- $T_{avg} = 565^{\circ}\text{F}$
- Przr Pressure = 2235 psig
- Przr level = 56%

The following equipment is out of service:

- 21 ABFP OOS for planned maintenance. Removed from service 4 hours ago. LCO 3.7.5 Condition B entered, 7 day completion time. Return expected in approximately 6 hours.
- MOV-1802 tagged OOS for MOVATS. Removed from service 2 hours ago. LCO 3.5.2 condition A entered, 72 hour completion time. Return to service in approximately 4 hours.
- PORV 456 has minor seat leakage. PORV is caution tagged for information. Engineering has determined the valve is operable, but needs to evaluate if the valve cycles.

Team instructions:

- In accordance with POP-2.1, reduce generator load to 800 MWe at a rate of 200 MWe per hour and remove 21 Condensate pump from service to investigate abnormal noise.
- Severe thunderstorms are in the area for the next four hours

Op-Test No: 1 Scenario No: 1 Event No.: 1 & 2

Page 6 of 23

Event Description: Stuck Rod (B-10) during a down power.

Time	Position	Applicant's Actions or Behavior
	Booth Instructor	Command for Event 2 is inserted at beginning of event 1.
	CRS	Refers to POP 2.1 and verifies prerequisites and initiates Attachment 3 for power reduction. (NOTE these or similar actions will be performed during events requiring power reductions although they will not be delineated in this detail for subsequent events)
	CRS	<u>IF</u> reducing Reactor Power for a maintenance support function, the SM SHALL DETERMINE the desired Reactor Power level <u>OR</u> Turbine load (MWe) to maintain while repairs are made/troubleshooting is performed
	CRS	REQUEST Test Group to determine if Pressurizer Level instrumentation must be re-calibrated.
	BOP	VERIFY LCV-1129, Excess Condensate Return to CST, is closed, <u>AND</u> isolated locally per Steps 9.1-9.3 of attachment 1. Cue: simulator operator will need to act as field operator, close valves, and report back to CCR.
	ATC	Energize B/U heaters
	ATC	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, Core Operating Limits Report.
	ATC	If necessary place rods in manual to maintain rods greater than Rod Insertion Limit.
	ATC	MAINTAIN delta flux within the target band.
	BOP	MONITOR condenser sextants for sodium increase on panel SKF.
	ATC	VERIFY T_{AVE} <u>AND</u> Pressurizer Level are maintained on program per Graph RCS-2, Pressurizer Level V.S. T_{AVE} .
	ATC	MAINTAIN steam generator levels between 40 and 50 percent Narrow Range.
	ATC	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 No: 1 Event No.: 1 & 2

Page 7 of 23

Event Description: Stuck Rod (B-10) during a down power.

	CRS	<p>DIRECT NPOs to perform the following during load reduction:</p> <ul style="list-style-type: none"> ○ MONITOR Main Turbine Oil Temperatures ○ MONITOR Hydrogen Seal Oil Temperatures ○ MONITOR MBFP Oil Temperatures ○ BALANCE Heater Drain Tank Pump flows between the pump in Auto and Manual per SOP 19.1, Extraction Steam And Heater Drain Systems Operation. ○ <u>IF</u> SJAEs are in service, MAINTAIN Steam pressure per SOP 20.1, Condenser Air Removal System Operation, <u>AND</u> periodically CHECK SJAEs for backfiring. ○ <u>IF</u> FCV-1120, Flowpath A Controller Stop, is in MANUAL, ADJUST to maintain FCV-1113, Gland Steam Condenser Minimum Flow Control Valve, closed.
	BOP	<p>INITIATE load decrease using either of the following as directed by CRS:</p> <ul style="list-style-type: none"> ○ Governor control ○ Load Limit 1 control ○ Load Limit 2 control
		<p>NOTE: the following steps are related to boration performed in conjunction with down power. These steps will be repeated as required during down power.</p>
	ATC	<p>DETERMINE RCS Boron concentration from reactor coolant sample analysis.</p> <ul style="list-style-type: none"> ○ <u>IF</u> analysis following concentration adjustment is <u>NOT</u> yet available, ESTIMATE Boron concentration based on latest readings.

Op-Test No: 1 Scenario No: 1 Event No.: 1 & 2

Page 8 of 23

Event Description: Stuck Rod (B-10) during a down power.

NOTE

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

	ATC	<p>DETERMINE magnitude of increase in Boron concentration necessary to accomplish desired reactivity change using one or more of the following references:</p> <ul style="list-style-type: none"> ○ GRAPH CVCS-3A, Boration Nomograph for Hot RCS ○ GRAPH CVCS-3B, Boration Nomograph for Cold RCS ○ GRAPH CVCS-6, Boration - Dilution Tables ○ GRAPH RV-2, Total Power Defect (PCM) as a Function of Power and Boron Concentration at MOL ○ GRAPH RV-3, Differential Boron Worth (Hot Zero Power) at MOL ○ GRAPH RV-4, Total Temperature Defect (PCM) as a Function of Temperature and Boron Concentration at MOL ○ GRAPH RV-9, IP2 Cycle 15 Reactivity Equivalents ○ POP 1.2, Reactor Startup ○ WCR 1, Reactivity Summary
	ATC	ESTIMATE total volume of boron required for boration from boration graphs or references listed in step 4.5.2.
	ATC	PLACE the RCS Makeup Control switch to STOP.
	ATC	SET Boric Acid Integrator to amount determined in step 4.5.3.
	ATC	PLACE the RCS Makeup Mode Selector switch to BORATE.
	ATC	FCV-110A, Boric Acid Flow Control, may be left in AUTO or placed in MANUAL as directed by CRS.
	ATC	VERIFY boric acid transfer pumps are in AUTO.
	ATC	PLACE the RCS Makeup Control switch to START.
	ATC	<p>VERIFY BATPs shift to fast speed.</p> <p style="text-align: center;"><u>NOTE</u></p> <p>BATPs shifting to fast speed is verified by both counter operation and by the respective fast speed lights illuminating.</p>

Op-Test No: 1 Scenario No: 1 Event No.: 1 & 2

Page 9 of 23

Event Description: Stuck Rod (B-10) during a down power.

*Command for Event 2 is inserted at beginning of event 1***Booth Instructor:** *When directed, insert the following command to force investigation into rod problem:***ANN SF-2-7 Control Rod Distribution Trouble alarm****Note:** *Rod motion may not produce enough deviation between the stuck rod and Bank Demand to provide positive indication that a stuck rod exists*

	CRS	Refer to ARP SFF-2-7 and/or AOP-ROD-1. Operator should note misalignment prior to alarm but if not the alarm will alert them to the misalignment.
	ATC, BOP	<p>(Note actions per ARP SFF 2-7) DETERMINE if rod(s) is dropped <u>OR</u> misaligned</p> <p>-VERIFY rod positions using PICS All Rod Display (ALLRODS) <u>AND</u> CCR Flight Panel Indications.</p> <p>-REVIEW PICS values</p> <p>-DETERMINE affected Bank <u>AND</u> nature of the alarm.</p> <p>-COMPARE the Power Range Level Indicators, Delta Flux Indicators, Individual Rod Position Indicators (IRPIs) <u>AND</u> Bank Step Counters.</p> <p>- <u>IF</u> a Rod Deviation is indicated, <u>THEN</u> GO TO 2-AOP-ROD-1, Rod Control and Indication Systems Failure to correct the dropped <u>OR</u> misaligned rod <u>OR</u> respond to the IRPI failure.</p>
	CRS/ATC	<p>(Note actions per 2-AOP-ROD-1)</p> <p>Determine if a rod has been dropped or misaligned using the following methods as necessary:</p> <ul style="list-style-type: none"> -Observation of power range channels for indicated deviation -Observation of NIS recorder for unexpected drop in power -Indication of abnormal quadrant power tilt ratio -Determination by Reactor Engineering

Op-Test No: 1 Scenario No: 1 Event No.: 1 & 2

Page 10 of 23

Event Description: Stuck Rod (B-10) during a down power.

		Crew determines rod is misaligned (transitions to step 4.92)
	CRS/ATC	Places rods in manual if not done so already (most like will already be complete)
	CRS	Contacts I&C to investigate and evaluates tech. Specs (NOTE: after Tech Specs. (3.1.4, 3.2.3, 3.2.4) Have been evaluated the simulator operator will prompt the CRS to continue the power reduction per guidance in AOP-ROD-1.
Lead Evaluator		<i>When team is preparing to trouble shoot the control rod or at Lead Evaluator's discretion, proceed to Event 3</i>

Op-Test No: 1 Scenario No: 1 Event No.: 3

Page 11 of 23

Event Description: 22 SG Level Transmitter Fails Low

Time	Position	Applicant's Actions or Behavior
	Booth Instructor	<i>When directed by the lead evaluator, activate trigger 1</i>
	ATC	Recognize alarms associated with the 22 SG level transmitter malfunction (should take manual control at this point)
	CRS	Refer to AOP-INST-1, Instrument Failures (CRS may direct ARP implementation but this will perform similar actions to AOP)
	TEAM	<p>VERIFY The Following Controls:</p> <ul style="list-style-type: none"> ○ Turbine load - STABLE ○ Rod Control - STABLE ○ PRZR pressure control - NORMAL ○ PRZR level control - NORMAL ○ MBFP Speed – NORMAL ○ S/G levels – NORMAL
	ATC	<p>PLACE SG level control system in MANUAL.(AOP step 4.17)</p> <ul style="list-style-type: none"> ○ CONTROL affected system to stabilize the plant.
	CRS	Refer to Tech. Specs. 3.3.1-1 (functions 13 14) and 3.3.2-1 (functions 5.b and 6.b)
	TEAM	Determine that tripping bistables in attachment 1 will not impact the unit (I&C may be called to accomplish this) The crew may or may not trip the bistables at this point. It is not required for the scenario and it will not restore auto control to the 22 SG.
	Lead Evaluator	<p>Once the CRS determines that the B/S can be tripped and that it is required in 72 hours the Sim. Operator will prompt CRS to continue down in power.</p> <p><i>Proceed to Event 4 at discretion of Lead Evaluator</i></p>

Op-Test No: 1

Scenario No: 1

Event No.: 4

Page 12 of 23

Event Description: 21 Condensate pump trip (AOP-FW)

Time	Position	Applicant's Actions or Behavior
	Booth Instructor	When directed, insert Trigger 2 associated with 21 Condensate pump trip (MOC-CFW001) the timing of this is important since being too high is power > 95% may result is a trip and being too low in power (<92%) will not require prompt operator actions.
	CRS	Refer to AOP-FW-1 (first alarm on pump trip should be SHF 3-3 "6900 V MOTOR TRIP (COMMON)" which refers you to AOP-FW)
	CRS	Directs power reduction and establishes a target power of <or =870 Mwe per AOP.
	Team	Initiates a power reduction to maintain feed flow>steam flow and MBFP suction pressure (>280#) this will be performed with boration only and manual control of 22 S/G (if not restored)
	Team	Monitors for: <ul style="list-style-type: none"> ○ Suction pressure cutback ○ MFRV windup ○ Loss of Load Interlock not reset ○ Any SG > 60% level And takes required IAAT actions
	BOP	When plant conditions have stabilized the CRS will direct the defeat of 22 condensate pump and the inspection of the MFRV's
		Perform bypass of the 22 condensate pump trip per SOP 20.2 section 4.20:
		<u>NOTE</u> Flexitest switches are located at EJD6, FAR Extension Panel N215.
	BOP	<p>_____ 1.1.1 CAUTION TAG OPEN the following:</p> <p>_____ • Flexitest Switch "A"</p> <p>_____ • Flexitest Switch "J"</p>
	Lead Evaluator	Event 5 will be triggered at discretion of Lead Evaluator after stable conditions have been established.

Op-Test No: 1 Scenario No: 1 Event No.: 5 Page 13 of 23
 Event Description: 22 Steam Generator Tube Leak (0-40 gpm over 5 minutes)

Time	Position	Applicant's Actions or Behavior
	Booth Instructor	<i>When directed, insert Trigger 3 related to MAL-RCS014B (0-40 gpm tube leak on 22 SG ramped over 5 minutes).</i>
	CRS	Based on various indications determines that an RCS leak into a SG is in progress and directs implementation of AOP-SG-1 (if AOP for RCS leak is implemented in error it will direct the team to AOP-SG eventually). AOP-SG ENTRY CONDITIONS Any actual or suspected primary to secondary tube leakage \geq 5 gpd as defined by an increase in one or more of the following: <ul style="list-style-type: none"> • R-45 (condenser off gas) • R-49 (SG blowdown) • R-55A/B/C or D (SG blowdown) • N-16 leakage detection system • R-28, 29, 30 or 31 (MS lines) Routine offgas or blowdown sample analysis
	ATC	Evaluates indications and determines approximate leak rate and that it is within the capacity of two charging pumps
	ATC	Reduces letdown to minimum: Open 200B. 2. ___ Verify 200A and 200C are closed. 3. ___ Adjust PCV-135 (NON-REGEN HX OUT FLOW) as necessary to maintain letdown pressure between 225 and 275 PSIG.
	ATC	May start another charging pump depending of PRZR level trend
	TEAM	Determines leak rate is >75 GPD either at this point or in following step.
	TEAM	2.1 Initiate determination of affected SG from one or more of the following: <ul style="list-style-type: none"> • R-55A/B/C/D indications • N-16 Monitor • R-28, 29, 30 or 31 (MS lines) • Steam line surveys • Chemistry results Crew determines 22 SG is affected
	CRS	Determine if notifications are being made per IP-SMM-LI-108 (EVENT NOTIFICATION AND REPORTING)? SM is making notifications
	Booth Instructor	CUE: SM is making notifications

Op-Test No: 1 Scenario No: 1 Event No.: 5

Page 14 of 23

Event Description: 22 Steam Generator Tube Leak (0-40 gpm over 5 minutes)

Time	Position	Applicant's Actions or Behavior
	CRS	Notify Chemistry to calculate leak rate per 0-CY-2450 (Primary to Secondary Leak) requirements.
	CRS	Determine shutdown rate to achieve the following: < 50% in 1 hour and MODE 3 within additional 2 hours (total of 3 hours)
	Team	Brief and initiate a plant shutdown and refer to Tech Specs. (3.4.1.13; >150 GPD from a SG and >10 GPM identified and > 1 GPM unidentified; 6 hour S/D)
	Lead Evaluator	<i>Event 6 will be triggered at discretion of Lead Evaluator after team has determined that a shutdown is required and Tech Specs. Implications determined.</i>

Op-Test No: 1 Scenario No: 1 Event No.: 6,7 & 8 Page 15 of 23

Event Description: Main Steam Line break, Auto MSLI failure, 22 MSIV failure (auto and remote manual) with subsequent SGTR on 22 SG and loss of Off-Site power.

Time	Position	Applicant's Actions or Behavior
	<i>Booth Instructor</i>	When directed, insert Trigger 4 for the following command: MAL SGN004B severity 0-100 ramp over 4 minutes, Piping rupture 22 MSL outside VC
	CRS	Direct entry to E-0, Reactor Trip or Safety Injection
	ATC	Verify reactor trip (YES)
	ATC	Verify turbine trip(YES)
	BOP	Verify power to 480 V busses(YES)
	ATC	Check if SI is actuated (YES)
	BOP	Perform attachment 1 while continuing with this procedure (Attachment 1 actions are listed as a group later in this event guide)
	BOP	Verify ABFPs running (NO- 21 ABFP is C/T so ATC will need to commence feeding with 22 ABFP to supply 23 & 24 SG's)
	BOP	Verify total AFW flow greater than 400 GPM
	ATC/BOP	<p style="text-align: center;"><u>CAUTION</u></p> <p>RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to less than 320 psig any RHR pump placed in PULLOUT must be manually started to supply water to the RCS</p> <p>Verify SI system flow</p> <ul style="list-style-type: none"> ○ RCS pressure less than 1650 psig ○ SI pump flow indicated ○ RCS pressure less than 320 psig (NO) ○ Place one RHR pump in PULLOUT
	BOP	<p>Check RCP seal cooling</p> <ul style="list-style-type: none"> ○ 3 CCW pumps running ○ CCW flow to RCP thermal barriers normal

Op-Test No: 1 Scenario No: 1 Event No.: 6,7 & 8

Page 16 of 23

Event Description: Main Steam Line break, Auto MSLI failure, 22 MSIV failure (auto and remote manual) with subsequent SGTR on 22 SG and loss of Off-Site power.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> ○ Service Water system aligned for 3 header operation ○ Locally verify SWN-4 and SWN-5 closed ○ Start one Service Water pump on Non-Essential header on bus supplied by off-site power
CRITICAL TASK	ATC	Check RCS temperature stable at or trending to 547°F (NO) <ul style="list-style-type: none"> ○ MSLI should have actuated automatically but did NOT ○ Initiate manual MSLI ○ Order that the 22 MSIV be closed locally per AOP-SSD-1
<i>Booth Instructor</i>		CUE: acknowledge order to closed the 22 MSIV and after appropriate time delay report back that the steam leak is preventing access to 22 MSIV.
	ATC	Check PRZR PORVs and spray valves closed (SAT)
	ATC	Check if RCPs should be stopped (NO)
	ATC	Check if any SG is faulted (YES) <ul style="list-style-type: none"> ○ Any SG depressurizing in an uncontrolled manner ○ Any SG depressurizing
	CRS	Direct Entry to E-2, Faulted SG Isolation
		Attachment 1 actions follow with actions per E-2 after
		E-0 Att. 1 actions: Note that these actions will likely be started in E-0 and finish after transition to E-2. BOP should continue on and if Off-Site power is lost would re-verify line-up.
	BOP	Verify proper Charging system operation: <ol style="list-style-type: none"> a. Start at least one charging pump in manual at maximum speed b. Align charging pump suction to the RWST <ul style="list-style-type: none"> ● Open charging pump suction valve from RWST <ol style="list-style-type: none"> 1. LCV-112B

Op-Test No: 1 Scenario No: 1 Event No.: 6,7 & 8 Page 17 of 23

Event Description: Main Steam Line break, Auto MSLI failure, 22 MSIV failure (auto and remote manual) with subsequent SGTR on 22 SG and loss of Off-Site power.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • Close charging pump suction valve from VCT <ol style="list-style-type: none"> 1. LCV-112C • Place RCS Makeup Control switch to STOP
	BOP	Check generator output breakers (345 KV MO Disc Switch F7-9) – OPEN
	BOP	<p>Check status of 480 volt busses:</p> <ol style="list-style-type: none"> a. All 480V busses – ENERGIZED BY OFF-SITE POWER b. Dispatch NPO to reset: <ul style="list-style-type: none"> ○ All lighting ○ MCC 24A ○ MCC 27A ○ MCC 29A c. Stop all Condensate Pumps
	BOP	<p>Verify FW Isolation:</p> <ul style="list-style-type: none"> ○ Main Boiler Feed Pumps – TRIPPED ○ Main Boiler Feed Pump Discharge Valves – CLOSED ○ FW Regulating valves – CLOSED ○ FW Stop Valves – CLOSED ○ SG Blowdown Isolation Valves - CLOSED
	BOP	<p>Check if Main Steam Lines should be isolated:</p> <ol style="list-style-type: none"> a. Check for either: <ul style="list-style-type: none"> • High Steam Line flow with EITHER Tave less than 541 deg F OR Steam line pressure less than 525 psig. <li style="text-align: center;">OR • Containment pressure – EVER GREATER THAN 24 psig b. Verify MSIVs - CLOSED
	BOP	<p>Verify proper Service Water System operation:</p> <ol style="list-style-type: none"> a. Three Service Water Pumps – Running on Essential Header b. Service Water valves from Diesel Generator - OPEN
	BOP	Verify SI system pumps running:

Op-Test No: 1 Scenario No: 1 Event No.: 6,7 & 8

Page 18 of 23

Event Description: Main Steam Line break, Auto MSLI failure, 22 MSIV failure (auto and remote manual) with subsequent SGTR on 22 SG and loss of Off-Site power.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> a. Three SI pumps – RUNNING b. 22 SI pump discharge isolation MOV-851A AND MOV-851B – OPEN c. Two RHR pumps - RUNNING
	BOP	Verify proper emergency SI System valve alignment: <ul style="list-style-type: none"> a. SI pump cold leg injection valves – OPEN <ul style="list-style-type: none"> ○ 856A ○ 856E ○ 856C ○ 856D b. RHR HX CCW outlet valves – OPEN <ul style="list-style-type: none"> ○ 822A ○ 822B c. RHR HX MOVs – OPEN <ul style="list-style-type: none"> ○ 746 ○ 747
	BOP	Verify Containment Fan Coolers – IN SERVICE: <ul style="list-style-type: none"> a. Five fan coolers - RUNNING b. Charcoal Filter valves - OPEN c. Fan normal discharge valves – CLOSED d. TCV-1104 and TCV-1105 – BOTH OPEN
	BOP	Verify AFW flow to all SGs
	BOP	Verify Containment Ventilation Isolation: <ul style="list-style-type: none"> a. Containment Purge Valves – CLOSED <ul style="list-style-type: none"> ○ FCV-1170 ○ FCV-1171 ○ FCV-1172 ○ FCV-1173 b. Containment Pressure Relief Valves - CLOSED <ul style="list-style-type: none"> ● PCV-1190 ● PCV-1191 ● PCV-1192

Op-Test No: 1 Scenario No: 1 Event No.: 6,7 & 8

Page 19 of 23

Event Description: Main Steam Line break, Auto MSLI failure, 22 MSIV failure (auto and remote manual) with subsequent SGTR on 22 SG and loss of Off-Site power.

Time	Position	Applicant's Actions or Behavior
		<p style="text-align: center;">Note</p> <p>Attachment 2 provides a list of Phase A valves</p>
	BOP	<p>Verify Containment Isolation Phase A</p> <ul style="list-style-type: none"> a. Phase A – ACTUATED <ul style="list-style-type: none"> ○ Train A master relay CA1 (above rack E) ○ Train B master relay CA2 (above rack F) b. Phase A valves – CLOSED c. IVSW valves – OPEN <ul style="list-style-type: none"> ○ 1410 ○ 1413 ○ SOV-3518 ○ SOV-3519 d. WCP valves – OPEN: <ul style="list-style-type: none"> ○ PCV 1238 ○ PCV 1239 ○ PCV 1240 ○ PCV 1241 e. Place personnel and equipment hatch solenoid control switches to INCIDENT on SM panel f. Dispatch NPO to periodically check <ul style="list-style-type: none"> ○ IVSW Tank <ul style="list-style-type: none"> ○ Level – GREATER THAN 92% ○ Pressure – GREATER THAN 57 PSIG ○ WCP header pressures – GREATER THAN 52 PSIG
Lead Evaluator		<p>The following step is intended for High Containment pressure condition. It will not be performed if conditions aren't met</p>
	BOP	<p>Check if Containment Spray should be actuated:</p> <ul style="list-style-type: none"> a. Containment Pressure – EVER GREATER THAN 24 PSIG b. Verify spray pumps – RUNNING c. Verify spray pump discharge valves – OPEN <ul style="list-style-type: none"> ○ MOV-866A ○ MOV-866B ○ MOV-866C ○ MOV-866D

Op-Test No: 1 Scenario No: 1 Event No.: 6,7 & 8

Page 20 of 23

Event Description: Main Steam Line break, Auto MSLI failure, 22 MSIV failure (auto and remote manual) with subsequent SGTR on 22 SG and loss of Off-Site power.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> d. Verify Containment Isolation Phase B valves – CLOSED e. STOP all RCPs f. Verify IVSW Isolation Valves – OPEN <ul style="list-style-type: none"> o 7864 o 7865 o 7866 o 7867
	BOP	Verify CCR Air Conditioner Train A and B – RUNNING IN INCIDENT MODE 2
	BOP	Notify CRS that Attachment 1 is complete
Lead Evaluator/ Booth Instructor		<p>The following steps are per E-2 starting at step 1</p> <p>On transition to E-2 Event 3 (22 SGTR with loss of Off-Site power) will be initiated Trigger 5</p>
		<p style="text-align: center;">CAUTION</p> <ul style="list-style-type: none"> o At least one SG must be maintained available for RCS cooldown o Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown o FRPs should NOT be implemented prior to completion of E-0, Attachment 1, Automatic Action Verification
	BOP	Check MSIVs closed <ul style="list-style-type: none"> o Should have been manually closed
	ATC	Check if any secondary boundary is intact
	ATC	Identify faulted SG <ul style="list-style-type: none"> o 22 is depressurizing

Op-Test No: 1 Scenario No: 1 Event No.: 6,7 & 8

Page 21 of 23

Event Description: Main Steam Line break, Auto MSLI failure, 22 MSIV failure (auto and remote manual) with subsequent SGTR on 22 SG and loss of Off-Site power.

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK	BOP	Isolate faulted SG <ul style="list-style-type: none"> ○ Main Feedline ○ AFW Flow ○ Dispatch NPO to close steam supply header valves to TDABFP ○ SG Atmospheric dump valves closed ○ SG B/D isolation valves closed ○ Locally isolate steam traps upstream of MSIVs ○ Isolate MSIV bypass valves
	BOP	Check CST level greater than 2 feet
	BOP	Check secondary radiation
Booth Instructor and Lead Evaluator		<p>Evaluator note: Secondary radiation will not indicate high radiation levels. The team may transition to E-1 prior to identifying the rupture in 22 SG. This guide assumes transition to E-3.</p> <p><i>Booth Instructor: Report as NPO that your digital dosimeter was beeping when you were directed to isolate 22 SG. Rad Pro confirmed elevated levels in the vicinity of 22 SG</i></p> <p><i>Approximately 15 minutes after being directed to sample SGs for activity, report as Chemistry that activity levels are elevated for 22 SG by a factor of 1,000.</i></p>
	CRS	Directs transition to E-3, Steam Generator Tube Rupture
	ATC	Check if RCPs should be stopped (NO power to RCP's)
	ATC/BOP	Identify Ruptured SG <ul style="list-style-type: none"> ○ 22 SG ruptured
	ATC/BOP	Check 22 and 23 SGs intact (NO) <ul style="list-style-type: none"> • Trip 22 ABFP • Direct local isolation of steam fully from 22 SG

Op-Test No: 1 Scenario No: 1 Event No.: 6,7 & 8

Page 22 of 23

Event Description: Main Steam Line break, Auto MSLI failure, 22 MSIV failure (auto and remote manual) with subsequent SGTR on 22 SG and loss of Off-Site power.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • Restart 22 ABFP <p>Note: Although this action is expected to be taken and in some situations this would be critical, in this situation it is not since the SG with the rupture is faulted and the exhaust from the ABFP will not contribute to the release.</p>
	BOP	Verify blowdown isolation valves from 22 SG closed. No action to take, isolated previously in E-2
	CRS	Dispatch NPO <ul style="list-style-type: none"> ○ Close steam traps upstream of ruptured SG MSIV ○ Verify ruptured SG MSIV bypass closed Close ruptured SG MSIV No action to take, isolated previously in E-2
		<u>CAUTION</u> If any ruptured SG is faulted, feed flow to that SG should remain isolated during subsequent recovery actions unless needed for RCS cooldown
	ATC	Check ruptured SG NR level greater than 10% (NO) <ul style="list-style-type: none"> ○ Stop feed flow to 22 SG because it was isolated in E-2. <u>DO NOT REINITIATE AFW flow!</u>
		<u>CAUTION</u> Isolation of the ruptured SG steamlines from the intact SG steamlines including trip of turbine driven ABFP or closing the steam supply valve to turbine driven ABFP from the ruptured SG should be completed before continuing with step 5
	ATC	Verify ruptured SG pressure greater than 440 psig (NO)
	CRS	Direct transition to ECA-3.1, SGTR with loss of reactor coolant – Subcooled recovery desired

Op-Test No: 1 Scenario No: 1 Event No.: 6,7 & 8 Page 23 of 23

Event Description: Main Steam Line break, Auto MSLI failure, 22 MSIV failure (auto and remote manual) with subsequent SGTR on 22 SG and loss of Off-Site power.

Time	Position	Applicant's Actions or Behavior
Lead Evaluator		<i>Terminate scenario upon transition to ECA-3.1</i>

2007 NRC EXAM SCENARIO 2

Facility: Indian Point 2 Scenario No: 2 Op-Test No: 1

Examiners: _____ Operators: _____

Initial Conditions: Reset simulator to IC-170

- The plant is at 100% normal full power lineup.
 - MOV-1802A is removed from service for MOVATS testing. Expected return to service is 8 hours.
 - 22 Charging pump is removed from service preventive maintenance. Expected return to service is 24 hours.
 - Severe thunderstorms expected over the next 4 hours.
- Turnover: Maintain 100% power.

Critical Tasks:

- (1) Insert negative reactivity into the core by at least one of the following methods before completing FR-S.1 step 4:
 - a. De-energize the control rod drive MG sets
 - b. Place rod control in manual and insert RCCAs
 - c. Establish emergency boration flow to the RCS
- (2) Close the block MOV upstream of the stuck-open PZR PORV by completion of the first step in the ERG network that directs the crew to close the block MOV.
- (3) Establish flow from a least one SI pump before transition out of E-1

Event No:	Malf. No.	Event Type*	Event Description
1	MOC-CVC005 C1	C(RO) C(CRS)	Running Charging pumps trips (at the same time as an earth quake) AOP-CVCS-1 actions taken to restore charging and letdown. Trigger 1
2	XMT-SGN005A	C(RO) C(CRS)	22 S/G Controlling Steam Flow Channel(429B)Fails High Event is concurrent with event #1 Trigger 1
3	N/A	R (RO) N (BOP) N (CRS)	Seismic event reported from Unit 3 with associated alarms requiring a down power (90 min. shutdown).
4	MAL-CVC002A (5.3 gpm) MAL-RCP007A (15 mils then ramp 15-17 over 45 min)	C(CRS)	#21 RCP seal degrades during down power (~99.5%). #21 RCP vibration increase to 15 mils AOP-RCP-1 actions taken. Trigger 2 (6.5mils =15 on malf) Ramp vibration from 15 to 17 mils over 45 minutes (8.5 =17 mils)

2007 NRC EXAM SCENARIO 2

5	LOA-CFW190 (value 90)	C(ALL)	Trip of 21 MBFPs at ~ 97% power due to discharge valve switch malfunction with a failure of the auto runback to function. AOP-FW-1 actions to rapidly reduce power. Trigger 3
6	MAL-ATS011B BKRPPLO03 (value 5) BKRPPLO04 (value 5) AOV-RCS3A	M(ALL)	#22 MBFP trips –after the crew stabilizes the plant from 21 MBFP trip. ATWS. Auto and manual trips fail. Local trip will work Trigger 4 -PORV 456 and block valve fails open Trigger 5 is linked to stop valves being shut.
7	AOV-RCS3A	C (RO) C(CRS)	21 RCP Seal LOCA after transition out of FR.S-1. Trigger 6
8	MAL-EPS001 (set to trigger 30 seconds after SI reset)	M(ALL)	Loss of offsite power after SI reset. 480V buses strip and SI equipment must be manually reload. Trigger 7
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

The evaluation begins with the plant at 100% power steady state operation.

Shortly after the team takes the watch, a seismic event will occur. Two failures occur immediately with the seismic event. The trip of the running charging pump will require the crew to restore charging and letdown per AOP-CVCS-1. The failure of the controlling 22 SG Steam Flow channel will require the crew to remove the channel from service and restore feedwater to automatic per AOP-INST-1. The crew will implement 0-AOP-SEISMIC-1 and due to alarms reported from Unit 3 will start a unit shutdown per POP-3.1 or AOP-RSD-1.

Early in the shutdown, 21 RCP #1 Seal will degrade. The team will respond to increased seal return flow and high vibrations in accordance with AOP-RCP-1, Reactor Coolant Pump Malfunction. The team should recognize the need to perform a controlled shutdown per the AOP.

During the down power at approximately 97% power, a loss of 21 MBFP will occur with a failure of the auto-runback to occur, This timing will allow for actions to stabilize the plant per AOP-FW-1 prior to loss of the second MBFP.

When the second feed pump trips the team should perform the immediate actions of AOP-FW-1, Loss of Feedwater and manually trip the reactor. Auto and manual reactor trips fail to open the reactor trip breakers. In addition, the rod drive MG set supply breakers fail to open. The team will manually insert control rods and align emergency boration. The NPO dispatched to locally trip the reactor will be successful after emergency boration has been initiated.

After the turbine is tripped, RCS pressure will increase and a PORV opens and fails to close. The team will recognize the failed open PORV and will isolate the PORV by closing it or its' block valve. The team will continue through FR-S.1 and then return to E-0 after the reactor is tripped locally. After transition to E-0 the 21 RCP seal will degrade

2007 NRC EXAM SCENARIO 2

resulting in a seal LOCA. The team will recognize that RCP trip criteria exist from lack of subcooling and will stop all RCPs. The E-0 will be performed until transition to E-1.

Following SI reset in E-1, offsite power will be lost. The team will be required to restart safeguards equipment.

The scenario can be terminated when SI pumps and Containment Cooling Equipment have been restarted following the loss of offsite power.

Procedure flow path: AOP-SEISMIC, AOP-RCP-1, AOP-FW-1, E-0, FR-S.1, E-0, E-1

**Indian Point Unit 2
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 2**

Watch Team Turnover Sheet:

Date/Time:	TODAY
RCS Tave:	565°F
RCS Press:	2247 psia
PZR Level:	56%
% Power:	100%
MW Gross:	1079 MWe
Boron Conc:	1042 ppm
Control Rods	223 steps

Plant Equipment Status:

- The plant is at 100% normal full power lineup.
- MOV-1802A is removed from service for MOVATS testing 1 hour ago. LCO 3.5.2, Condition A entered. 72 hour LCO Expected return to service is 8 hours.
- 22 Charging pump is removed from service preventive maintenance. Expected return to service is 24 hours.
- Severe thunderstorms expected over the next 4 hours.

Team instructions:

- Maintain 100% power.

Op-Test No: 1 Scenario No: 2 Event No.: 1&2

Page 5 of 25

Event Description: **Seismic event that results in the trip of running charging pump and the failure of 22 S/G Controlling Steam Flow Channel (429B) High.**

Time	Position	Applicant's Actions or Behavior
	<i>Evaluator Note:</i>	Seismic event that results in the trip of running charging pump and the failure of 22 S/G Controlling Steam Flow Channel (429B) High. Although these happen concurrently and actions will be taken concurrently, for clarity, the two malfunctions will be described separately below. Also note that since two malfunctions are occurring the CRS will assign actions to BOP that would "normally" be assigned to the ATC. The BOP evaluator should be prepared to evaluate these actions as they are assigned.
	<i>Booth Instructor</i>	Cue: Approximately 3-4 minutes after the malfunction(s) call the CCR as an NPO and report that you felt the turbine building shake for a few seconds 3-4 minutes ago. Shortly after that call as the Unit 3 SM and report "three annunciators are lit on the Peak Shock Annunciator Panel one is red and Strong Motion Event indicator is lit." (this is the AOP trigger for a shutdown)
		<u>The following are the actions related to the loss of Charging flow and AOP-CVCS.</u>
	ATC	Recognize loss of running charging pump and report to CRS
	CRS	Recognize entry condition for 2-AOP-CVCS-1 and direct entry into AOP <u>Or</u> CRS may determine that indications of a common mode failure do not exist and immediately start another charging pump without performing the actions below. If the CRS/ATC do not overtly verify that common mode failure is not a risk then a post scenario follow-up may be required to determine.
	CRS	Direct closure of open Letdown orifice isolation valve: <ul style="list-style-type: none"> • 200A • 200B • 200C
	ATC	Close the open Letdown orifice isolation valve
	ATC	Close LCV-459.
	ATC	Check VCT level > 9% and VCT outlet valve open (LCV-112C) (both met)
		Simulator Operator/Evaluator note: If asked to investigate trip of charging pump after an appropriate delay report nothing abnormal

Op-Test No: 1 Scenario No: 2 Event No.: 1&2

Page 6 of 25

Event Description: **Seismic event that results in the trip of running charging pump and the failure of 22 S/G Controlling Steam Flow Channel (429B) High.**

		but if asked to reset the breaker it <u>will not reset.</u>
	TEAM	<p>Evaluate :</p> <p>Were any indications of gas build-up observed prior to charging pump trip.</p> <ul style="list-style-type: none"> • Fluctuating charging flow • Fluctuating seal injection flow • Fluctuating regenerative heat exchanger temperature <p>(Determine that they did not And continue to step 4.9)</p>
	ATC	Place speed controller for charging pump to be started in MANUAL.
	ATC	Set speed controller for charging pump to be started to \approx 20% output.
	ATC	Start selected charging pump.
	ATC	Increase charging pump speed to obtain 6 -12 gpm seal injection flow.
	ATC or BOP	<p>PERFORM Attachment 1 (Restoration of Charging and Letdown) to restore charging and letdown.</p> <p>The next steps are performed from ATT. 1 to AOP</p>
	ATC or BOP	<p>1.1 Are the following letdown isolation stops open?</p> <ul style="list-style-type: none"> • 201 • 202 <p>Determine they are</p>
	ATC or BOP	Determine that a charging pump is running
	ATC or BOP	<p>1.2 Open one of the following:</p> <ul style="list-style-type: none"> • 204A • 204B

Op-Test No: 1 Scenario No: 2 Event No.: 1&2

Page 7 of 25

Event Description: **Seismic event that results in the trip of running charging pump and the failure of 22 S/G Controlling Steam Flow Channel (429B) High.**

	ATC or BOP	<p>1.3 Are charging pump bypass stops open on running charging pump?</p> <table border="1" data-bbox="551 439 984 700"> <thead> <tr> <th data-bbox="551 439 601 476">√</th> <th data-bbox="601 439 794 476">Pump</th> <th data-bbox="794 439 984 476">Valves</th> </tr> </thead> <tbody> <tr> <td data-bbox="551 476 601 551"></td> <td data-bbox="601 476 794 551">21</td> <td data-bbox="794 476 984 551">4900 1275</td> </tr> <tr> <td data-bbox="551 551 601 627"></td> <td data-bbox="601 551 794 627">22</td> <td data-bbox="794 551 984 627">4901 1277</td> </tr> <tr> <td data-bbox="551 627 601 700"></td> <td data-bbox="601 627 794 700">23</td> <td data-bbox="794 627 984 700">4902 1279</td> </tr> </tbody> </table> <p data-bbox="472 717 1449 793">Determines based on pump started and direct throttling needle valves closed locally if open and then closing the associated isolation valve.</p>	√	Pump	Valves		21	4900 1275		22	4901 1277		23	4902 1279
√	Pump	Valves												
	21	4900 1275												
	22	4901 1277												
	23	4902 1279												
	ATC or BOP	Open HCV-142 to maintain 6-12 gpm seal injection flow.												
	ATC or BOP	Adjust charging pump speed to achieved desired PRZR level.												
	CRS	Is auto control of charging pump speed desired? (determine yes)												
	ATC	Place charging pump speed controller in MAN-BAL												
	ATC	Adjust bias knob until deviation meter indicates zero.												
	ATC	Slowly turn bias knob back to zero												
	CRS	Exit AOP												

Op-Test No: 1 Scenario No: 2 Event No.: 1&2

Page 8 of 25

Event Description: **Seismic event that results in the trip of running charging pump and the failure of 22 S/G Controlling Steam Flow Channel (429B) High.**

	CRS	<p>Evaluate T.S./</p> <p>TRM for loss of charging pump with one charging pump already OOS. TRO 3.1.B.1 Two Chemical and Volume Control System flow paths for boric acid injection shall be OPERABLE as follows:</p> <p>a) One flow path from the Refueling Water Storage Tank (RWST) to the Reactor Coolant System (RCS);</p> <p>b) One flow path from the boric acid storage system to the RCS that includes:</p> <ol style="list-style-type: none"> 1) One boric acid transfer pump, 2) Two channels of heat tracing, 3) Minimum specified volume and concentration of boric acid solution above the minimum specified temperature. <p>c) Two charging pumps, each capable of supporting both the RWST injection flow path and the boric acid storage system injection flow path.</p> <p>APPLICABILITY: MODES 1 and 2.</p> <p>ACTIONS</p> <p>CONDITION REQUIRED ACTION COMPLETION TIME</p> <p>A. One required charging pump inoperable.</p> <p>A.1 Restore required charging pump to OPERABLE status.</p> <p>24 hours</p>
	<i>Booth Instructor</i>	<p><u>Evaluator Note:</u></p> <p>The following steps are relate to loss of failure of 22 S/G Controlling Steam Flow Channel (429B) High. As previously noted these actions will be taken concurrent with actions to address the loss of charging.</p>
	CRS/ ATC	Identifies Steam Flow channel 429B has failed high
	CRS	Directs entry into 2-AOP-INST-1
	ATC	<p>Take manual actions as necessary to control parameters and stabilize the plant.</p> <p>(likely to be taken as soon as malfunction is recognized and prior to AOP implementation)</p>
	ATC	<p>(Note: This action is not procedurally directed but may be taken to restore automatic control)</p> <p>Transfer S/G level control to other Steam Flow channel</p>

Op-Test No: 1 Scenario No: 2 Event No.: 1&2

Page 9 of 25

Event Description: **Seismic event that results in the trip of running charging pump and the failure of 22 S/G Controlling Steam Flow Channel (429B) High.**

	ATC	Check all other controls for malfunction to determine if other failures occurred. (none other than those related to charging pump trip)
	CRS	Determine that a Steam flow instrument has failed and direct transition to step 4.66 per table.
	ATC	Restore affected SG level to program. Operator should be performing this already using 22 MFRV in manual.
	CRS	Return controls used to stabilize plant conditions to auto as desired. (no action should be necessary)
	CRS	Refer to Tech Spec Table 3.3.2-1 for required actions:
<i>Evaluator Note:</i>		<u>If the lead desires to see the applicants manipulate bistables a CUE may be required if the CRS does not decide that the bistables need to be tripped. This CUE would be given as the SM and should be given prior to direction for rapid down power.</u>
	CRS	IAAT SM/CRS determines <u>any</u> bistables listed on Attachment 4 (Steam Flow Mismatch Bistable Trip Switches) associated with failed channel should be tripped, THEN trip bistables as directed by SM/CRS. The following steps are directed by ATT. 4 of the AOP
	BOP	Trip the following bistable <ul style="list-style-type: none"> • BISTABLE: FC-428F • SWITCH NAME: Loop 2B SF > FWF • PROTECTION RACK: White A-10 Trip the affected bistable
	CRS	IAAT SM/CRS determines <u>any</u> bistables listed on Attachment 5 (High Steam Flow Bistable Trip Switches) associated with failed channel should be tripped, THEN trip bistables as directed by SM/CRS.

Op-Test No: 1 Scenario No: 2 Event No.: 1&2

Page 10 of 25

Event Description: **Seismic event that results in the trip of running charging pump and the failure of 22 S/G Controlling Steam Flow Channel (429B) High.**

		The following steps are directed by ATT. 5 of the AOP
		The following steps are directed by ATT. 5 of the AOP
	BOP	<p>Trip the following:</p> <ul style="list-style-type: none"> • BISTABLE: FC-429B • SWITCH NAME: Loop 2B SF SI • PROTECTION RACK: White A-10 <p>Trip the affected bistable</p>
	CRS	Initiate troubleshooting to determine and correct the malfunctions.
Lead Evaluator		This ends the response for the two seismically triggered malfunctions. The actions for the Seismic Event should take place after actions for the above malfunctions.

Op-Test No: 1 Scenario No: 2 Event No.: 3

Page 11 of 25

Event Description: Significant Seismic Event requiring plant shutdown.

Time	Position	Applicant's Actions or Behavior
	<i>Booth Instructor</i>	<p>Reports related to Seismic event should have occurred by this point if not make the following report:</p> <p>Call as the Unit 3 SM and report "three annunciators are lit on the Peak Shock Annunciator Panel one is red and Strong Motion Event indicator is lit." (this is the AOP trigger for a shutdown)</p>
	CRS	Recognize the entry conditions for 0-AOP-SEISMIC-1 and direct entry.
	CRS	<p>IAAT Unit 3 reports that two or more Annunciators are lit on the Peak Shock Annunciator Panel, one of which is red, <u>and</u> Strong Motion Event indicator is lit,</p> <p>THEN perform Steps 4.18....</p> <p>Determine this condition exists and go on to step 4.18</p>
	CRS	<p>Is reactor critical?</p> <p>Determine yes and continue.</p>
	ALL	<p>1.1 INITIATE shutdown as directed by CRS or SM using one of the following:</p> <ul style="list-style-type: none"> • -2-POP-3.1 (PLANT SHUTDOWN, MODE 1 TO MODE 3) or • 2-AOP-RSD-1 (RAPID SHUTDOWN) <p>Down power will be described below after other actions per AOP</p>
	<i>Booth Instructor</i>	<p>NOTE/CUE: the following actions should not distract the crew from the required shutdown. After a short while, < 5 minutes, the Lead Evaluator may have the Booth Operator cue the crew as the SM/OM to start the down power and be shutdown in 90 minutes and plan to trip from 250 MWe.</p> <p>CUE: If requested information on Ground Acceleration is not available yet</p>
	CRS	<p>IF Ground Acceleration is greater than or equal to 0.10g horizontal or 0.05g vertical (OBE),</p> <p>THEN inform Reactor Engineer to initiate a verification of Unit 2 Spent Fuel rack design gaps.</p>

Op-Test No: 1 Scenario No: 2 Event No.: 3

Page 12 of 25

Event Description: Significant Seismic Event requiring plant shutdown.

		Determine ground acceleration and inform as required
	CRS	Dispatch NPO to perform Attachment 1 Booth role play and initiate attachment 1
	CRS	Direct Design Engineering to initiate performance of Attachment 3 Booth role play and initiate attachment 3
	ATC	Is CST Level normal? Determine yes it is normal.
	CRS	INITIATE Attachment 4 for damage.
	CRS	Conduct the following actions/evaluations as time permits <ul style="list-style-type: none"> • Is RCS hot leg temperature greater than 200°F? (YES) • Are Narrow Range SG levels greater than 9%? (YES) • Maintain Narrow Range SG levels between 40 and 50%. • Is Charging Pump CCW cooling normal? (YES) • Are Charging Pump controls normal? (by this point they should be) (YES) • Are SW Header Pressures greater than 60 PSIG? (YES) <ul style="list-style-type: none"> ○ Essential SW Header ○ Non-Essential SW header • Dispatch NPO to inspect Turbine Hall essential service water piping downstream of SWN-6 and SWN-7 for breaks and leakage • Are any CCW Pumps running? (YES) • Is IA header pressure greater than 90 PSIG?(YES) • Is the following valve open? TCV-1103 (FCU COOLER COMMON DISCHARGE HDR TEMP CONTROL VALVE). (YES) • Is at least one of the following FCUs running? <ul style="list-style-type: none"> ○ 22 FCU ○ 25 FCU • Is containment temperature less than 110°F? (YES) • Are Instrument Channel Checks normal? (NO) but actions already take per AOP-INST

Op-Test No: 1 Scenario No: 2 Event No.: 3

Page 13 of 25

Event Description: Significant Seismic Event requiring plant shutdown.

		<ul style="list-style-type: none"> • Determine condition of annunciators: (SAT) <ul style="list-style-type: none"> ○ Annunciator test satisfactory ○ Annunciators in alarm as expected ○ Annunciators that normally are clear remain clear • Are all air operated valves in proper position for plant conditions? (YES) • Are Motor operated valves in proper position for plant conditions? (YES) • Is 480V Equipment status normal as per control switch positions and plant conditions? (YES) • Are any PAB Exhaust Fans running? (YES) • Consult with the following to evaluate plant status. <ul style="list-style-type: none"> ○ Operations Staff ○ Plant Engineering ○ Chemistry ○ RES Staff <p>Return to procedure in effect.</p>
<i>Booth Instructor</i>		<p>NOTE: Although the procedure gives the operators options for the down power (POP or AOP), the previous Booth CUE to shutdown in the next 90 min. should prompt use of the AOP. Although the AOP is the better choice the operators may select the POP which will have slightly different actions from those below (AOP actions)</p> <p>Cue: Acknowledge reports and role play as SM you will perform notifications listed in next step.</p>
	CRS	<p>1.2 INITIATE notification of rapid shutdown:</p> <ul style="list-style-type: none"> ___ ConEd System Operator ___ Operations Manager/Designee ___ Watch Chemist (implement 2-CY-2625 (General Plant Systems - Specifications And Frequencies) ___ Health Physics ___ Reactor Engineer ___ Shift NPOs

Op-Test No: 1 Scenario No: 2 Event No.: 3

Page 14 of 25

Event Description: Significant Seismic Event requiring plant shutdown.

		<input type="checkbox"/> Unit 3 SM <input type="checkbox"/> Power Marketing																									
	CRS	IAAT conditions change such that the shutdown is no longer required while the turbine is online and the CRS <u>or</u> SM directs termination of the shutdown, THEN immediately GO TO Att. 1 to stabilize. (N/A)																									
	CRS	1.3 Are pressurizer pressure controllers in AUTO? <ul style="list-style-type: none"> • Pressurizer Press Control • PCV-455A Spray Control Valve • PCV-455B Spray Control Valve Determine YES																									
	ATC	Place all available heaters to ON																									
	CRS	Will the reactor be tripped at 250 MWe? (YES based on previous cue) the power reduction and boration rate is determined 10mwe/min and 2.5 gpm boron																									
	CRS	Are control rods in AUTO? YES																									
	CRS	1.4 <input type="checkbox"/> Set Boric Acid Flow Integrator to required total boron from the following table <u>or</u> a total determined by the CRS. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>MWe</th> <th>REQUIRED TOTAL BORON (gal)</th> <th>MWe</th> <th>REQUIRED TOTAL BORON (gal)</th> </tr> </thead> <tbody> <tr> <td><u>≥ 1000</u></td> <td><u>200</u></td> <td>500</td> <td>53</td> </tr> <tr> <td>900</td> <td>145</td> <td>400</td> <td>36</td> </tr> <tr> <td>800</td> <td>90</td> <td>300</td> <td>18</td> </tr> <tr> <td>700</td> <td>80</td> <td>200</td> <td>0</td> </tr> <tr> <td>600</td> <td>71</td> <td></td> <td></td> </tr> </tbody> </table>		MWe	REQUIRED TOTAL BORON (gal)	MWe	REQUIRED TOTAL BORON (gal)	<u>≥ 1000</u>	<u>200</u>	500	53	900	145	400	36	800	90	300	18	700	80	200	0	600	71		
MWe	REQUIRED TOTAL BORON (gal)	MWe	REQUIRED TOTAL BORON (gal)																								
<u>≥ 1000</u>	<u>200</u>	500	53																								
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800	90	300	18																								
700	80	200	0																								
600	71																										

Op-Test No: 1 Scenario No: 2 Event No.: 3

Page 15 of 25

Event Description: Significant Seismic Event requiring plant shutdown.

		Should select 200 gal.
		INITIATE boration per Att. 2 Boration at a rate determined by the CRS. 10mwe/min and 2.5 gpm boron
	ATC	Attachment 2 actions follow: <ul style="list-style-type: none"> ○ Record Primary Water Flow Setting. ● Record Boric Acid Flow Setting ● Turn Makeup Control switch to STOP and return to neutral. ● Set FCV-110A (Boric Acid Flow Control) to desired rate. ● Place RCS Makeup Mode Selector Switch to BORATE ● Turn Makeup Control Switch to START and return to neutral. ● WHEN directed to secure boration, THEN continue with Attachment.....
	CRS	IAAT VCT level is less than 22%, (Should not) THEN perform the following:.....
	CRS	IAAT Steam Dumps are in temperature mode and the Steam Dump Loss of Load Interlock light is extinguished, THEN PERFORM Steps 4.32-4.34. (Should not occur)
	ATC/BOP	1.5 Reduce load between the rate determined in Step 4.6 or 4.8 and a maximum of 50 MWe while maintaining the following: <ul style="list-style-type: none"> ___ SG narrow range levels between 44 and 54%. ___ Both Turbine Load Limit Oil pressures as follows: <ul style="list-style-type: none"> ● no greater than 2 psig above governor oil pressure when above 75% power. ● no greater than 5 psig above governor oil pressure when below 75% power. ___ MTG voltage at approximately zero VARs. ___ Tave between 0 and +4 °F of Tref using any of the following: <ul style="list-style-type: none"> ● Adjust Turbine load reduction rate ● Adjust RCS boron concentration ● Adjust Control Rods

Op-Test No: 1 Scenario No: 2 Event No.: 3

Page 16 of 25

Event Description: Significant Seismic Event requiring plant shutdown.

		<p>___ Adjust PCV-1175-1-4 as required.</p> <p>SG blowdown as necessary to maintain desired flow.</p>
	ATC	<p>IAAT MBFP recirc. valve opens due to low feedwater flow, THEN place control switch for running MBFP recirc valve(s) to the OPEN position as necessary.</p>
	BOP	<ul style="list-style-type: none"> • Is generator load less than 800 MWe? • Is MBFP suction pressure greater than 310 PSIG? • Are three Condensate Pumps running? • If yes to all the Stop 22 Condensate Pump and Press the Arming button for 22 Condensate Pump. <p>Should not get any further then this since event <u>5</u> will occur immediately after 22 condensate pump is secure</p>
	Lead Evaluator	<p>Any time after down power is commenced and adequate demonstrations of operator performance is observed Event 4 can be triggered (trigger 2) at the Lead Examiner's discretion.</p>

Op-Test No: 1 Scenario No: 2 Event No.: 4 Page 17 of 25
 Event Description: **21 RCP High Seal Return Flow and High Vibrations (Trigger 2)**

Time	Position	Applicant's Actions or Behavior
	Lead Evaluator	<p>The team will have concurrent indications of both a seal problem and vibration problem. The following steps anticipate that the team will address the seal problem steps first; however, the team may decide to address the vibration portion of AOP-RCP-1 first. Regardless of which is addressed first, both portions of the AOP should be addressed by the team</p> <p>NOTE: Most of the following actions will take place concurrent with the down power actions described in event 3 above. This event sets the stage for the post "major event" seal leak but is not absolutely required to meet applicant evaluation opportunities. It is important that the RCP malfunction occur early in the down power (~99+%) to ensure the next event provides an adequate challenge (must occur at ~97% power)</p>
	CRS/ATC	Diagnose 21 RCP Seal and Vibration Malfunction
	BOP	Perform ARPs for alarms <ul style="list-style-type: none"> • SF 1-5 RCP Seal Return Flow High/Low Common • SF 4-6 21 RCP High Vibration
	Team	Check the following conditions for IAAT step 4.1: <ul style="list-style-type: none"> • Stator winding temp $\geq 250^{\circ}\text{F}$ <u>AND</u> $T_{\text{ave}} \geq 547^{\circ}\text{F}$ (no) • Stator winding temp $\geq 270^{\circ}\text{F}$ <u>AND</u> $T_{\text{ave}} < 547^{\circ}\text{F}$. (no) • RCS seal 1 $\Delta\text{P} < 200$ psig. (no) • Sustained RCP vibration > 20 mils (no) • RCP motor bearing temp $\geq 200^{\circ}\text{F}$ (no) • #1 Seal inlet temp $\geq 225^{\circ}$ (no)
	TEAM	Determine a seal malfunction exists Check if any of the following conditions exist: <ul style="list-style-type: none"> • #1 seal return flow < 1 gpm (no) • #1 seal return flow > 5 gpm (yes)
	CRS/BOP	Check if seal return flow is > 6 gpm for IAAT step 4.8 (no)
	BOP	Check #1 seal return flow outside the region of Attachment 4 for IAAT step

Op-Test No: 1 Scenario No: 2 Event No.: 4 Page 18 of 25
 Event Description: **21 RCP High Seal Return Flow and High Vibrations (Trigger 2)**

Time	Position	Applicant's Actions or Behavior
		4.18 (RCP Seal 1 Normal Operating Range) (yes)
	ATC	Check reactor trip breakers closed (yes)
	CRS/ATC	Check IAAT step 4.20, all the following conditions exist: <ul style="list-style-type: none"> • #1 seal return flow < 0.8 (no) • Affected RCP running (yes) • Seal temps increasing (no)
	CRS	Notify SM that a normal reactor shutdown is required to allow affected RCP to be stopped within 8 hrs.
	BOP	Record indications for affected RCPs every 10 minutes (or as determined by SM) on Attachment 1 (RCP Data Sheet)
	CRS	Go back and begin execution of the High Vibration portion of the AOP
	Lead Evaluator	Insert next event with <u>Trigger 3</u> at ~97% power. This will set up the conditions for the MBFP trip and actions to rapidly reduce power to prevent a trip due to lower SG level.

Op-Test No: 1 Scenario No: 2 Event No.: 5

Page 19 of 25

Event Description: Trip of 21 MBFP (Trigger 3) with a failure of the automatic runback.

Time	Position	Applicant's Actions or Behavior
	Team	Evaluate the loss of 21 MBFP and implement actions of AOP-FW-1 Run back may require changes in boration rate etc. from the ATC operator.
	Team	IAAT remaining MBFP is lost AND reactor power is > 4%, THEN trip the reactor <u>and</u> GO TO E-0. (Not applicable yet)
	ATC	Is a MBFP running? (yes)
	ATC	Is the recirculation valve for the tripped MBFP closed? (no) must close it
	CRS	Is turbine load > 745 MWe? (yes) Required rapid load reduction
	CRS/BOP	Is reactor power > 50%? (Yes) Are <u>all available</u> condensate pumps running? (yes)
	CRS/ATC	Are 21 and 23 ABFP running? yes
	ATC	Operator may cycle the FRV controllers from auto to manual and back to remove controller wind-up.
	Lead Evaluator	Insert next event at lead evaluators' discretion after conditions are stabilized and SG levels are recovering following rapid manual power reduction.

Op-Test No: 1 Scenario No: 2 Event No.: 6

Page 20 of 25

Event Description: Loss of second MBFP, ATWS (manual/auto) with PORV 456 failing to re-close.

Time	Position	Applicant's Actions or Behavior
	Booth Instructor	<i>When directed by the Lead Evaluator, activate trigger 4</i>
	ATC	Diagnose loss of feedwater event
	ATC	Trip the reactor based on Immediate Actions and IAAT step of AOP-FW (Reactor does not auto or manually trip)
	CRS	Direct Operators to perform immediate actions of E-0, Reactor trip or safety injection
	ATC	Determines that reactor has not tripped
	Team	Go to FR-S.1 Response to Nuclear Power Generation/ATWS
	CRS	Directs team to perform immediate actions of FR-S.1, Response to Nuclear Power Generation/ATWS
	ATC	Verify reactor trip <ul style="list-style-type: none"> • Determines reactor is not tripped • Attempts to manually trip the reactor
	ATC	Manually inserts control rods (Critical action)
	CRS	Dispatches NPO to locally trip reactor trip breakers. Informs NPO that if RTBs will not open, then trip MG set output breakers
	Booth Operator	After NPO is dispatched to locally trip the RTBs, wait until emergency boration has been started, then delete the RTB malfunctions and locally open the reactor trip breakers.
	BOP	Verify turbine tripped
	BOP	Check AFW Pumps Running
	Team Critical task	Team Critical Task: Insert negative reactivity into the core by at least one of the following methods before completing FR-S.1 step 4: <ul style="list-style-type: none"> • De-energize the control rod drive MG sets • Place rod control in manual and insert RCCAs Establish emergency boration flow to the RCS.

Op-Test No: 1 Scenario No: 2 Event No.: 6

Page 21 of 25

Event Description: Loss of second MBFP, ATWS (manual/auto) with PORV 456 failing to re-close.

Time	Position	Applicant's Actions or Behavior
		Note that all of these actions should be taken. If all are not performance may meet critical task requirement and still be deficient.
	BOP	Initiate emergency boration of RCS <ul style="list-style-type: none"> • Start Charging Pumps • Open MOV-333 • Start both BATPs in high speed • Increase charging pump speed to maximum • Open LCV-112B • Close LCV-112C • Place RCS Makeup Control Switch to Stop • Establish minimum charging flow of 75 gpm • Check RCS Pressure < 2335 psig
	BOP	Verify Containment Ventilation Isolation
Lead Evaluator		<p>The CRS should direct the either the RO or BOP to perform steps 1-9 of E-0 per the FR-S.1 step 6 caution.</p> <p>After SI occurs, the RO should restart Charging Pumps.</p> <p>During the performance of E-0, the team should recognize that RCP trip criteria are met by the E-0 foldout and trip all RCPs.</p> <p>The team should recognize the failed open PORV and block valve and use prudent operator action to isolate it by closing either the PORV or its' block valve (per OAP-012 section 4.5).</p>
	Team Critical Task:	Check PZR PORVs and Spray Valves Determine PORV 456 did not reclose and manually closes either PORV 456 or its' associated MOV to isolate flow. <p><i>Team Critical Task:</i></p> <p><i>Isolate stuck-open PZR PORV by completion of the first step in the ERG network that directs the crew to close the block MOV or PORV manually</i></p>
	ATC	Check if reactor trip and turbine trip have occurred.
	ATC/BOP	Check SG Levels <ul style="list-style-type: none"> • Checks SG levels in at least one SG > 10% • Verifies AFW Flow > 800 gpm

Op-Test No: 1 Scenario No: 2 Event No.: 6

Page 22 of 25

Event Description: Loss of second MBFP, ATWS (manual/auto) with PORV 456 failing to re-close.

Time	Position	Applicant's Actions or Behavior
	ATC	Verify all dilution paths isolated
	ATC	Check for reactivity addition from uncontrolled Cooldown
	BOP/ATC	Check Core Exit thermocouples < 1200F
	ATC	Verify Reactor subcritical
	Team	Return to procedure and step in effect (E-0)
	Lead Evaluator	On transition to E-0 and PORV isolated Lead may insert Trigger 6 for 21 RCP seal failure. If PORV has not been addressed then Leads judgment should be used to insert the seal failure when crew performance related to PORV has been adequately evaluated.

Op-Test No: 1 Scenario No: 2 Event No.: 7 & 8

Page 23 of 25

Event Description: 21 RCP seal leak (Trigger 6) followed by Loss of offsite power 30 seconds after SI reset. 480V buses strip and SI equipment must be manually reload (Trigger 7)

Time	Position	Applicant's Actions or Behavior
<i>Lead evaluator</i>		
	ATC	Verify Reactor Trip
	ATC	Verify power to AC 480V Busses
	ATC	Check SI Status
	BOP	Perform attachment 1 while continuing with this procedure (actions listed after E-0 actions)
	ATC	Verify AFW Pumps Running
	ATC	Verify SI system Flow
	ATC	Check RCP Seal Cooling
	ATC	Check RCS Temperature
	ATC	Check if RCPs should be stopped
	ATC	Check if Any SG is Faulted
	ATC	Check if SG Tubes are intact
	CRS/ATC	Check if RCS is intact (no) <ul style="list-style-type: none"> Go to E-1, Loss of Reactor or Secondary Coolant
	BOP	E-0, REACTOR TRIP OR SAFETY INJECTION Attachment 1 – Automatic Action Verification
		Verify proper charging system operation
	BOP	Check 345KV MO Disc Switch F7-9 OPEN
	BOP	Check status of 480V busses
	BOP	Verify FW Isolation
	BOP	Check if Main Steamlines should be isolated
	BOP	Verify Proper Service Water System Operation
	BOP	Verify SI System Pumps Running

Op-Test No: 1 Scenario No: 2 Event No.: 7 & 8

Page 24 of 25

Event Description: 21 RCP seal leak (Trigger 6) followed by Loss of offsite power 30 seconds after SI reset. 480V buses strip and SI equipment must be manually reload (Trigger 7)

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Proper Emergency SI Valve Alignment
	BOP	Verify Containment Fan Coolers – In Service
	BOP	Verify AFW flow to ALL SGs
	BOP	Verify Containment Ventilation Isolation
	BOP	Verify Containment Isolation Phase A
	BOP	Check If Containment Spray Should Be Actuated
	BOP	Verify CCR Air Conditioner Status
	BOP	Notify CRS that ATTACHMENT 1, is complete
		E-1, Loss of Reactor or Secondary Coolant
	ATC	Check if any S/G Secondary Pressure Boundary is Faulted
	ATC	Check Intact SG Levels
	ATC	Check PZR PORVs and Block Valves
	BOP	Reset SI
Lead Evaluator		Offsite power will be lost ~30 seconds after SI is reset (trigger 7) on Leads direction. Team should diagnose loss of offsite power and recognize SI pumps and FCUs must be restarted
		Reset Containment Isolation Phase A and Phase B
	CRS/BOP	Directs Operator to restart FCUs and SI pumps
	Team Critical Task	Team Critical Task Establish flow from a least one SI pump before transition out of E-1
Lead Evaluator		Terminate the scenario after FCUs and SI pumps have been restarted, or at the discretion of the lead evaluator.

Op-Test No: 1 Scenario No: 2 Event No.: 7 & 8 Page 25 of 25
Event Description: 21 RCP seal leak (Trigger 6) followed by Loss of offsite power 30 seconds after SI reset. 480V buses strip and SI equipment must be manually reload (Trigger 7)

Time	Position	Applicant's Actions or Behavior

Indian Point Unit 3
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3

Facility: Indian Point 2 Scenario No: 3 Op-Test No: 1

Examiners: _____ Operators: _____

Initial Conditions:

100% power MOL.

22 ABFP is tagged for maintenance

Severe thunderstorms expected over the next 4 hours

Crew is to maintain steady state plant conditions

Critical Tasks:

1. Manually trip the main turbine before a severe (orange-path) challenge develops to either the subcriticality or the integrity CSF or before transition to ECA-2.1, whichever happens first
2. Establish RCS bleed and feed when the average of the three lowest SG levels reaches 41% WR and prior to S/G depressurization.
3. At the discretion of the Lead Evaluator, the following CT may also be evaluated:
Close all reactor vessel head vent valves before the end of the scenario

Event No:	Malf. No.	Event Type*	Event Description
1	MAL-EPS007B	I/R (RO) N (BOP) N (CRS)	480v bus 3A fault. Trigger 1
2	XMT-RCS028A (fail high)	I (All)	PT-455 fails high Trigger 2
3	MAL-RCS010 (0.015)	C (RO) C(CRS)	30 gpm RCS leak Trigger 4
4	-CVH-CFW009B (24 FRV fails closed) -CVH-MSS031A - AOV-MSS038A &031A(stop and control valve open)	M(All)	24 FRV fails closed leading to Auto or manual Reactor Trip with Turbine failure to trip and loss of running AFW pump. Trigger 3

**Indian Point Unit 3
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3**

	AOV-RCS003A (PORV will not open)		

The evaluation begins with the plant at 100% power steady state operation. The following equipment is out of service:

- 22 ABFP has been out-of-service for bearing oil line repair for 4 hours. It is expected back within the next 6 hours (ITS 3.7.5 – 72 hr AOT). 21 and 23 ABFPs are protected equipment.

After taking the watch, a fault will occur on 480V Bus 3A. The team will take actions in accordance with AOP-480V-1, “Loss of Normal Power to any Safeguards 480V Bus.” Due to the fault on Bus 3A, 22 EDG cannot re-energize the bus. TS require plant shutdown. (OTE: Lead may choose to allow or direct a plant shutdown if desired to evaluate an additional event. To accomplish the lead will direct a controlled shutdown to affect repairs to the 3A bus)

Prior to completion of the Subsequent Actions of AOP-480V-1, PRZR Pressure Controlling Transmitter PT-455 will fail high requiring operator actions IAW AOP-INST-1. The CRS will refer to Technical Specifications (T.S.).

After the team stabilized the plant from the PT-455 failure and assesses T.S., an RCS leak will begin. The team will respond IAW AOP-LEAK-1. The leak rate (~30gpm) will allow stabilization of pressurizer level by adjusting charging and letdown.

After the team has stabilized the plant and determined T.S. for the RCS leak, 24 feed regulation valve will slowly fail closed and trigger either an automatic or manual reactor trip. When the reactor is tripped, the turbine upper right stop and control valve pair fail to close. MSIVs must be manually closed to isolate steam to the turbine.

23 ABFP will not auto start and will not be able to be manually started from the Control Room due to 480V circuit breaker failure. (21 ABFP is deenergized due to fault on bus 3A, and 22 ABFP is out of service.)

The team will subsequently transition to FR-H.1, “Loss of Secondary Heat Sink” due to a loss of AFW flow. SG WR levels will lower until bleed and feed is required.

One PRZR PORV will not open when required. The crew will open the Reactor Head Vent valves. 21 AFW pump will then be successfully started from its ASSS supply, or 23 AFW pump from its normal supply after swapping 480V breakers with the spare breaker. The scenario can be terminated after the head vent valves have been closed, or at the discretion of the lead evaluator.

Procedure flow path: AOP-480V-1, AOP-RCP-1, E-0, FR-H.1

**Indian Point Unit 3
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3**

PRE-SCENARIO ACTIVITIES:

- **Ensure that 22 Charging Pump is running and all others are secured**
- Perform simulator setup checklist

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
IC Reset	100	Reset Simulator to 100% power IC
SES Setup Batch File	Run setup batch	<ul style="list-style-type: none"> -Isolates steam supply to 22 ABFP -Removes 22 ABFP from service (CVH-ATS019A) -Loads 23 ABFP failure (MOT-AFW002A) -Fails Upper Right Stop Valve (AOV-MSS038A) -Loads PORV 456 failure (AOV-RCS003A) -Loads bus 3A fault on Trigger 1 (MAL-EPS007B) -Loads PT455 failing high on Trigger 2 (XMT-RCS028A) -Loads 30 GPM RCS leak on Trigger 4 (MAL-RCS010 (0.015)) -Sets Trigger 3 to actuate 24 FRV ramping closed (CVH-CFW009B 60 sec. ramp) & Fails Upper Right Control Valve partially open (AOV-MSS031A (FAI))

**Indian Point Unit 3
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3**

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
Floor Setup	<p><u>Ensure that 22 Charging Pump is running and all others are secured.</u></p> <p>Place PCV-1139 (22 ABFP) in Trip and apply Danger Tag</p> <p>Perform setup checklist Distribute Turn over sheets</p>	<p>Hang PROTECTED EQUIPMENT tags for: 21 & 23 ABFP's</p> <p>Update the Protected Equipment Computer display. Risk is yellow.</p> <p>Watch team walks the panels and assumes the watch.</p>
Event 1	<p>Actuate Trigger 1 At lead evaluator direction</p>	<p>^ MAL-EPS007B 480V BUS 3A FAULT IMF MAL-EPS007B (1 0) TRUE</p>
Role Play	<p>If NPO sent to investigate Bus 3A Trip</p> <p>If requested to secure the 22 EDG</p> <p>Acknowledge requests for I&C to troubleshoot</p> <p>If requested to Initiate 2-OSP-27.1.13 (<i>Support Procedure - Providing Unit 1 Rectifier 125 Volt DC Power To A Unit 2 Battery</i>) to provide an alternate power supply to 23 Battery Charger.</p>	<p>NPO reports some discoloration and blistered paint on the 3A switch gear, the bus supply breaker tripped on over current and strong odor of ozone.</p> <p>Acknowledge order, secure EDG and report 22 EDG is secured.</p> <p>I&C will develop a troubleshooting plan</p> <p>Acknowledge order (no other action to be taken prior to next event)</p>
Event 2	<p>Actuate Trigger 2 At lead evaluator direction</p>	<p>MAL- XMT-RCS028A PT 455 fails high.</p>

Indian Point Unit 3
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
Role Play	If AOP-INST Attachment 6 table 2 has not been revised to correctly reflect delta T defeat switch T/411A vice T/412A be prepared to provide a temporary change copy that provides correct guidance.	IF deficiency is noted by applicant in performance of AOP-INST-1 Attachment 6 table 2 then state that the SM has a temporary change for that table and provide it to the applicant. This will only be necessary if the AOP is not correct prior to the exam date.
Event 3	Actuate Trigger 4 At lead evaluator direction <u>Note trigger is not the same as event</u>	MAL-RCS010 – Inserts 30 GPM RCS leak
Event 4	Actuate Trigger 3 At lead evaluator direction <u>Note trigger is not the same as event</u>	-CVH-CFW009B (24 FRV fails closed) -CVH-MSS031A -AOV-MSS038A & 031A(stop and control valve open) AOV-RCS003A (PORV will not open)
NOTE:	When Rx is tripped	Upper right stop and control valve do not close.
Role Play	ABFP Status:	21 deenergized 22 bearing oil is drained 23 pump appears normal. Breaker appears normal
Role Play	When NPO dispatched to energize head vent valves at MCC 26A/B	Close breaker for HCV-3100 o MCC 26A Sheet 2 (EPS 18) LOA-EPS431 Close breaker for HCV-3101 o MCC 26B Sheet 2 (EPS 22) LOA-EPS523

**Indian Point Unit 3
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3**

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
	<p>After head vent valves have been opened:</p> <p>Depending upon previous requests from the CCR, perform one of the following: fix the 23 ABFP 480V breaker or align ASSS power to 21 ABFP</p>	<p>Do one of the following to restore a motor driven ABFP:</p> <ol style="list-style-type: none"> 1. Fix 23 ABFP 480V bkr: Call CCR and request 23 ABFP control switch be placed in pullout to support breaker swap. From the Instructor Station Summary - Delete MOC-AFW002. NPO reports that the 480V breaker for 23 ABFP has been swapped with the spare breaker. Request CCR to attempt to start 23 ABFP. 2. Align ASSS 440V power (SOP-ESP-1, section 4.11) to 21 ABFP: Place EDC5 in "ALT" (Bus 3A P&ID EPS7). Notify CCR. When directed by CCR, close breaker at 12FD3 to start ABFP. (P&ID SWD4 breaker 12FD3-1B)
Role Play	At CCR request	Perform various LOA's per NPO local task list

Indian Point Unit 3
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3

SESSION PRE-BRIEF:

- The plant is at 100% normal full power lineup
- The following equipment is out of service:
 - 22 ABFP has been out-of-service for bearing oil line repair for 4 hours. It is expected back within the next 6 hours (ITS 3.7.5 – 72 hr AOT). 21 and 23 ABFPs are protected equipment.
- RCS Boron is in accordance with the Reactivity Summary sheet
- No surveillances planned for the shift.
- Maintain Current plant conditions

SHIFT TURNOVER

1. Ensure the simulator is cleared of unauthorized personnel
2. Ensure trainees are aware of the shift job assignments
3. Hold a shift briefing, detailing plant conditions and instructions to the shift
4. Allow trainees to perform panel walk downs and ask questions. Inform the trainees that you will respond to any alarms during this period.
5. Direct the CRS to inform you when the trainees are ready to assume the watch
6. When the trainees are ready, inform them that they have the watch and commence the exercise

Op-Test No: 1 Scenario No: 3 Event No.: 1

Page 8 of 20

Event Description: 480V Bus 3A faults. Team responds per AOP-480V-1 to stabilize the plant.

Time	Position	Applicant's Actions or Behavior
	Booth Instructor	When directed by the lead evaluator, activate trigger 1: ^ MAL-EPS007D 480V BUS 3A FAULT IMF MAL-EPS007D (2 0) TRUE
	BOP/RO	Diagnose bus 3A de-energized Perform ARPs for associated alarms
	CRS	Implement AOP-480V-1 <ul style="list-style-type: none"> ○ Direct actions of RO and BOP ○ Initiate Attachment 2 ○ Evaluate TS ○ Determine shutdown is required ○ Ensure notifications are initiated (OM, WWM, NRC, Power Marketing, etc).
	RO	Either: -Start 21 or 23 Charging pump and adjust speed to match 22 prior to trip. (note taking this action without procedure should be the topic of a follow up question since the possibility of common mode failure exists and the IPEC expectation is that a procedure be used in this situation (i.e. in hand AOP or ARP etc.) -If flashing in letdown line occurs (it should occur quickly), then first close LCV-459, start a charging pump and re-establish letdown per 2-SOP-3.1
	BOP	Check CCW pumps running and 625 open Check SW pumps Dispatch NPO to monitor EDGs

Op-Test No: 1 Scenario No: 3 Event No.: 1

Page 9 of 20

Event Description: 480V Bus 3A faults. Team responds per AOP-480V-1 to stabilize the plant.

	CRS	<p>Initiate review of the following TS to determine required actions based on plant conditions:</p> <p>3.8.1 AC Sources – Operating, Condition C</p> <p>3.8.9 Distribution Systems – Operating, Condition A</p> <p>Determine that bus 3A is inoperable.</p> <p>Determine 21 ABFP is inoperable and since 22 ABFP pump is also inoperable, per LCO 3.7.5 Condition C:</p> <ul style="list-style-type: none"> ○ Be in mode 3 in next six hours
Lead Evaluator		<p>This is an opportunity to allow the team to perform a controlled down power if desired for evaluation purposes at the <u>Leads discretion</u>. If this is desired provide a prompt to the CRS to have the unit off line in a specified time period (< 2 hours will have the crew us RSD procedure)</p> <p>Direct the Booth Instructor to actuate trigger 2.</p> <p>Proceed to the next event the failure of PT455</p>

Op-Test No: 1 Scenario No: 3 Event No.: 2 Page 10 of 20
 Event Description: PRZR Pressure Controlling Transmitter PT-455 will fail high. AOP-INST-1

Time	Position	Applicant's Actions or Behavior						
	Booth Instructor	<p><i>When directed by the lead evaluator, activate trigger 2</i></p> <p>Indications received: Pressurizer Pressure Channel 1 indication increases to 2255 over 60 seconds Spray valves modulate open Actual Pressurizer Pressure decreases Alarm SA 3-2 PRZR Low Pressure 2185 PSIG</p>						
	CRS/ATC	Diagnoses Pressurizer pressure control system malfunction						
	CRS	Direct ATC to perform immediate actions of AOP-INST-1.						
	ATC	Take manual control of heaters and spray and shuts the spray valves and turns on heaters to restore pressure.						
	CRS/ATC	<p>Have all control systems listed in step have been checked as being affected? Direct the evaluation of other systems and determine only the PRZR Press is impacted.</p>						
	CRS	Has an instrument failure occurred? (YES)						
	CRS	CRS refers to table in step 4.2 and selects transition to step 4.76						
	ATC	<p>Manually operate PRZR heaters and sprays as necessary to maintain desired RCS pressure. Should already be done</p>						
	BOP	<p>Place Pressurizer Pressure Defeat switch (P/455A) (Rack B-6) in position specified by Attachment 6 (Defeating Failed PRZR Pressure Channels) (Page 101).</p> <table border="1" data-bbox="490 1555 1513 1647"> <thead> <tr> <th>Failed Channel</th> <th>In Rack B-6, place P/455A in:</th> <th></th> </tr> </thead> <tbody> <tr> <td>1 (455 red)</td> <td>DEFEAT 1 & 4</td> <td>✓</td> </tr> </tbody> </table>	Failed Channel	In Rack B-6, place P/455A in:		1 (455 red)	DEFEAT 1 & 4	✓
Failed Channel	In Rack B-6, place P/455A in:							
1 (455 red)	DEFEAT 1 & 4	✓						
	BOP	<p>Place AT DEFEAT switch (Rack B-8) in position specified in Table 2. PI-455 (Red) delta T defeat switch T/412A to DEFEAT LOOP 1 position</p> <p>NOTE Procedure is incorrect and should say 411A vice 412A. If this is not resolved prior to the exam the booth will prepare a temporary change to correct as desired by Lead Examiner.</p>						

Op-Test No: 1 Scenario No: 3 Event No.: 2 Page 11 of 20
 Event Description: PRZR Pressure Controlling Transmitter PT-455 will fail high. AOP-INST-1

	ATC	Place Pressurizer Pressure Recorder Transfer Switch (Panel FB) to the Channel in control.			
	ATC	Return PRZR heater and spray controls to auto as desired.			
	ATC	Has channel failed high? (YES)			
	CRS/ATC	Has Channel 3 failed (457 blue)? (No) Transition to 4.95			
	CRS/ATC	Has Channel 4 failed (474 yellow)? (NO) Transition to step 4.100			
	CRS	Refer to Tech Spec Tables 3.3.1-1 & 3.3.2-1 for required actions 3.3.1 action E.1(3.3.2 action D.1) Place channel in trip. Within 72 hours. CRS determines that the bistable(s) must be tripped in 72 hours and that 3.4.11 does not apply			
		IAAT CRS determines <u>any</u> bistables listed on Attachment 7 (PRZR Pressure Bistable Trip Switches) associated with failed channel should be tripped, THEN trip bistables as directed by CRS. CRS determines that bistables can be tripped and if desired directs Attachment 7 be performed.			
	<i>Lead Evaluator</i>	The Attachment 7 actions to trip bistables are listed below. This may not be performed since 72 hours are allowed per T.S. Lead discretion.			
	BOP	BISTABLE	SWITCH NAME	PROTECTION RACK	TRIP ✓
		PC-455B	(Loop 1) Hi Press Trip	Red A-4	
		PC-455A	(Loop 1) Lo Press Trip	Red A-4	
		PC-455E	(Loop 1) SI	Red A-4	
		PC-455C	(Loop 1) Unblock SI	Red A-4	

Op-Test No: 1 Scenario No: 3 Event No.: 2 Page 12 of 20
Event Description: PRZR Pressure Controlling Transmitter PT-455 will fail high. AOP-INST-1

		TC-411A,	Over Temp Trip, (Alarm and proving lamp)	Red A-4		
Lead Evaluator	At Lead Evaluators discretion trigger 4 (for Event 3, 30gpm RCS leak) after T.S. have been evaluated (3.3.1.1 action K, E & 3.3.2.1 action D)					

Op-Test No: 1 Scenario No: 3 Event No.: 3

Page 13 of 20

Event Description: 30 gpm leak on pressurizer surge line

*Decreasing PRZR Level and Pressure**Containment airborne radioactivity levels go up.**Increased Charging flow and auto makeup frequency**Multiple alarms*

Time	Position	Applicant's Actions or Behavior
	ATC	Determines that RCS leakage has increased
	CRS	Implements 2-AOP-LEAK-1, Sudden Increase in Reactor Coolant System Leakage
	CRS/ATC	IAAT source of leakage is known, THEN isolate leak as directed by CRS. Leak source unknown but may be able to determine that it is in containment
	CRS/ATC	IAAT PRZR pressure decreases to ≤ 1930 psig, THEN trip the reactor and GO TO E-0. Determined not applicable yet.
	CRS/ATC	IAAT leakage exceeds capacity of two charging pumps, OR PRZR level decreases to $< 14\%$, THEN perform the following: A. Trip the reactor. B. Initiate SI. C. GO TO E-0. <u>Determined not applicable yet.</u>
	CRS/ATC	Perform the following as necessary to maintain PRZR level: <ul style="list-style-type: none"> • increase charging pump speed. • Start second charging pump <u>and</u> open HCV-142 as necessary to prevent lifting charging pump reliefs. • Reduce letdown to 45 gpm. May perform one or more of these actions
	CRS/ATC	Check for PORV leakage (NO) <ul style="list-style-type: none"> • PORV Outlet Temperature • Acoustic Monitor • PRT Pressure • PRT Level

Op-Test No: 1 Scenario No: 3 Event No.: 3

Page 14 of 20

Event Description: 30 gpm leak on pressurizer surge line
Decreasing PRZR Level and Pressure
Containment airborne radioactivity levels go up.
Increased Charging flow and auto makeup frequency
Multiple alarms

		Is there indication of PRZR safety valve leakage? (NO) <ul style="list-style-type: none"> • Acoustic Monitor • Safety valve outlet temperature
	CRS/BOP	Is sudden increase in leakage due to a SG tube leak? (NO)
	CRS/BOP	Is sudden increase in leakage due to leakage into CCW? (NO)
	CRS/BOP	Are there indications of leakage inside containment? (YES) <ul style="list-style-type: none"> • R-41/42 • R-2 • R-7 • Sump level • Humidity • FCU weir leak rate
	CRS	Initiate preparations for VC entry per SAO 213 (Containment Entry, Egress and Inspection).
	CRS	Determine T.S. leakage limit has been exceeded. A. RCS operational LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE or primary to secondary LEAKAGE. A.1 Reduce LEAKAGE w/in 4 hours or B.1 Be in MODE 3. 6 hours.....
Lead Evaluator		It is not necessary to exercise all of the above steps. Once the Team has identified an increase in leakage and begins performing AOP-LEAK, the next malfunction may be inserted at the lead evaluator's (trigger 3 for 24 FRV slowly closing). If desired lead may wait until T.S. are evaluated but this is not required.

Op-Test No: 1 Scenario No: 3 Event No.: 4,5,6 Page 15 of 20
 24 FRV slowly ramps closed causing an Automatic/manual Reactor trip. On the Reactor trip the Turbine upper left stop and control valve don't close requiring MSIVs to be manually closed. AFW flow cannot be established. Team implements E-0 and transitions to ES-0.1 and then to FR-H.1 and establishes Bleed and Feed.

Time	Position	Examinee's Actions or Behavior
	CRS	<p>Direct the actions of the crew</p> <p>Direct team to perform immediate actions of E-0</p> <p>Transition to FR-H.1</p>
	RO	<p>Checks Reactor tripped</p> <p>Checks Turbine Tripped</p> <ul style="list-style-type: none"> ○ <u>Attempts to manually trip turbine</u> ○ Manually closes all MSIVs ○ Checks SI actuated ○ <u>Attempts to start 23 ABFP</u> <p>Note: Underlined actions will not be successful but are important (although not critical) and should be attempted by a competent applicant.</p>
	Critical Task	<p>WOG CT: E-0--Q</p> <p>Manually trip the main turbine (shut the MSIV's) before a severe (orange-path) challenge develops to either the subcriticality or the integrity CSF or before transition to ECA-2.1, whichever happens first</p>
	BOP	Checks 480V busses 2A, 5A, and 6A energized
	EVALUATOR NOTE:	<p>The RO may close MSIVs before Safety Injection occurs. If so, the team will transition to ES-0.1 and then FR-H.1.</p> <p>If auto SI occurs, then the team will go to FR-H.1 from E-0 step 7</p>

Op-Test No: 1 Scenario No: 3 Event No.: 4,5,6 Page 16 of 20
 24 FRV slowly ramps closed causing an Automatic/manual Reactor trip. On the Reactor trip the Turbine upper left stop and control valve don't close requiring MSIVs to be manually closed. AFW flow cannot be established. Team implements E-0 and transitions to ES-0.1 and then to FR-H.1 and establishes Bleed and Feed.

Time	Position	Examinee's Actions or Behavior
	ALL STA	Determine AFW flow cannot be established and transition to FR-H.1 is required.
	CRS	Implement FR-H.1 Direct the actions of the crew Review Caution Criteria for Bleed and Feed
	BOP/RO	Check RCS pressure > than the highest SG Pressure and RCS temperature > 350 degrees F. Check the average of the three lowest WR SG Levels < 41% <ul style="list-style-type: none"> o Inform CRS when Bleed and Feed criteria met
	CRS	Immediately proceed to step 9 to establish bleed and feed (conditions should be met by this point)
	BOP/RO	Stop all running RCPs Actuate SI if not actuated
	RO/BOP	Verify RCS Feed Path <ul style="list-style-type: none"> • Check SI pumps running • Check SI Valve alignment • Reset SI • Reset Phase A and open 1228 (this requires the operator to manually realign valves to permit the reset of Phase A per step 12 of EOP)

Op-Test No: 1 Scenario No: 3 Event No.: 4,5,6 Page 17 of 20
 24 FRV slowly ramps closed causing an Automatic/manual Reactor trip. On the Reactor trip the Turbine upper left stop and control valve don't close requiring MSIVs to be manually closed. AFW flow cannot be established. Team implements E-0 and transitions to ES-0.1 and then to FR-H.1 and establishes Bleed and Feed.

Time	Position	Examinee's Actions or Behavior
	RO/BOP	Establish RCS Bleed Path <ul style="list-style-type: none"> • Check power available to both PORV Block valves • Check both PORV Block Valves open • OPEN both PRZR PORVS (456 will not open) • Dispatch NPO to energize Rx Head Vent Valves at MCC 26A and 26B • Open both Reactor Head Vent Valves
	Critical Task	WOG CT: FR-H.1--F Establish RCS bleed and feed when the average of the three lowest SG Levels reach 41% WR as demonstrated by RCS < SI head and adequate flow established prior to depressurizing S/G's. (RCP's must be secured also)
	CRS	Check for available low pressure water source for SGs Direct BOP to perform E-0 steps 1-9 Continue attempts to establish secondary heat sink

Op-Test No: 1 Scenario No: 3 Event No.: 4,5,6 Page 18 of 20
 24 FRV slowly ramps closed causing an Automatic/manual Reactor trip. On the Reactor trip the Turbine upper left stop and control valve don't close requiring MSIVs to be manually closed. AFW flow cannot be established. Team implements E-0 and transitions to ES-0.1 and then to FR-H.1 and establishes Bleed and Feed.

Time	Position	Examinee's Actions or Behavior
	Booth Instructor After the head vents are open with feed and bleed established and with Leads concurrence...	Depending upon previous requests from the CCR, perform one of the following: fix 23 ABFP 480V breaker or align ASSS power to 21 ABFP 1. Fix 23 ABFP 480V bkr: Request CCR place 23 ABFP control switch to pullout to allow breaker change out. From the Instructor Station Summary - Delete MOC-AFW002. NPO reports that the 480V breaker for 23 ABFP has been swapped with the spare breaker. Request CCR to attempt to start 231 ABFP 2. Align ASSS 440V power to 21 ABFP: Refer to SOP-ESP-1 section 4.11. Place EDC5 in "ALT" (Bus 3A P&ID EPS7). Notify CCR. When directed by CCR, close breaker at 12FD3 to start ABFP. (P&ID SWD4 breaker 12FD3-1B)
	CRS/RO	Establish AFW flow from 21 or 23 ABFP Observe foldout page criteria for flow restoration Restore NR level in at least one SG to > 10% (27% if adverse VC) Check RCS temperature lowering Close Head Vent Valves
Evaluator Note:		At the lead evaluator's discretion, if the third critical task is required to complete the scenario set, continue until reactor head vent valves are closed. If the third critical task is not required or desired, then the lead evaluator may terminate the scenario after AFW flow is established.
Critical Task		WOG CT: FR-H.1--G Close all reactor vessel head vent valves before the end of the scenario (Optional CT)

Op-Test No: 1 Scenario No: 3 Event No.: 4,5,6 Page 19 of 20
24 FRV slowly ramps closed causing an Automatic/manual Reactor trip. On the Reactor trip the Turbine upper left stop and control valve don't close requiring MSIVs to be manually closed. AFW flow cannot be established. Team implements E-0 and transitions to ES-0.1 and then to FR-H.1 and establishes Bleed and Feed.

Time	Position	Examinee's Actions or Behavior
	CRS RO	Determine if SI pumps can be stopped. When sub-cooling requirements are met: <ul style="list-style-type: none">○ Close PORV○ Stop SI pump(s)
Lead Evaluator		Terminate the scenario at the discretion of the Lead Evaluator when appropriate number of critical tasks have been evaluated.

Turnover Information

Date/Time:	Today/Now
Condition:	Power Ops
% Power:	100%
Xenon:	Equilibrium
PZR Press Control:	Channel 1
PZR Level Control:	Channel 2
RCS Total Leakage:	0.1 gpm
RCS Unidentified Leakage:	0.01 gpm
Condenser Air leakage	6 SCFM
RCS Gas activity	1.78E-2 $\mu\text{Ci/cc}$
Risk Assessment:	Yellow

Plant Equipment Status:

22 ABFP has been out-of-service for bearing oil line repair for 4 hours. It is expected back within the next 6 hours (ITS 3.7.5 – 72 hr AOT). 21 and 23 ABFPs are protected equipment.