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NL-17-101

August 17, 2017

Mr. Daniel H. Dorman
Regional Administrator
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U.S. Nuclear Regulatory Commission
2100 Renaissance Blvd Suite 100
King of Prussia, Pennsylvania 19406-2713

Subject: Indian Point Unit 3 Initial Licensed Operator Examination Submittal
Indian Point Unit 3
Docket No. 50-286
DPR-64

Dear Sir;

In accordance with NUREG 1021, Revision 11, "Operator Licensing Examination Standards for Nuclear Power Reactors", Entergy Nuclear Operations, Inc. (Entergy) is providing your Mr. David Silk the enclosed documentation for the Indian Point Energy Center Initial Reactor Operator and Senior Reactor Operator written and operating examinations, scheduled for October 30, 2017.

Entergy is making no commitments in this letter. Should you have any questions regarding this matter, please contact Mr. Charles Kocsis, Superintendent, Operations Training - ILO at (914) 254-2065, or Mr. Tim Jenkins, Senior Instructor at (914) 254-2630.

Sincerely,


Clifford Chapin
Manager, Training & Development


Brian Sullivan
Facility Reviewer

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Enclosures:

- Enclosure 1: Exam Outline changes and justifications
- Enclosure 2: Written Exam Material:
 - Written exam data (site specific similar to ES-401-5) including references
 - ES-401-8 SRO Exam Cover Sheet
 - SRO written exam
 - SRO written exam key
 - Hand-out material for questions as applicable
- Enclosure 3: Operating Test Material:
 - Administrative JPMs
 - Simulator/In-Plant JPMs
 - Simulator Scenarios
- Enclosure 4: Exam Quality Checklists:
 - ES-301-3
 - ES-301-4
 - ES-301-5
 - ES-301-6
 - ES-401-6
- Enclosure 5: Operating Test Schedule
- Enclosure 6: Updated Examination Security Agreement (ES-201-3)

cc:

Document Control Desk
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Facility: IPEC Unit 3Date of Examination: 10-30-2017Examination Level: RO ☐ SRO ☒Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R M	Review an ECP 2.1.37 SRO 4.6
Conduct of Operations	R M	Review AOP-SG-1 Leakrate Calculation 2.3.14 SRO 3.8
Equipment Control	R N	Review a tagout/scope 2.2.13 SRO 4.3
Radiation Control	R M	Review a Manual Gaseous Rad Waste Release Permit 2.3.06 SRO – 3.8
Emergency Plan	R M	Classify an event 2.4.41 SRO 4.6

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

* Type Codes and Criteria: (C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs and RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1 , randomly selected)

Facility: <u>Indian Point Unit 3</u>	Date of Examination: <u>10-30-2017</u>
Exam Level: RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	Operating Test Number: <u>1</u>

Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U		
System/JPM Title	Type Code*	Safety Function
a. Emergency Borate 000024A1.20 RO – 3.2 SRO – 3.3	A D L S	1
b. Establish Cold Leg Recirc. 000011A1.11 RO – 4.2 SRO – 4.2	A M S	2
c. R-18 setpoint change 073000A4.02 RO – 3.7 SRO – 3.7	D S	9
d. Bleed and Feed 00WE05A1.01 RO – 4.1 SRO – 4.0	A D E N S	4P
e. Pressurizer Pressure Channel/Controller Failure 010000A2.02 RO – 3.9 SRO – 3.9	A N S	3
f. Perform the actions of AOP-DC-1 058000A2.03 RO – 3.5 SRO – 3.9	A M L S	6
g. Thot microprocessor fails high 016000A2.01 RO – 3.0 SRO – 3.1	N S	7
h.		
In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. Perform a Containment Pressure Relief 103000A1.01 RO 3.7 SRO 4.1	N R	8
j. Reduce PRT level with RCDT pumps 068000A4.02 RO 3.2 SRO 3.1	N R	5
k. Locally operate ATMO 000068A1.01 RO 4.3 SRO 4.5	E M	4S
<p>* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions, all five SRO-U systems must serve different safety functions, and in-plant systems and functions may overlap those tested in the control room.</p>		
* Type Codes	Criteria for R /SRO-I/SRO-U	

(A)lternate path	4-6/4-6 /2-3
(C)ontrol room	
(D)irect from bank	$\leq 9/\leq 8/\leq 4$
(E)mergency or abnormal in-plant	$\geq 1/\geq 1/\geq 1$
(EN)gineered safety feature	$\geq 1/\geq 1/\geq 1$ (control room system)
(L)ow-Power/Shutdown	$\geq 1/\geq 1/\geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2/\geq 2/\geq 1$
(P)revious 2 exams	$\leq 3/\leq 3/\leq 2$ (randomly selected)
(R)CA	$\geq 1/\geq 1/\geq 1$
(S)imulator	

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

Examiners: _____ Operators: _____

Initial Conditions: 100% Reactor Power.

Turnover: The team takes the shift with LI- 417A removed from service and they will have direction to perform a plant shutdown.

Event No.	Malf. No.	Event Type*	Event Description
1	MAL-SGN001A	R(ATC) N(CRS, BOP)	Team enters with direction to perform a plant shutdown. LI 417A failed and has been removed from service per AOP
2	MAL-CFW012B	I (CRS, ATC) TS (CRS)	Feed flow transmitter 418B fails high
3	MAL-CRF003AN	C (ALL) TS/TRM (CRS)	Dropped Rod N3 in Control Bank C
4	MAL-CCW008	C (ALL)	Loss of CCW to NRXH due to leak
5	MAL-MSS002B	M(ALL)	Steam Line break 32 SG outside containment upstream of MSIV.
6	MAL-SIS004A MAL-SIS004B MAL-SIS004C	C (CRS BOP)	Failure of all HHSI pumps to automatically start on SI signal
7	MAL-SGN005B	C (ALL)	SGTR on 32 SG post faulted SG isolation
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Simulator Exam Scenario 1 Summary

The evaluation begins with the plant at 100% power with the direction to perform a POP shutdown in four hours for a forced outage. The following equipment is out of service:

- 31 SG level channel 417A failed low on previous shift and was removed from service per AOP-INST-1, Instrument or Controller Failures including tripping bistables.

The team will be briefed that will be performing the shutdown and provided with POP-2.1, SOP-CVCS-003, OPT-25 Reactivity Summary Sheet, and the Graphs Book.

The team will begin the shutdown. After sufficient shutdown activities have been observed, 31 SG B channel feed flow instrument will fail high. The team will take action to stabilize the plant and the ATC will transfer to the unaffected feed flow channel using AOP-INST-1, Instrument or Controller Failure. TS 3.3.1, Reactor Protection System Instrumentation will require a 6 hour AOT to trip bistables. The team will determine that they will not be able to trip bistables due to conflict with the previous failure. (Tripping bistables would result in a reactor trip.)

Next Control Bank C rod N3 will drop. The team will respond using AOP-ROD-1, Rod Control and Indication Malfunctions. The ATC will place rods in manual and the BOP will reset the dropped rod mode switch. The CRS will evaluate TS.

A leak will be discovered upstream of TCV-130 requiring isolation of CCW to the Non-Regenerative Heat Exchanger. Isolation of the leak will result in isolation of letdown and the need to place excess letdown in service per AOP-CCW-1, Loss of CCW and AOP-CVCS-1, Chemical and Volume Control Malfunctions.

After the team has established excess letdown, a steam break will occur on 32 SG steam line outside the VC and upstream of the MSIV. Due to the uncontrolled cooldown, the team will trip the reactor, and respond using E-0, Reactor Trip or Safety Injection. When it is noted that 32 SG is depressurizing, SI will be initiated. The team will need to start all HHSI pumps since auto start is defeated by a simulator malfunction.

When the team enters E-2, Faulted SG isolation, a SGTR will occur on 32 SG. The team may diagnose the SGTR due to SG pressure and level. The team may also continue to E-1 if symptoms are not picked up. The team will diagnose the SGTR and transition to E-3 either from E-2 or E-1.

The team will continue in E-3 will transition to ECA-3.1 when ruptured SG pressure is determined less than 400 psig. When cooldown is commenced or properly evaluated in ECA-3.1, the scenario will be terminated.

Procedure Flowpath: POP-2.1, AOP-INST-1, AOP-ROD-1, AOP-CCW-1, AOP-CVCS-1, E-0, E-2, E-1, E-3, ECA-3.1

Critical Tasks:

E-2 -- A	Isolate the faulted SG before transition out of E-2.
Non-WOG	Manually start at least two HHSI pumps before completion of RO-1 steps 1-12.
ECA-3.1—B	Cool down the RCS to CSD conditions at the highest achievable rate w/o exceeding 100F/hr.

EXPLANATION OF CREDITED ACTIONS:

Event 1 – Team performs shutdown. The ATC will borate and possibly drive rods. The BOP will lower load using the governor. The CRS will coordinate the evolution.

Event 2 - Feedflow Transmitter 418B fails high. The ATC will swap to the unaffected channel. The BOP will trip bistables. The CRS will evaluate Tech Specs.

Event 3 – Dropped Rod N3. The ATC will place rods in manual. The BOP will reset the dropped rod at the NI drawer. The CRS will evaluate Tech Specs.

Event 4 – Loss of CCW to NRHX due to leak. The ATC will operate the running charging pump in manual. The BOP will place Excess Letdown in service. The will coordinate the evolution.

Event 5 – Steam line break. This is the major event for the team. The reactor will be tripped and MSIVs closed. The team will initiate SI.

Event 6 – Failure of HHSI pumps to autostart on SI. The BOP will start HHSI pumps. The CRS will ensure this is action is taken.

Event 7 – SGTR on faulted SG. This will cause the team to transition to E-3 and ECA-3.1. A plant cooldown will be required.

2017 Scenario 1 Schedule File

At Time	On Event	Action	Description
00:00:00	None	Insert malfunction MAL-SGN001A to 0	STEAM GENERATOR LEVEL TRANSMITTER FAILURE (LT-417A)
00:00:00	2	Insert malfunction MAL-CFW012B to 4.00000 on event 2	FEEDWATER FLOW TRANSMITTER FT-418B FAILURE
00:00:00	3	Insert malfunction MAL-CRF003AN to STATIONARY on event 3	DROPPED ROD (CBC-N3)
00:00:00	4	Insert malfunction MAL-CCW008 to 5.00000 on event 4	LOSS OF CCW TO NON-REGENERATIVE HX (PIPE RUPTURE)
00:00:00	5	Insert malfunction MAL-MSS002B to 1518000.00000 in 180 on event 5	STEAMLINE BREAK OUTSIDE CONTAINMENT (S/G 32)
00:00:00	6	Insert malfunction MAL-SGN005B to 12.00000 in 300 on event 6	STEAM GENERATOR 32 TUBE LEAK
00:00:00	None	Insert malfunction MAL-SIS004A to FAILURE_TO_AUTOSTART	SAFETY INJECTION PUMP 31 FAILURES
00:00:00	None	Insert malfunction MAL-SIS004B to FAILURE_TO_AUTOSTART	SAFETY INJECTION PUMP 32 FAILURES
00:00:00	None	Insert malfunction MAL-SIS004C to FAILURE_TO_AUTOSTART	SAFETY INJECTION PUMP 33 FAILURES
None	None	Insert remote LOA-CCW033 to 0 on event 10	810 NON-REGEN HX INLET ISO
None	None	Insert remote LOA-CCW034 to 0 on event 10	814 NON-REGEN HX OUTLET ISO

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
IC Reset		Reset Simulator to 100% power IC
SES Setup Schedule File	Run Setup File: 2017 Scenario 1.sch LI-417A is failed.	Verify Schedule has been loaded. Trip the following bistables: In Yellow B-9 <ul style="list-style-type: none"> • Loop 1A, High Level • Loop 1A, Low Level • Loop 1A, Low Level Mismatch
Event 1	Plant shutdown. No trigger	
Role Play	Any	Respond to request for starting shutdown
Event 2	Activate Trigger 2 At lead evaluator direction	Feedflow transmitter 418B fails high
Role Play	I&C	Will get troubleshooting package together.
Event 3	Activate Trigger 3 At lead evaluator direction	N3 Rod Drop
Role Play	SM	Continue S/D. We will not recover rod.
Event 4	Activate Trigger 4 At lead evaluator direction	CCW Leak
Role Play	NPO	Fill surge tanks using extreme view valve commands. Full open on valves will maintain level with malfunction in.
Role Play	NPO	Report leak location just upstream of TCV-130. Isolate leak by clicking 810/814 in schedule and deleting leak malfunction. CCW surge tank level will trend up.
Event 5	Activate Trigger 5 At lead evaluator direction	Steam Break outside VC upstream of MSIV.
Roll Play	NPO	There is no steam in Turbine Building. There is lots of steam and noise in steam bridge area.
Event 6	No trigger	Failure of HHSI pumps to auto start.
Role Play		
Event 7	Activate Trigger 6 When E-2 is entered	SGTR 32 SG.
Role Play	NPO	Cannot enter steam bridge area due to steam. All other requests can be met.

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

Event Description: Plant Shutdown

Time	Position	Applicant's Actions or Behavior
	CRS	Briefs team to start shutdown as planned using POP-2.1 Attachment 3
	ATC	Energizes all PZR backup heaters
	ATC	Commences boration using SOP-CVCS-003 <ul style="list-style-type: none">• Sets YIC-110 Integrator• Takes Makeup Mode Switch to BORATE• Takes Makeup Control Switch to START then NORM
	BOP	Adjusts MTG Governor to reduce load
	ATC	Manually inserts control rods or monitors for proper automatic insertion
Lead Evaluator		When the following has been demonstrated/observed: Sufficient Shutdown Activities. Then instruct Booth to insert Event 2.

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

Event Description: Feed flow transmitter 418B fails high.

Time	Position	Applicant's Actions or Behavior
	ATC	Notes that SG is trending down for 31 SG or "Steam Generator Level Deviation Alarm" annunciates. May place FRV in Manual.
	ATC	Notes that 31 SG feedflow channel B is failed high.
	ATC	Swap to A channel for 31 SG feedflow (and possibly steamflow).
	CRS	Announces entry in AOP-INST-1, Instrument or Controller Failure.
	CRS	Goes to section in AOP-INST-1 for failed feedwater flow instrument.
	ATC	Places both SG Transfer Switches to Channel A if not already done.
	ATC	Returns FRV to Automatic if placed in Manual earlier.
	CRS	Refers to TS Table 3.3.1-1: <ul style="list-style-type: none"> Function 14 SG Water Level Low is the applicable protection. Condition E of LCO 3.3.1 applies. Place channel in trip in 6 hours. CRS may recognize that this cannot be done due to other failure.
	BOP	Verifies redundant bistable lights are extinguished. They are not.
	CRS	Recognizes that the plant is in at least a 12 hour action statement to be in Mode 3. LCO 3.0.3 may be entered due to having multiple elements of LCO 3.3.1 not satisfied.
	ALL	AOP-INST-1 at hold step. Continue shutdown.
Lead Evaluator		When the following has been demonstrated/observed: Team gets to hold step in AOP-INST-1. Then instruct Booth to insert Event 3.

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

Event Description: Dropped Rod N3

Time	Position	Applicant's Actions or Behavior
	BOP	Acknowledges alarms "NIS Power Range Dropped Rod or Rod Stop", "NIS Power Range Channel Deviation", and "Rod Bottom Rod Stop".
	ATC	Notes Power Recorder (NR-45) drop and Power Range changes. N3 Rod Bottom Light lit.
	CRS	Announces entry into AOP-ROD-1, Rod Control and Indication System Malfunction.
	ALL	Should diagnose that this is an actual dropped rod vs. failed IRPI.
	CRS	Determines that only 1 rod is dropped and navigates to correct steps of AOP.
	ATC	Places control rods in manual if not already done.
	ATC	May lower load to match Tavg to Tref.
	CRS	Refers to TS 3.1.4, 3.2.3, and 3.2.4: <ul style="list-style-type: none"> Condition B of 3.1.4 applies requiring recovering rod within 1 hour or lowering power to <75%. 3.2.3 and 3.2.4 may require load reduction. CRS should understand TS and continue shutting down.
	BOP	Resets the Dropped Rod Mode Switch on affected NIS channel N-41.
	ALL	Continue shutdown.
Lead Evaluator		When the following has been demonstrated/observed: Dropped Rod Mode Switch is reset. Then instruct Booth to insert Event 4.

Op-Test No.: 1 Scenario No.: 1 Event No.: 4

Event Description: Loss of CCW to NRHX due to leak.

Time	Position	Applicant's Actions or Behavior
	BOP	Notes CCW surge tanks lowering. Possibly before alarms.
	BOP	Acknowledges "Component Cooling Surge Tank 31/32 Level" alarms.
	CRS	Enters AOP-CCW-1, Loss of CCW.
	BOP	Dispatch NPO to look for leak.
	BOP	Dispatch NPO to makeup to CCW Surge Tanks.
<p>Note:</p> <p>The NPO will report that the leak is just upstream of TCV-130. It is realistic that the NPO would find this quickly since the valve is across from the NPO office.</p>		
	ALL	Determine that AC-810 and 814 will isolate the leak and that letdown will have to be secured. AC-810 and 814 will be closed when directed.
	CRS	Work through AOP-CCW-1 to section for isolating letdown.
	BOP	Close Valves 459/460 to isolate letdown.
	ATC	Because of the shutdown, RCS makeup is likely to be set up for boration. The ATC will at some point have to align makeup to the VCT and perform a makeup in automatic or manual to maintain VCT level.
	ATC	Adjust charging (likely done before addressed by AOP-CVCS-1.
	CRS	Enters AOP-CVCS-1 to establish Excess Letdown
	BOP	Adjust HCV-142.
	ATC	Reduce charging pump speed to minimum.
	BOP	Dispatch NPO to adjust charging pump recirculation valve.
<p>Note:</p> <p>If needed the SM will inform the team that it is desired to put Excess Letdown in service. The attachment for placing Excess Letdown in service may be handed off to the BOP while shutdown continues.</p>		
	CRS	Implement Attachment 2 to place Excess Letdown in service.
	BOP	<p>Open the following valves to establish CCW to Excess Letdown HX:</p> <ul style="list-style-type: none"> • AC-AOV-793 • AC-AOV-796 • AC-AOV-791 • AC-AOV-798
	BOP	Verify CH-AOV-215 is aligned to RCDT
	BOP	Crack open CH-HCV-123
	BOP	Open CH-AOV-213A and B
	BOP	Slowly open CH-HCV-123

Op-Test No.: 1 Scenario No.: 1 Event No.: 4

Event Description: Loss of CCW to NRHX due to leak.

	BOP	Following warm up: <ul style="list-style-type: none">• Close CH-HCV-123• Place CH-AOV-215 to VCT• Open CH-HCV-123
	CRS	Acknowledge that Excess Letdown is in service. Depending on timing, the PZR Level TS band may have been challenged. Excess Letdown flow should be restoring that.
Lead Evaluator		When the following has been demonstrated/observed: Excess Letdown is placed in service. Then instruct Booth to insert Event 5.

Op-Test No.: 1 Scenario No.: Event No.: 5/6

Event Description: Steam Line Break Outside VC Upstream of MSIV/ Failure of all HHSI pumps to automatically start on SI signal

Time	Position	Applicant's Actions or Behavior
	ALL	Hear sound of steam. Diagnose that reactor trip and MSIV closure is required.
	ATC	Trips reactor.
	BOP	Closed MSIVs.
	ATC	Notes that 32 SG is depressurizing.
	ATC/BOP	May actuate SI.
	CRS	Directs entry into E-0.
	ATC	Verifies reactor trip: <ul style="list-style-type: none"> • Reactor Trip Breakers Open • Rod Bottom Light Lit • IRPIs all near 0 • Flux decreasing
	ATC	Verifies turbine trip: <ul style="list-style-type: none"> • Checks Stop Valves closed • May trip turbine manually since stop valve indication is not available with SI
	BOP	Verifies power to 480V busses: <ul style="list-style-type: none"> • All have power from offsite
<p align="center">Critical Task</p> <p align="center">Manually start at least two HHSI pumps before completion of RO-1 steps 1-12.</p> <p>The BOP will start all 3 HHSI pumps as early as when first recognized as not starting. It is expected that this will occur during E-0 immediate actions. At least 2 shall be started when first procedurally directed which is in RO-1.</p>		
	BOP	Verifies SI: <ul style="list-style-type: none"> • SI will be manually initiated even if already done. • Recognize that no HHSI pumps are running and start pumps.
	BOP	Verify AFW flow > 365 gpm.

Op-Test No.: 1 Scenario No.: Event No.: 5/6

Event Description: Steam Line Break Outside VC Upstream of MSIV/ Failure of all HHSI pumps to automatically start on SI signal

	BOP	<p>Perform RO-1 in parallel with E-0/E-2:</p> <ul style="list-style-type: none"> • Start HHSI pumps if not already done. If not done in RO-1, the critical task is not met. • Positions FCU dampers • Place switched to open for 1104/1105 • Has NPO place switches for 1176/1176A to open. • Place CR HVAC to 10% Incident Mode • Reset SI unless done by E-2 first • Has NPO resets MCCs • Has NPO close SW valves SWN-FCV-1111/1112 • Has NPO align CW cooling • Verifies letdown valves closed. May close excess letdown valves, but no required. • Establish IA to Containment • Open 863 N2 supply • Start NESW
	ATC	Opens CH-LCV-112B and closes CH-LCV-112C
	ATC	Places M/U to stop
	ATC	Starts 1 charging pump
	ATC	Diagnoses that 32 SG is blown down or depressurizing
	CRS	Transitions to E-2
Lead Evaluator		<p>When the following has been demonstrated/observed:</p> <p>Team transitions to E-2</p> <p>Then instruct Booth to insert Event 7.</p>

Op-Test No.: 1 Scenario No.: 1 Event No.: 5/7

Event Description: Steam Line break 32 SG outside containment upstream of MSIV /SGTR on 32 SG post faulted SG isolation

Time	Position	Applicant's Actions or Behavior
<p align="center">Critical Task:</p> <p align="center">Isolate the faulted SG before transition out of E-2.</p> <p>Because of the leak location in addition to SGTR, some local actions will not be possible due to environmental hazards. To satisfy meeting the critical task. The team must:</p> <ul style="list-style-type: none"> • Secure all sources of feed to 32 SG • Trip 32 AFW pump • Verify Atmospheric closed • Verify SG BD valves closed • Verify Sample valves closed 		
	BOP	Attempt to have NPO close MS-41. The NPO will not be able to access the area.
	BOP	Place 32 AFW pump in trip.
	BOP	<p>Ensure the following are done to isolate 32 SG:</p> <ul style="list-style-type: none"> • Isolate MFW • Isolate AFW flow • Verify SG Atmospheric closed • Verify BD and Sample valves closed • Upstream traps will not be accessible.
	ALL	Should diagnose that SGTR is in progress, so 32 SG is ruptured/faulted.
<p align="center">Note:</p> <p align="center">In the unlikely event that the team transitions to E-1, a transition to E-3 should occur at step 6.</p>		
	CRS	Transition to E-3
	CRS	After some preliminary checks in E-3, the CRS will determine that 32 SG pressure is < 400 psig and transition to ECA-3.1.

Op-Test No.: 1 Scenario No.: 1 Event No.: 5/7

Event Description: Steam Line break 32 SG outside containment upstream of MSIV /SGTR on 32 SG post faulted SG isolation

	ATC	Places Modulating Heater switch in TPO and Backup Heater switches in OFF.
	BOP	Secures RHR pumps
	ATC	Establishes maximum charging by starting 2 additional pumps and running all 3 pumps speed controllers to maximum.
Critical Task: Cool down the RCS to CSD conditions at the highest achievable rate w/o exceeding 100F/hr. The procedure does not specify a minimum, however the following will constitute satisfying the critical task: <ul style="list-style-type: none">• A target rate, once control established, of at least 75°F/hour.• The ATC/BOP can monitor and control to be within 15°F/hour of rate given by CRS.• RCS is not intentionally cooled down such that temperature decreases by more than a 100°F in any 1 hour.		
	ATC	Used HP Steam Dumps to establish <100°F/hour cooldown: <ul style="list-style-type: none">• HP Dumps to Pressure Mode• Controller to Manual• Dumps throttled open as necessary to maintain cooldown rate
Lead Evaluator		When the following has been demonstrated/observed: Cooldown established, then scenario may be terminated.

Emergency Plan Follow Up:

For this scenario, the following conditions occurred regarding Emergency Declarations:

- Site Area Emergency based on FS-1.1, loss or potential loss of two barriers.
- The RCS is lost as shown by subcooling (or potentially lost due to ECCS flow – this does not affect EAL)
- Containment is lost due to a SGTR with secondary break outside Containment.

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

Examiners: _____ Operators: _____

Initial Conditions: 100% Reactor Power.

Turnover: Unit in a 72 hour AOT for 32 EDG being OOS, retest in progress. Unit in a 7 day AOT for PCV-455C and its block valve MOV-535 being held off due to 455C blowing control power fuses. Feeder 33332 L&M is OOS for high resistance readings on BT-5-6 connections.

Event No.	Malf. No.	Event Type*	Event Description
1	MAL-HVA001B2	TS(CRS) C(BOP)	32 Containment Recirc Fan (FCU) trips.
2	MAL-DSG001B	C(CRS)	32 EDG trips during retest.
3		N(CRS, BOP) R(ATC)	Shutdown due to inoperable EDG and FCU.
4	MAL-TUR 010A	I (ALL) TS (CRS)	Turbine First Stage Pressure (PT-412A) fails low.
5	MAL-CVC008	C (ALL)	VCT level instrument fails low.
6	MAL-CFW013C	C (CRS, ATC)	32 Feed Reg Valve fails in automatic, manual control available.
7	LOA-SWD011	C(ALL)	Loss of 138KV power that results in loss of 480V Bus 6A due to EDG OOS.
8	MAL-CFW015 MAL-ATS004	M(ALL)	Feed Pumps Trip and 31 AFW Pump Trips
9	MAL- DSG001A/C	C(ALL)	31 and 33 EDGs trip causing loss of all AC power
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Simulator Exam Scenario # 2 Summary

The evaluation begins with the plant at 100% power steady state operation. Ensure charging pumps and service water pumps are running on 480V Bus 6A. The following equipment is out of service:

- 32 EDG is inoperable due preventative maintenance. The plant entered a 72 hour AOT per TS 3.8.1 36 hours ago. A retest is in progress per 3-PT-M79B.
- PORV PCV-455C and its Block Valve, MOV-535 is held off due to PCV-455C blowing control power fuses. Per TS 3.4.11, the block valve has been closed with power removed and 7 day AOT entered. An estimated time for return to service has not been determined.

After taking the watch 32 FCU will trip due to a bearing failure. This will require the CRS to review TS 3.6.6 for FCU operability. At a minimum, this is a 7 day AOT per 3.6.6 Condition C. However with the EDG inoperable, two trains may be considered inoperable putting the plant in a 72 hour AOT (there is a 4 hour action to declare systems supported by the EDG inoperable if redundant equipment is inoperable).

Next 32 EDG will trip during the retest. Since the AOT is in effect when the team takes the watch, no credit is given for the TS. This event will give a reason to shut down and sets up a loss of 480V bus 6A when offsite power is lost later in the scenario.

The Operation Manager will prompt the team to shut down the plant starting now to address these issues. The crew will perform AOP-RSD-1, Rapid Shutdown.

When some shutdown has been started, Turbine First Stage Pressure Transmitter PT-412A will fail low causing rods to step in. The ATC will place rods in manual. The BOP will bypass AMSAC (and trip bistables if desired by the lead examiner) for the instrument. The CRS will address TS.

VCT level transmitter will fail low causing charging pump suction to swap the RWST. The BOP will have address charging pump suction. The ATC will address makeup.

After charging suction is stabilized, 32 FRV will fail in auto with manual available. The ATC will have to control 32 SG level in manual.

When SG level is stabilized, offsite power will be lost. 480V Bus 6A will not have power because 32 EDG is not available. The team will enter AOP-138KV-1 and possible AOP-480V-1. Charging will have to be started by the ATC and service water will be started by the BOP. There are TS for this event, but the CRS will not have time to address them.

When the ATC and BOP have had a chance to take action for service water, CCW, and charging, both MFW pumps will trip. Operators will trip the reactor. 31 AFW pump will trip and 33 has no power. AFW flow will be established using 32 AFW pump. When this is done, 31 and 33 EDGs will sequentially trip causing a loss of all AC power.

The team will transition to ECA-0.0. 13.8 KV power is available. The team may already be taking action to restore power. However, in ECA-0.0 there is direction to use SOP-EL-005 to restore power. This will be successful. The scenario may be terminated at any time after power is restored, to at least one 480V bus.

Procedure flow path: ARP011, AOP-RSD-1, AOP-INST-1, AOP-CVCS-1, AOP-FW-1, AOP-138KV-1 (AOP-480V-1), E-0, ECA-0.0

Critical Tasks:

E-0--F Establish greater than 365 gpm AFW flow to the SGs before transition out of E-0 or tripping RCPs in FR-H.1

Non-WOG Energize at least one AC emergency bus before degrading RCP seals in ECA-0.0. Criteria will be to begin taking actions to restore power with available 13.8KV power prior to depressurizing SGs.

EXPLANATION OF CREDITED ACTIONS:

Event 1 – 32 Fan Cooler Unit Trips. The CRS will evaluate Tech Specs. BOP will place in Trip Pull Out to restore 480V Motor Trip (Common) alarm.

Event 2 – 32 Emergency Diesel Generator (EDG) trips during retest. This event will give reason to shutdown the unit. If necessary, the SM will prompt the shutdown.

Event 3 – Power Reduction. The ATC will borate and possibly drive rods. The BOP will lower turbine load using the governor. The CRS will coordinate the evolution.

Event 4 – Turbine First Stage Pressure Instrument fails low. The ATC will place rod control in manual. The BOP will bypass AMSAC and trip bistables if desired. The CRS will evaluate Tech Specs.

Event 5 – VCT Level transmitter fails low. The ATC will address makeup. The BOP will swap charging pump suction from RWST to VCT. The ATC and BOP will control VCT level by controlling VCT pressure. The CRS will coordinate the evolution.

Event 6 - 33 Fed Reg Valve fails open in automatic, manual control is available. The ATC will take manual control of FRV and control SG level. The CRS will coordinate the evolution.

Event 7 – Loss of 138KV (offsite) power; bus 6A will not have power because 32 EDG is out of service. The CRS will implement the procedure AOP-138KV-1 and possibly AOP-480V-1. The ATC will restart a charging pump. The BOP will restart service water.

Event 8 – 31 and 32 Main Feedwater Pumps trip; 31 AFW pump trips. After Charging, Service Water and CCW pumps are started, both Main Feedwater pumps trip. The ATC will trip the reactor.

2017 Scenario 2 Schedule File

At Time	On Event	Action	Description
00:00:00	None	Insert remote LOA-DSG005 to ON	D/G #32 SURVEILLANCE TEST START
00:00:00	None	Insert override SWI-RCS021A to Off	PCV-455C GREEN LAMP PRESSURIZER RELIEF VALVE PCV-455C CONTROL SWITCH
00:00:00	None	Insert override SWI-RCS022A to Off	535 GREEN LAMP PRZR POWER RELIEF BLOCK VLV NO.535 CONTROL SWITCH
00:00:00	None	Insert override SWI-RCS022D to On	535 CLOSE POS PRZR POWER RELIEF BLOCK VLV NO.535 CONTROL SWITCH
00:00:00	None	Insert remote LOA-SWD012 to OPEN_BREAKER	BT 5-6 BREAKER
00:00:00	None	Insert malfunction MAL-HVA001B2 to 0.00000 on event 1	FAN COOLER UNIT 32 TRIP DUE TO BRG FAILURE
00:00:00	None	Insert malfunction MAL-DSG001B on event 2	DIESEL 32 GENERATOR FAILURE
00:00:00	None	Insert malfunction MAL-TUR010A to 0.31446 on event 4	TURB FIRST-STAGE PRESS TRANS FAILURE (PT-412A)
00:00:00	None	Create Event 28 hwxboa082w<0.9 -desc Set Event 28 for AFW Flow Established	
00:00:00	None	Insert malfunction MAL-DSG001A after 30 on event 28	DIESEL 31 GENERATOR FAILURE
00:00:00	None	Insert malfunction MAL-DSG001C after 60 on event 28	DIESEL 33 GENERATOR FAILURE
00:00:00	None	Insert malfunction MAL-CVC008 to 0 on event 5	VCT LEVEL TRANSMITTER FAILURE
00:00:00	None	Insert malfunction MAL-CFW013C to 100.00000 on event 6	FDW CNTRL FIC-427 AUTO MODE FAILURE (MANUAL AVAIL)
00:00:00	None	Insert remote LOA-SWD011 to OPEN_BREAKER on event 7	BT 2-6 BREAKER
00:00:00	None	Create Event 30 JPPLP4(1)==1 - desc Set Trigger 30 to actuate after Reactor Trip	
00:00:00	None	Insert malfunction MAL-ATS004A on event 8	MAIN FEEDWATER PUMP 31 TRIP
00:00:00	None	Insert malfunction MAL-ATS004B after 10 on event 8	MAIN FEEDWATER PUMP 32 TRIP
00:00:00	None	Insert malfunction MAL-CFW001A after 55 to TRIP on event 30	AUXILIARY FEEDWATER PUMP 31 FAILURES

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
IC Reset		Reset Simulator to 100% power IC
SES Setup Schedule File	Run Setup File: 2017 Scenario 2.sch MOV-535 in TPO with Red Tag	Verify Schedule has been loaded. Ensure 33 Charging Pump, and 33 & 36 Service Water Pumps are in service. Clear EDG Trouble Alarm.
Event 1	Actuate Trigger 1 At lead evaluator direction	32 Fan Cooler Unit Trip
Role Play	Conventional NPO	NPO reports circuit breaker tripped with no unusual smell or conditions
Event 2	Actuate Trigger 2 At lead evaluator direction	32 EDG trip
Role Play	FSS	Governor performance became erratic. Same issue as before.
Role Play	Shift Manager	Direct Rapid Shutdown using AOP-RSD-1
Event 3	Rapid Shutdown	Acknowledge notifications
Event 4	Actuate Trigger 4 At lead evaluator direction	PT-412A Failure Low
Role Play	When NPO or Maintenance dispatched to investigate	Report – No unusual conditions at the transmitter.
Role Play	When SM, I&C or Work Control are notified	Inform team that work package is being developed. Bistables need to be tripped.
Event 5	Actuate Trigger 5 At lead evaluator direction	VCT Level Transmitter Failure Low
Event 6	Actuate Trigger 6 At lead evaluator direction	32 Feedwater Regulating Valve Failure Open in Auto Only.
Role Play	When NPO or Maintenance dispatched to investigate	Report – No unusual conditions at the valve.
Event 7	Actuate Trigger 7 At lead evaluator direction	Loss of Offsite Power
Event 8	Actuate Trigger 8	Feed Pump Trips

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
Role Play	When NPO dispatched, to perform Local Operator Actions	Perform actions using the Operator Action Tool. Report when actions are complete.
Event 9	Actuate Trigger 9	Loss of All AC Power
Role Play	Con Ed System Operator	Report Investigating reason for loss of 138KV power. If asked 13.8KV power is available.

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

Event Description: 32 Fan Cooler Unit Trip

Time	Position	Applicant's Actions or Behavior
	BOP	Acknowledges Alarm 480V SWGR MOTOR TRIP (COMMON)
	CRS/ATC/ BOP	Diagnose 32 Fan Cooler Unit trip
	CRS	Refer to TS 3.6.6 <ul style="list-style-type: none">• Condition C for 1 FCU Inoperable is 7 day LCO• Condition D for 2 Trains Inoperable is 72 hour LCO<ul style="list-style-type: none">○ 32 FCU and 32 EDG (35 FCU)○ NOTE 4 hour action to declare 35 FCU Inoperable due to EDG AND 32 FCU Inoperable
	BOP	Place switch in Trip Pull Out per Alarm Response Procedure
Lead Evaluator		When the following has been demonstrated/observed: Then instruct Booth to insert Event 2

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

Event Description: 32 EDG Trips

Time	Position	Applicant's Actions or Behavior
	BOP	Determine 32 EDG Tripped. (EDG Trouble Alarm will annunciate. May take a prompt from the NPO operating the EDG that it tripped).
	CRS	Determine that a shutdown is required.
	SM	PROMPT to use Rapid Shutdown procedure AOP-RSD-1
Lead Evaluator		When the following has been demonstrated/observed: Tech Specs evaluated by CRS Then continue to Event 3.

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

Event Description: Plant Shutdown using RSD due to FCU and EDG Inoperable

Time	Position	Applicant's Actions or Behavior
	CRS	Direct actions per AOP-RSD-1, Rapid Shutdown.
	ATC	<ul style="list-style-type: none">• Energize all PRZR heaters.• Initiate 100 gallon boration per Attachment 2 at rate of 10 gpm (will reduce to lower boration rate after 20 gallons are added).• Set YIC-110 Boric Acid Integrator to 100 gallons.• Place Makeup Mode Selector Switch to Borate.• Turn Makeup Control Switch to START and return to NORMAL.
	BOP	Peer Check Boration.
	CRS/ATC	Check Rods in Auto.
	CRS	Initiate Shutdown notifications.
	BOP	When directed Lower Turbine Load using the governor.
Lead Evaluator		When the following has been demonstrated/observed: Sufficient load reduction Then instruct Booth to insert Event 4.

Op-Test No.: 1 Scenario No.: 2 Event No.: 4

Event Description: PT-412A fails LOW

Time	Position	Applicant's Actions or Behavior
		Respond to alarms <ul style="list-style-type: none"> • HIGH STEAM FLOW SI CHANNEL TRIP • T-AVG T-REF DIVIATION • Observe Rods stepping in a maximum speed with no load rejection.
	ATC	<ul style="list-style-type: none"> • Diagnose PT-412A failure • PLACE Rod Control in MANUAL
	CRS	Announces entry AOP-INST-1, Instrument or Controller Failures.
	CRS	Determines that Turbine First Stage Pressure failure has occurred and goes to procedure section.
	CRS/ATC	Determine if Tavg is within 1.5°F of Tref. Depending on crew response Tavg may or may not be within 1.5°F of Tref.
	ATC	MAY stop boration
	BOP	MAY reduce load to match Tavg with Tref
	ATC	Place Steam Dump in Pressure Mode <ul style="list-style-type: none"> • Place controller in Manual • Adjust controller output to 0% • Steam Dump Control Switch to RESET the PRESS CONT. • Place Controller in Auto
	BOP	Place BS/2MSS 400 block switch in AMSAC cabinet to BYPASS
	CRS	Review Tech Specs <ul style="list-style-type: none"> • Table 3.3.1-1 function 17b (1 hour completion time) • Table 3.3.1-1 function 17e (1 hour completion time) • Table 3.3.2-1 function 1g • Table 3.3.2-1 function 4d • Table 3.3.2-1 function 4e • TRM TROS 3.1.A
<p style="text-align: center;">NOTE:</p> <p style="text-align: center;">If needed, prompt CRS as the SM that bistables need to be tripped.</p>		

Op-Test No.: 1 Scenario No.: 2 Event No.: 4

Event Description: PT-412A fails LOW

	BOP	<p>Trip Bistables</p> <ul style="list-style-type: none">• Loop 3A High SF-SI• Loop 4A High SF-SI• Loop 1A High SF-SI• Loop 2A High SF-SI
	CRS	Determine channel failed low
Lead Evaluator		<p>When the following has been demonstrated/observed:</p> <ul style="list-style-type: none">• Bistables tripped (may be skipped)• TS Addressed <p>Then instruct Booth to insert Event 5</p>

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

Event Description: VCT Level Transmitter

Time	Position	Applicant's Actions or Behavior
	ATC	May observe Auto Makeup VCT level recorder at 0 and VCT pressure recorder increasing. (May be in Borate/Manual.)
	BOP	Observes Auto Makeup VCT level meter at 0 and VCT pressure meter increasing
	ATC	Stop Boration (may or may not be in progress due to shutdown and previous failure)
	CRS	Announces entry into AOP-CVCS-1 <ul style="list-style-type: none"> Determine VCT level indicator LI-112 has failed low.
	BOP	Place CH-LCV-112C control switch to Open When CH-LCV-112C is Open, THEN Place CH-LCV-112B control switch to Close.
	ATC/BOP	Maintain VCT pressure 2 – 10 psig above pre-malfunction value using makeup or diverting VCT.
Lead Evaluator		When the following has been demonstrated/observed: When LCV-112C is open and LCV-112B is closed Then instruct Booth to insert Event 6

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

Event Description: 32 Feedwater Regulating Valve fails open in Automatic Manual control is available

Time	Position	Applicant's Actions or Behavior
	ATC	Observe 32 SG level increasing. Possible STEAM GENERATOR LEVEL CONTROL DEVIATION
	ATC	Place 32 Feedwater Regulating Valve in MANUAL Restore SG Level to program
	CRS	Announce entry into AOP-FW-1 and direct Perform Immediate Operator Actions of AOP-FW-1, Loss of Feedwater
	ATC	Determine Both Main Feedwater Pumps are operating and announces Immediate Operator Actions Complete.
	CRS	Determines Valve Failure and goes to procedure section. Determines Only Main Feedwater Regulating valve failed and returns to AOP for Rapid Shutdown
Lead Evaluator		When the following has been demonstrated/observed: Steam Generator Level control stable. Then instruct Booth to insert Event 7

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

Event Description: Loss of 138KV power results in Loss of 480V bus 6A

Time	Position	Applicant's Actions or Behavior
	CREW	Respond to multiple alarms indicating loss of offsite power from 138KV
	CRS	Announce entry into AOP-138KV-1 Loss of Power to 6.9KV bus 5 and/or 6
	ATC	Start 31 or 32 Charging Pump
	BOP	Start Essential and Non-Essential Service Water Pumps
	BOP	Possible load reduction due to decreasing condenser vacuum.
	CRS	Review Tech Specs <ul style="list-style-type: none">• 3.8.1 AC Sources Operating• 3.8.9 Distribution Systems Operating Determines buses 1 – 4 powered from Unit Aux Transformer
Lead Evaluator		When the following has been demonstrated/observed: Charging, CCW and Service Water Pumps are running Then instruct Booth to insert Event 8

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

Event Description: Feed Pumps Trip, 31 AFW Pump Trip, Manual Reactor Trip

Time	Position	Applicant's Actions or Behavior
	ATC	Identify both Main Feedwater Pumps Tripped Announces Manually Tripping Reactor <ul style="list-style-type: none"> Depresses Reactor Trip Pushbutton Verify Reactor Trip Verify Turbine Trip (Push Turbine Trip pushbutton)
	ATC	Perform Immediate Operator Actions of E-0 <ul style="list-style-type: none"> Verify Reactor Trip Verify Turbine Trip (Push Turbine Trip pushbutton)
	BOP	Verify 480V Power for buses 5A, 2A and 3A
	ATC	Checks requirements for Safety Injection. <ul style="list-style-type: none"> Safety Injection NOT required
	BOP	Identify no Motor Driven AFW pumps operating. <ul style="list-style-type: none"> Increase speed of 32 AFW pump until adequate discharge pressure Open 405A – D to provide flow to all Steam Generators
<p align="center">Critical Task</p> <p>Establish greater than 365 gpm AFW flow to the SGs before transition out of E-0 or tripping RCPs in FR-H.1</p> <p>Crew will increase the speed of 32 (Steam Driven Auxiliary Feedwater Pump) and open the discharge valves.</p>		
Lead Evaluator		When the following has been demonstrated/observed: Loss of 31 and 33 EDG automatically actuated when adequate AFW flow established
		Continue to Event 9

Op-Test No.: 1 Scenario No.: 2 Event No.: 9

Event Description: Loss of All AC Power

Time	Position	Applicant's Actions or Behavior
	CREW	Identify when 31 and 33 EDGs trip
	CRS	Direct performance of Immediate Operator Actions for ECA-0.0, Loss of All AC Power.
	ATC	Immediate Operator Actions <ul style="list-style-type: none">• Verify Reactor Trip• Close Main Steam Isolation Valves
	BOP	Isolate RCS by Closing: <ul style="list-style-type: none">• 459• 460• 200 A-C
	BOP	Maintain SG Level using 32 AFW Pumps <ul style="list-style-type: none">• Preferentially feed 32 or 33 SG as directed by CRS<ul style="list-style-type: none">◦ Maintain feed flow to other SGs at less than or equal to 100 gpm
	BOP	Re-energize any 480V bus using offsite power per SOP-EL-005 Attachment 2 <ul style="list-style-type: none">• Place 35 Circ Water Pump breaker in PULL OUT• Verify 6900 Bus 5 Normal Feed breaker in PULL OUT• Verify voltage on bus No. 5 is zero• Close GT 35 6.9 KV us No. 5 feed breaker• Verify 6.9 KV Bus No. 5 is energized• Check Bus 5A Normal Feed breaker OPEN• CLOSE Station Service Transformer 5 Supply breaker• Hold 480V bus 5A Normal Feed breaker in the closed position until bus voltage is observed

Op-Test No.: 1 Scenario No.: 2 Event No.: 9

Event Description: Loss of All AC Power

Critical Task

Energize at least one AC emergency bus before degrading RCP seals in ECA-0.0. Criteria will be to begin taking actions to restore power with available 13.8KV power prior to depressurizing SGs.

Crew should restore offsite power from 13.8 KV using SOP-EL-005.

Lead Evaluator

When the following has been demonstrated/observed: Power is restored to at least one 480V Bus

Then scenario may be terminated.

Emergency Plan Follow Up:

For this scenario, the following conditions occurred regarding Emergency Declarations:

- SAE SS1.1 Loss of All offsite and all onsite AC power (Table 2.1) to 480V safeguards buses (5A, 2A and 3A, 6A) for ≥ 15 minutes.

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

Examiners: _____ Operators: _____

Initial Conditions: 4% Reactor Power about to raise power to synchronize to the grid.

Turnover: 32 Charging Pump has caution tag to minimize use.

Event No.	Malf. No.	Event Type*	Event Description
1		R(ATC) N(CRS, BOP)	Increase power.
2	MAL-PRS006B	I (ALL) TS (CRS)	Controlling pressurizer level instrument fails high.
3	MAL-CVC006C	C (ATC, CRS) TRM (CRS)	33 Charging Pump Trip.
4	MAL-EPS005C	C (ALL) TS/TRM (CRS)	480V Bus 5A fault and shutdown.
5	MAL-RCS005A MAL-RCS001A	M (ALL)	Small break loss of coolant accident
6	MAL-SIS001A MAL-SIS001B	C (CRS, ATC)	Failure of Auto SI.
7	MAL-SIS004C	C (CRS, ATC)	33 Safety Injection Pump trip
8	SWI-SIS002D SWI-SIS002F	C (CRS, ATC)	32 Safety Injection Pump failure to start
9	MAL-RHR001	C (BOP)	RHR pumps fail to auto start.
10		M (ALL)	Degraded Core Cooling
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Simulator Exam Scenario 3 Summary

The evaluation begins with the plant at 4% about to perform a power increase to synchronize the generator to the grid. 33 Charging Pump is in service. 32 Charging Pump has a caution tag specifying limited use to force the team to place 31 in service when 33 trips. At least one service water pump is running on 480V Bus 5A to ensure required BOP action when 5A trips. The team will be pre-briefed on plant status. When the team takes the watch, they will start to raise power.

Following sufficient power increase, the controlling pressurizer level instrument fails high. The ATC diagnoses the failure and places running charging pump speed control to manual. CRS directs crew to perform AOP-INST-1, Instrument / Controller Failures. The BOP defeats the failed channel and the ATC returns charging pump speed control to auto. The CRS will direct the BOP trip protection bistables per TS 3.3.1, Reactor Protection System Instrumentation.

Next, 33 Charging pump trips. The team will perform actions of AOP-CVCS-1, Chemical and Volume Control System Malfunctions to restore charging by the ATC starting 31 Charging Pump. The CRS will evaluate the TRM for Boration Systems.

After the team has restored charging, a fault occurs on Bus 5A. Team enters AOP-480V-1, Loss of 480 V Bus to stabilize the plant. The ATC will start 32 Charging Pump. The BOP will start a service water pump. When the team determines that shutdown is required per Tech Specs, they will be directed to start a plant shutdown using POP-3.1 Section 4.3.

Next, an unisolable RCS leak develops. The team will trip the reactor, manually actuate SI and go to EOP E-0, Reactor Trip or Safety Injection. Manual SI initiation is a critical task since auto SI is failed (Phase A will not occur).

31 SI pump cannot be powered. 32 SI pump will not start. 33 SI pump initially starts but trips. 32 Charging pump is eventually started and is the only source of injection. RHR pumps will not auto start requiring manual start. This is a critical task to provide a low-head source of injection. The team will diagnose RCS not intact and transition to EOP E-1, Loss of Reactor or Secondary Coolant.

As the team progresses through E-1, Reactor Vessel Level will continue to lower. When level lowers to 44% RCP running range (after about 22 minutes following reactor trip), an orange path on core cooling will require a transition to FR-C.2, Response to Degraded Core Cooling. A prompt as STA will be required.

The team will initiate depressurization of SGs per FR-C.2. The scenario is terminated after SG depressurization has been initiated.

Procedure Flowpath: POP-1.3, AOP-INST-1, AOP-CVCS-1, AOP-480V-1, POP-3.1, ARP-004, E-0, E-1, FR-C.2

Critical Tasks:

- E-0 -- D** Manually actuate at least one train of SIS actuated safeguards before any of the following
- Transition to any E-1 series, E-2 Series, or E-3 series procedure or transition to any FRP
 - Completion of ES-0.1, Step 5A
- Non-WOG** Manually start at least one RHR pump to provide a low-head injection source prior to initiating SG depressurization in FR-C.2.
- FR-C.2 -- A** Depressurize SGs to atmospheric pressure (at $< 100^{\circ}\text{F/hr}$) to inject ECCS accumulators and establish low-head injection flow before a Core Cooling red path develops.

EXPLANATION OF CREDITED ACTIONS:

Event 1 – Increase Power. The ATC will withdraw control rods and/or dilute the RCS boron concentration. The BOP will control feedwater flow to SG. The CRS will coordinate the evolution.

Event 2 – Pressurizer level channel failure high. The ATC will diagnose the failure, place the charging pump in manual, and restore Pressurizer level to program. The BOP will remove the failed channel from service. The CRS will address Tech Specs.

Event 3 – 33 Charging Pump Trip. The ATC will diagnose the pump trip. The CRS and ATC will start 31 charging pump (32 charging pump is caution tagged). The CRS will address Tech Requirements Manual for Boration Systems.

Event 4 – 480V Bus 5A Fault. The ATC will start 32 charging pump. The BOP will start a service water pump on the essential header. The CRS will direct actions per AOP, evaluate Tech Specs, and direct Shutdown per POP-3.1.

Event 5 – Unisolable RCS Leak. The ATC will determine that the leak exceeds capacity of charging and trip the reactor. The BOP will control AFW Flow to the Steam Generators. CRS will direct actions and make correct procedure transitions.

Event 6 – Failure of Auto SI. The ATC will manually actuate SI (while the SI pumps and RHR pumps do not automatically start, this is required to actuate Phase A containment isolation).

Event 7 – 33 Safety Injection Pump Trip. The ATC will identify and announce Trip. ATC and CRS may attempt a single restart of the pump.

Event 8 – 32 Safety Injection Pump start failure.

Event 9 – Failure of RHR Pumps to start. The BOP will start RHR pumps.

Event 10 – Degraded Core Cooling. The ATC will stop 34 RCP, and Depressurize steam generators. The BOP will control AFW to the Steam Generators.

At Time	On Event	Action	Description
00:00:00	2	Insert malfunction MAL-PRS006B to 100.00000 in 30 on event 2	PRESSURIZER LEVEL CHANNEL 460 FAILURE
00:00:00	3	Insert malfunction MAL-CVC005C on event 3	CHARGING PUMP 33 TRIP
00:00:00	4	Insert malfunction MAL-EPS005C on event 4	LOSS OF 480 V BUS 5A
00:00:00	5	Insert malfunction MAL-RCS005A to 100.00000 in 1200 on event 5	RCS LEAK (LOOP 1 COLD LEG)
00:00:00	None	Insert malfunction MAL-SIS001A	SAFETY INJECTION FAILURE TRAIN A
00:00:00	None	Insert malfunction MAL-SIS001B	SAFETY INJECTION FAILURE TRAIN B
00:00:00	5	Insert malfunction MAL-RCS001A after 180 to 0.50000 on event 5	RCS RUPTURE (LOOP 1 COLD LEG)
00:00:00	None	Insert malfunction MAL-SIS004C to TRIP	SAFETY INJECTION PUMP 33 FAILURES
00:00:00	None	Insert override SWI-SIS002D to On	STOP SI PUMP #32 CONT SW
00:00:00	None	Insert override SWI-SIS002F	START SI PUMP #32 CONT SW
00:00:00	None	Insert malfunction MAL-RHR001A to FAILURE_TO_AUTOSTART	RHR PUMP 31 FAILURES
00:00:00	None	Insert malfunction MAL-RHR001B to FAILURE_TO_AUTOSTART	RHR PUMP 32 FAILURES

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
IC Reset		Reset Simulator to 4% IC
SES Setup Schedule File	Run Setup File: 2017 Scenario 3.sch	Verify Schedule has been loaded. Ensure 33 Charging Pump in service. Hang Caution Tag on 32 charging pump
Event 1		Increase Power
Event 2	Actuate Trigger 2 At lead evaluator direction	Controlling Pressurizer Level instrument fails high.
Role Play	When SM, I&C or Work Control are notified	Inform team that work package is being developed. Bistables need to be tripped.
Event 3	Actuate Trigger 3 At lead evaluator direction	33 Charging Pump Trip.
Role Play	When NPO or Maintenance dispatched to investigate	Conventional NPO report Breaker Tripped; no abnormal smell. Nuclear NPO reports no obvious problem with 33 charging pump.
Event 4	Actuate Trigger 4 At lead evaluator direction	Fault on bus 5A
Role Play	When NPO or Maintenance dispatched to investigate	Conventional NPO - report acrid smell with NO fire.
Role Play	When SM is notified	Concur or direct shutdown using POP-3.1 section 4.3
Event 5	Actuate Trigger 5 At lead evaluator direction	Small break LOCA
Role Play	When NPO dispatched, to perform Local Operator Actions	Acknowledge and perform actions using as directed.
Event 6	Entered at Setup	Failure of Auto SI
Event 7	Entered at Setup	33 Safety Injection Pump Trip
Event 8	Entered at Setup	32 Safety Injection Pump failure to start
Role Play	When NPO or Maintenance dispatched to investigate	Conventional NPO report 33 breaker tripped on overcurrent – no other apparent problems. No obvious problem with 32 breaker. If asked to locally close breaker, report breaker will not close.
Event 9	Entered at Setup	RHR Pumps fail to Automatically start.

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
Event 10		Degraded Core Cooling

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

Event Description: Increase Power

Time	Position	Applicant's Actions or Behavior
	CRS	Briefs team to raise power as planned using POP-1.3 Step 4.30
	ATC	Withdraw Control Rods in acceptable increments.
	BOP	Peer check rod withdrawal.
	ATC	Commence Dilution <ul style="list-style-type: none">• Determine volume of water• Set YIC-111 Integrator• Take Makeup Mode Switch to Dilute• Take Makeup Control Switch to Start
	BOP	Control feedwater flow to maintain SG level using Low Flow Bypass Valves
	CRS	Coordinates procedure actions.
Lead Evaluator		When the following has been demonstrated/observed: Adequate power increase. Then instruct Booth to insert Event 2

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

Event Description: Controlling Pressurizer Level Channel fails high

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	Respond to alarms: <ul style="list-style-type: none"> • Pressurizer High Level; • Low Charging Flow; • RCP Thermal Barrier Low ΔP
	ATC	<ul style="list-style-type: none"> • Diagnose LI-460 Failure high • Take 33 Charging pump speed to manual and increase speed
	CRS	Announces entry AOP-INST-1, Instrument or Controller Failures.
	CRS	Determines that LI-460 failure has occurred and goes to procedure section.
	ATC/BOP	Restore Pressurizer level to program <ul style="list-style-type: none"> • Throttle HCV-142 • Operate CH-409, Charging pump bypass valve
	BOP	Remove LI-460 from service <ul style="list-style-type: none"> • L/460 in DFT CH II
	ATC	Reset Pressurizer Heaters <ul style="list-style-type: none"> • Modulating Heater to Stop for 5 seconds then Start and return to Auto • Control switches for Backup Heaters in OFF for 5 seconds then return to Auto (heaters were on crew will return to ON)
	ATC	Select Non-affected channel for Pressurizer Level Recorder
	CRS	Refer to Tech Specs: <ul style="list-style-type: none"> • Table 3.3.1-1 Function 8 • Table 3.3-3.1 Function 12 • Bases Table 3.3.4 Function 4a • 3.4.9 • TRM 3.3.D-1 Function 3.3.D.3
	BOP	Trip bistable <ul style="list-style-type: none"> • Loop 2, High Level Trip (LC460A)

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

Event Description: Controlling Pressurizer Level Channel fails high

Lead Evaluator

When the following has been demonstrated/observed:

- Bistables tripped
- TS Addressed

Then instruct Booth to insert Event: 3

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

Event Description: 33 Charging Pump Trip

Time	Position	Applicant's Actions or Behavior
		Respond to alarms: <ul style="list-style-type: none">• 480V Motor Trip (Common)• RCP Thermal Barrier Low ΔP
	ATC	Diagnose trip 33 Charging Pump
	CRS	Announces entry AOP-CVCS-1 Chemical and Volume Control Malfunctions.
	BOP	Check Support Conditions to start a charging pump <ul style="list-style-type: none">• Adequate VCT Pressure and Level• No evidence of gas binding• No flashing in the letdown line
	ATC	Start 31 Charging pump
	CRS	Refer to TRM <ul style="list-style-type: none">• TRO 3.1.C.1
Lead Evaluator		When the following has been demonstrated/observed: Charging Pump 31 started. Then instruct Booth to insert Event 4

Op-Test No.: 1 Scenario No.: 3 Event No.: 4

Event Description: Loss of 480V bus 5A

Time	Position	Applicant's Actions or Behavior
		Respond to multiple alarms indicating loss of 480V Bus 5A
	BOP	Diagnose loss of bus 5A
	CRS	Announces entry AOP-480V-1, Loss of Normal Power to Any Safeguards 480V Bus
	CRS/ATC	Determine a charging Pump is NOT Running
	ATC	Start 32 Charging Pump
	CRS/BOP	Check CCW and Service Water
	BOP	Start Service Water Pumps on Essential and Non-essential headers.
	CRS	Determine Shutdown is required.
Lead Evaluator		When the following has been demonstrated/observed: Shutdown is required
		Then instruct Booth to insert Event 5

Op-Test No.: 1 Scenario No.: 3 Event No.: 5

Event Description: Small Break LOCA.

Time	Position	Applicant's Actions or Behavior
	CRS/ATC/ BOP	Respond to alarms/plant conditions indicating SBLOCA <ul style="list-style-type: none"> Pressurizer Level decreasing rapidly Containment humidity increasing
	CRS/ATC	Determine Reactor trip required <ul style="list-style-type: none"> ATC may announce Tripping the reactor
	CRS	Directs entry into E-0.
	ATC	Verifies reactor trip: <ul style="list-style-type: none"> Reactor Trip Breakers Open Rod Bottom Light Lit IRPIs all near 0 Flux decreasing
	ATC	Verifies turbine trip: <ul style="list-style-type: none"> Checks Stop Valves closed
	BOP	Verifies power to 480V busses: <ul style="list-style-type: none"> 2A, 3A and 6A are energized
	ATC	Check if SI is actuated or required <ul style="list-style-type: none"> SI is not actuated but is required Manually actuates SI
<p align="center">Critical Task</p> <p>Manually actuate at least one train of SIS actuated safeguards before any of the following</p> <ul style="list-style-type: none"> Transition to any E-1 series, E-2 Series, or E-3 series procedure or transition to any FRP 		
	ATC	Identify 32 SI Pump did not start and 33 SI Pump tripped on overcurrent. <ul style="list-style-type: none"> Attempt start on 32 SI Pump May attempt start on 33 SI Pump with CRS concurrence
	BOP	Check Status of AFW > 365 gpm (Low power trip did not actuate) <ul style="list-style-type: none"> Start both Motor Driven AFW Pumps

Op-Test No.: 1 Scenario No.: 3 Event No.: 5

Event Description: Small Break LOCA.

	BOP	<p>Perform RO-1 in parallel with E-0/E-1:</p> <ul style="list-style-type: none"> • Attempt Start HHSI pumps. • Start RHR pumps • Positions FCU dampers • Place switched to open for 1104/1105 • Has NPO place switches for 1176/1176A to open. • Place CR HVAC to 10% Incident Mode • Reset SI unless done by E-1 first • Has NPO resets MCCs • Has NPO close SW valves SWN-FCV-1111/1112 • Has NPO align CW cooling • Verifies letdown valves closed. May close excess letdown valves, but no required. • Establish IA to Containment • Open 863 N2 supply • Start NESW
Critical Task		
Manually start at least one RHR pump to provide a low-head injection source prior to initiating SG depressurization in FR-C.2		
	ATC	Opens CH-LCV-112B and closes CH-LCV-112C
	ATC	Places M/U to stop
	ATC	Starts 1 charging pump
	ATC	<p>Check if RCPs should be stopped</p> <ul style="list-style-type: none"> • RCPs should not be stopped No SI pumps running.
	ATC	Diagnoses RCS not intact
	CRS	Transition to E-1.

Op-Test No.: 1 Scenario No.: 3 Event No.: 5

Event Description: Small Break LOCA.

ATC/CRS

- Determine RCPs should NOT be tripped (No SI Pumps running)
- Determine SGs are NOT faulted
- Control SG Level
- Reset SI (May have been completed by BOP in RO-1)
- Reset Phase A (May have been completed by BOP in RO-1)
- Determine SGs NOT ruptured
- Determine status of PORVs and Block Valves (PORVs closed Block Valves open, only one energized).
- Establish Instrument Air to Containment (May have been completed by BOP in RO-1)
- Determine RCP Seal Cooling is established
- Determine CCW is available for charging pumps
- Determine charging flow has been established
- Determine SI flow cannot be terminated

Cue to Team

STA announce Orange Path on Core Cooling
(if the team does not identify this condition).

Lead Evaluator

When the following has been demonstrated/observed:
RVLIS level less than 44%
Then continue to Event 10

Op-Test No.: 1 Scenario No.: 3 Event No.: 10

Event Description: Degraded Core Cooling

Time	Position	Applicant's Actions or Behavior
Events 6, 7, and 8 were inserted during simulator setup. No specific action is required for these events beyond identification.		
	ATC/CRS	<ul style="list-style-type: none"> • Verify proper SI Valve alignment • Verify SI flow NOT indicated • Verify RCS Vent Path • Check RCP status • Check RVLIS Dynamic Head indication • Stop 34 RCP • Check Core Cooling (remains degraded)
	BOP/CRS	<ul style="list-style-type: none"> • Check Accumulator Discharge Valves (only 894 B & D are available). • Check Accumulator Discharge Valves Open • Control SG level using Auxiliary Feedwater
	ATC/CRS	Depressurize all Intact SGs to 175 psig <ul style="list-style-type: none"> • Maintain cooldown rate less than 100°F/hr • Dump steam to condenser
Critical Task		
Depressurize SGs to atmospheric pressure (at <100°F/hr) to inject ECCS accumulators and establish low-head injection flow before a Core Cooling red path develops.		
Lead Evaluator	When the team initiates the cooldown in FR-C.2, the scenario may be terminated.	

Emergency Plan Follow Up:

For this scenario, the following conditions occurred regarding Emergency Declarations:

- SAE due to Loss or potential loss of 2 fission product barriers.
 - RCS is lost
 - Clad is potentially lost due to ORANGE path on Core Cooling

Facility: Indian Point 3 Scenario No.: 4 Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: 30% Reactor Power.

Turnover: FRVs were just placed in automatic. Continue with load ascension. 33 Safety Injection pump is out due to motor fault and has been out for 6 hours. There is no projected time for return at this time (72 hr AOT).

Event No.	Malf. No.	Event Type*	Event Description
1		N(BOP) N(CRS)	Start HDTP
2		N (BOP) R (ATC) N (CRS)	Power ascension.
3	MAL-RCS011D	I (CRS, BOP) TS(CRS)	32 RCS Loop flow instrument failure.
4	MAL-EPS002C MAL-EPS002G	C (ALL) TS (CRS)	Loss of 33 Instrument Bus.
5	MAL-RCS007B		32 RCP high vibrations.
6	MAL-CCW001C	C (BOP)	33 CCW Pump trips and 32 fails to auto start.
7	MAL-RCS005A	C (ALL)	32 RCP seal degrading.
8	MAL-RCS002B	C(ALL)	32 RCP trips
9	MAL-RPS002B	M(ALL)	ATWS
10	MAL-RCS005A	C (ALL)	SBLOCA due to 32 RCP seal failure.
	MAL-EPS006	C (ALL)	Loss of Station Auxiliary Transformer after SI reset.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Simulator Exam Scenario 4 Summary

The evaluation begins with the plant at approximately 30% power during a power ascension. The following equipment is out of service:

- 33 Safety Injection pump is out due to motor fault and has been out for 6 hours. There is no projected time for return at this time (72 hr AOT – 3.5.2). 31 and 32 SI Pumps are designated as protected equipment.

After taking the watch, the team will raise power and start the first Heater Drain Tank Pump.

Following sufficient power increase, Loop 32 RCS Flow transmitter FT-424 fails low. The team will respond per AOP-INST-1. The CRS will reference Technical Specifications, and the bistable will be tripped by the BOP.

After the bistable for the failed instrument is tripped, 33 Instrument Bus will de-energize due to a static inverter issue. The team will enter AOP-IB-1. The ATC will place rods and the charging pump in manual along with placing steam dumps in pressure mode. The BOP will re-establish letdown. The instrument bus will be restored via the backup MCC when the CRS directs an operator to align busses outside the control room. The CRS will reference Technical Specification since 33 Static Inverter is inoperable.

Next, 32 RCP begins to degrade as evidenced by increased RCP vibrations. The team will take actions per AOP-RCP-1, "RCP Malfunctions."

Next, 33 CCW Pump Trips, 32 CCW pump does not auto-start. The team takes actions per ARP-010, "Panel SGF – Auxiliary Coolant System" or AOP-CCW-1, "Loss of Component Cooling Water" to manually start 32 CCW pump.

32 RCP Number 1 Seal will degrade slightly and the Team will re-enter AOP-RCP-1. Prior to completion of the Subsequent Actions of AOP-RCP-1, 32 RCP will trip. The team will attempt to trip the reactor.

The reactor will not trip from the Control Room and the team will respond per FR-S.1, "Response to Nuclear Power Generation / ATWS" and will S/D the reactor by inserting control rods and initiating Emergency Boration. The reactor trip breakers will be locally opened and the team will transition to E-0, "Reactor Trip or Safety Injection."

After the Reactor Trip Breakers are opened, 32 RCP seal will fail resulting in a SBLOCA. The team will progress through E-0 toward entry into E-1, "Loss of Reactor or Secondary Coolant." One minute after SI is reset, a loss of offsite power will occur. The team will respond per LOOP-1, "Loss of Offsite Power After SI."

Procedure flow path: AOP-INST-1, AOP-IB-1, AOP-RCP-1, ARP-010 (or 3-AOP-CCW-1), AOP-RCP-1, E-0, FR-S.1, E-0, LOOP-1, E-1.

Critical Tasks:

- FR-S.1--C** Insert negative reactivity into the core by at least 1 of the following methods before Step 4 of FR-S.1 is complete:
- Deenergize Rod Drive MG Sets
 - Manually insert the rods
 - Establish Emergency Boration

E-1--C Trip all RCPs before completion of E-1 Step 1

E-0--I Establish flow from at least one SI Pump before transition out of LOOP-1

EXPLANATION OF CREDITED ACTIONS:

Event 1 – Start a Heater Drain Tank Pump. The BOP will coordinate with the Conventional NPO to start the first Heater Drain Tank Pump. The CRS will coordinate the evolution.

Event 2 – Increase Power. The ATC will withdraw control rods and/or dilute the RCS boron concentration. The BOP will raise turbine load. The CRS will coordinate the evolution.

Event 3 – 32 RCS Loop Flow Instrument Failure. The ATC will diagnose the instrument failure. There are no actions necessary to stabilize the plant. The BOP will trip bistables and the CRS will evaluate Tech Specs.

Event 4 – Loss of 33 Instrument Bus. The team will diagnose the instrument bus failure and enter AOP-IB-1, Loss of Power to an Instrument Bus. The ATC will place rod control in manual, charging pump speed control in manual, and steam dumps in pressure mode. The BOP will reestablish Letdown. The bus will be restored by the NPO. The CRS will reference Tech Specs.

Event 5 – 32 RCP High Vibrations. The BOP will investigate alarms and determine that 32 RCP vibrations have increases. The BOP will increase monitoring the RCP vibrations.

Event 6 – 33 CCW Pump trip 32 CCW pump fails to auto start. BOP will diagnose 33 CCW pump trip and identify that 32 CCW did not auto start. BOP will start 32 CCW pump (guidance in EN-OP-115). The CRS may enter AOP-CCW -1.

Event 7 – 32 RCP #1 Seal degradation. ATC will determine 32 RCP seal flow has increased but not to the trip setpoint of AOP-RCP-1. The CRS will re-enter AOP-RCP-1.

Event 8 – 32 RCP Trip. While performing subsequent actions of AOP-RCP-1, 32 RCP will trip. The ATC will attempt to trip the reactor from the flight panel and the BOP will attempt to trip the reactor from the supervisory panel. The reactor will not trip.

Event 9 – ATWS. The CRS will enter E-0, Reactor Trip or Safety Injection, and transition to FR-S.1, Response to Nuclear Power Generation ATWS. The ATC will insert control rods in manual. The BOP will dispatch an NPO to trip the reactor locally from the Cable Spreading Room. The BOP will trip the turbine generator, start both motor driven AFW pumps, and establish AFW flow of 686 gpm. The BOP will open 333 to initiate emergency boration and close HCV-104 and 105.

The ATC will start both boric acid transfer pumps in fast speed and transfer charging to manual at maximum speed. The NPO will open the reactor trip breakers tripping the reactor.

Event 10 – 32 RCP Seal LOCA. The team will complete actions in FR-S.1 to secure emergency boration and establish normal boration. The team will return to E-0. The team will progress through E-0 toward E-1.

Event 11 – Loss of Station Auxiliary Transformer. One minute after SI has been reset a loss of offsite power will occur. The CRS will enter LOOP-1. The BOP will start all Essential Service Water pumps and place CCW pumps in trip pull out. ATC/BOP will start Safety Injection pumps, RHR pumps, Fan Cooler Units, and AFW pumps.

At Time	On Event	Action	Description
00:00:00	None	Insert override SWI-SIS003G to On	PULL OUT POS SI PUMP #33 CONT SW
00:00:00	None	Insert malfunction MAL-CCW001B to FAILURE_TO_AUTOSTART	CCW PUMP 32 FAILURES
00:00:00	None	Insert malfunction MAL-RPS002B	REACTOR TRIP BREAKERS FAIL TO OPEN (AUTO & MANUAL)
00:00:00	None	Insert malfunction MAL-TUR002A	TURBINE PROTECTION TRIP FAILURE (ELECTRICAL)
00:00:00	None	Insert malfunction MAL-RCS011D to 0 on event 3	LOOP 32 FLOW TRANSMITTER FAILURE 3FI-424
00:00:00	None	Insert malfunction MAL-EPS002C on event 4	LOSS OF 120 VAC INSTRUMENT BUS 33
00:00:00	None	Insert malfunction MAL-RCS007B to 10.30000 on event 5	RCP 32 VIBRATION
00:00:00	None	Insert malfunction MAL-CCW001C to TRIP on event 6	CCW PUMP 33 FAILURES
None	None	Insert malfunction MAL-EPS002C on event 4	LOSS OF 120 VAC INSTRUMENT BUS 33
00:00:00	None	Insert malfunction MAL-RCS012B to 1.80000 in 30 on event 7	RCP 32 NUMBER 1 SEAL FAILURE
00:00:00	None	Insert malfunction MAL-RCS002B on event 8	REACTOR COOLANT PUMP 32 TRIP
00:00:00	None	Insert malfunction MAL-EPS002G on event 4	LOSS OF 120 VAC INSTRUMENT BUS 33A
00:00:00	None	Create Event 29 jpplp4(1)==1 -desc Set Event 29 to actuate after Reactor Trip	Set Event 29 to actuate after Reactor Trip
00:00:00	None	Insert malfunction MAL-RCS013B to 100.00000 on event 29	RCP 32 NUMBER 2 SEAL FAILURE
00:00:00	None	Insert malfunction MAL-RCS014B to 100.00000 on event 29	RCP 32 NUMBER 3 SEAL FAILURE
00:00:00	None	Insert malfunction MAL-RCS005A to 25.00000 in 60 on event 29	RCS LEAK (LOOP 1 COLD LEG)
00:00:00	None	Create Event 30 hwxeoi364f==1 -desc Set Event 30 to allow manual trip	Set Event 30 to allow manual trip
None	30	Delete malfunction MAL-TUR002A	TURBINE PROTECTION

			TRIP FAILURE (ELECTRICAL)
00:00:00	None	Create Event 28 jpplsir(1)==1 -desc Set Event 28 to actuate after SI Reset	Set Event 28 to actuate after SI Reset
00:00:00	None	Insert malfunction MAL-EPS006 after 60 on event 28	LOSS OF STATION AUX TRANSFORMER
00:00:00	None	Insert malfunction MAL-CFW001A to TRIP	AUXILIARY FEEDWATER PUMP 31 FAILURES
None	7	Delete malfunction MAL-RPS002B	REACTOR TRIP BREAKERS FAIL TO OPEN (AUTO & MANUAL)
00:00:00	None	Insert malfunction MAL-SWS001A to FAILURE_TO_AUTOSTART	SERVICE WATER PUMP 31 FAILURES
00:00:00	None	Insert malfunction MAL-SWS001D to FAILURE_TO_AUTOSTART	SERVICE WATER PUMP 34 FAILURES

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
IC Reset		Reset Simulator to 30% IC
SES Setup Schedule File	Run Setup File: 2017 Scenario 4.sch	Verify Schedule has been loaded. 33 Safety Injection Pumps is OOS. Hang Danger Tag on pump Ensure LCV-1127 is in manual at about 0.4
Event 1		Start Heater Drain Pump
Role Play	When NPO called to standby start	4 inch dumps fully open Discharge LCV (1127 for 31 1127A for 32) is in Manual Request CR to Start and HOLD switch until told to release. Wait approximately 15 seconds and inform CR to release pump switch
Event 2		Power ascension.
Role Play	When individuals outside CR called	Acknowledge request. Perform actions as necessary Report when actions complete
Event 3	Actuate Trigger 3 At lead evaluator direction	32 Loop Flow instrument failure
Event 4	Actuate Trigger 4 At lead evaluator direction	Loss of 33 Instrument bus
Role Play	When NPO dispatched to perform Attachment 9	Inform CR Instrument Bus 33 re-energized when reverse transfer button depressed.
Event 5	Actuate Trigger 5 At lead evaluator direction	RCP vibrations
Role Play	If NPO dispatched	Report vibrations in upper electrical tunnel the same as indicated in the control room.
Event 6	Actuate Trigger 6 At lead evaluator direction	33 CCW Pump trip; 32 CCW pump fails to auto start
Role Play	When NPO or Maintenance dispatched to investigate	Conventional NPO report NO unusual conditions at 33 CCW pump breaker. Nuclear NPO report 33 CCW pump is bound and will not rotate.
Event 7	Actuate Trigger 7 At lead evaluator direction	32 RCP seal degradation
Role Play	If Nuclear NPO dispatched to investigate	Report 32 RCP local seal return flow is approximately 5.2 gpm
Event 8	Actuate Trigger 8 At lead evaluator direction	32 RCP Trips
	Entered in setup	ATWS

Simulator Setup and Instructor Directions		
Setup/Event	INSTRUCTOR ACTIONS	EXPECTED RESPONSE/INSTRUCTOR CUES
Role Play	When NPO dispatched to locally trip the reactor	Wait approximately 2 minutes. Remove malfunction MAL-RPS002B. If reactor does not trip insert MAL-RPS001A and B to open Trip Breakers. Ensure breakers are open.
Event 9	Entered at Setup	Seal failure will occur when reactor trips. Additional leakage will ramp in over 60 seconds.
Role Play	When individuals outside CR called	Acknowledge request. Perform actions as necessary Report when actions complete
Event 10	Entered at Setup	Loss of Offsite Power 60 seconds after Safety Injection was reset.
Role Play	When individuals outside CR called	Acknowledge request. Perform actions as necessary Report when actions complete

Op-Test No.: 1 Scenario No.: 4 Event No.: 1

Event Description: Start Heater Drain Pump

Time	Position	Applicant's Actions or Behavior
	BOP	Dispatch NPO to perform actions to start a Heater Drain pump (Team can select either 31 or 32 pumps) Start Heater Drain Pump
	CRS	Coordinate evolution
Lead Evaluator		When the following has been demonstrated/observed: Heater Drain Pump is running Then continue to Event 2

Op-Test No.: 1 Scenario No.: 4 Event No.: 2

Event Description: Power ascension

Time	Position	Applicant's Actions or Behavior
	CRS	Briefs team to raise power as planned using POP-1.3
	ATC	Withdraw Control Rods in acceptable increments.
	BOP	Peer check rod withdrawal.
	ATC	Commence Dilution <ul style="list-style-type: none">• Determine volume of water• Set YIC-111 Integrator• Take Makeup Mode Switch to Dilute• Take Makeup Control Switch to Start
	BOP	Raise turbine Load
	CRS	Coordinates procedure actions.
Lead Evaluator		When the following has been demonstrated/observed: Sufficient power level change Then instruct Booth to insert Event 3

Op-Test No.: 1 Scenario No.: 4 Event No.: 3

Event Description 32 RCS Loop Flow Instrument failure

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	Respond to alarms: <ul style="list-style-type: none">Reactor Coolant Loop#32 Low Flow Channel Trip
	ATC	<ul style="list-style-type: none">Diagnose FI-424 Failure low
	CRS	Announces entry AOP-INST-1, Instrument or Controller Failures.
	CRS	Determines that FI-424 failure has occurred and goes to procedure section.
	CRS	Refer to Tech Specs: <ul style="list-style-type: none">Table 3.3.1-1 Function 9
	BOP	Trip bistable <ul style="list-style-type: none">Loop 2A, Low Flow
Lead Evaluator		When the following has been demonstrated/observed: Bistable is tripped Then instruct Booth to insert Event 4

Op-Test No.: 1 Scenario No.: 4 Event No.: 4

Event Description: Loss of 33 120V Instrument Bus

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	Multiple alarms indicating loss of 33 Instrument Bus Additional Indications <ul style="list-style-type: none"> • Loop 34 OP and OT ΔT indications all 0 • Loop 34 Tavg at 0 • N44 0 • Yellow Bistables light SOF • Bus voltage indication rear of flight panel
	CRS	Announce entry into AOP-IB-1
	ATC	<ul style="list-style-type: none"> • Place Rod Control in Manual • Place charging pump speed in Manual • Place LCV-459 and 460 in OPEN
	BOP	Dispatch NPO to perform Attachment 9 for Instrument Bus 33
		Multiple alarms clear indicating that 33 instrument bus is reenergized.
	CRS	Refer to Tech Specs: <ul style="list-style-type: none"> • 3.8.7 • 3.8.8 • 3.8.9 • 3.8.10
Lead Evaluator		When the following has been demonstrated/observed: Instrument bus 33 is re-energized and Tech Specs reviewed Then instruct Booth to insert Event 5

Op-Test No.: 1 Scenario No.: 4 Event No.:

Event Description: Plant Shutdown

Time	Position	Applicant's Actions or Behavior
	BOP	Respond to Reactor Coolant Pumps High Vibration alarm Determine 32 RCP is affected
	CRS	Announce entry into AOP-RCP-1.
	ATC/BOP	Verify RCP Shutdown Criteria <ul style="list-style-type: none"> • Motor Winding Temp > 250°F • Motor Winding Temp > 300°F • Upper or Lower motor bearing temp > 200°F • Shaft Vibration > 20 mils • Shaft Vibration > 15 mils and increasing >1 mil/hr • Frame Vibration > 5 mils • Frame Vibration > 3 mils and increasing >0.2 mils/hr • #1 Seal Return Flow > 6 gpm • #1 Seal Return Flow < 0.84 gpm and seal temps increasing • Seal ΔP < 200 psid • Seal Inlet temp > 225°F • Seal Outlet temp > 235°F
	CRS	Goes to correct section of the procedure.
	BOP	Record indications every 10 minutes Determine vibrations are stable
Lead Evaluator		When the following has been demonstrated/observed: Trending RCP vibrations Then instruct Booth to insert Event 6

Op-Test No.: 1 Scenario No.: 4 Event No.: 6

Event Description: 33 CCW Pump trip (32 fails to auto start)

Time	Position	Applicant's Actions or Behavior
		Multiple alarms indicating CCW pump trip <ul style="list-style-type: none">• 480V Motor Trip (Common)• Component Cooling Pump Loop 1 Discharge Low Press.• Component Cooling Pump Loop 2 Discharge Low Press• RCP #3X Bearing Coolant Low Flow alarms
	BOP	Determine 33 CCW Pump is tripped and 32 pump failed to auto start. Start 32 CCW pump
	CRS	May enter AOP-CCW-1.
Lead Evaluator		When the following has been demonstrated/observed: 32 CCW pump is running and pressure is > 100 psig Then instruct Booth to insert Event 7

Op-Test No.: 1 Scenario No.: 4 Event No.: 7

Event Description: RCP Seal Degradation

Time	Position	Applicant's Actions or Behavior
	BOP	Respond to alarms <ul style="list-style-type: none"> • RCP No. 1 Seal Return High Low Flow (Common) • RCP Thermal Barrier Low ΔP
	ATC	Diagnose 32 RCP Seal Return Flow increasing not at trips setpoint
	CRS	Re-enter AOP-RCP-1.
	ATC/BOP	Verify RCP Shutdown Criteria <ul style="list-style-type: none"> • Motor Winding Temp > 250°F • Motor Winding Temp > 300°F • Upper or Lower motor bearing temp > 200°F • Shaft Vibration > 20 mils • Shaft Vibration > 15 mils and increasing >1 mil/hr • Frame Vibration > 5 mils • Frame Vibration > 3 mils and increasing >0.2 mils/hr • #1 Seal Return Flow > 6 gpm • #1 Seal Return Flow < 0.84 gpm and seal temps increasing • Seal ΔP < 200 psid • Seal Inlet temp > 225°F • Seal Outlet temp > 235°F
	CRS	Goes to appropriate section of the procedure
Lead Evaluator		When the following has been demonstrated/observed: When adequate progress through subsequent steps Then instruct Booth to insert Event 8

Op-Test No.: 1 Scenario No.: 4 Event No.: 8

Event Description: 32 RCP Trip Reactor /ATWS

Time	Position	Applicant's Actions or Behavior
		Multiple alarms indicating RCP Trip <ul style="list-style-type: none"> • 6900 V Motor Trip (Common) • Loss of Flow Single Loop • ΔT Deviation
	ATC	Announce Tripping Reactor from Flight Panel
	BOP	Backup Reactor Trip from Supervisory Panel
	CRS	Announce Perform Immediate Operator Actions of E-0
	ATC	Determine Reactor Not Tripped
	BOP	Dispatch NPO to locally trip reactor
	ATC	Announce reactor Power > 5%
	CRS	Announce Transitioning to FR-S.1
	ATC	<ul style="list-style-type: none"> • Reactor still not tripped • Manually insert Control Rods
	BOP	<ul style="list-style-type: none"> • Manually trip the Turbine • Start both motor driven AFW pumps (will not auto start due to plant conditions) • Establish > 686 gpm AFW flow • Open MOV-333 • Close HCV-104 and 105
	ATC	<ul style="list-style-type: none"> • Start both Boric Acid Transfer Pumps in fast speed • Check Pressurizer Pressure < 2335 psig
<p align="center">Critical Task</p> <p>Insert negative reactivity into the core by at least 1 of the following methods before step 4 of FR-S.1 is complete.</p> <p>Deenergize Rod drive MG Sets</p> <p>Manually Insert the rods Establish Emergency Boration</p>		

Op-Test No.: 1 Scenario No.: 4 Event No.: 8

Event Description: 32 RCP Trip Reactor /ATWS

Booth Operator

Remove MAL-RPS002B and ensure the Reactor is tripped. Insert MAL-RPS001A/B to trip the reactor if necessary.

	BOP	<ul style="list-style-type: none">• Check Purge Valves Closed• Check Pressure Relief Valves Closed• Check WCCPP Low Pressure Alarms NOT lit• Check SI not actuated
	ATC	Check Reactor Subcritical <ul style="list-style-type: none">• Power <5%• Rods < 20 steps
	BOP	<ul style="list-style-type: none">• Close MOV-333
	ATC	<ul style="list-style-type: none">• Place Boric Acid Transfer Pumps in Slow Speed
	BOP	<ul style="list-style-type: none">• Open HCV-104 and 105 to 25%
	ATC	<ul style="list-style-type: none">• Check RCP Seal Cooling established• Check Charging Pumps running• Establish Normal Boration
Lead Evaluator		When the following has been demonstrated/observed: After reactor trips. Event 9 Entered in Setup

Op-Test No.: 1 Scenario No.: 4 Event No.: 9

Event Description: SBLOCA

Time	Position	Applicant's Actions or Behavior
	CRS/ATC/ BOP	Respond to alarms/plant conditions indicating SBLOCA <ul style="list-style-type: none">• Pressurizer Level decreasing rapidly• Containment humidity increasing
	CRS	Directs entry into E-0.
	ATC	Verifies reactor trip: <ul style="list-style-type: none">• Reactor Trip Breakers Open• Rod Bottom Light Lit• IRPIs all near 0• Flux decreasing
	ATC	Verifies turbine trip: <ul style="list-style-type: none">• Checks Stop Valves closed
	BOP	Verifies power to 480V busses: <ul style="list-style-type: none">• All energized from offsite power
	ATC	Check if SI is actuated or required <ul style="list-style-type: none">• SI may not actuated but is required• Manually actuates SI
<p style="text-align: center;">NOTE:</p> <p>When SI occurs Instrument Bus 33 will be lost again. This is a result of the non-essential load shed from the SI signal.</p>		
	BOP	Check Status of AFW > 365 gpm <ul style="list-style-type: none">• Control SG level between 9 and 50%

Op-Test No.: 1 Scenario No.: 4 Event No.: 9

Event Description: SBLOCA

	BOP	<p>Perform RO-1 in parallel with E-0/E-1:</p> <ul style="list-style-type: none">• Attempt Start HHSI pumps.• Start RHR pumps• Positions FCU dampers• Place switched to open for 1104/1105• Has NPO place switches for 1176/1176A to open.• Place CR HVAC to 10% Incident Mode• Reset SI unless done by E-2 first• Has NPO resets MCCs• Has NPO close SW valves SWN-FCV-1111/1112• Has NPO align CW cooling• Verifies letdown valves closed. May close excess letdown valves, but no required.• Establish IA to Containment• Open 863 N2 supply• Start NESW
	ATC	<ul style="list-style-type: none">• Verify Feedwater Isolation• Verify SI Flow• Verify Containment Spray Not Required• Check RCP Seal Cooling• Check Average RCS Temperature
Critical Task		
Trip all RCPs before completion of E-1 Step 1		
Lead Evaluator	<p>When the following has been demonstrated/observed: 1 minute after SI is reset by BOP or ATC Then Event 10 will occur</p>	

Op-Test No.: 1 Scenario No.: 4 Event No.: 10

Event Description: Loss of Offsite Power after SI Reset

Time	Position	Applicant's Actions or Behavior
		Control room lights will turn off and on when offsite power is lost. 480V buses will quickly re-energize but essential and non-essential loads will be shed.
	CRS	Announce entry into LOOP-1
	BOP	<ul style="list-style-type: none"> • Verify power to 480V buses • Check 3 Essential Service Water Pumps running <ul style="list-style-type: none"> ◦ Start 3 Essential Service Water Pumps • Place CCW in TPO • Ensure Letdown is isolated
	ATC/BOP	Restart <ul style="list-style-type: none"> • High Head SI Pumps • RHR Pumps • Fan Cooler Units • AFW Pumps
Critical Task		
Establish flow from at least one SI Pump before transition out of LOOP 1		
Lead Evaluator		When the team restarts HHSI Pumps and RHR pumps, the scenario may be terminated.

Emergency Plan Follow Up:

For this scenario, the following conditions occurred regarding Emergency Declarations:

- SAR SS2.1 Failure of an automatic trip signal to reduce power range $< 5\%$
AND
Manual trip actions taken at the reactor control console (manual reactor trip switches) are not successful.