

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 2.1.25 SRO 4.2
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 ( $\leq 3$  for ROs;  $\leq 4$  for SROs and RO retakes)  
(N)ew or (M)odified from bank ( $\geq 1$ )  
(P)revious 2 exams ( $\leq 1$ , 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. Transfer Buses 1-4 to the Unit Aux Transformer 062000A4.01 RO – 3.3 SRO – 3.1	M S	6
f. Perform RO-1, BOP Operator Actions – Phase A Failures 103000A3.01 RO – 3.9 SRO – 4.2	A M L S	5
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 Unit 3														Date of Exam: Oct/Nov 2017				
Tier	Group	RO K/A Category Points												SRO-Only Points				
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2		G*	Total	
1. Emergency and Abnormal Plant Evolutions	1	4	0	3	N/A			4	3	N/A			4	18				6
	2	0	5	0				1	1				2	9				4
	Tier Totals	4	5	3				5	4				6	27				10
2. Plant Systems	1	1	2	2	3	2	2	4	4	2	4	2	28				5	
	2	2	0	0	1	1	1	1	3	0	1	0	10				3	
	Tier Totals	3	2	2	4	3	3	5	7	2	5	2	38				8	
3. Generic Knowledge and Abilities Categories				1		2		3		4		10		1	2	3	4	7
				2		3		2		3								

- Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by  $\pm 1$  from that specified in the table based on NRC revisions. The final RO exam must total 75 points, and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the outline. Systems or evolutions that do not apply at the facility should be deleted with justification. Operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible. Sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' IRs for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. If fuel-handling equipment is sampled in a category other than Category A2 or G\* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2. (Note 1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

G\* Generic K/As

- \* These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.
- \*\* These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

ES-401		PWR Examination Outline						Form ES-401-2		
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#	
000007 (EPE 7; BW E02&E10; CE E02) Reactor Trip, Stabilization, Recovery / 1						X	2.4.21 – Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	4.0	1	
000008 (APE 8) Pressurizer Vapor Space Accident / 3					X		AA2.18 – Computer indications for RCS temperature and pressure	3.0	2	
000009 (EPE 9) Small Break LOCA / 3			X				EK3.27 – Manual depressurization or HPI recirculation for sustained high pressure	3.6	3	
000011 (EPE 11) Large Break LOCA / 3				X			EA1.03 – Securing of RCPs	4.0	4	
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4				X			AA1.22 – RCP seal failure/malfunction	4.0	5	
000022 (APE 22) Loss of Reactor Coolant Makeup / 2	X						AK1.03 – Relationship between charging flow and PZR level	3.0	6	
000025 (APE 25) Loss of Residual Heat Removal System / 4						X	2.2.22 – Knowledge of limiting conditions for operations and safety limits.	4.0	7	
000026 (APE 26) Loss of Component Cooling Water / 8							N/A – Not randomly selected			
000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3							N/A – Not randomly selected			
000029 (EPE 29) Anticipated Transient Without Scram / 1							N/A – Not randomly selected			
000038 (EPE 38) Steam Generator Tube Rupture / 3			X				EK3.06 – Actions contained in EOP for RCS water inventory balance, S/G tube rupture, and plant shutdown procedures	4.2	8	
000040 (APE 40; BW E05; CE E05; W E12) Steam Line Rupture—Excessive Heat Transfer / 4	X						AK1.07 – Effects of feedwater introduction on dry S/G	3.4	9	
000040 (APE 40; BW E05; CE E05; W E12) Steam Line Rupture—Excessive Heat Transfer / 4				X			AA1.10 AFW System	4.1	9	
000054 (APE 54; CE E06) Loss of Main Feedwater / 4	X						AK1.01- MFW line break depressurizes the S/G (similar to a steam line break)	4.1	10	
000055 (EPE 55) Station Blackout / 6					X		EA2.02 – RCS core cooling through natural circulation cooling to S/G cooling	4.4	11	
000056 (APE 56) Loss of Offsite Power / 6	X						AK1.03 – Definition of subcooling: use of steam tables to determine it	3.1*	12	
000057 (APE 57) Loss of Vital AC Instrument Bus / 6			X				AK3.01 – Actions contained in EOP for loss of vital ac electrical instrument bus	4.1	13	
000057 (APE 57) Loss of Vital AC Instrument Bus / 6				X			AA1.03 Feedwater pump speed to control pressure and level in S/G	3.6	13	
000058 (APE 58) Loss of DC Power / 6	X						AK1.01 – Battery charger equipment and instrumentation	2.8	14	
000062 (APE 62) Loss of Nuclear Service Water / 4					X		AA2.02 – The cause of possible SWS loss	2.9	15	
000065 (APE 65) Loss of Instrument Air / 8						X	2.4.2 – Knowledge of system setpoints, interlocks and automatic actions associated with EOP entry conditions	4.5	16	

000077 (APE 77) Generator Voltage and Electric Grid Disturbances / 6							N/A – Not randomly selected		
(W E04) LOCA Outside Containment / 3							N/A – Not randomly selected		
(W E11) Loss of Emergency Coolant Recirculation / 4			X				EK3.3 – Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.8	17
(BW E04; W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4						X	2.1.19 – Ability to use plant computers to evaluate system or component status	3.9	18
K/A Category Totals:	5	0	4	2	3	4	Group Point Total:		18

ES-401		PWR Examination Outline						Form ES-401-2		
Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#	
000001 (APE 1) Continuous Rod Withdrawal / 1							N/A – Not randomly selected			
000003 (APE 3) Dropped Control Rod / 1							N/A – Not randomly selected			
000005 (APE 5) Inoperable/Stuck Control Rod / 1				X			AA1.04 – Reactor and turbine power	3.9	19	
000024 (APE 24) Emergency Boration / 1							N/A – Not randomly selected			
000028 (APE 28) Pressurizer (PZR) Level Control Malfunction / 2							N/A – Not randomly selected			
000032 (APE 32) Loss of Source Range Nuclear Instrumentation / 7							N/A – Not randomly selected			
000033 (APE 33) Loss of Intermediate Range Nuclear Instrumentation / 7					X		AA2.08 – Intermediate range channel operability	3.3	20	
000036 (APE 36; BW/A08) Fuel-Handling Incidents / 8							N/A – Not randomly selected			
000037 (APE 37) Steam Generator Tube Leak / 3							N/A – Not randomly selected			
000051 (APE 51) Loss of Condenser Vacuum / 4							N/A – Not randomly selected			
000059 (APE 59) Accidental Liquid Radwaste Release / 9							N/A – Not randomly selected			
000060 (APE 60) Accidental Gaseous Radwaste Release / 9		X					AK2.01 – ARM system, including the normal radiation-level indications and the operability status	2.6	21	
000061 (APE 61) Area Radiation Monitoring System Alarms / 7							N/A – Not randomly selected			
000067 (APE 67) Plant Fire On Site / 8						X	2.2.39 – Knowledge of less than or equal to one hour Technical Specification action statements for systems.	3.9	22	
000068 (APE 68; BW A06) Control Room Evacuation / 8							N/A – Not randomly selected			
000069 (APE 69; W E14) Loss of Containment Integrity / 5		X					AK2.03 – Personnel access hatch and emergency access hatch	2.8*	23	
000074 (EPE 74; W E06 & E07) Inadequate Core Cooling / 4							N/A – Not randomly selected			
000076 (APE 76) High Reactor Coolant Activity / 9		X					AK2.01 – Process radiation monitors	2.6	24	
000078 (APE 78*) RCS Leak / 3							N/A – Not randomly selected			
(W E01 & E02) Rediagnosis & SI Termination / 3							N/A – Not randomly selected			
(W E13) Steam Generator Overpressure / 4		X					EK2.2 – Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility	3.0	25	
(W E15) Containment Flooding / 5						X	2.1.20 – Ability to interpret and execute procedure steps	4.6	26	
(W E16) High Containment Radiation / 9		X					EK2.2 - Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility	2.6	27	
(BW A01) Plant Runback / 1							N/A – Not randomly selected			
(BW A02 & A03) Loss of NNI-X/Y/7							N/A – Not randomly selected			
(BW A04) Turbine Trip / 4							N/A – Not randomly selected			
(BW A05) Emergency Diesel Actuation / 6							N/A – Not randomly selected			
(BW A07) Flooding / 8							N/A – Not randomly selected			
(BW E03) Inadequate Subcooling Margin / 4							N/A – Not randomly selected			

(BW E08; W E03) LOCA Cooledown—Depressurization / 4							N/A – Not randomly selected		
(BW E09; CE A13**; W E09 & E10) Natural Circulation/4							N/A – Not randomly selected		
(BW E13 & E14) EOP Rules and Enclosures							N/A – Not randomly selected		
(CE A11**; W E08) RCS Overcooling—Pressurized Thermal Shock / 4							N/A – Not randomly selected		
(CE A16) Excess RCS Leakage / 2							N/A – Not randomly selected		
(CE E09) Functional Recovery							N/A – Not randomly selected		
(CE E13*) Loss of Forced Circulation/LOOP/Blackout / 4							N/A – Not randomly selected		
K/A Category Point Totals:	0	5	0	1	1	2	Group Point Total:		9



ES-401		PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO)											Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
003 (SF4P RCP) Reactor Coolant Pump						X						K6.04 - Containment isolation valves affecting RCP operation	2.8	28
004 (SF1; SF2 CVCS) Chemical and Volume Control						X						K6.37 - Boron Loading of demineralizer resin	2.9	29
004 (SF1; SF2 CVCS) Chemical and Volume Control										X		A4.04 - Calculation of boron concentration changes	3.2	30
005 (SF4P RHR) Residual Heat Removal			X									K3.06 - Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: CSS	3.1*	31
005 (SF4P RHR) Residual Heat Removal								X				A2.02 - Pressure transient protection during cold shutdown	3.5	32
006 (SF2; SF3 ECCS) Emergency Core Cooling							X					A1.11 - Boron Concentration	3.1	33
006 (SF2; SF3 ECCS) Emergency Core Cooling											X	2.2.25 - Knowledge of bases in Technical Specifications for limiting conditions for operations and safety limits	3.2	34
007 (SF5 PRTS) Pressurizer Relief/Quench Tank							X					A1.02 - Maintaining quench tank pressure	2.7	35
008 (SF8 CCW) Component Cooling Water								X				A2.01 - Loss of CCW pump	3.3	36
010 (SF3 PZR PCS) Pressurizer Pressure Control							X					A1.06 - RCS heatup and cooldown effect on pressure	3.1	37
012 (SF7 RPS) Reactor Protection							X					A1.01 - Trip setpoint adjustment	2.9*	38
013 (SF2 ESFAS) Engineered Safety Features Actuation										X		A4.02 - Reset of ESFAS channels	4.3	39
022 (SF5 CCS) Containment Cooling				X								K4.02 - Correlation of fan speed and flowpath changes with containment pressure	3.1*	40
025 (SF5 ICE) Ice Condenser												N/A - Not randomly selected, not applicable to Indian Point Unit 3		
026 (SF5 CSS) Containment Spray										X		A4.01 - CSS controls	4.5	41
026 (SF5 CSS) Containment Spray											X	2.4.6 - Knowledge of EOP mitigation strategies	3.7	42
039 (SF4S MSS) Main and Reheat Steam					X							K5.05 - Bases for RCS cooldown limits	2.7	43
059 (SF4S MFW) Main Feedwater			X									K3.04 - Knowledge of the effect that a loss or malfunction of the MFW will have on the following: RCS	3.6	44
061 (SF4S AFW) Auxiliary/Emergency Feedwater					X							K5.02 - Decay heat sources and magnitude	3.2	45
062 (SF6 ED AC) AC Electrical Distribution				X								K4.06 - One-line diagram of 6.9KV distribution, including sources of normal and alternate power	2.9*	46
062 (SF6 ED AC) AC Electrical Distribution								X				A2.07 - Consequences of opening a disconnect under load	3.0*	47
062 (SF6 ED AC) AC Electrical Distribution								X				A2.16 Degraded System Voltages	2.5	47

063 (SF6 ED DC) DC Electrical Distribution		X													K2.01 – Knowledge of bus power supplies to the following: Major DC loads	2.9*	48
063 (SF6 ED DC) DC Electrical Distribution											X				A4.03 – Battery discharge rate	3.0*	49
064 (SF6 EDG) Emergency Diesel Generator				X											K4.02 – Trips for ED/G while operating (normal or emergency)	3.9	50
073 (SF7 PRM) Process Radiation Monitoring	X														K1.01 – Those systems served by PRMs	3.6	51
076 (SF4S SW) Service Water											X				A3.02 – Emergency heat loads	3.7	52
078 (SF8 IAS) Instrument Air		X													K2.02 – Knowledge of bus power supplies to the following: Emergency air compressor	3.3*	53
078 (SF8 IAS) Instrument Air		X													K2.01 – Knowledge of bus power supplies to the following: Instrument Air Compressor	2.7	53
103 (SF5 CNT) Containment									X						A2.03 – Phase A and B isolation	3.5*	54
103 (SF5 CNT) Containment										X					A3.01 – Containment isolation	3.9	55
053 (SF1; SF4P ICS*) Integrated Control															N/A for NUREG 1122, Rev. 2		
K/A Category Point Totals:	1	2	2	3	2	2	4	4	2	4	2				Group Point Total:		28

ES-401		PWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)											Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
001 (SF1 CRDS) Control Rod Drive						X						K6.02 – Purpose and operation of sensors feeding into the CRDS	2.8	56
002 (SF2; SF4P RCS) Reactor Coolant	X											K1.01 – Knowledge of the physical connections and/or cause-effect relationships between the RCS and the following systems: RWST	3.7	57
011 (SF2 PZR LCS) Pressurizer Level Control	X											K1.01 – Knowledge of the physical connections and/or cause-effect relationships between the PZR LCS and the following systems: CVCS	3.6	58
014 (SF1 RPI) Rod Position Indication												N/A – Not randomly selected		
015 (SF7 NI) Nuclear Instrumentation												N/A – Not randomly selected		
016 (SF7 NNI) Nonnuclear Instrumentation												N/A – Not randomly selected		
017 (SF7 ITM) In-Core Temperature Monitor					X							K5.02 – Knowledge of the operational implications of the following concepts as they apply to the ITM system: Saturation and subcooling of water	3.7	59
027 (SF5 CIRS) Containment Iodine Removal								X				A2.01 – High temperature in the filter system	3.0*	60
028 (SF5 HRPS) Hydrogen Recombiner and Purge Control												N/A – Not randomly selected		
029 (SF8 CPS) Containment Purge												N/A – Not randomly selected		
033 (SF8 SFPCS) Spent Fuel Pool Cooling								X				A2.02 – Loss of SFPCS	2.7	61
034 (SF8 FHS) Fuel-Handling Equipment				X								K4.01 – Fuel protection from binding and dropping	2.6	62
035 (SF 4P SG) Steam Generator												N/A – Not randomly selected		
041 (SF4S SDS) Steam Dump/Turbine Bypass Control										X		A4.02 – Cooldown valves	2.7*	63
045 (SF 4S MTG) Main Turbine Generator												N/A – Not randomly selected		
055 (SF4S CARS) Condenser Air Removal												N/A – Not randomly selected		
056 (SF4S CDS) Condensate												N/A – Not randomly selected		
068 (SF9 LRS) Liquid Radwaste												N/A – Not randomly selected		
071 (SF9 WGS) Waste Gas Disposal												N/A – Not randomly selected		
072 (SF7 ARM) Area Radiation Monitoring							X					A1.01 – Radiation Levels	3.4	64
075 (SF8 CW) Circulating Water								X				A2.03 – Safety features and relationship between condenser vacuum, turbine trip, and steam dump	2.5	65
079 (SF8 SAS**) Station Air												N/A – Not randomly selected		
086 Fire Protection												N/A – Not randomly selected		
050 (SF 9 CRV*) Control Room Ventilation												N/A for NUREG 1122, Rev. 2		
K/A Category Point Totals:	2	0	0	1	1	1	1	3	0	1	0	Group Point Total:		10

Facility: Indian Point Unit 3

Date of Exam: Oct/Nov 2017

Category	K/A #	Topic	RO	
			IR	#
1. Conduct of Operations	2.1.26	Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).	3.4	66
	2.1.44	Knowledge of the RO duties in the control room during fuel handling, such as responding to alarms from the fuel handling area, communication with the fuel storage facility, systems operated from the control room in support of refueling operations, and supporting instrumentation.	3.9	67
	Subtotal			2
2. Equipment Control	2.2.6	Knowledge of the process fro making changes to procedures.	3.0	68
	2.2.18	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.	2.6	69
	2.2.43	Knowledge of the process used to track inoperable alarms.	3.0	70
	Subtotal			3
3. Radiation Control	2.3.12	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.2	71
	2.3.13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.4	72
	Subtotal			2
4. Emergency Procedures/Plan	2.4.14	Knowledge of general guidelines for EOP usage.	3.8	73
	2.4.35	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	3.8	74
	2.4.42	Knowledge of emergency response facilities.	2.6	75
	Subtotal			3
Tier 3 Point Total				10

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		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2		G*	Total
1. Emergency and Abnormal Plant Evolutions	1				N/A					N/A			18	3		3	6
	2												9	2		2	4
	Tier Totals													27	5		5
2. Plant Systems	1												28	2		3	5
	2												10		2	1	3
	Tier Totals												38	4		4	8
3. Generic Knowledge and Abilities Categories				1		2		3		4		10	1	2	3	4	7
										2	2		1	2			

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5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' IRs for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. If fuel-handling equipment is sampled in a category other than Category A2 or G\* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2. (Note 1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

#### G\* Generic K/As

- \* These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.
- \*\* These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000007 (EPE 7; BW E02&E10; CE E02) Reactor Trip, Stabilization, Recovery / 1							N/A – Not randomly selected		
000008 (APE 8) Pressurizer Vapor Space Accident / 3							N/A – Not randomly selected		
000009 (EPE 9) Small Break LOCA / 3							N/A – Not randomly selected		
000011 (EPE 11) Large Break LOCA / 3							N/A – Not randomly selected		
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4							N/A – Not randomly selected		
000022 (APE 22) Loss of Reactor Coolant Makeup / 2							N/A – Not randomly selected		
000025 (APE 25) Loss of Residual Heat Removal System / 4							N/A – Not randomly selected		
000026 (APE 26) Loss of Component Cooling Water / 8						X	2.4.46 – Ability to verify that alarms are consistent with the plant conditions	4.2	1
000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3					X		AA2.11 – RCS Pressure	4.1	2
000029 (EPE 29) Anticipated Transient Without Scram / 1					X		EA2.02 – Reactor Trip Alarm	4.4	3
000038 (EPE 38) Steam Generator Tube Rupture / 3							N/A – Not randomly selected		
000040 (APE 40; BW E05; CE E05; W E12) Steam Line Rupture—Excessive Heat Transfer / 4							N/A – Not randomly selected		
000054 (APE 54; CE E06) Loss of Main Feedwater / 4							N/A – Not randomly selected		
000055 (EPE 55) Station Blackout / 6							N/A – Not randomly selected		
000056 (APE 56) Loss of Offsite Power / 6							N/A – Not randomly selected		
000057 (APE 57) Loss of Vital AC Instrument Bus / 6						X	2.4.20 – Knowledge of the operational implications of EOP warnings, cautions, and notes.	4.3	4
000058 (APE 58) Loss of DC Power / 6							N/A – Not randomly selected		
000062 (APE 62) Loss of Nuclear Service Water / 4							N/A – Not randomly selected		
000065 (APE 65) Loss of Instrument Air / 8							N/A – Not randomly selected		
000077 (APE 77) Generator Voltage and Electric Grid Disturbances / 6					X		AA2.01 – Operating point on the generator capability curve	3.6	5
(W E04) LOCA Outside Containment / 3						X	2.4.8 – Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	4.5	6
(W E11) Loss of Emergency Coolant Recirculation / 4							N/A – Not randomly selected		
(BW E04; W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4							N/A – Not randomly selected		
K/A Category Totals:	0	0	0	0	3	3	Group Point Total:		6

ES-401		PWR Examination Outline						Form ES-401-2		
Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#	
000001 (APE 1) Continuous Rod Withdrawal / 1						X	2.4.1— Knowledge of EOP entry conditions and immediate action steps	4.8	7	
000003 (APE 3) Dropped Control Rod / 1							2.1.07 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	7	
000005 (APE 5) Inoperable/Stuck Control Rod / 1							N/A – Not randomly selected			
000024 (APE 24) Emergency Boration / 1							N/A – Not randomly selected			
000028 (APE 28) Pressurizer (PZR) Level Control Malfunction / 2							N/A – Not randomly selected			
000032 (APE 32) Loss of Source Range Nuclear Instrumentation / 7							N/A – Not randomly selected			
000033 (APE 33) Loss of Intermediate Range Nuclear Instrumentation / 7							N/A – Not randomly selected			
000036 (APE 36; BW/A08) Fuel-Handling Incidents / 8							N/A – Not randomly selected			
000037 (APE 37) Steam Generator Tube Leak / 3							N/A – Not randomly selected			
000051 (APE 51) Loss of Condenser Vacuum / 4					X		AA2.02 – Conditions requiring reactor and/or turbine trip	4.1	8	
000059 (APE 59) Accidental Liquid Radwaste Release / 9							N/A – Not randomly selected			
000060 (APE 60) Accidental Gaseous Radwaste Release / 9							N/A – Not randomly selected			
000061 (APE 61) Area Radiation Monitoring System Alarms / 7							N/A – Not randomly selected			
000067 (APE 67) Plant Fire On Site / 8							N/A – Not randomly selected			
000068 (APE 68; BW A06) Control Room Evacuation / 8							N/A – Not randomly selected			
000069 (APE 69; W E14) Loss of Containment Integrity / 5							N/A – Not randomly selected			
000074 (EPE 74; W E06 & E07) Inadequate Core Cooling / 4							N/A – Not randomly selected			
000076 (APE 76) High Reactor Coolant Activity / 9							N/A – Not randomly selected			
000078 (APE 78*) RCS Leak / 3							N/A – Not randomly selected			
(W E01 & E02) Rediagnosis & SI Termination / 3						X	2.2.44 – Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions	4.4	9	
(W E13) Steam Generator Overpressure / 4							N/A – Not randomly selected			
(W E15) Containment Flooding / 5							N/A – Not randomly selected			
(W E16) High Containment Radiation /9							N/A – Not randomly selected			
(BW A01) Plant Runback / 1							N/A – Not randomly selected			
(BW A02 & A03) Loss of NNI-X/Y/7							N/A – Not randomly selected			
(BW A04) Turbine Trip / 4							N/A – Not randomly selected			
(BW A05) Emergency Diesel Actuation / 6							N/A – Not randomly selected			
(BW A07) Flooding / 8							N/A – Not randomly selected			
(BW E03) Inadequate Subcooling Margin / 4							N/A – Not randomly selected			
(BW E08; <b>W E03</b> ) LOCA Cooldown—Depressurization / 4					X		EA2.1 – Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.2	10	
(BW E09; CE A13*; W E09 & E10) Natural Circulation/4							N/A – Not randomly selected			
(BW E13 & E14) EOP Rules and Enclosures							N/A – Not randomly selected			

(CE A11**; W E08) RCS Overcooling—Pressurized Thermal Shock / 4							N/A – Not randomly selected		
(CE A16) Excess RCS Leakage / 2							N/A – Not randomly selected		
(CE E09) Functional Recovery							N/A – Not randomly selected		
(CE E13*) Loss of Forced Circulation/LOOP/Blackout / 4							N/A – Not randomly selected		
K/A Category Point Totals:	0	0	0	0	2	2	Group Point Total:		4



ES-401		PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO)													Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#		
003 (SF4P RCP) Reactor Coolant Pump											X	2.1.32 – Ability to explain and apply system limits and precautions.	4.0	11		
004 (SF1; SF2 CVCS) Chemical and Volume Control												N/A – Not randomly selected				
005 (SF4P RHR) Residual Heat Removal												N/A – Not randomly selected				
006 (SF2; SF3 ECCS) Emergency Core Cooling												N/A – Not randomly selected				
007 (SF5 PRTS) Pressurizer Relief/Quench Tank												N/A – Not randomly selected				
008 (SF8 CCW) Component Cooling Water											X	2.4.50 – Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.0	12		
010 (SF3 PZR PCS) Pressurizer Pressure Control												N/A – Not randomly selected				
012 (SF7 RPS) Reactor Protection												N/A – Not randomly selected				
013 (SF2 ESFAS) Engineered Safety Features Actuation												N/A – Not randomly selected				
022 (SF5 CCS) Containment Cooling								X				A2.04 – Loss of service water	3.2	13		
025 (SF5 ICE) Ice Condenser												N/A – Not randomly selected				
026 (SF5 CSS) Containment Spray												N/A – Not randomly selected				
039 (SF4S MSS) Main and Reheat Steam												N/A – Not randomly selected				
059 (SF4S MFW) Main Feedwater												N/A – Not randomly selected				
061 (SF4S AFW) Auxiliary/Emergency Feedwater												N/A – Not randomly selected				
062 (SF6 ED AC) AC Electrical Distribution												N/A – Not randomly selected				
063 (SF6 ED DC) DC Electrical Distribution												N/A – Not randomly selected				
064 (SF6 EDG) Emergency Diesel Generator												N/A – Not randomly selected				
073 (SF7 PRM) Process Radiation Monitoring											X	2.1.23 – Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.4	14		
076 (SF4S SW) Service Water												N/A – Not randomly selected				
078 (SF8 IAS) Instrument Air								X				A2.01 – Air dryer and filter malfunctions	2.9	15		
103 (SF5 CNT) Containment												N/A – Not randomly selected				
053 (SF1; SF4P ICS*) Integrated Control												N/A for NUREG 1122, Rev. 2				
K/A Category Point Totals:	0	0	0	0	0	0	0	2	0	0	3	Group Point Total:		5		

ES-401		PWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)												Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#	
001 (SF1 CRDS) Control Rod Drive												N/A – Not randomly selected			
002 (SF2; SF4P RCS) Reactor Coolant												N/A – Not randomly selected			
011 (SF2 PZR LCS) Pressurizer Level Control												N/A – Not randomly selected			
014 (SF1 RPI) Rod Position Indication												N/A – Not randomly selected			
015 (SF7 NI) Nuclear Instrumentation								X				A2.04 – Effects on axial flux density of control rod alignment and sequencing, xenon production and decay, and boron vs. control rod reactivity changes.	3.8	46	
015 (SF7 NI) Nuclear Instrumentation								X				A2.01 – Power supply loss or erratic operation	3.9	16	
016 (SF7 NNI) Nonnuclear Instrumentation												N/A – Not randomly selected			
017 (SF7 ITM) In-Core Temperature Monitor												N/A – Not randomly selected			
027 (SF5 CIRS) Containment Iodine Removal												N/A – Not randomly selected			
028 (SF5 HRPS) Hydrogen Recombiner and Purge Control												N/A – Not randomly selected			
029 (SF8 CPS) Containment Purge												N/A – Not randomly selected			
033 (SF8 SFPCS) Spent Fuel Pool Cooling												N/A – Not randomly selected			
034 (SF8 FHS) Fuel-Handling Equipment												N/A – Not randomly selected			
035 (SF 4P SG) Steam Generator											X	2.4.4 – Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.7	17	
041 (SF4S SDS) Steam Dump/Turbine Bypass Control												N/A – Not randomly selected			
045 (SF 4S MTG) Main Turbine Generator												N/A – Not randomly selected			
055 (SF4S CARS) Condenser Air Removal												N/A – Not randomly selected			
056 (SF4S CDS) Condensate												N/A – Not randomly selected			
068 (SF9 LRS) Liquid Radwaste								X				A2.04 – Failure of automatic isolation	3.3	18	
071 (SF9 WGS) Waste Gas Disposal												N/A – Not randomly selected			
072 (SF7 ARM) Area Radiation Monitoring												N/A – Not randomly selected			
075 (SF8 CW) Circulating Water												N/A – Not randomly selected			
079 (SF8 SAS**) Station Air												N/A – Not randomly selected			
086 Fire Protection												N/A – Not randomly selected			
050 (SF 9 CRV*) Control Room Ventilation												N/A for NUREG 1122, Rev. 2			
												N/A – Not randomly selected			
K/A Category Point Totals:	0	0	0	0	0	0	0	2	0	0	1	Group Point Total:		3	

Facility: Indian Point Unit 3

Date of Exam: Oct/Nov 2017

Category	K/A #	Topic	SRO	
			IR	#
1. Conduct of Operations	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management.	4.6	19
	2.1.42	Knowledge of new and spent fuel movement procedures.	3.4	20
	Subtotal			2
2. Equipment Control	2.2.19	Knowledge of maintenance work order requirements.	3.4	21
	2.2.40	Ability to apply Technical Specifications for a system.	4.7	22
	Subtotal			2
3. Radiation Control	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.8	23
	Subtotal			1
4. Emergency Procedures/Plan	2.4.26	Knowledge of facility protection requirements, including fire brigade and portable fire fighting equipment usage.	3.6	24
	2.4.44	Knowledge of emergency plan protective action recommendations.	4.4	25
	Subtotal			2
Tier 3 Point Total				7



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-CRF003AN	C (ALL) TS/TRM (CRS)	Dropped Rod N3 in Control Bank C
3	MAL-CFW012B	I (CRS, ATC) TS (CRS)	Feed flow transmitter 418B fails high
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 they 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, 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.

Next, 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.)

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:

<b>E-2 -- A</b>	Isolate the faulted SG before transition out of E-2.
<b>Non-WOG</b>	Manually start at least two HHSI pumps before completion of RO-1 steps 1-12.
<b>ECA-3.1—B</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 - 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 3 – 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 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 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-CRF003AN to STATIONARY on event 2	DROPPED ROD (CBC-N3)
00:00:00	3	Insert malfunction MAL-CFW012B to 4.00000 on event 3	FEEDWATER FLOW TRANSMITTER FT-418B FAILURE
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



<b>Simulator Setup and Instructor Directions</b>		
<b>Setup/Event</b>	<b>INSTRUCTOR ACTIONS</b>	<b>EXPECTED RESPONSE/INSTRUCTOR CUES</b>
<b>IC Reset</b>		Reset Simulator to 100% power IC
<b>SES Setup Schedule File</b>	<b>Run Setup File:</b> 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"> <li>• Loop 1A, High Level</li> <li>• Loop 1A, Low Level</li> <li>• Loop 1A, Low Level Mismatch</li> </ul>
<b>Event 1</b>	Plant shutdown. No trigger	
<b>Role Play</b>	<b>Any</b>	Respond to request for starting shutdown
<b>Event 2</b>	<b>Activate Trigger 2 At lead evaluator direction</b>	N3 Rod Drop
<b>Role Play</b>	<b>SM</b>	Continue S/D. We will not recover rod.
<b>Event 3</b>	<b>Activate Trigger 3 At lead evaluator direction</b>	Feedflow transmitter 418B fails high
<b>Role Play</b>	<b>I&amp;C</b>	Will get troubleshooting package together.
<b>Event 4</b>	<b>Activate Trigger 4 At lead evaluator direction</b>	CCW Leak
<b>Role Play</b>	<b>NPO</b>	Fill surge tanks using extreme view valve commands. Full open on valves will maintain level with malfunction in.
<b>Role Play</b>	<b>NPO</b>	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.
<b>Event 5</b>	<b>Activate Trigger 5 At lead evaluator direction</b>	Steam Break outside VC upstream of MSIV.
<b>Roll Play</b>	<b>NPO</b>	There is no steam in Turbine Building. There is lots of steam and noise in steam bridge area.
<b>Event 6</b>	No trigger	Failure of HHSI pumps to auto start.
<b>Role Play</b>		
<b>Event 7</b>	<b>Activate Trigger 7 When E-2 is entered</b>	SGTR 32 SG.
<b>Role Play</b>	<b>NPO</b>	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"><li>• Sets YIC-110 Integrator</li><li>• Takes Makeup Mode Switch to BORATE</li><li>• Takes Makeup Control Switch to START then NORM</li></ul>
	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: 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"> <li>Condition B of 3.1.4 applies requiring recovering rod within 1 hour or lowering power to &lt;75%.</li> <li>3.2.3 and 3.2.4 may require load reduction.</li> <li>CRS should understand TS and continue shutting down.</li> </ul>
	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.: 3

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 feed flow channel B is failed high.
	ATC	Swap to A channel for 31 SG feed flow (and possibly steam flow).
	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"> <li>Function 14 SG Water Level Low is the applicable protection.</li> <li>Condition E of LCO 3.3.1 applies.</li> <li>Place channel in trip in 6 hours.</li> <li>CRS may recognize that this cannot be done due to other failure.</li> </ul>
	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.
	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.: 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.
<b><i>If desired, Lead Evaluator may move on to event 5 at this time</i></b>		
	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"> <li>• AC-AOV-793</li> <li>• AC-AOV-796</li> <li>• AC-AOV-791</li> <li>• AC-AOV-798</li> </ul>
	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"><li>• Close CH-HCV-123</li><li>• Place CH-AOV-215 to VCT</li><li>• Open CH-HCV-123</li></ul>
	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"> <li>• Reactor Trip Breakers Open</li> <li>• Rod Bottom Light Lit</li> <li>• IRPIs all near 0</li> <li>• Flux decreasing</li> </ul>
	ATC	Verifies turbine trip: <ul style="list-style-type: none"> <li>• Checks Stop Valves closed</li> <li>• May trip turbine manually since stop valve indication is not available with SI</li> </ul>
	BOP	Verifies power to 480V busses: <ul style="list-style-type: none"> <li>• All have power from offsite</li> </ul>
<p align="center"><b>Critical Task</b></p> <p align="center">Manually start at least two HHSI pumps before completion of RO-1 steps 1-12.</p> <p align="center">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"> <li>• SI will be manually initiated even if already done.</li> <li>• Recognize that no HHSI pumps are running and start pumps.</li> </ul>
	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"> <li>• Start HHSI pumps if not already done. If not done in RO-1, the critical task is not met.</li> <li>• Positions FCU dampers</li> <li>• Place switched to open for 1104/1105</li> <li>• Has NPO place switches for 1176/1176A to open.</li> <li>• Place CR HVAC to 10% Incident Mode</li> <li>• Reset SI unless done by E-2 first</li> <li>• Has NPO resets MCCs</li> <li>• Has NPO close SW valves SWN-FCV-1111/1112</li> <li>• Has NPO align CW cooling</li> <li>• Verifies letdown valves closed. May close excess letdown valves, but no required.</li> <li>• Establish IA to Containment</li> <li>• Open 863 N2 supply</li> <li>• Start NESW</li> </ul>
	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:  Team transitions to E-2  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"><b>Critical Task:</b></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"> <li>• Secure all sources of feed to 32 SG</li> <li>• Trip 32 AFW pump</li> <li>• Verify Atmospheric closed</li> <li>• Verify SG BD valves closed</li> <li>• Verify Sample valves closed</li> </ul>		
	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"> <li>• Isolate MFW</li> <li>• Isolate AFW flow</li> <li>• Verify SG Atmospheric closed</li> <li>• Verify BD and Sample valves closed</li> <li>• Upstream traps will not be accessible.</li> </ul>
	ALL	Should diagnose that SGTR is in progress, so 32 SG is ruptured/faulted.
<p align="center"><b>Note:</b></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.
<p style="text-align: center;">Critical Task:</p> <p>Cool down the RCS to CSD conditions at the highest achievable rate w/o exceeding 100F/hr.</p> <p>The procedure does not specify a minimum, however the following will constitute satisfying the critical task:</p> <ul style="list-style-type: none"><li>• A target rate, once control established, of at least 75°F/hour.</li><li>• The ATC/BOP can monitor and control to be within 15°F/hour of rate given by CRS.</li><li>• RCS is not intentionally cooled down such that temperature decreases by more than a 100°F in any 1 hour.</li></ul>		
	ATC	Used Atmospheric Steam Dumps to establish <100°F/hour cooldown: <ul style="list-style-type: none"><li>• Individual Controllers (31, 33, 34) to Manual</li><li>• Dumps throttled open as necessary to maintain cooldown rate</li></ul>
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 is at hour 70 of 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)	32 Containment Recirc Fan (FCU) trips.
2	MAL-DSG001B		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) TS (CRS)	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, SOP-EL-5.

Event 1 – 32 Fan Cooler Unit Trips. The CRS will evaluate Tech Specs. BOP will place in Trip 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. <b>Clear EDG Trouble Alarm.</b>
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



<b>Simulator Setup and Instructor Directions</b>		
<b>Setup/Event</b>	<b>INSTRUCTOR ACTIONS</b>	<b>EXPECTED RESPONSE/INSTRUCTOR CUES</b>
<b>Role Play</b>	<b>When NPO dispatched, to perform Local Operator Actions</b>	Perform actions using the Operator Action Tool. Report when actions are complete.
<b>Event 9</b>	<b>Actuate Trigger 9</b>	Loss of All AC Power
<b>Role Play</b>	<b>Con Ed System Operator</b>	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"> <li>• Condition C for 1 FCU Inoperable is 7 day LCO</li> <li>• Condition D for 2 Trains Inoperable is 72 hour LCO               <ul style="list-style-type: none"> <li>○ 32 FCU and 32 EDG (35 FCU)</li> <li>○ NOTE 4 hour action to declare 35 FCU Inoperable due to EDG <b>AND</b> 32 FCU Inoperable</li> </ul> </li> </ul>
	BOP	Place switch in stop per Alarm Response Procedure
	BOP	Close Dampers for 32 FCU
Lead Evaluator		When the following has been demonstrated/observed: Tech Specs evaluated by the CRS. 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 the 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"><li>• Energize all PRZR heaters.</li><li>• Initiate 100 gallon boration per Attachment 2 at rate of 10 gpm (will reduce to lower boration rate after 20 gallons are added).</li><li>• Set YIC-110 Boric Acid Integrator to 100 gallons.</li><li>• Place Makeup Mode Selector Switch to Borate.</li><li>• Turn Makeup Control Switch to START and return to NORMAL.</li></ul>
	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"> <li>• HIGH STEAM FLOW SI CHANNEL TRIP</li> <li>• T-AVG T-REF DIVIATION</li> <li>• Observe Rods stepping in a maximum speed with no load rejection.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Diagnose PT-412A failure</li> <li>• PLACE Rod Control in MANUAL</li> </ul>
	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"> <li>• Place controller in Manual</li> <li>• Adjust controller output to 0%</li> <li>• Steam Dump Control Switch to RESET the PRESS CONT.</li> <li>• Place Controller in Auto</li> </ul>
	BOP	Place BS/2MSS 400 block switch in AMSAC cabinet to BYPASS
	CRS	Review Tech Specs <ul style="list-style-type: none"> <li>• Table 3.3.1-1 function 17b (1 hour completion time)</li> <li>• Table 3.3.1-1 function 17e (1 hour completion time)</li> <li>• Table 3.3.2-1 function 1g</li> <li>• Table 3.3.2-1 function 4d</li> <li>• Table 3.3.2-1 function 4e</li> <li>• TRM TROS 3.1.A</li> </ul>
<p align="center"><b>NOTE:</b></p> <p 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"><li>• Loop 3A High SF-SI</li><li>• Loop 4A High SF-SI</li><li>• Loop 1A High SF-SI</li><li>• Loop 2A High SF-SI</li></ul>
	CRS	Determine channel failed low
Lead Evaluator		<p>When the following has been demonstrated/observed:</p> <ul style="list-style-type: none"><li>• Bistables tripped (may be skipped)</li><li>• TS Addressed</li></ul> <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"> <li>Determine VCT level indicator LI-112 has failed low.</li> </ul>
	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
	CRS	Refer to Tech Spec 3.7.3 Condition B for One MFRV inoperable 72 hours to close or isolate
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/or Non-Essential Service Water Pumps as necessary to maintain > 60 psig.
	BOP	Possible load reduction due to decreasing condenser vacuum.
	CRS	Review Tech Specs <ul style="list-style-type: none"><li>• 3.8.1 AC Sources Operating</li><li>• 3.8.4 DC Sources Operating</li><li>• 3.8.9 Distribution Systems Operating</li></ul> 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"> <li>Depresses Reactor Trip Pushbutton</li> <li>Verify Reactor Trip</li> <li>Verify Turbine Trip (Push Turbine Trip pushbutton)</li> </ul>
	ATC	Perform Immediate Operator Actions of E-0 <ul style="list-style-type: none"> <li>Verify Reactor Trip</li> <li>Verify Turbine Trip (Push Turbine Trip pushbutton)</li> </ul>
	BOP	Verify 480V Power for buses 5A, 2A and 3A
	ATC	Checks requirements for Safety Injection. <ul style="list-style-type: none"> <li>Safety Injection NOT required</li> </ul>
	BOP	Identify no Motor Driven AFW pumps operating. <ul style="list-style-type: none"> <li>Increase speed of 32 AFW pump until adequate discharge pressure</li> <li>Open 405A – D to provide flow to all Steam Generators</li> </ul>
<p align="center"><b>Critical Task</b></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		<p>When the following has been demonstrated/observed: Loss of 31 and 33 EDG automatically actuated when adequate AFW flow established</p> <p>Continue to Event 9</p>

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

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  $\geq 15$  minutes.

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-SWS001F	C (BOP) TS(CRS)	36 SW Pump trips
5	MAL-RCS007B		32 RCP high vibrations.
6	MAL-RCS005A	C (ALL)	32 RCP seal degrading.
7	MAL-RCS002B	C(ALL)	32 RCP trips
8	MAL-RPS002B	M(ALL)	ATWS
9	MAL-RCS005A	C (ALL)	SBLOCA due to 32 RCP seal failure.
10	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, 36 Service Water Pump will trip. The BOP will start 34 or 35 SW pump in accordance with the ARP.

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

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 – 36 SW pump trip. The BOP will diagnose 36 SW pump trip and determine that another pump must be started to maintain SW header pressure,

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

Event 6 – 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 7 – 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 8 – 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 9 – 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 10 – 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-SWS001F to TRIP on event 4	SWS PUMP 36 FAILURE
00:00:00	None	Insert malfunction MAL-RCS007B to 10.30000 on event 5	RCP 32 VIBRATION
00:00:00	None	Insert malfunction MAL-RCS012B to 1.80000 in 30 on event 6	RCP 32 NUMBER 1 SEAL FAILURE
00:00:00	None	Insert malfunction MAL-RCS002B on event 7	REACTOR COOLANT PUMP 32 TRIP
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	None	Delete malfunction MAL-RPS002B	REACTOR TRIP BREAKERS FAIL TO OPEN (AUTO & MANUAL)

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 Ensure Rods are in MANUAL
Event 1		Start Heater Drain Pump
Role Play	When NPO called to standby start  LOA-FWH021 (1127) LOA-FWH022 (1127A)	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 36 Service Water Pump
Role Play	If NPO dispatched	Report breaker is tripped and pump will not rotate.
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	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 7	Actuate Trigger 8 At lead evaluator direction	32 RCP Trips
Event 8	Entered in setup	ATWS
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. <b>Ensure breakers are open.</b>
Event 9	Entered at Setup	Seal failure will occur when reactor trips. Additional leakage will ramp in over 60 seconds.

<b>Simulator Setup and Instructor Directions</b>		
<b>Setup/Event</b>	<b>INSTRUCTOR ACTIONS</b>	<b>EXPECTED RESPONSE/INSTRUCTOR CUES</b>
<b>Role Play</b>	<b>When individuals outside CR called</b>	Acknowledge request. Perform actions as necessary Report when actions complete
<b>Event 10</b>	<b>Entered at Setup</b>	Loss of Offsite Power 60 seconds after Safety Injection was reset.
<b>Role Play</b>	<b>When individuals outside CR called</b>	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
	NPO	Report > 600 gpm flow when alarm clears to signal BOP to release switch
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"><li>• Determine volume of water</li><li>• Set YIC-111 Integrator</li><li>• Take Makeup Mode Switch to Dilute</li><li>• Take Makeup Control Switch to Start</li></ul>
	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"><li>Reactor Coolant Loop # 32 Low Flow Channel Trip</li></ul>
	ATC	<ul style="list-style-type: none"><li>Diagnose FI-424 Failure low</li></ul>
	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"><li>Table 3.3.1-1 Function 9</li></ul>
	BOP	Trip bistable <ul style="list-style-type: none"><li>Loop 2A, Low Flow</li></ul>
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: 36 SWS Pump trip

Time	Position	Applicant's Actions or Behavior
		Multiple alarms indicating SWS pump trip <ul style="list-style-type: none"><li>• 480V Motor Trip (Common)</li><li>• Service Water Header (34, 35, 36) High Low Pressure</li></ul>
	BOP	Determine 36 SWS Pump is tripped Start 334 or 35 SWS pump
	CRS	May enter AOP-SWS-1.
	CRS	Refer to Tech Specs <ul style="list-style-type: none"><li>• 3.7.9, action a</li></ul>
Lead Evaluator		When the following has been demonstrated/observed: 34 or 35 SWS pump is running and pressure is > 60 psig Then instruct Booth to insert Event 5

Op-Test No.: 1 Scenario No.: 4 Event No.: 5

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"> <li>• Motor Winding Temp &gt; 250°F</li> <li>• Motor Winding Temp &gt; 300°F</li> <li>• Upper or Lower motor bearing temp &gt; 200°F</li> <li>• Shaft Vibration &gt; 20 mils</li> <li>• Shaft Vibration &gt; 15 mils and increasing &gt;1 mil/hr</li> <li>• Frame Vibration &gt; 5 mils</li> <li>• Frame Vibration &gt; 3 mils and increasing &gt;0.2 mils/hr</li> <li>• #1 Seal Return Flow &gt; 6 gpm</li> <li>• #1 Seal Return Flow &lt; 0.84 gpm and seal temps increasing</li> <li>• Seal ΔP &lt; 200 psid</li> <li>• Seal Inlet temp &gt; 225°F</li> <li>• Seal Outlet temp &gt; 235°F</li> </ul>
	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: RCP Seal Degradation

Time	Position	Applicant's Actions or Behavior
	BOP	Respond to alarms <ul style="list-style-type: none"> <li>• RCP No. 1 Seal Return High Low Flow (Common)</li> <li>• RCP Thermal Barrier Low <math>\Delta P</math></li> </ul>
	ATC	Diagnose 32 RCP Seal Return Flow increasing not at trip setpoint
	CRS	Re-enter AOP-RCP-1.
	ATC/BOP	Verify RCP Shutdown Criteria <ul style="list-style-type: none"> <li>• Motor Winding Temp &gt; 250°F</li> <li>• Motor Winding Temp &gt; 300°F</li> <li>• Upper or Lower motor bearing temp &gt; 200°F</li> <li>• Shaft Vibration &gt; 20 mils</li> <li>• Shaft Vibration &gt; 15 mils and increasing &gt;1 mil/hr</li> <li>• Frame Vibration &gt; 5 mils</li> <li>• Frame Vibration &gt; 3 mils and increasing &gt;0.2 mils/hr</li> <li>• #1 Seal Return Flow &gt; 6 gpm</li> <li>• #1 Seal Return Flow &lt; 0.84 gpm and seal temps increasing</li> <li>• Seal <math>\Delta P</math> &lt; 200 psid</li> <li>• Seal Inlet temp &gt; 225°F</li> <li>• Seal Outlet temp &gt; 235°F</li> </ul>
	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 7

Op-Test No.: 1 Scenario No.: 4 Event No.: 7/8

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"> <li>• 6900 V Motor Trip (Common)</li> <li>• Loss of Flow Single Loop</li> <li>• <math>\Delta T</math> Deviation</li> </ul>
	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"> <li>• Reactor still not tripped</li> <li>• Manually insert Control Rods</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Manually trip the Turbine</li> <li>• Start both motor driven AFW pumps (will not auto start due to plant conditions)</li> <li>• Establish &gt; 686 gpm AFW flow</li> <li>• Open MOV-333</li> <li>• Close HCV-104 and 105</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Start both Boric Acid Transfer Pumps in fast speed</li> <li>• Check Pressurizer Pressure &lt; 2335 psig</li> </ul>

Op-Test No.: 1 Scenario No.: 4 Event No.: 7/8

Event Description: 32 RCP Trip Reactor /ATWS

**Critical Task**

**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**

**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"><li>• Check Purge Valves Closed</li><li>• Check Pressure Relief Valves Closed</li><li>• Check WCCPP Low Pressure Alarms NOT lit</li><li>• Check SI not actuated</li></ul>
	ATC	Check Reactor Subcritical <ul style="list-style-type: none"><li>• Power &lt;5%</li><li>• Rods &lt; 20 steps</li></ul>
	BOP	<ul style="list-style-type: none"><li>• Close MOV-333</li></ul>
	ATC	<ul style="list-style-type: none"><li>• Place Boric Acid Transfer Pumps in Slow Speed</li></ul>
	BOP	<ul style="list-style-type: none"><li>• Open HCV-104 and 105 to 25%</li></ul>
	ATC	<ul style="list-style-type: none"><li>• Check RCP Seal Cooling established</li><li>• Check Charging Pumps running</li><li>• Establish Normal Boration</li></ul>
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"><li>• Pressurizer Level decreasing rapidly</li><li>• Containment humidity increasing</li></ul>
	CRS	Directs entry into E-0.
	ATC	Verifies reactor trip: <ul style="list-style-type: none"><li>• Reactor Trip Breakers Open</li><li>• Rod Bottom Light Lit</li><li>• IRPIs all near 0</li><li>• Flux decreasing</li></ul>
	ATC	Verifies turbine trip: <ul style="list-style-type: none"><li>• Checks Stop Valves closed</li></ul>
	BOP	Verifies power to 480V busses: <ul style="list-style-type: none"><li>• All energized from offsite power</li></ul>
	ATC	Check if SI is actuated or required <ul style="list-style-type: none"><li>• SI may not actuated but is required</li><li>• Manually actuates SI</li></ul>
	BOP	Check Status of AFW > 365 gpm <ul style="list-style-type: none"><li>• Control SG level between 9 and 50%</li></ul>

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"><li>• Attempt Start HHSI pumps.</li><li>• Start RHR pumps</li><li>• Positions FCU dampers</li><li>• Place switched to open for 1104/1105</li><li>• Has NPO place switches for 1176/1176A to open.</li><li>• Place CR HVAC to 10% Incident Mode</li><li>• Reset SI unless done by E-2 first</li><li>• Has NPO resets MCCs</li><li>• Has NPO close SW valves SWN-FCV-1111/1112</li><li>• Has NPO align CW cooling</li><li>• Verifies letdown valves closed. May close excess letdown valves, but no required.</li><li>• Establish IA to Containment</li><li>• Open 863 N2 supply</li><li>• Start NESW</li></ul>
	ATC	<ul style="list-style-type: none"><li>• Verify Feedwater Isolation</li><li>• Verify SI Flow</li><li>• Verify Containment Spray Not Required</li><li>• Check RCP Seal Cooling</li><li>• Check Average RCS Temperature</li></ul>
<b>Critical Task</b>		
<b>Trip all RCPs before completion of E-1 Step 1</b>		
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"><li>• Verify power to 480V buses</li><li>• Check 3 Essential Service Water Pumps running<ul style="list-style-type: none"><li>◦ Start 3 Essential Service Water Pumps</li></ul></li><li>• Place CCW in TPO</li><li>• Ensure Letdown is isolated</li></ul>
	ATC/BOP	<p>Restart</p> <ul style="list-style-type: none"><li>• High Head SI Pumps</li><li>• RHR Pumps</li><li>• Fan Cooler Units</li><li>• AFW Pumps</li></ul>
<b>Critical Task</b>		
<b>Establish flow from at least one SI Pump before transition out of LOOP 1</b>		
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.