

Description of program used to generate IPEC Unit 2 July 2010 Written Exam K/As

Generated the RO and SRO sample plan using the "NKEG" Database Program, version 1.1, developed by Westinghouse Electric Company. This program will automatically produce a Random Sample Plan based on NUREG 1122, Rev. 2, Supplement 1 K/As.

K/As were suppressed prior to the outline generation process as provided for in the examiner standard, the list of suppressed K/As is provided as required by the examiners standard.

Inappropriate and inapplicable K/As were discarded during the outline development process and are included in the record of rejected K/As. The replacement K/As were replaced using the random sample function of the NKEG database program.

Facility: Indian Point Unit 2

Printed: 03/16/2010

Date Of Exam: 07/12/2010

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 & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A			3	18	3	3	6	
	2	1	2	1	N/A			1	2	N/A			2	9	2	2	4	
	Tier Totals	4	5	4	N/A			4	5	N/A			5	27	5	5	10	
2. Plant Systems	1	3	2	3	3	3	2	3	3	2	2	2	28	3	2	5		
	2	1	1	1	1	1	1	1	1	1	1	0	10	0	2	1	3	
	Tier Totals	4	3	4	4	4	3	4	4	3	3	2	38	5	3	8		
3. Generic Knowledge And Abilities Categories				1		2		3		4		10		1	2	3	4	7
				2		3		2		3				2	2	1	2	

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 outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
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 ±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 associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; 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' importance ratings (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 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.

PWR RO/SRO Examination Outline

Facility: Indian Pont Unit 2

NRC Written Examination Outline

ES-401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic	Imp.	Q#
000007 Reactor Trip - Stabilization - Recovery / 1	X						EK1.02	Knowledge of the operational implications of the following concepts as they apply to the reactor trip: - Shutdown margin	3.4	1
000008 Pressurizer Vapor Space Accident / 3							AA2.13	Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: - High-pressure safety injection pump flow indicator, ammeter, and controller	3.9	76
000009 Small Break LOCA / 3							2.1.25	Conduct of Operations - Ability to interpret reference materials such as graphs, curves, tables etc.	4.2	81
000011 Large Break LOCA / 3							2.4.8	Emergency Procedures/Plan - Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	4.5	77
000011 Large Break LOCA / 3							EA2.13	Ability to determine and interpret the following as they apply to a Large Break LOCA: - Difference between overcooling and LOCA indications	3.7	78
000015/000017 RCP Malfunctions / 4							2.2.36	Equipment Control - Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	3.1	3
000025 Loss of RHR System / 4							AK3.01	Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: - Shift to alternate flowpath	3.1	2
000026 Loss of Component Cooling Water / 8			X				AK3.02	Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: - The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS	3.6	4

PWR RO/SRO Examination Outline

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NRC Written Examination Outline

ES-401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic	Imp.	Q#
000027 Pressurizer Pressure Control System Malfunction / 3					X		AA2.15	Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: - Actions to be taken if PZR pressure instrument fails high	3.7	5
000029 ATWS / 1		X					EK2.06	Knowledge of the interrelations between the ATWS and the following: - Breakers, relays, and disconnects	2.9	6
000038 Steam Gen. Tube Rupture / 3					X		EA2.01	Ability to determine and interpret the following as they apply to a SGTR: - When to isolate one or more S/Gs	4.1	7
000040 Steam Line Rupture - Excessive Heat Transfer / 4					X		AA2.02	Ability to determine and interpret the following as they apply to the Steam Line Rupture: - Conditions requiring a reactor trip	4.7	79
000054 Loss of Main Feedwater / 4				X			AA1.02	Ability to operate and/or monitor the following as they apply to the Loss of Main Feedwater (MFW): - Manual startup of electric and steam-driven AFW pumps	4.4	8
000055 Station Blackout / 6					X		EA2.01	Ability to determine and interpret the following as they apply to a Station Blackout: - Existing valve positioning on a loss of instrument air system	3.4	9
000056 Loss of Off-site Power / 6	X						AK1.04	Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: - Definition of saturation conditions, implication for the systems	3.1	10
000057 Loss of Vital AC Inst. Bus / 6				X			AA1.04	Ability to operate and/or monitor the following as they apply to the Loss of Vital AC Instrument Bus: - RWST and VCT valves	3.5	11

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Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic	Imp.	Q#
000058 Loss of DC Power / 6						X	2.2.36	Equipment Control - Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	3.1	12
000058 Loss of DC Power / 6						X	2.4.46	Emergency Procedures/Plan - Ability to verify that the alarms are consistent with the plant conditions.	4.2	80
000062 Loss of Nuclear Svc Water / 4						X	2.2.42	Equipment Control - Ability to recognize system parameters that are entry level conditions for Technical Specifications.	3.9	13
000077 Generator Voltage and Electric Grid Disturbances / 6	X						AK1.03	Knowledge of the operational implications of the following concepts as they apply to Generator Voltage and Electric Grid Disturbances: - Under-excitation	3.3	14
W/E04 LOCA Outside Containment / 3			X				EK3.2	Knowledge of the reasons for the following responses as they apply to the LOCA Outside Containment: - Normal, abnormal and emergency operating procedures associated with LOCA Outside Containment	3.4	15
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4		X					EK2.1	Knowledge of the interrelations between the Loss of Secondary Heat Sink and the following: - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.7	16
W/E11 Loss of Emergency Coolant Recirc. / 4				X			EA1.01	Ability to operate and/or monitor the following as they apply to the Loss of Emergency Coolant Recirculation: - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.9	17

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Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic	Imp.	Q#
W/E12 - Steam Line Rupture - Excessive Heat Transfer / 4		X					EK2.2	Knowledge of the interrelations between the Uncontrolled Depressurization of all Steam Generators and the following: - 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	3.6	18

PWR RO/SRO Examination Outline

Facility: Indian Pont Unit 2

NRC Written Examination Outline

ES-401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic	Imp.	Q#
000001 Continuous Rod Withdrawal / 1							AA2.01	Ability to determine and interpret the following as they apply to the Continuous Rod Withdrawal: - Reactor tripped breaker indicator	4.2	19
000003 Dropped Control Rod / 1							2.4.31	Emergency Procedures/Plan - Knowledge of annunciators alarms, indications, or response instructions.	4.2	23
000003 Dropped Control Rod / 1							2.2.22	Equipment Control - Knowledge of limiting conditions for operations and safety limits.	4.7	82
000074 Inadequate Core Cooling							2.2.25	Equipment Control - Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.2	24
000032 Loss of Source Range NI / 7							AA2.01	Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation: - Normal/abnormal power supply operation	2.6	20
000033 Loss of Intermediate Range NI / 7				X			AA1.03	Ability to operate and/or monitor the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: - Manual restoration of power	3.0	21
000024 Emergency Boration / 1							AA2.02	Ability to determine and interpret the following as they apply to the Emergency Boration: - When use of manual boration valve is needed	4.4	83
000036 Fuel Handling Accident / 8	X						AK1.01	Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents: - Radiation exposure hazards	3.4	22

PWR RO/SRO Examination Outline

Facility: Indian Pont Unit 2

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ES-401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic	Imp.	Q#
000037 Steam Generator Tube Leak / 3							AA2.02	Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: - Agreement/disagreement among redundant radiation monitors	3.9	84
W/E03 LOCA Cooldown - Depress. / 4		X					EK2.1	Knowledge of the interrelations between the LOCA Cooldown and Depressurization and the following: - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.6	25
W/E06 Inad. Core Cooling / 4		X					EK2.2	Knowledge of the interrelations between the Degraded Core Cooling and the following: - 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	3.8	26
W/E08 RCS Overcooling - PTS / 4			X				EK3.1	Knowledge of the reasons for the following responses as they apply to the Pressurized Thermal Shock: - Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics	3.4	27
W/E10 Natural Circ. / 4						X	2.4.6	Emergency Procedures/Plan - Knowledge of EOP mitigation strategies.	3.7	85

PWR RO/SRO Examination Outline

Facility: Indian Pont Unit 2

NRC Written Examination Outline

ES-401

Plant Systems - Tier 2 / Group 1

Form ES-401-2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topic	Imp	Q#
003 Reactor Coolant Pump	X										K1.12	Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: - CCWS	3.0	28
004 Chemical and Volume Control					X						K5.07	Knowledge of the operational implications of the following concepts as they apply to the CVCS: - Relationship between SUR and reactivity	2.8	29
004 Chemical and Volume Control											A2.13	Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Low RWST	3.9	86
005 Residual Heat Removal							X				A1.0.1	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including: - Heatup/cooldown rates	3.3	30
005 Residual Heat Removal									X		A4.04	Ability to manually operate and/or monitor in the control room: - Controls and indication for closed cooling water pumps	3.1	31
006 Emergency Core Cooling									X		A3.02	Ability to monitor automatic operation of the ECCS, including: - Pumps	4.1	32
006 Emergency Core Cooling					X						K5.04	Knowledge of the operational implications of the following concepts as they apply to the ECCS: - Brittle fracture, including causes and preventative actions	2.9	33

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**NRC Written Examination Outline
Plant Systems - Tier 2 / Group 1**

ES-401

Form ES-401-2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	Number	K/A Topic	Imp	Q#
007 Pressurizer Relief/Quench Tank	X											K1.01	Knowledge of the physical connections and/or cause-effect relationships between the PRTS and the following systems: - Containment system	2.9	34
008 Component Cooling Water												2.2.37	Equipment Control - Ability to determine operability and/or availability of safety related equipment.	3.6	87
008 Component Cooling Water												A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - PRMS alarm	3.3	36
010 Pressurizer Pressure Control						X						K6.03	Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: - PZR sprays and heaters	3.2	37
010 Pressurizer Pressure Control												2.1.23	Conduct of Operations - Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.4	35
012 Reactor Protection					X							K5.02	Knowledge of the operational implications of the following concepts as they apply to the RPS: - Power density	3.1	38
012 Reactor Protection												2.4.50	Emergency Procedures/Plan - Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.0	88
013 Engineered Safety Features Actuation						X						K6.01	Knowledge of the effect of a loss or malfunction of the following will have on the ESFAS: - Sensors and detectors	2.7	40
013 Engineered Safety Features Actuation				X								K4.13	Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following: - MFW isolation/reset	3.7	39

PWR RO/SRO Examination Outline

Facility: Indian Pont Unit 2

**NRC Written Examination Outline
Plant Systems - Tier 2 / Group 1**

ES-401

Form ES-401-2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	Number	K/A Topic	Imp	Q#
022 Containment Cooling			X									K3.01	Knowledge of the effect that a loss or malfunction of the CCS will have on the following: - Containment equipment subject to damage by high or low temperature, humidity, and pressure	2.9	41
026 Containment Spray		X										K2.01	Knowledge of bus power supplies to the following: - Containment spray pumps	3.0	42
039 Main and Reheat Steam				X								K4.05	Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following: - Automatic isolation of steam line	3.7	43
059 Main Feedwater			X									K3.02	Knowledge of the effect that a loss or malfunction of the MFW System will have on the following: - AFW System	3.6	44
059 Main Feedwater												A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the MFW System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Overfeeding event	3.1	89
061 Auxiliary/ Emergency Feedwater							X					A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW System controls including: - S/G level	3.9	45

PWR RO/SRO Examination Outline

Facility: Indian Pont Unit 2

**NRC Written Examination Outline
Plant Systems - Tier 2 / Group 1**

ES-401

Form ES-401-2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	Number	K/A Topic	Imp	Q#
062 AC Electrical Distribution												A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the A.C. Distribution System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Types of loads that, if de-energized, would degrade or hinder plant operation	3.4	47
062 AC Electrical Distribution							X					A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the A.C. Distribution System controls including: - Significance of D/G load limits	3.4	46
063 DC Electrical Distribution										X		A4.03	Ability to manually operate and/or monitor in the control room: - Battery discharge rate	3.0	48
064 Emergency Diesel Generator	X											K1.02	Knowledge of the physical connections and/or cause-effect relationships between the ED/G System and the following systems: - D/G Cooling Water System	3.1	49
073 Process Radiation Monitoring			X									K3.01	Knowledge of the effect that a loss or malfunction of the PRM System will have on the following: - Radioactive effluent releases	3.6	50
076 Service Water												2.1.32	Ability to explain and apply all system limits and precautions.	3.8	52
076 Service Water												A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the SWS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Loss of SWS	3.5	51

PWR RO/SRO Examination Outline

Facility: Indian Pont Unit 2

**NRC Written Examination Outline
Plant Systems - Tier 2 / Group 1**

ES-401

Form ES-401-2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	Number	K/A Topic	Imp	Q#
078 Instrument Air		X										K2.01	Knowledge of bus power supplies to the following: - Instrument air compressor	2.7	53
078 Instrument Air									X			A3.01	Ability to monitor automatic operation of the IAS, including: - Air pressure	3.1	54
103 Containment				X								K4.06	Knowledge of Containment System design feature(s) and/or interlock(s) which provide for the following: - Containment isolation system	3.1	55
103 Containment												A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the Containment System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Phase A and B isolation	3.8	90

PWR RO/SRO Examination Outline

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Plant Systems - Tier 2 / Group 2**

ES-401

Form ES-401-2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	Number	K/A Topic	Imp	Q#
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001 Control Rod Drive									X			A3.06	Ability to monitor automatic operation of the CRDS, including: - RCS temperature and pressure	3.9	60
002 Reactor Coolant												A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the RCS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Loss of coolant inventory	4.3	56
011 Pressurizer Level Control							X					A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PZR LCS controls including: - Charging and letdown flows	3.3	58
014 Rod Position Indication System (RPIS)												A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the RPIS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Loss of power to the RPIS	3.3	93
015 Nuclear Instrumentation		X										K2.01	Knowledge of bus power supplies to the following: - NIS channels, components, and interconnections	3.3	57
033 Spent Fuel Pool Cooling				X								K4.02	Knowledge of Spent Fuel Pool Cooling System design feature(s) and/or interlock(s) which provide for the following: - Maintenance of spent fuel cleanliness	2.5	59
035 Steam Generator						X						K6.01	Knowledge of the effect of a loss or malfunction of the following will have on the S/GS: - MSIVs	3.2	61

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Plant Systems - Tier 2 / Group 2**

ES-401

Form ES-401-2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	Number	K/A Topic	Imp	Q#
041 Steam Dump/Turbine Bypass Control			X									K3.02	Knowledge of the effect that a loss or malfunction of the SDS will have on the following: - RCS	3.8	62
045 Main Turbine Generator					X							K5.23	Knowledge of the operational implications of the following concepts as they apply to the MT/G System: - Relationship between rod control and RCS boron concentration during T/G load increases	2.7	65
045 Main Turbine Generator												A2.17	Ability to (a) predict the impacts of the following malfunctions or operations on the MT/G System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Malfunction of electrohydraulic control	2.9	91
062 AC Electrical Distribution												2.2.40	Equipment Control - Ability to apply technical specifications for a system.	3.4	92
071 Waste Gas Disposal										X		A4.26	Ability to manually operate and/or monitor in the control room: - Authorized waste gas release, conducted in compliance with radioactive gas discharge permit	3.1	63
072 Area Radiation Monitoring	X											K1.01	Knowledge of the physical connections and/or cause-effect relationships between the ARM system and the following systems: - Plant ventilation systems	3.1	64

Facility	Indian Point Unit 2	Date of Exam	7/12/2010			
Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.3	Knowledge of shift or short-term relief turnover practices.	3.7	68		
	2.1.42	Knowledge of new and spent fuel movement procedures.	2.5	67		
	2.1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.			4.7	94
	2.1.45	Ability to identify and interpret diverse indications to validate the response of another indication.			4.3	95
	Subtotal				2	2
2. Equipment Control	2.2.1	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	4.5	66		
	2.2.7	Knowledge of the process for conducting special or infrequent tests.	2.9	69		
	2.2.22	Equipment Control - Knowledge of limiting conditions for operations and safety limits.	4.0	70		
	2.2.22	Equipment Control - Knowledge of limiting conditions for operations and safety limits.			4.2	96
	2.2.21	Knowledge of pre- and post-maintenance operability requirements.			4.1	97
Subtotal				3	2	

Facility	Indian Point Unit 2		Date of Exam		7/12/2010	
Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
3. Radiological Controls	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	71		
	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	72		
	2.3.4	Radiological Controls - Knowledge of radiation exposure limits under normal and emergency conditions.			3.7	98
	Subtotal				3	
4. Emergency Procedures/plan	2.4.19	Knowledge of EOP layout, symbols, and icons.	3.4	74		
	2.4.29	Knowledge of the emergency plan.	3.1	75		
	2.4.21	Emergency Procedures/Plan - 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	73		
	2.4.4	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.			4.7	99
	2.4.30	Knowledge of which events related to system operations/status that must be reported to internal organizations or external agencies, such as State, the NRC, or the transmission system operator.			4.1	100
	Subtotal				2	
Tier 3 Point Totals				10		7

Tier / Group	Randomly Selected K/A		Reason for Rejection
R-1/1	000009 EK3.25	Knowledge of the reasons for the following responses as they apply to the small break LOCA: Monitoring of in-core T-cold	System does not exist at IPEC
R-1/1	000017 G2.1.29	Reactor Coolant Pump (RCP) Malfunctions Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.	This Generic KA is not applicable to off-normal procedures
R-1/1	000026 AK3.01	Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The conditions that will initiate the automatic opening and closing of the SWS isolation valves to the CCW/nuclear service water coolers	There is no automatic function at IPEC
R-1/1	000077 AK1.03	Knowledge of the operational implications of the following concepts as they apply to Generator Voltage and Electric Grid Disturbances - Under-excitation.	REJECT, tested similar concept. See question 14 on the RO Exam.
R-1/2	000032 AA2.03	Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation: - Expected values of source range indication when high voltage is automatically removed	Rejected due to inability to develop 3 plausible distractors.
R-1/2	000067 AK3.04	067 Plant Fire on Site Actions contained in EOP for plant fire on site	EOPs do not contain actions for fire

R-1/2	W/E01 G2.4.25	E01 Rediagnosis Knowledge of fire protection procedures.	EOPs do not contain actions for fire
R-1/2	000036 AK1.02	Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents:-SDM	REJECT, concept tested on admin JPM
R-1/2	000028 2.2.25	Equipment Control - Knowledge of bases in technical specifications for limiting conditions for operations and safety limits	REJECT due to oversampling of Pressurizer Level System
R-2/1	012000 K6.07	Knowledge of the effect of a loss or malfunction of the following will have on the RPS: Core protection calculator	Equipment not applicable at IPEC
R-2/1	013000 K4.22	Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following: Reason for shut safety injection pump discharge valve of train to be tested	Rejected due to inability to develop 3 plausible distractors.
R-2/1	063000 K4.01	Knowledge of D.C. Electrical System design feature(s) and/or interlock(s) which provide for the following: Manual/automatic transfers of control	Rejected due to similarities with RO question #48
R-2/1	013000 G2.1.21	Engineered Safety Features Actuation System (ESFAS) Ability to verify the controlled procedure copy.	Rejected, candidates evaluated on this concept during simulator and JPM exams.
R-2/1	078000 K2.02	Knowledge of bus power supplies to the following: Emergency air compressor	Unit 2 does not have an emergency air compressor

R-2/1	000005 A1.05	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including:- Detection of and response to presence of water in RHR emergency sump.	Rejected, concept already tested. See RO question 51
R-2/1	022000 K4.04	Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: - Cooling of control rod drive motors	Rejected. There is no safety significance for the CRDM fans at IPEC
R-2/1	062000 A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the A.C. Distribution System controls including: - Significance of D/G load limits	REJECT due to oversampling. See RO question 46.
R-2/1	000064 K1.05	Knowledge of the physical connections and/or causes-effect relationship between the ED/G System and the following systems:- Starting air system.	Rejected due to inability to write discriminatory RO level question
R-2/1	000076 2.4.25	Emergency Procedures/Plan - Knowledge of fire protection procedures.	No credible tie for this K/A exists for the system Service Water and Fire Protection Procedures.
R-2/2	028000 AK1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the HRPS controls including: Containment pressure	The Hydrogen Recombiners at IP2 are passive (no controls)and the purge system is not used during accident conditions.
R-2/2	033000 G2.2.40	Spent Fuel Pool Cooling System (SFPCS) Ability to apply technical specifications for a system.	Unit 2 does not have Tech Spec for SFP Cooling

R-2/2	034000 A3.03	Ability to monitor automatic operation of the Fuel Handling System, including: - High flux at shutdown	Rejected. Too simplistic, the only function of High Flux at Shutdown is an alarm.
R-2/2	079000 K4.01	Knowledge of SAS design feature(s) and/or interlock(s) which provide for the following: Cross-connect with IAS	Unit 2 does not have auto function/interlock for IAS & SAS
R-3	2.1.9	Ability to direct personnel activities inside the control room.	ROs do not direct activities in control room
R-3	2.1.21	Ability to verify the controlled procedure copy.	REJECT, concept tested on admin JPM
R-3	2.3.7	Ability to comply with radiation work permit requirements during normal and abnormal conditions.	Rejected. This concept is evaluated during in-plant JPM
R-3	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings.	Rejected. This KA is evaluated on admin JPM
R-3	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	Rejected due to similarities with RO question #71
S-1/1	000022 G2.1.4	Loss of Rx Coolant Makeup Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no solo" operation, maintenance of active license status, 10CFR55, etc.	Generic KA does not apply to system specific E/APE

S-1/1	000065 G2.4.16	<p>Loss of Instrument Air</p> <p>Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, severe accident management guidelines.</p>	Rejected due to oversampling Generic 2.4.16
S-1/2	000068 G2.4.8	<p>Control Room Evacuation</p> <p>Knowledge of how abnormal operating procedures are used in conjunction with EOPs.</p>	Rejected due to oversampling AOP use in conjunction with EOP
S-1/2	000076 AA2.04	<p>Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity:</p> <p>Process effluent radiation chart recorder</p>	Rejected due to over sampling of radiation monitors (See SRO questions 9 & 10)
S-1/2	0W/E13 2.3.4	<p>Radiological Controls - Knowledge of radiation exposure limits under normal and emergency conditions.</p>	Rejected due to oversampling KA. The same KA appears in the SRO Generic section
S-2/1	056000 G2.3.15	<p>Condensate System</p> <p>Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.</p>	Rejected Unit 2 does not have condensate system radiation monitors.
S-2/1	103000 A2.02	<p>Ability to (a) predict the impacts of the following malfunctions or operations on the Containment System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Necessary plant conditions for work in containment</p>	Rejected due to oversampling work in containment

S-2/2	086000 A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the Fire Protection System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Low FPS header pressure	Rejected due to inability to write discriminatory SRO level question
S-3	2.4.5	Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.	Rejected due to oversampling AOP use in conjunction with EOP
R-3	2.1.26	Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).	Rejected due to inability to write discriminatory RO level question

Facility: <u>Indian Point Unit 2</u>		Date of Examination: <u>July 12, 2010</u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: _____
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N, R	Review WCR-1 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.
Conduct of Operations	N, R	Determine Location for Spent Fuel Assembly 2.1.42 Knowledge of new and spent fuel movement procedures.
Equipment Control	N, R	Review a Tagout for 21 Safety Injection Pump 2.2.13 Knowledge of tagging and clearance procedures
Radiation Control	M, R, P	Review/Approve a Liquid Radiation Release Permit 2.3.11 Ability to control radiation releases.
Emergency Procedures/Plan	D	Classify E-Plan Event and Complete Part 1 Form 2.4.28 Knowledge of procedures relating to a security event (non-safeguards information).
<p>NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.</p>		
<p>* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1; randomly selected)</p>		

^{SRO}
INDIAN POINT UNIT 2 NRC RO EXAMINATION

CONDUCT OF OPERATIONS: Review WCR-1 The candidate will be given a copy of WCR-1, Reactivity Summary Sheet prepared by an RO for review. The candidate will review the calculation and find an error. The candidate should NOT sign Reviewed By and return the form.

- This is a New JPM
- SRO Only

CONDUCT OF OPERATIONS: Determine Location for Spent Fuel Assembly This JPM gives the candidate a spent fuel assembly with initial enrichment and burnup. The spent fuel assembly must be moved in the pit. The candidate must determine the spent fuel pit location zone.

- This is a New JPM
- The SRO Only

EQUIPMENT CONTROL: Review a Tagout for 21 Safety Injection Pump – The candidate will be given plant prints and associated procedures and a manually prepared tagout for 21 Safety Injection Pump. The candidate will be directed to review the manual tagout for the 21 Safety Injection Pump for seal replacement. NOTE: The tagout will have 2 missing components and 1 mispositioned component. Review a Manual tagout JPMs exist in the JPM Bank; however, this component (21 Safety Injection Pump) is new and has not been used before.

- This is a New JPM
- SRO Only.

RADIATION CONTROL: Review a Liquid Radiation Release Permit. This JPM has modified values from the existing bank version. The permit will have inaccurate information.

- This is a Modified Bank JPM
- SRO Only.

EMERGENCY PROCEDURES/PLAN: Classify E-Plan Event and Complete Part 1 Form. The candidate will be given a set of plant conditions. The candidate must diagnose the accident in progress, identify the EAL classification within 15 minutes and complete the NYS Part 1 form within an additional 15 minutes. The candidate will be given that the crew was performing 2-AOP-SG-1, for Steam Generator Tube Leakage of approximately 90 gpm which exceeded the procedural limitations and initiated a reactor trip and safety injection. The remaining conditions will indicate steam break outside of containment upstream of the MSIVs. In addition, RCS activity is elevated. This will result in a General Emergency.

- This is a Modified Bank JPM.
- SRO Only.

Facility: <u>Indian Point Unit 2</u>		Date of Examination: <u>July 12, 2010</u>
Examination Level: RO X SRO <input type="checkbox"/>		Operating Test Number: _____
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N, R	Calculate Shutdown Margin 2.1.25 Ability to interpret reference materials such as graphs, curves, tables etc. 2.1.19 Ability to use plant computers to evaluate system or component status
Conduct of Operations	D, R	Perform a Manual Quadrant Power Tilt Ration Calculation (3 Detectors) 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.
Equipment Control	N, R	Tagout 21 Safety Injection Pump 2.2.13 Knowledge of tagging and clearance procedures.
Radiation Control	M, R, P	Calculate a Liquid Radiation Release Permit 2.3.11 Ability to control radiation releases.
Emergency Procedures/Plan		Not Applicable for RO
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected)		

(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	- / - / ≥ 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	

ES-301

Administrative Topics Outline

Form ES-301-1

INDIAN POINT UNIT 2 NRC RO EXAMINATION

CONDUCT OF OPERATIONS: Calculate Shutdown Margin – The candidate will be given a set of conditions and asked to calculate Shutdown Margin. This is accomplished using any computer with access to the IPEC intranet to obtain current plant data from the On-Line NuPOP. The data is entered in the SDM calculation section of WRC-1.

- This is a New JPM
- RO Only

CONDUCT OF OPERATIONS: Perform a Manual Quadrant Power Tilt Ratio Calculation (3 Detectors) – The candidate is directed to perform a manual Quadrant Power Tilt Ratio calculation. For this JPM one of the Power Range Nuclear Instrumentation Channels is out of service.

- This is a Bank JPM
- RO Only

EQUIPMENT CONTROL: Tagout 21 Safety Injection Pump – The candidate will be given plant prints and associated procedures and directed to prepare a manual tagout for the 21 Safety Injection Pump for seal replacement. NOTE: Manual tagout JPMs exist in the JPM Bank; however, this component (21 Safety Injection Pump) is new and has not been used before.

- This is a New JPM
- RO Only

RADIATION CONTROL: Calculate a Liquid Radiation Release Permit. This JPM has modified values from the existing bank version

- This is a Modified Bank JPM
- RO Only

Facility: <u>Indian Point Unit 2</u>		Date of Examination: <u>July 12, 2010</u>
Exam Level: RO X SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: _____
Control Room Systems [@] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. Realign a Misaligned Rod	M, A, S	1
b. Terminate Safety Injection after Main Steam Line Break	N, S, EN	2
c. Depressurize the RCS during SGTR using Aux Spray	D, A, S, EN	3
d. Transfer from AFW to Low Flow Bypass Feed.	M, L, P, S	4-S
e. Align Recirculation Spray	N, S, EN	5
f. Perform Required Actions for 23 SG Pressure Channel (439B) Failing Low	D, A, S	7
g. Adjust the Alarm setpoints for R-44 in preparation for a gaseous release	N, S	9
h. Restore Power to Bus 3A using 22 EDG <i>(RO ONLY)</i>	A, N, S	6
In-Plant Systems [@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. Perform Required Actions to Dump Steam Locally Using the Atmospheric Steam Dump Valve for 23 SG	D, A, E	4-P
j. Start the Appendix R SBO EDG	N	6
k. Perform the Required Actions to Establish Backup Cooling to the Charging Pumps	D, R, E	8
<p>[@] All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>		
* Type Codes	Criteria for RO / SRO-I / SRO-U	

- a. **Realign a Misaligned Control Bank Rod** in accordance with 2-AOP-ROD-1, *Rod Control Malfunctions*. One Control Bank Rod has become misaligned during power ascension with power level approximately 50%. When the candidate releases the IN-HOLD-OUT switch, the control rod will continue to withdraw. The candidate should re-enter 2-AOP-ROD-1, trip the reactor and perform the Immediate Operator Actions for a Reactor Trip.
- This is an Alternate Path JPM.
 - This is a Modified Bank JPM
 - Failure to properly perform this task will result in violation of TS and possible exceeding hot channel factors.
- b. **Terminate Safety Injection after Main Steam Line Break.** The plant experienced a steam break outside containment upstream of the MSIVs. Following the isolation of the faulted SG, the crew would transition to E-1; then, the crew would transition to ES-1.1, *SI Termination* using the foldout page criteria. This procedure flowpath does not have SI, or Phase A reset prior to entry. The candidate will be required to perform all actions to Reset SI and Phase A signals, then Terminate SI by securing the pumps.
- This is a new JPM.
 - Failure to properly perform this JPM will result in SI flow continuing and possible PTS condition.
- c. **Depressurize the RCS during a SGTR using Aux Spray.** A SGTR of adequate size to cause an SI has occurred. 6.9 KV Bus 3 tripped on fault resulting in a loss of 23 RCP. All actions up to depressurize to refill the pressurizer and minimize break flow will have been completed. The PORV Block Valves will be danger tagged shut and PCV-455A (Loop 24 Spray Valve) will not open. The candidate will continue in 2-E-3, *Steam Generator Tube Rupture* and perform depressurization using Aux Spray.
- This is an Alternate Path JPM.
 - This JPM directly from the JPM bank; however, it has not been used on the previous 2 NRC Exams.
 - Failure to properly perform this task will result in excessive loss of RCS inventory and possible SG overflow.
- d. **Transfer from AFW to Low Flow Bypass Feed.** The plant is at approximately 2-3% power. One MBFP has been started and is ready to provide flow to the SGs. In accordance with 2-SOP-21.1, *Main Feedwater System*, the candidate will transfer steam generator feedwater from the Auxiliary Feedwater System to the Main Feedwater Low Flow Bypass valves.
- A similar JPM was used on the last Unit 3 exam; however the method used was different from the method used in this JPM.
 - Failure to properly perform this task will result in possible reactor trip on SG level.
- e. **Align Recirculation Spray Flow.** The plant has experienced a Large Break LOCA. Transfer to recirculation has been accomplished. When the RWST has decreased to 2 feet the operating Containment Spray pump must be secured and transfer to recirculation spray flow must be accomplished in accordance with 2-ES-1.3 *Transfer to Cold Leg Recirculation*. This JPM requires the candidate to ensure proper core flow while Recirculation Spray flow is established since the Recirculation Pumps will be providing both core cooling flow and containment spray flow.
- This is a new JPM.
 - Failure to properly perform this task will result in failure to meet FSAR assumptions for Iodine removal.

- f. **Perform Required Actions for 23 SG Pressure Channel (439B) Failing Low (alternate Path).** The affected Steam Pressure Transmitter provides density compensation for the steam flow channel used in the Steam Generator Water Level Control System. Steam Pressure failing Low will result in Steam Flow failing Low. The Immediate Operator actions will attempt to place the unaffected steam flow transmitter in service. The switch will not function (stuck contacts) requiring the candidate to take manual control of the feedwater regulating valve and controlling level. Additional actions include tripping bistables to remove the channel from service.
- This is a Bank JPM.
 - This JPM has never been used on an ILO NRC exam.
 - This is an Alternate path JPM.
 - Failure to properly perform this task will result in loss of control of SG level and possible Reactor Trip.
- g. **Adjust the Alarm setpoints for R-44 in preparation for a gaseous release.** In preparation for a gaseous waste release, the Warn and Alarm setpoint for Radiation Monitor 44, *Plant Vent Radio Gas*, must be changed. A Gaseous Waste Release Permit calculation indicates that the Alarm and Warn setpoint must be reset prior to the actual release. The candidate must change the Alarm and Warn setpoint to the values calculated on the Release Permit.
- This is a New JPM.
 - Failure to properly perform this task may result in excessive release of radioactive gas to the environment.
- h. **Restore power to bus 3A using 22 EDG.** Bus 3A normal supply breaker will be tripped on overcurrent. The candidate will use 2-SOP-480V-1, *Loss Of Normal Power To Any 480v Bus*. All 3 EDGs will have automatically started and be running unloaded. All of the loads on the bus will be removed and a visual inspection of the bus performed (Local action). The bus will be re-energized from the control room using the EDG supply breaker.
- This is a New JPM.
 - This is an Alternate path JPM.
 - Failure to properly perform this task will result in reduction in redundant power supplies for safeguards equipment.
- i. **Perform Required Actions to Dump Steam Locally Using the Atmospheric Steam Dump Valve for 23 SG.** The JPM is part of the Appendix R actions. Instrument Air will not be available for the Atmospheric Steam Dump Valve. The candidate will be required to simulate connecting the alternate Nitrogen supply tank to the valve and control steam flow locally.
- In Plant JPM
 - This is a Bank JPM.
 - This JPM has not been used at Unit 2 for initial NRC exams. The Nitrogen Bottles were recently added and this JPM was written for annual requal operating exam.
 - Failure to properly perform this task will result in inability to control RCS temperature during a control room evacuation.
- j. **Start the Appendix R Emergency Diesel Generator.** Using 2-SOP-27.6, *Unit 2 Appendix R Diesel Generator Operation*, Start the Appendix R EDG Normal Engine Start (Parallel Mode). This is a relatively new piece of equipment. This EDG was not installed during the last NRC exam.
- In Plant JPM
 - This is a New JPM.
 - Failure to properly perform this task will result in not supplying electrical power during control room evacuation event.

- k. **Perform the Required Actions to Establish Backup Cooling to the Charging Pumps**
- This JPM is part of the Appendix R actions. The control room is evacuated and CCW is not available to the charging pumps. The candidate is directed to align backup city water cooling to the charging pumps.
 - In Plant JPM
 - This JPM is directly from existing bank.
 - This JPM has not been used on the previous last 2 Unit 2 Initial NRC examinations. A similar JPM was used on the last Unit 3 Initial exam; however, the methodology is significantly different between units.
 - Failure to properly perform this task will result in inability to maintain RCS inventory and possible core damage.

Facility: Indian Point 2 Scenario No.: 1

Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions:
 The Plant is in a 100% normal full power lineup.

Turnover:
 PORV PCV-456 and associated block valve 536 are tagged out due to PCV-456 blowing fuses on the previous shift. 7 Day AOT entered per T.S. 3.4.11 Condition B. Estimated resolution is 2-3 days from now.

Maintain 100% Power

Event No.	Malf. No.	Event Type*	Event Description
1	CNH-PCS008 D	C(ATC) C(CRS)	23 MFRV fails closed in auto with manual available ramped over 10 minutes.
2	XMT-CVC019 A	I(ALL)	VCT level instrument fails low causing automatic makeup and charging pump suction to swap to the RWST.
3	MAL-RCS014 C	R(ATC) N(CRS) N(BOP) TS (CRS)	SGTL on 23 SG 900 gpd. This will require a downpower and eventual shutdown.
4	AOV-SGB013 A	TS(CRS)	PCV-1216 failed open requiring T.S. evaluation.
5	MAL-RCS014 C	M(ALL)	SGTR on 23 SG grows to 280 gpm. This will lead to team performing a manual reactor trip and SI.
6	MAL-EPS007 D	C(CRS)	Fault on 480 V Bus 6A during the SI loading sequence. This will require tripping RCPs.
7	MOC-AFW001	C(CRS) C(BOP)	21 AFW pump will not auto start (inserted at setup). This along with loss of 6A will result in inadequate heat sink until addressed by team.

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

Session Outline:

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

Shortly after the team takes the watch, 23 MFRV will slowly fail closed. The team should recognize the failure and the ATC should transfer control of the valve to manual per administrative guidance of EN-OP-115, Conduct of Operations. The team will enter 2-AOP-FW-1, Loss of Main Feedwater, but no equipment manipulations will be required since 23 MFRV was already placed in manual.

While the team is progressing through 2-AOP-FW-1 (or after exit), VCT level instrument LC-112 will fail low. This will cause an automatic makeup and charging pump suction to swap to the RWST. The team will respond per 2-AOP-CVCS-1, CVCS Malfunctions.

After the team has stabilized charging pump suction, a 900 gpd steam generator tube leak will develop on 23 SG. The team will implement 2-AOP-SG-1, Steam Generator Tube Leak, and begin a shutdown. SGBD Valve 1216 will not close automatically and will only close if failed in the field.

While progressing with the shutdown, the tube leakage in 23 SG will increase to 280 gpm. The team will diagnose the increase in leak rate and trip the reactor and actuate SI. The manual reactor trip pushbutton on the flight panel will not work, however the supervisory panel button will function. When SI is actuated, 480V Bus 6A will fault, which will lead to the SI Blackout logic being made up causing all CCW Pumps to be off.

Following the reactor trip and SI, the team will have to establish AFW flow because 23 AFW Pump does not have power and 21 AFW Pump will not auto start (malfunction). 22 AFW pump must be placed in service to feed 23 and 24 SGs. 21 AFW may be manually started to feed 21 and 22 SGs or 22 AFW pump may be used to feed all four SGs. The team will progress through E-0, Reactor Trip or Safety Injection and transition to E-3, Steam Generator Tube Rupture. 23 SG will be isolated and the team will cool down the RCS in preparation to depressurize. The team will be unable to depressurize the RCS using E-3. Normal spray cannot be used because no RCPs are in service. Auxiliary spray will not be available because instrument air to containment will not be available (PCV-1228 will not open). Neither PORV will be available; one is tagged out, and the other's closed block valve does not have power. The team will transition to 2-ECA-3.3, SGTR without Pressurizer Pressure Control.

The scenario will be terminated when SI pumps have been stopped after RCS depressurization in ECA-3.3.

Procedural flow path: 2-AOP-FW-1, 2-AOP-CVCS-1, 2-AOP-SG-1, (2-POP-2.1, 2-AOP-RSD-1, or 2-AOP-RLR-1), E-0, E-3, ECA-3.3

Facility: Indian Point 2 Scenario No.: 2

Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions:

Reset simulator to IC-282 Load Simulator Schedule-Scenario2
 The Plant is in Mode 1 just above 5% power preparing to come on line.

Turnover:

Raise power to approximately 8-10% to place MTG in service. No equipment is out of service.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R(ATC) N(CRS) N(BOP)	Power ascension, maintain SG levels in manual.
2	MOC-SWS007	C(CRS) C(BOP) TS(CRS)	22 Service Water Pump trip.
3	XMT-RCS028 A	I(ALL) TS(CRS)	Controlling PZR Pressure transmitter fails high.
4	MOV-CCW008	C(CRS) C(BOP)	FCV-625 spurious closure.
5	MAL-SGN005	M(ALL)	Steam leak in the Turbine Building leading to plant trip. 21 MSIV fails to close.
6	BKR-PPL003/4	C(ALL)	Entered at setup, Reactor Trip Breakers will not open causing team to enter 2-FR-S.1.
7	RLY-PPL487/8	C(CRS) C(BOP)	Entered at setup, SI does not automatically actuate. Manual actuation will be required.

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

Session Outline:

The scenario begins with the plant at 5% power with no equipment is out of service. The team has been instructed to raise power to 8-10% and place MTG in service.

After taking the watch, the crew will commence raising power. After the power escalation has progressed, 22 SWP will trip. The team will start another pump per 2-ARP-SJF.

Following the restoration of SW, a failure high of PT-455 will occur. The team will respond using 2-AOP-INST-1 "Instrument or Controller Failures." The channel will be removed from service.

After the channel is removed from service, FCV-625 will go closed with no apparent reason. The team should respond per 2-ARP-SGF and re-open the valve. If the team elects to not re-open the valve, the scenario can continue.

Prior to completion of the Subsequent Actions of 2-AOP-CCW-1, a steam break will occur in the Turbine Building. The team will attempt to manually trip the plant but the reactor trip breakers will not open.

The reactor will not trip from the Control Room and the team will respond per 2-FR-S.1, "Response to Nuclear Power Generation / ATWS," and will shutdown the reactor by manually inserting control rods and initiating Emergency Boration. The reactor trip breakers will not be locally opened after an NPO is dispatched, until after emergency Boration has been aligned. One MSIV will fail to close from the control switches. The team will proceed through 2-FR-S.1 until transition to 2-E-0, "Reactor Trip or Safety Injection."

After the transition to 2-E-0 is made, the team will determine that three SGs are intact and 23 SG is faulted. The Team will also determine that SI did not automatically actuate and must manually actuate SI. The team will transition to 2-E-2, Faulted Steam Generator Isolation and isolate 23 SG. At this point the scenario is terminated.

Procedure flow path: 2-POP-1.3, 2-ARP-SJF, 2-AOP-INST-1, 2-ARP-SGF, 2-AOP-UC-1, 2-E-0, 2-FR-S.1, 2-E-0, 2-E-2

Facility: Indian Point 2 Scenario No.: 3

Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions:

Reset simulator to IC-118 Load Simulator Schedule-Scenario3

The Plant is in a 100% normal full power lineup.

22 AFW Pump has been OOS for 4 hours due to bearing oil line repair.

Turnover:

Maintain 100% Power

Event No.	Malf. No.	Event Type*	Event Description
1	XMT-SGN002 A	I(ALL) TS(CRS)	21 SG B Channel of Steam Flow Fails high. Team will place Channel B in service and enter 2-AOP-INST-1.
2	MAL-EPS007 B	C(ALL) R(ATC) N(CRS) N(BOP) TS(CRS)	Loss of 480V Bus 3A. Team will enter 2-AOP-480V-1 and diagnose that a T.S. shutdown is required due to having 2 inoperable AFW pumps.
3	MAL-CVC002 A	C(CRS) C(ATC)	21 RCP Number 1 Seal leak. Team will have to enter 2-AOP-RCP-1. Continued operation is allowed with existing leakage. 21 RCP seal leakage will increase until tripping the pump and reactor is required.
4	MAL-AOV-MSS036 A	C(CRS) C(ATC)	MTG Stop and Control Valve pair failing to close on turbine trip signal requiring manual closure of MSIVs
5	MOC-AFW002	M(ALL)	23 AFW pump will not start. This will lead the team to a loss of heat sink.
6	AOV-RCS002 A	C(ALL)	PORV PCV-455C will not open. This will require the team to open the reactor head vent valves to perform bleed and feed.

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

Session Outline:

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

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

After taking the watch, 21 SG Steam Flow Channel B transmitter will fail high. The ATC will switch to the A channel and the team will enter 2-AOP-INST-1. The CRS will refer to Tech Spec Table 3.3.2-1 and bistables will be tripped.

After bistables are tripped, a fault will occur on 480V Bus 3A. The team will take actions in accordance with AOP-480V-1, "Loss of Normal Power to any Safeguards 480V Bus." Due to the fault on Bus 3A, 22 EDG cannot re-energize the bus. TS require plant shutdown due to 2 trains of AFW inoperable (TS 3.7.5 condition C).

After team has begun shutdown, 21 RCP will experience #1 seal degradation. The team will perform actions of AOP-RCP-1, Reactor Coolant Pump Malfunctions." The #1 seal degradation severity will then increase requiring reactor trip.

When the reactor is tripped, the turbine upper left stop and control valve pair fail to close. MSIV's must be manually closed to trip the turbine.

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

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

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

Procedure flow path: 2-AOP-INST-1, 2-AOP-480V-1, 2-POP-2.1 or 2-AOP-RSD-1, 2-AOP-RCP-1, 2-E-0, 2-FR-H.1