

Facility: <u>Indian Point Unit 2</u>		Date of Examination: <u>February 6 2012</u>
Examination Level: RO <input type="checkbox"/> SRO X		Operating Test Number: _____
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M, R	Review an ECP by Hand 1940012137 - Conduct of Operations - Knowledge of procedures, guidelines, or limitations associated with reactivity management. SRO-4.6
Conduct of Operations	N, R	Determine Isolation Boundaries for CCW Leak Using Plant Print 1940012125 - Conduct of Operations - Ability to interpret reference materials such as graphs, curves, tables etc. SRO - 4.2
Equipment Control	N, R	Review a Surveillance Test 1940012212 - Equipment Control - Knowledge of surveillance procedures. SRO - 4.1
Radiation Control	M, R	Review a Release Permit for Containment Pressure Relief 1940012306 - Radiological Controls - Ability to approve release permits. SRO - 3.8
Emergency Procedures/Plan	M, R	Classify an Emergency Event 1940012441 - Emergency Procedures/Plan - Knowledge of the emergency action level thresholds and classifications. SRO - 4.6
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)		

Facility: Indian Point Unit 2

Date of Examination: February 6 2012

Exam Level: RO SRO-I SRO-U

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. Align CVCS Makeup after Chemistry Sample(004007A4.07 RO-3.9 SRO 3.7)	N	1
b. Align Hot Leg Recirculation 23 SIP fails to Start (000011EA1.13 RO-4.1 SRO-4.2)	A, M, EN	2
c. Depressurize RCS during Natural Circ Cooldown and Block Low Pressure SI (WE09EA1.1 RO-3.5 SRO-3.5)	A, N, L	3
d. NA SROs	NA	NA
e. Respond to 22 SG "B" Level Channel failure High (059000A4.08 RO-3.0 SRO-2.9)	D	7
f. Perform the Required Action to Isolate the SI Accumulators during a Loss of Coolant Accident with Failure of MOV-894B to Isolate (Alternate Path) (006000A3.01 RO-4.0 SRO-3.9)	A, EN, D	2
g. Start 21 RCP during FR-C.1 (WE06EA1.01 RO3.8 SRO-3.8)	E, D	4P
h. Verify Containment Phase A Isolation Manually Close Valves (103000A3.01 RO-3.9 SRO-4.2)	EN, A, D	5

In-Plant Systems[@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. Align 23 Charging Pump to 12FD3 (000068AA1.06 RO-4.1 SRO-4.2)	D, E	6
j. Lineup Alternate Cooling to SIS and RHR Pumps (005000 2.4.34 RO-4.2 SRO-4.1)	D, E, R	8
k. Align 24 Waste Gas Decay Tank for Discharge (071000 2.3.11 RO-3.8 SRO-4.1)	R, D	9

[@] 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.

* Type Codes

Criteria for RO / 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	- / - / ≥ 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: <u>Indian Point Unit 2</u>		Date of Examination: <u>February 6 2012</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	M, R	Perform an ECP by Hand 1940012137 - Conduct of Operations - Knowledge of procedures, guidelines, or limitations associated with reactivity management. RO-4.3
Conduct of Operations		NA for ROs
Equipment Control	N, R	Review a Surveillance Test 1940012212 - Equipment Control - Knowledge of surveillance procedures. RO – 3.7
Radiation Control	M, R	Calculate a Release Permit for Containment Pressure Relief 1940012311 - Radiological Controls - Ability to control radiation releases. RO – 3.8
Emergency Procedures/Plan	D, S	Perform Initial UNUSUAL EVENT Notifications 1940012439 Emergency Procedures/Plan - Knowledge of the RO's responsibilities in emergency plan implementation. RO – 3.9
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)		

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Exam Level: **RO X** SRO-I SRO-U

Operating Test No.: _____

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System / JPM Title	Type Code*	Safety Function
a. Align CVCS Makeup after Chemistry Sample (004007A4.07 RO-3.9 SRO 3.7)	N	1
b. Align Hot Leg Recirculation 23 SIP fails to Start (000011EA1.13 RO-4.1 SRO-4.2)	A, M, E	2
c. Depressurize RCS during Natural Circ Cooldown and Block Low Pressure SI (WE09EA1.1 RO-3.5 SRO-3.5)	A, N, L	3
d. Fill the PRT (007000A4.01 RO-2.7 SRO-2.7)	N	5
e. Respond to 22 SG "B" Level Channel failure High (059000A4.08 RO-3.0 SRO-2.9)	D	7
f. Perform the Required Action to Isolate the SI Accumulators during a Loss of Coolant Accident with Failure of MOV-894B to Isolate (Alternate Path) (006000A3.01 RO-4.0 SRO-3.9)	A, EN, D	2
g. Start 21 RCP during FR-C.1 (WE06EA1.01 RO3.8 SRO-3.8)	E, D	4P
h. Verify Containment Phase A Isolation Manually Close Valves (103000A3.01 RO-3.9 SRO-4.2)	E, A, D	5

In-Plant Systems[@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. Align 23 Charging Pump to 12FD3 (000068AA1.06 RO-4.1 SRO-4.2)	D	6
j. Lineup Alternate Cooling to SIS and RHR Pumps (005000 2.4.34 RO-4.2 SRO-4.1)	D, E, R	8
k. Align 24 Waste Gas Decay Tank for Discharge (071000 2.3.11 RO-3.8 SRO-4.1)	R, D	9

@ 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.

* Type Codes

Criteria for RO / 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	- / - / ≥ 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 2

Printed: 08/16/2011

Date Of Exam: 02/06/2012

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	2	2	1	N/A			2	2	N/A			0	9	2		2	4
	Tier Totals	5	5	4	N/A			5	5	N/A			3	27	5		5	10
2. Plant Systems	1	3	2	3	3	3	2	2	3	2	2	3	28	3		2	5	
	2	1	1	1	1	1	1	1	1	1	1	0	10	1	2	0	3	
	Tier Totals	4	3	4	4	4	3	3	4	3	3	3	38	6		2	8	
3. Generic Knowledge And Abilities Categories				1		2		3		4		10	1	2	3	4	7	
				3		2		3		2			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				EK3.01	Knowledge of the reasons for the following responses as they apply to the reactor trip: - Actions contained in EOP for reactor trip	4.0	1
000008 Pressurizer Vapor Space Accident / 3			X				AK3.02	Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: - Why PORV or code safety exit temperature is below RCS or PZR temperature	3.6	2
000009 Small Break LOCA / 3				X			EA1.11	Ability to operate and/or monitor the following as they apply to a small break LOCA: - AFW/MFW	4.1	3
000011 Large Break LOCA / 3		X					EK2.02	Knowledge of the interrelations between the Large Break LOCA and the following: - Pumps	2.6	4
000015/000017 RCP Malfunctions / 4						X	2.1.7	Conduct of Operations - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	5
000022 Loss of Rx Coolant Makeup / 2					X		AA2.02	Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: - Charging pump problems	3.7	76
000022K101 Loss of Reactor Coolant Makeup / 2	X						AK1.01	Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup: - Consequences of thermal shock to RCP seals	2.8	7
000025 Loss of RHR System / 4		X					AK2.05	Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: - Reactor building sump	2.6	6

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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			AA1.01	Ability to operate and/or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: - PZR heaters, sprays, and PORVs	4.0	13
000029 ATWS / 1	X						EK1.05	Knowledge of the operational implications of the following concepts as they apply to the ATWS: - definition of negative temperature coefficient as applied to large PWR coolant systems	2.8	8
000038 Steam Gen. Tube Rupture / 3			X				EK3.04	Knowledge of the reasons for the following responses as they apply to the SGTR: - Automatic actions provided by each PRM	3.9	9
000038 Steam Gen. Tube Rupture / 3						X	2.4.41	Emergency Procedures/Plan - Knowledge of the emergency action level thresholds and classifications.	4.6	77
000055 Station Blackout / 6							EA2.02	Ability to determine and interpret the following as they apply to a Station Blackout: - RCS core cooling through natural circulation cooling to S/G cooling	4.4	10
000056 Loss of Off-site Power / 6						X	2.1.43	Conduct of Operations - Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc.	4.3	78
000057 Loss of Vital AC Inst. Bus / 6						X	2.1.20	Conduct of Operations - Ability to interpret and execute procedure steps.	4.6	11
000058 Loss of DC Power / 6						X	AA2.03	Ability to determine and interpret the following as they apply to the Loss of DC Power: - DC loads lost; impact on to operate and monitor plant systems	3.5	12

PWR RO/SRO Examination Outline

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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#
000065 Loss of Instrument Air / 8				X			AA1.02	Ability to operate and/or monitor the following as they apply to the Loss of Instrument Air: - Components served by instrument air to minimize drain on system	2.6	14
000065 Loss of Instrument Air / 8						X	2.1.7	Conduct of Operations - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	79
000077 Generator Voltage and Electric Grid Disturbances / 6		X					AK2.01	Knowledge of the interrelations between Generator Voltage and Electrical Grid Disturbances and the following: - Motors	3.1	15
W/E04 LOCA Outside Containment / 3					X		EA2.2	Ability to determine and interpret the following as they apply to the LOCA Outside Containment: - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.6	16
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	X						EK1.1	Knowledge of the operational implications of the following concepts as they apply to the Loss of Secondary Heat Sink: - Components, capacity, and function of emergency systems	3.8	17
W/E11 Loss of Emergency Coolant Recirc. / 4						X	2.1.27	Conduct of Operations - Knowledge of system purpose and or function.	3.9	18
W/E11 Loss of Emergency Coolant Recirc. / 4					X		EA2.2	Ability to determine and interpret the following as they apply to the Loss of Emergency Coolant Recirculation: - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.4	80

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#
W/E12 Steam Line Rupture – Excessive Heat Transfer / 4					X		EA2.1	Ability to determine and interpret the following as they apply to the Uncontrolled Depressurization of all Steam Generators: - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	3.2	81

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	X						AK1.02	Knowledge of the operational implications of the following concepts as they apply to Continuous Rod Withdrawal: - SUR	3.6	19
000003 Dropped Control Rod / 1					X		AA2.01	Ability to determine and interpret the following as they apply to the Dropped Control Rod: - Rod position indication to actual rod position	3.9	82
000024 Emergency Boration / 1					X		AA2.04	Ability to determine and interpret the following as they apply to the Emergency Boration: - Availability of BWST	4.2	83
000028 Pressurizer Level Malfunction / 2		X					AK2.02	Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following: - Sensors and detectors	2.6	20
000032 Loss of Source Range NI / 7				X			AA1.01	Ability to operate and/or monitor the following as they apply to the Loss of Source Range Nuclear Instrumentation: - Manual restoration of power	3.1	21
000037 Steam Generator Tube Leak / 3						X	2.4.8	Emergency Procedures/Plan - Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	4.5	84
000067 Plant Fire On-site / 9				X			AA1.06	Ability to operate and/or monitor the following as they apply to the Plant Fire on Site: - Fire alarm	3.5	22
000074 Inadequate Core Cooling / 4		X					EK2.01	Knowledge of the interrelations between the Inadequate Core Cooling and the following: - RCP	3.6	23
000076 High Reactor Coolant Activity / 9							AA2.02	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: - Corrective actions required for high fission product activity in RCS	2.8	24

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#
W/E03 LOCA Cooldown - Depress. / 4			X				EK3.2	Knowledge of the reasons for the following responses as they apply to the LOCA Cooldown and Depressurization: - Normal, abnormal and emergency operating procedures associated with LOCA Cooldown and Depressurization	3.4	25
W/E09 Natural Circ / 4						X	2.4.6	Emergency Procedures/Plan – Knowledge of EOP mitigation strategies	4.7	85
W/E10 Natural Circ. / 4							EA2.2	Ability to determine and interpret the following as they apply to the Natural Circulation Operations: - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.4	26
W/E14 Loss of Containment Integrity / 5	X						EK1.3	Knowledge of the operational implications of the following concepts as they apply to Loss of Containment Integrity: - Annunciators and conditions indicating signals, and remedial actions associated with the High Containment Pressure	3.3	27

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#
003 Reactor Coolant Pump		X										K2.01	Knowledge of bus power supplies to the following: - RCPS	3.1	28
003 Reactor Coolant Pump										X		A4.04	Ability to manually operate and/or monitor in the control room: - RCP seal differential pressure instrumentation	3.1	29
004 Chemical and Volume Control									X			A3.11	Ability to monitor automatic operation of the CVCS, including: - Charging/letdown	3.6	30
004 Chemical and Volume Control												A2.35	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: - Reactor trip	3.3	31
005 Residual Heat Removal		X										K2.03	Knowledge of bus power supplies to the following: - RCS pressure boundary motor-operated valves	2.7	32
005 Residual Heat Removal											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.	4.2	86
006 Emergency Core Cooling					X							K5.01	Knowledge of the operational implications of the following concepts as they apply to the ECCS: - Effects of temperatures on water level indications	2.8	33

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#
006 Emergency Core Cooling							X					A2.08	Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Effect of electric power loss on valve position	3.0	89
007 Pressurizer Relief/Quench Tank										X		A4.10	Ability to manually operate and/or monitor in the control room: - Recognition of leaking PORV/code safety	3.6	34
007 Pressurizer Relief/Quench Tank							X					A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: - Maintaining quench tank pressure	2.7	35
008 Component Cooling Water				X								K4.09	Knowledge of CCWS design feature(s) and/or interlock(s) which provide for the following: - The "standby" feature for the CCW pumps	2.7	36
010 Pressurizer Pressure Control												A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Spray valve failures	3.9	37
010 Pressurizer Pressure Control										X		2.2.22	Equipment Control - Knowledge of limiting conditions for operations and safety limits.	4.7	87
012 Reactor Protection						X						K6.04	Knowledge of the effect of a loss or malfunction of the following will have on the RPS: - Bypass-block circuits	3.3	38
012 Reactor Protection				X								K5.01	Knowledge of the operational implications of the following concepts as they apply to the RPS: - DNB	3.3	41

PWR RO/SRO Examination Outline

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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	A3	A4	Number	K/A Topic	Imp	Q#
012 Reactor Protection							X			A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the RPS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Faulty bistable operation	3.6	88
013 Engineered Safety Features Actuation			X							K3.02	Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: - RCS	4.3	39
013 Engineered Safety Features Actuation							X			A2.05	Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Loss of dc control power	3.7	90
022 Containment Cooling	X									K1.01	Knowledge of the physical connections and/or cause-effect relationships between the CCS and the following systems: - SWS/cooling system	3.5	40
026 Containment Spray										2.4.14	Emergency Procedures/Plan - Knowledge of general guidelines for EOP usage.	3.8	42
039 Main and Reheat Steam										A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Malfunctioning steam dump	3.4	43
059 Main Feedwater	X									K1.05	Knowledge of the physical connections and/or cause-effect relationships between the MFW System and the following systems: - RCS	3.1	44

PWR RO/SRO Examination Outline

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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#
061 Auxiliary/ Emergency Feedwater						X						K6.01	Knowledge of the effect of a loss or malfunction of the following will have on the AFW System components: - Controllers and positioners	2.5	46
062 AC Electrical Distribution												2.4.27	Emergency Procedures/Plan – Knowledge of fire in the plant procedure.	3.4	45
062 AC Electrical Distribution			X									K3.03	Knowledge of the effect that a loss or malfunction of the A.C. Distribution System will have on the following: - DC system	3.7	47
063 DC Electrical Distribution				X								K4.02	Knowledge of D.C. Electrical System design feature(s) and/or interlock(s) which provide for the following: - Breaker interlocks, permissives, bypasses and cross-ties	2.9	48
064 Emergency Diesel Generator												2.4.34	Emergency Procedures/Plan – Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	49
064 Emergency Diesel Generator							X					A1.08	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ED/G System controls including: - Maintaining minimum load on ED/G (to prevent reverse power)	3.1	50
073 Process Radiation Monitoring					X							K5.01	Knowledge of the operational implications of the following concepts as they apply to the PRM System: - Radiation theory, including sources, types, units, and effects	2.5	51
076 Service Water									X			A3.02	Ability to monitor automatic operation of the SWS, including: - Emergency heat loads	3.7	52

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#
076 Service Water			X									K3.02	Knowledge of the effect that a loss or malfunction of the SWS will have on the following: - Secondary closed cooling water	2.5	53
078 Instrument Air				X								K4.02	Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following: - Cross-over to other air systems	3.2	54
103 Containment	X											K1.08	Knowledge of the physical connections and/or cause-effect relationships between the Containment System and the following systems: - SIS, including action of safety injection reset	3.6	55

PWR RO/SRO Examination Outline

Facility: Indian Pont Unit 2

NRC Written Examination Outline

ES-401

Plant Systems - Tier 2 / Group 2

Form ES-401-2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	Number	K/A Topic	Imp	Q#
002 Reactor Coolant								X				A2.02	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 pressure	4.2	57
011 Pressurizer Level Control						X						K6.01	Knowledge of the effect of a loss or malfunction of the following will have on the PZR LCS: - Reasons for starting charging pump while increasing letdown flow rate	2.8	58
014 Rod Position Indication System (RPIS)			X									K3.02	Knowledge of the effect that a loss or malfunction of the RPIS will have on the following: - Plant computer	2.5	59
015 Nuclear Instrumentation	X											K1.01	Knowledge of the physical connections and/or cause-effect relationships between the NIS and the following systems: - RPS	4.1	60
016 Non-nuclear Instrumentation									X			A3.01	Ability to monitor automatic operation of the NNIS, including: - Automatic selection of NNIS inputs to control systems	2.9	61
017 In-core Temperature Monitoring				X								K4.03	Knowledge of ITM System design feature(s) and/or interlock(s) which provide for the following: - Range of temperature indication	3.1	62

PWR RO/SRO Examination Outline

Facility: Indian Pont Unit 2

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

ES-401

Form ES-401-2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topic	Imp	Q#
017 In-core Temperature Monitoring							X				A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the ITM System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Core damage	3.5	91
033 Spent Fuel Pool Cooling System (SFPCS)							X				A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Inadequate SDM	3.0	92
034 Fuel Handling Equipment									X		A3.02	Ability to monitor automatic operation of the Fuel Handling System, including: - Load limits	3.1	93
035 Steam Generator										X	A4.01	Ability to manually operate and/or monitor in the control room: - Shift of S/G controls between manual and automatic control, by bumpless transfer	3.7	63
045 Main Turbine Generator (MT/G) System					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	56
072 Area Radiation Monitoring							X				A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ARM system controls including: - Radiation levels	3.4	64
075 Circulating Water		X									K2.03	Knowledge of bus power supplies to the following: - Emergency/essential SWS pumps	2.6	65

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	66		
	2.1.30	Ability to locate and operate components, including local controls	4.4	67		
	2.1.42	Knowledge of new and spent fuel movement procedures.	2.5	68		
	2.1.32	Conduct of Operations - Ability to explain and apply all system limits and precautions.			3.8	94
	2.1.45	Ability to identify and interpret diverse indications to validate the response of another indication			4.3	95
	Subtotal				3	
2. Equipment Control	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels	4.6	69		
	2.2.39	Knowledge of less than or equal to one hour Technical Specification action statements for systems	3.9	70		
	2.2.6	Knowledge of the process for making changes to procedures			3.6	96
	2.2.37	Ability to determine operability and/or availability of safety related equipment.			4.6	97
	Subtotal				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	2.3.4	Radiological Controls - Knowledge of radiation exposure limits under normal and emergency conditions.	3.2	71		
	2.3.11	Ability to control radiation releases	3.8	72		
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	73		
	2.3.11	Ability to control radiation releases			4.3	98
	Subtotal				3	
4. Emergency Procedures/plan	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	74		
	2.4.50	Ability to verify system alarm setpoints and operate controls identified in the alarm response manual	4.2	75		
	2.4.16	Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures and severe accident management guidelines.			4.4	99
	2.4.25	Knowledge of fire protection procedures.			3.7	100
	Subtotal				2	
Tier 3 Point Totals				10		7

Tier / Group	Randomly Selected K/A		Reason for Rejection
R-1/1	0000402439 Steam Line Rupture	Emergency Procedures/Plan – Knowledge of RO responsibilities in emergency plan implementation	Generic KA not applicable to Steam Line Rupture Event
R-1/1	0000542432 Loss of Min Feedwater (MFW)	Emergency Procedures/Plan – Knowledge of operator response to loss of all annunciators	Generic KA not applicable to Loss of MFW event
R-1/1	00WE11K304 Loss of Emergency Coolant Recirculation	Knowledge of the reasons for the following responses as they apply to the Loss of Emergency Coolant Recirculation: - RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated	This KA is evaluated during the Simulator/Walkthrough portion of the Exam
R-1/1	0000262140 Loss of Component Cooling Water	Conduct of Operations - Knowledge of refueling administrative requirements.	This KA rejected due to inability to write a discriminatory question for refueling administrative requirements for Loss of CCW.
R-1/1	000056K103	Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: - Definition of subcooling: use of steam tables to determine it	This KA was rejected due to overlap with Question 10.

R-1/2	0000052449 Inoperable/Stuck Control Rod	Emergency Procedures/Plan – Ability to perform without reference to procedures those actions that require immediate operation of system components and controls	Generic KA not applicable to Inoperable/Stuck Control Rod. There are no procedures with immediate operator actions related to this condition.
R-1/2	000037AA101 Steam Generator Tube Leak	Ability to operate and/or monitor the following as they apply to the Steam Generator Tube Leak: - Maximum controlled depressurization rate for affected S/G	This KA was rejected because, at IP2 for a Steam Generator Tube Leak, a normal cooldown and depressurization is performed NOT a maximum rate depressurization.
R-1/2	000068AA111	Ability to operate and/or monitor the following as they apply to the Control Room Evacuation: - Emergency borate valve controls and indicators	This KA was rejected because, at IP2 for a Control Room Evacuation, the charging pump is aligned to the RWST. Emergency Boration is not identified in the procedure 2-AOP-SSD-1.
R-2/1	012000K608 Reactor Protection System	Knowledge of the effect of a loss or malfunction of the following will have on the RPS: COLSS	Equipment (COLSS) not applicable to IPEC.
R-2/1	006000K509 Emergency Core Cooling System	Knowledge of the operational implications of the following concepts as they apply to the ECCS: - Thermodynamics of water and steam, including subcooled margin, superheat, and saturation	This KA was rejected due to overlap with question 2.
R-2/1	026000A102	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: - Containment temperature	This KA was rejected due to overlap with question 33.
R-2/1	0590002134 Main Feedwater	Conduct of Operations – Knowledge of primary and secondary plant chemistry limits.	This KA was rejected because Chemistry Limits are no longer in any operations procedure. Unable to write a discriminatory RO level question for this KA.

R-2/2	001000K520	Knowledge of the operational implications of the following concepts as they apply to the CRDS: - Effects of RCS temperature on boron reactivity worth	This KA is rejected because it is a Generic Fundamentals concept with limited impact on the Control Rod Drive System. The change in temperature will have an impact on the CRDS. Unable to write a discriminatory RO level question for this KA.
R-2/2	0290002126 Containment Purge System (CPS)	Conduct of Operations – Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).	Generic KA not applicable to Containment Purge System
3	2.1.17	Conduct of Operations – Ability to make accurate, clear and concise verbal reports.	Generic KA not applicable to written examinations. This KA is evaluated during Simulator Evaluation.
S-1/1	0000082206 Pressurizer (PZR) Vapor Space Accident (Relief Valve stuck open)	Equipment Control – Knowledge of the process for making changes to procedures.	Generic KA not applicable to Emergency Plant Evolutions
S-1/2	0000512225 Loss of Condenser Vacuum	Equipment Control – Knowledge of bases in technical specifications for limiting conditions for operations and safety limits	Generic KA not applicable to Loss of Condenser Vacuum.
S-2/1	0260002401 Containment Spray System (CSS)	Emergency Procedures/Plan – Knowledge of EOP entry conditions and immediate actions steps	Generic KA not applicable to Containment Spray. There are no Immediate Operator Actions for the Containment Spray System.

S-2/1	061000A206 Auxiliary / Emergency Feedwater (AFW) System	Ability to (a) predict the impacts of the following malfunctions or operations on the AFW System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Back leakage of MFW	This KA was rejected because IPEC has no procedure to address this condition. Unable to write a discriminatory SRO level question
S-2/2	0140002113 Rod Position Indication System (RPIS)	Conduct of Operations – Knowledge of facility requirements for controlling vital/controlled access.	Generic KA not applicable to Rod Position Indication System.
S-2/2	0270002235 Containment Iodine Removal System (CIRS)	Equipment Control – Ability to determine Technical Specification Mode of Operation.	Generic KA unable to write a valid SRO Only question.
3	2.1.14	Conduct of Operations - Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc.	Generic KA not applicable to written examinations. This KA is evaluated during Simulator Evaluation.

Facility: Indian Point 2 Scenario No.: 1

Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions:

Reset simulator to IC-114 Load Simulator Schedule-Scenario1
 The Plant is at 16% power. 23 EDG is OOS due to a malfunctioning governor.

Turnover:

Return plant to 100% power.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R (ATC) N (CRS) N (BOP)	Power Escalation
2	XMT-SGN008A	I(ATC) I(BOP) TS(CRS)	23 SG Controlling Steam Flow Transmitter Fails High
3	MAL-EPS008L	C (BOP) C (CRS) TS (CRS)	MCC-28 will trip on overcurrent.
4	MAL-EPS001	C (ALL)	Loss of offsite power due to Loss of Station Aux Transformer. The running charging pump (21) will trip.
5	MAL SWD003A	M(ALL)	Complete loss of off site power resulting in a Reactor Trip
6	MAL-DSG007A	M(ALL)	21 EDG will trip and team will enter ECA-0.0.
7	N/A	C(BOP)	22 EDG will be repaired and started. Team must start a service water pump to cool the EDG before it overheats and tips.
8	N/A	C(ATC) C(CRS)	Prior to starting a charging pump, RCP Seal Injection must be isolated.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Session Outline:

The evaluation begins with the plant at 15% power steady state operation. 23 EDG is out of service due to a malfunctioning governor. Post maintenance testing will be performed this shift. After completion of testing, the diesel will be declared operable. The team is currently raising power.

After taking the watch, 23 SG Steam Flow Transmitter fails high. The team will take actions in accordance with 2-AOP-INST-1, Instrument and Controller Failures.

After failed channel is removed from service, MCC-28 will trip on overcurrent. The team will need to restart Control Rod Drive Cooling Fans on MCC-28A.

Following restart on the CRD cooling fans, a loss of offsite power will occur due to a widespread blackout. The running charging pump (21) will trip and EDG 22 will fail to start.

About two minutes after the loss of offsite power, a loss of grid will occur resulting in a unit trip. The team will perform actions of E-0, Reactor Trip or Safety Injection. Only Bus 5A will be energized. Because both motor driven AFW Pumps are de-energized, the team will take manual action to align AFW flow from the turbine driven AFW pump.

Soon after AFW flow is established, 21 EDG will trip. The team will recognize a loss of all AC and enter EOP ECA-0.0, Loss of All AC Power. After equipment is placed in pullout per ECA-0.0, 22 EDG will be repaired and started. However, 22 Service Water Pump will not auto start. The team will manually start the Service Water pump to provide cooling to the EDG before the diesel overheats and trips. The team will proceed through ECA-0.0 and transition to 1) ECA-0.1, Loss of All AC Recovery without SI Required, and then transition to ES-0.2, Natural Circulation Cool down OR 2) ECA-0.2, Loss of All AC Recovery with SI Required, and then to E-1, Loss of Reactor or Secondary Coolant. The scenario will be terminated after transition to ES-0.2, E-1, or at the lead evaluator's discretion.

Procedure flow path: AOP-INST-1, 2-AOP-138 KV-1ECA-0.0, ECA-0.1 or ECA-0.2, ES-0.2
E-1

Facility: Indian Point 2 Scenario No.: 2

Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions:

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

Turnover:

21 Charging Pump and 21 CCW pump are out of service. The team will assume the shift and begin a rapid shutdown in accordance with AOP-RSD-1.

Perform a Rapid Plant Shutdown in accordance with 2-AOP-RSD-1 due to excessive packing leak on

Event No.	Malf. No.	Event Type*	Event Description
1	XMT RCS043A	I (ALL) TS (CRS)	RCS Loop 23 T-Hot fails high
2	N/A	R (ATC) N (CRS) N (BOP)	Rapid Load Shutdown
3	MAL CRF002AV	C (ATC) C (CRS) TS (CRS)	Control Rod P-6 "ratchets in" during rod motion.
4	MOT CVC004A	C (ATC) C (CRS) TS (CRS)	22 Charging Pump trips.
5	MAL SGN004A	M (ALL)	Steam Break down stream of 21 MSIV & Check Valve in Aus Boiler Feed Pump Building.
6	RLY PPL487 RLY PPL488	C (CRS) C (BOP)	Safety Injection fails to Auto Actuate requiring Manual Actuation.
7	MOV RHR011	C (CRS) C (BOP)	RHR valve 746 will fail to auto open requiring Manual Action
8	PLP RHR033 PLP RHR022	M (ALL)	LOCA outside Containment in Primary Auxiliary Building (PAB)

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

Session Outline:

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

21 Charging Pump and 21 CCW pump are out of service.

Shortly after the crew assumes the watch 23 Loop T-hot instrument fails high. The team will take actions in accordance with 2-AOP-INST-1, Instrument and Controller Failures.

The Shift Manager will call the control room and report that 24 SG Feed Regulating Valve air line has been damaged by a maintenance crew. The shift manager will direct the team to begin a rapid shutdown in accordance with 2-AOP-RSD-1.

After adequate power reduction has taken place, Control Rod P-6 will ratchet into the core due to a movable gripper failure, requiring the load reduction to be stopped and the condition evaluated per 2-AOP-ROD-1.

After the load reduction is resumed, 22 Charging pump will trip. The crew will respond using 2-AOP-CVCS-1 and isolate letdown. Charging and letdown then will be re-established.

Subsequently a Main Steam Rupture will occur downstream of 21 MSIV and check valve. The team may use 2-AOP-UC-1 to trip the reactor and close the MSIVs.

Simultaneously with the reactor trip, a rupture will occur on the RHR discharge header outside of containment. Automatic SI will fail to actuate when demanded, requiring manual actuation.

The team will progress through E-0 and may determine that RCP trip criteria is met. (This depends on the magnitude of the cooldown during the steam break.) The BOP will manually open MOV-746 while performing E-0 Attachment 1. the team will continue in E-0 until a transition to ECA-1.2 is directed. In ECA-1.2, the source of the LOCA outside containment will be identified and isolated. The scenario is terminated when the team has determined a transition to E-1 is required.

Procedural flow path: 2- AOP-INST-1, 2-AOP-RSD-1, 2-AOP-ROD-1, 2-AOP-CVCS-1, 2-AOP-UC-1, 2-E-0, 2-ECA-1.2, 2-E-1.

Facility: Indian Point 2 Scenario No.: 3

Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions:

Reset simulator to IC-115 Load Simulator Schedule-Scenario4
 The Plant is at 30% power. 21 EDG is OOS for major PM.

Turnover:

Return plant to 100% power.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R (ATC) N (CRS) N (BOP)	Power Escalation
2	XMT-SGN037A	I (ALL) TS (CRS)	PT-419C (31 SG C Channel Pressure) fails high causing 21 ADV to fail open requiring manual closure.
3	MOC CCW003A MOC CCW001/2	C(CRS) C (BOP) TS (CRS)	23 CCW Pump trips and 21 and 22 CCW Pump fail to auto start
4	MAL-RCS002A	C (ALL) TS (CRS)	35 gpm RCS leak.
5	MAL-RCS001A	M (ALL)	Large Break RCS LOCA.
6	MOC-RHR003/4	C (CRS) C (BOP)	RHR pumps will not auto start and need to be started manually.
7	RLY-PPL085/090	C (BOP)	Failure of Containment Phase A requiring manual initiation.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Session Outline:

The evaluation begins with the plant at 30% power steady state operation. The team is instructed to raise power to return to full load. The following equipment is out of service:

- 21 EDG is out of service for 36 hours for malfunctioning governor. Maintenance is in progress with expected return to service this shift.

After starting the power ascension, a SG pressure channel (PT-419C) fails high. The team will take actions in accordance with 2-AOP-INST-1, Instrument/Controller Failures.

Prior to completion of the Subsequent Actions of 2-AOP-INST-1, 23 CCW Pump will trip. 21 and 22 CCW Pumps will fail to auto start requiring the BOP to manually start 21 or 22 CCW Pump before RCP trip is required.

After CCW is restored, a 35 gpm RCS leak will occur. The crew will diagnose RCS leakage, quantify the leak rate and take actions per 2-AOP-LEAK-1.

Large Break LOCA will occur. The team will perform actions of E-0, Reactor Trip or Safety Injection. Both RHR Pumps will fail to Auto start and must be started manually. Containment Isolation Phase A will fail to auto actuate requiring manual actuation by the operator. Fan Cooler Units 23 and 25 will trip due to bearing failures and will remain out of service for the remainder of the scenario. The team will subsequently transition to E-1, Loss of Reactor or Secondary Coolant.

When RWST level decreases to 9.24 feet, the team will transition to ES-1.3, Transfer to Cold Leg Recirculation. The team will take the appropriate action to place a train of recirculation in service. The scenario is terminated when recirculation is established to one train and SI pumps are secured.

Procedure flow path: 2-AOP-INST-1, 2-AOP-CCW-1, 2-AOP-LEAK-1, 2-E-0, 2-E-1, 2-ES-1.3

Facility: Indian Point 2 Scenario No.: 4

Op-Test No.: 1

Examiners: _____ Operators: _____

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

Turnover:

Event No.	Malf. No.	Event Type*	Event Description
1	XMT CVC019A	I (ALL)	VCT Level Transmitter LT-112 fails low
2	MAL RCS014D	C (ALL) TS (CRS)	6 gpm SG Tube Leak 24 SG
3	NA	R (ATC) N (CRS) N (BOP)	Rapid Load Reduction/Shutdown
4	MAL RCS014D	M (ALL)	Steam Generator Tube Rupture
5	MAL EPS001	C (ALL)	Station Auxiliary Transformer Fault resulting in a loss of off-site power on reactor trip
6	MAL EPS007D	C (ALL)	Bus 6A fault after Safety Injection
7	MAL SIS001	C (BOP)	Safety Injection Pump 21 Fails to Auto Start
8	AOV RCS003A SWI RCS006B SWI RCS006C	C (CRS) C (ATC)	PORV 456 loss of control power when attempted to open
9	AOV CVC008A	C (CRS) C (BOP)	Auxiliary Spray Valve 212 fails to open resulting in a transition to ECA-3.3 SGTR With Loss of Pressure Control

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

Session Outline:

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

21 AFW Pump out of service for scheduled maintenance and is expected back within 4 hours.

Shortly after the crew takes the shift, VCT level transmitter 112 will fail low. The crew will take actions in accordance with 2-AOP-CVCS-2 to restore a normal charging lineup. VCT level will be maintained by maintaining VCT pressure above the pre-failed value.

A 6 gpm Steam Generator Tube leak will occur in 24 SG. The team will take actions in accordance with 2-AOP-SG-1 and determine that a shutdown must commence per TS 3.4.13. After the magnitude of the leak is determined, the crew will initiate a power reduction using either 2-AOP-RLR-1 or 2-AOP-RSD-1. (The crew may determine that the leak rate will not be adequately reduced at 50% power and perform 2-AOP-RSD-1 to shutdown the unit.)

During the power reduction the tube leak will increase to a Steam Generator Tube Rupture requiring a Reactor Trip and Safety Injection. When the Main Generator output breakers open, the Station Auxiliary Transformer will fault resulting in a loss of offsite power. Approximately 45 seconds after Safety Injection is actuated, bus 6A will fault. With 6A faulted and 21 AFW pump out of service, 22 Auxiliary Boiler Feed Pump will have to be manually aligned to supply water to the SGs. 21 Safety Injection Pump will fail to auto start and must be manually started.

The team will transition to E-3. Pressurizer Spray will not be available due to loss of RCPs. PORV 456 control power will fail when the valve is placed to open. Auxiliary Spray Valve AOV-212 will not open when the crew attempts to align Aux Spray. The crew will transition to ECA-3.3. The scenario is terminated when SI pumps are secured.

Procedure Flow Path: 2-AOP-CVCS-1, 2-AOP-SG-1, 2-AOP-RSD-1, E-0, E-3, ECA-3.3.