

**Facility:** Cook Nuclear Plant

Printed: 04/28/2016

Date Of Exam: 07/11/2016

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

**Note:**

- 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).
- 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.
- 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.
- 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.
- 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.
- Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
- \* 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.
- 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.
- 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 Examination Outline

Printed: 04/28/2016

Facility: Cook Nuclear Plant

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	KA Topic	Imp.	Points
000007 Reactor Trip - Stabilization - Recovery / 1		X					EK2.02 - Breakers, relays and disconnects	2.6	1
000011 Large Break LOCA / 3		X					EK2.02 - Pumps	2.6*	1
000015/000017 RCP Malfunctions / 4		X					AK2.07 - RCP seals	2.9	1
000022 Loss of Rx Coolant Makeup / 2				X			AA1.02 - CVCS charging low flow alarm, sensor, and indicator	3.0	1
000025 Loss of RHR System / 4	X						AK1.01 - Loss of RHRS during all modes of operation	3.9	1
000026 Loss of Component Cooling Water / 8			X				AK3.03 - Guidance actions contained in EOP for Loss of CCW	4.0	1
000027 Pressurizer Pressure Control System Malfunction / 3			X				AK3.01 - Isolation of PZR spray following loss of PZR heaters	3.5*	1
000038 Steam Gen. Tube Rupture / 3			X				EK3.02 - Prevention of secondary PORV cycling	4.4	1
000054 Loss of Main Feedwater / 4	X						AK1.01 - MFW line break depressurizes the S/G (similar to a steam line break)	4.1	1
000055 Station Blackout / 6					X		EA2.03 - Actions necessary to restore power	3.9	1
000058 Loss of DC Power / 6					X		AA2.01 - That a loss of dc power has occurred; verification that substitute power sources have come on line	3.7	1
000062 Loss of Nuclear Svc Water / 4					X		AA2.02 - The cause of possible SWS loss	2.9	1
000065 Loss of Instrument Air / 8						X	2.4.8 - Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	3.8	1
000077 Generator Voltage and Electric Grid Disturbances / 6						X	2.2.44 - Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.2	1
W/E04 LOCA Outside Containment / 3				X			EA1.2 - Operating behavior characteristics of the facility	3.6	1
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	X						EK1.1 - Components, capacity, and function of emergency systems	3.8	1
W/E11 Loss of Emergency Coolant Recirc. / 4						X	2.1.20 - Ability to interpret and execute procedure steps.	4.6	1

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E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
W/E12 - Steam Line Rupture - Excessive Heat Transfer / 4				X			EA1.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.8	1
<b>K/A Category Totals:</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>Group Point Total:</b>	<b>18</b>	

PWR RO Examination Outline

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Facility: Cook Nuclear Plant

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	KA Topic	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1				X			AA1.02 - Rod selection switches	3.7	1
000059 Accidental Liquid RadWaste Rel. / 9						X	2.4.9 - Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	3.8	1
000061 ARM System Alarms / 7		X					AK2.01 - Detectors at each ARM system location	2.5*	1
000067 Plant Fire On-site / 9			X				AK3.02 - Steps called out in the site fire protection plan, FPS manual, and fire zone manual	2.5	1
000068 Control Room Evac. / 8					X		AA2.01 - S/G level	4.0	1
W/E02 SI Termination / 3				X			EA1.3 - Desired operating results during abnormal and emergency situations	3.8	1
W/E06 Inad. Core Cooling / 4	X						EK1.2 - Normal, abnormal and emergency operating procedures associated with Degraded Core Cooling	3.5	1
W/E10 Natural Circ. / 4		X					EK2.2 - Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility	3.6	1
W/E16 High Containment Radiation / 9	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the High Containment Radiation	3.0	1
<b>K/A Category Totals:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>		<b>Group Point Total:</b>	<b>9</b>

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Facility: Cook Nuclear Plant

Plant Systems - Tier 2 / Group 1

ES - 401

Form ES-401-2

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
003 Reactor Coolant Pump	X											K1.10 - RCS	3.0	1
004 Chemical and Volume Control					X							K5.07 - Relationship between SUR and reactivity	2.8	1
005 Residual Heat Removal						X						K6.03 - RHR heat exchanger	2.5	1
005 Residual Heat Removal											X	2.4.2 - Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.5	1
006 Emergency Core Cooling		X										K2.04 - ESFAS-operated valves	3.6	1
006 Emergency Core Cooling											X	2.2.37 - Ability to determine operability and/or availability of safety related equipment.	3.6	1
007 Pressurizer Relief/Quench Tank								X				A2.04 - Overpressurization of the waste gas vent header	2.5	1
008 Component Cooling Water										X		A4.07 - Control of minimum level in the CCWS surge tank	2.9*	1
008 Component Cooling Water								X				A2.07 - Consequences of high or low CCW flow rate and temperature; the flow rate at which the CCW standby pump will start	2.5*	1
010 Pressurizer Pressure Control				X								K4.03 - Over pressure control	3.8	1
012 Reactor Protection							X					A1.01 - Trip setpoint adjustment	2.9*	1
012 Reactor Protection										X		A4.07 - M/G set breakers	3.9*	1
013 Engineered Safety Features Actuation						X						K6.01 - Sensors and detectors	2.7*	1
022 Containment Cooling	X											K1.01 - SWS/cooling system	3.5	1
025 Ice Condenser			X									K3.01 - Containment	3.8*	1
026 Containment Spray											X	2.4.18 - Knowledge of the specific bases for EOPs.	3.3	1
026 Containment Spray			X									K3.02 - Recirculation spray system	4.2*	1
039 Main and Reheat Steam								X				A2.04 - Malfunctioning steam dump	3.4	1
059 Main Feedwater									X			A3.02 - Programmed levels of the S/G	2.9	1
059 Main Feedwater							X					A1.03 - Power level restrictions for operation of MFW pumps and valves	2.7*	1

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**ES - 401**

**Plant Systems - Tier 2 / Group 1**

**Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
061 Auxiliary/Emergency Feedwater				X								K4.04 - Prevention of AFW runout by limiting AFW flow	3.1	1
062 AC Electrical Distribution									X			A3.01 - Vital ac bus amperage	3.0	1
063 DC Electrical Distribution				X								K4.04 - Trips	2.6?	1
064 Emergency Diesel Generator			X									K3.01 - Systems controlled by automatic loader	3.8*	1
073 Process Radiation Monitoring					X							K5.01 - Radiation theory, including sources, types, units, and effects	2.5	1
076 Service Water							X					A1.02 - Reactor and turbine building closed cooling water temperatures	2.6*	1
078 Instrument Air		X										K2.01 - Instrument air compressor	2.7	1
103 Containment	X											K1.01 - CCS	3.6	1
<b>K/A Category Totals:</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>Group Point Total: 28</b>		

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Plant Systems - Tier 2 / Group 2

ES - 401

Form ES-401-2

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
001 Control Rod Drive			X									K3.02 - RCS	3.4*	1
002 Reactor Coolant										X		A4.07 - Flow path linking the RWST through the RHR system to the RCS hot legs for gravity refilling of the refueling cavity	2.8	1
011 Pressurizer Level Control											X	2.1.7 - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	1
014 Rod Position Indication								X				A2.06 - Loss of LVDT	2.6*	1
015 Nuclear Instrumentation							X					A1.01 - NIS calibration by heat balance	3.5	1
017 In-core Temperature Monitor									X			A3.01 - Indications of normal, natural, and interrupted circulation of RCS	3.6*	1
028 Hydrogen Recombiner and Purge Control		X										K2.01 - Hydrogen recombiners	2.5*	1
035 Steam Generator						X						K6.02 - Secondary PORV	3.1	1
055 Condenser Air Removal	X											K1.06 - PRM system	2.6	1
079 Station Air				X								K4.01 - Cross-connect with IAS	2.9	1
<b>K/A Category Totals:</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>Group Point Total:</b>	<b>10</b>	

# Generic Knowledge and Abilities Outline (Tier 3)

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**Form ES-401-3**

<u>Generic Category</u>	<u>KA</u>	<u>KA Topic</u>	<u>Imp.</u>	<u>Points</u>
<b>Conduct of Operations</b>	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	1
	2.1.42	Knowledge of new and spent fuel movement procedures.	2.5	1
	2.1.45	Ability to identify and interpret diverse indications to validate the response of another indication.	4.3	1
	<b>Category Total:</b>			<b>3</b>
<b>Equipment Control</b>	2.2.21	Knowledge of pre- and post-maintenance operability requirements.	2.9	1
	2.2.23	Ability to track Technical Specification limiting conditions for operations.	3.1	1
	<b>Category Total:</b>			<b>2</b>
<b>Radiation Control</b>	2.3.11	Ability to control radiation releases.	3.8	1
	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	1
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	1
	<b>Category Total:</b>			<b>3</b>
<b>Emergency Procedures/Plan</b>	2.4.29	Knowledge of the emergency plan.	3.1	1
	2.4.31	Knowledge of annunciator alarms, indications, or response procedures.	4.2	1
	<b>Category Total:</b>			<b>2</b>
<b>Generic Total:</b>			<b>10</b>	



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E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
000008 Pressurizer Vapor Space Accident / 3					X		AA2.27 - Effects on indicated PZR pressure and/or level of sensing line leakage	3.2	1
000009 Small Break LOCA / 3					X		EA2.04 - PZR level	4.0	1
000029 ATWS / 1						X	2.1.7 - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	1
000040 Steam Line Rupture - Excessive Heat Transfer / 4						X	2.4.6 - Knowledge of EOP mitigation strategies.	4.7	1
000056 Loss of Off-site Power / 6					X		AA2.39 - Safety injection pump ammeter and flowmeter	3.6	1
000057 Loss of Vital AC Inst. Bus / 6						X	2.2.40 - Ability to apply Technical Specifications for a system.	4.7	1
<b>K/A Category Totals:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>		<b>Group Point Total:</b>	<b>6</b>

# PWR SRO Examination Outline

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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	KA Topic	Imp.	Points
000001 Continuous Rod Withdrawal / 1						X	2.4.31 - Knowledge of annunciator alarms, indications, or response procedures.	4.1	1
000037 Steam Generator Tube Leak / 3						X	2.1.25 - Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	1
W/E03 LOCA Cooldown - Depress. / 4					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.2	1
W/E08 RCS Overcooling - PTS / 4					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.2	1
<b>K/A Category Totals:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>		<b>Group Point Total:</b>	<b>4</b>

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Plant Systems - Tier 2 / Group 1

ES - 401

Form ES-401-2

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
004 Chemical and Volume Control								X				A2.27 - Improper RWST boron concentration	4.2	1
007 Pressurizer Relief/Quench Tank											X	2.1.27 - Knowledge of system purpose and/or function.	4.0	1
061 Auxiliary/Emergency Feedwater											X	2.4.9 - Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	1
073 Process Radiation Monitoring								X				A2.02 - Detector failure	3.2	1
078 Instrument Air								X				A2.01 - Air dryer and filter malfunctions	2.9	1
<b>K/A Category Totals:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>Group Point Total:</b>	<b>5</b>	

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**Plant Systems - Tier 2 / Group 2**

**ES - 401**

**Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
014 Rod Position Indication								X				A2.01 - Loss of offsite power	3.3	1
034 Fuel Handling Equipment											X	2.4.35 - Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	4.0	1
045 Main Turbine Generator								X				A2.11 - Control problems in primary, e.g., axial flux imbalance; need to reduce load on secondary	2.9*	1
<b>K/A Category Totals:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>Group Point Total:</b>	<b>3</b>	

# Generic Knowledge and Abilities Outline (Tier 3)

## PWR SRO Examination Outline

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**Form ES-401-3**

<u>Generic Category</u>	<u>KA</u>	<u>KA Topic</u>	<u>Imp.</u>	<u>Points</u>
<b>Conduct of Operations</b>	2.1.6	Ability to manage the control room crew during plant transients.	4.8	1
	<b>Category Total:</b>			<b>1</b>
<b>Equipment Control</b>	2.2.14	Knowledge of the process for controlling equipment configuration or status.	4.3	1
	2.2.43	Knowledge of the process used to track inoperable alarms.	3.3	1
	<b>Category Total:</b>			<b>2</b>
<b>Radiation Control</b>	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personal monitoring equipment, etc.	2.9	1
	2.3.6	Ability to approve release permits.	3.8	1
	<b>Category Total:</b>			<b>2</b>
<b>Emergency Procedures/Plan</b>	2.4.11	Knowledge of abnormal condition procedures.	4.2	1
	2.4.25	Knowledge of fire protection procedures.	3.7	1
	<b>Category Total:</b>			<b>2</b>
<b>Generic Total:</b>				<b>7</b>