

Facility: Fort Calhoun

Printed: 07/10/2012

Date Of Exam: 09/21/2012

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

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 Examination Outline

Printed: 07/10/2012

Facility: Fort Calhoun

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		EA2.02 - Proper actions to be taken if the automatic safety functions have not taken place	4.3	1
000008 Pressurizer Vapor Space Accident / 3				X			AA1.06 - Control of PZR level	3.6	1
000009 Small Break LOCA / 3		X					EK2.03 - S/Gs	3.0	1
000011 Large Break LOCA / 3			X				EK3.12 - Actions contained in EOP for emergency LOCA (large break)	4.4	1
000015/000017 RCP Malfunctions / 4						X	2.1.30 - Ability to locate and operate components, including local controls.	4.4	1
000022 Loss of Rx Coolant Makeup / 2	X						AK1.03 - Relationship between charging flow and PZR level	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			AA1.02 - Loads on the CCWS in the control room	3.2	1
000027 Pressurizer Pressure Control System Malfunction / 3		X					AK2.03 - Controllers and positioners	2.6	1
000029 ATWS / 1	X						EK1.01 - Reactor nucleonics and thermo-hydraulics behavior	2.8	1
000038 Steam Gen. Tube Rupture / 3						X	2.4.31 - Knowledge of annunciator alarms, indications, or response procedures.	4.2	1
000040 Steam Line Rupture - Excessive Heat Transfer / 4		X					AK2.02 - Sensors and detectors	2.6*	1
000054 Loss of Main Feedwater / 4						X	2.1.20 - Ability to interpret and execute procedure steps.	4.6	1
000056 Loss of Off-site Power / 6				X			AA1.09 - CCW pump	3.3	1
000057 Loss of Vital AC Inst. Bus / 6			X				AK3.01 - Actions contained in EOP for loss of vital ac electrical instrument bus	4.1	1
000058 Loss of DC Power / 6			X				AK3.02 - Actions contained in EOP for loss of dc power	4.0	1
000065 Loss of Instrument Air / 8					X		AA2.08 - Failure modes of air-operated equipment	2.9*	1
000077 Generator Voltage and Electric Grid Disturbances / 6				X			AA1.03 - Voltage regulator controls	3.8	1
K/A Category Totals:	3	3	3	4	2	3	Group Point Total:	18	

PWR RO Examination Outline

Printed: 07/10/2012

Facility: Fort Calhoun

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		AA2.04 - Reactor power and its trend	4.2	1
000024 Emergency Boration / 1						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
000028 Pressurizer Level Malfunction / 2	X						AK1.01 - PZR reference leak abnormalities	2.8*	1
000051 Loss of Condenser Vacuum / 4			X				AK3.01 - Loss of steam dump capability upon loss of condenser vacuum	2.8*	1
000059 Accidental Liquid RadWaste Rel. / 9			X				AK3.04 - Actions contained in EOP for accidental liquid radioactive-waste release	3.8	1
000060 Accidental Gaseous Radwaste Rel. / 9				X			AA1.02 - Ventilation system	2.9	1
000061 ARM System Alarms / 7		X					AK2.01 - Detectors at each ARM system location	2.5*	1
CE/A11 RCS Overcooling - PTS / 4	X						EK1.1 - Components, capacity, and function of emergency systems	3.1	1
CE/E09 Functional Recovery					X		EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.5	1
K/A Category Totals:	2	1	2	1	2	1	Group Point Total:	9	

Facility: Fort Calhoun

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
003 Reactor Coolant Pump		X										K2.01 - RCPS	3.1	1
004 Chemical and Volume Control										X		A4.08 - Charging	3.8	1
005 Residual Heat Removal											X	2.4.1 - Knowledge of EOP entry conditions and immediate action steps.	4.6	1
006 Emergency Core Cooling				X								K4.30 - Containment isolation	3.6	1
006 Emergency Core Cooling							X					A1.15 - RWST Level and temperature	3.3	1
007 Pressurizer Relief/Quench Tank								X				A2.05 - Exceeding PRT high-pressure limits	3.2	1
008 Component Cooling Water									X			A3.08 - Automatic actions associated with the CCWS that occur as a result of a safety injection signal	3.6*	1
010 Pressurizer Pressure Control	X											K1.01 - RPS	3.9	1
010 Pressurizer Pressure Control						X						K6.03 - PZR sprays and heaters	3.2	1
012 Reactor Protection		X										K2.01 - RPS channels, components, and interconnections	3.3	1
013 Engineered Safety Features Actuation						X						K6.01 - Sensors and detectors	2.7*	1
022 Containment Cooling			X									K3.02 - Containment instrumentation readings	3.0	1
022 Containment Cooling											X	2.2.22 - Knowledge of limiting conditions for operations and safety limits.	4.0	1
026 Containment Spray							X					A1.03 - Containment sump level	3.5	1
039 Main and Reheat Steam					X							K5.08 - Effect of steam removal on reactivity	3.6	1
039 Main and Reheat Steam	X											K1.08 - MFW	2.7*	1
059 Main Feedwater			X									K3.02 - AFW System	3.6	1
061 Auxiliary/Emergency Feedwater					X							K5.02 - Decay heat sources and magnitude	3.2	1
061 Auxiliary/Emergency Feedwater								X				A2.03 - Loss of dc power	3.1	1
062 AC Electrical Distribution				X								K4.10 - Uninterruptable ac power sources	3.1	1
063 DC Electrical Distribution							X					A1.01 - Battery capacity as it is affected by discharge rate	2.5	1
064 Emergency Diesel Generator									X			A3.05 - Operation of the governor control of frequency and voltage control in parallel operation	2.8	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
064 Emergency Diesel Generator				X								K4.05 - Incomplete-start relay	2.8	1
073 Process Radiation Monitoring										X		A4.02 - Radiation monitoring system control panel	3.7	1
073 Process Radiation Monitoring					X							K5.03 - Relationship between radiation intensity and exposure limits	2.9*	1
076 Service Water		X										K2.01 - Service water	2.7*	1
078 Instrument Air	X											K1.04 - Cooling water to compressor	2.6	1
103 Containment			X									K3.02 - Loss of containment integrity under normal operations	3.8	1
K/A Category Totals:	3	3	3	3	3	2	3	2	2	2	2	Group Point Total:	28	

PWR RO Examination Outline

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ES - 401

Plant Systems - Tier 2 / Group 2

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
011 Pressurizer Level Control		X										K2.02 - PZR heaters	3.1	1
014 Rod Position Indication											X	2.4.4 - Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5	1
017 In-core Temperature Monitor						X						K6.01 - Sensors and detectors	2.7	1
027 Containment Iodine Removal								X				A2.01 - High temperature in the filter system	3.0*	1
028 Hydrogen Recombiner and Purge Control							X					A1.02 - Containment pressure	3.4*	1
035 Steam Generator				X								K4.06 - S/G pressure	3.1	1
041 Steam Dump/Turbine Bypass Control	X											K1.05 - RCS	3.5	1
068 Liquid Radwaste					X							K5.03 - Units of radiation, dose, and dose rate	2.6	1
079 Station Air										X		A4.01 - Cross-tie valves with IAS	2.7	1
K/A Category Totals:	1	1	1	1	1	1	1	1	0	1	1	Group Point Total:	10	

Generic Knowledge and Abilities Outline (Tier 3)

PWR RO 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>
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements.	3.8	1
	2.1.13	Knowledge of facility requirements for controlling vital / controlled access.	2.5	1
	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management.	4.3	1
	Category Total:			3
Equipment Control	2.2.6	Knowledge of the process for making changes to procedures.	3.0	1
	2.2.25	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	3.2	1
	Category Total:			2
Radiation Control	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
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	1
	Category Total:			2
Emergency Procedures/Plan	2.4.2	Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.5	1
	2.4.8	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	3.8	1
	2.4.25	Knowledge of fire protection procedures.	3.3	1
	Category Total:			3

Generic Total: 10

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1	000029 EA2.08	No Rod Bank Step Counters (resampled 000029 EK1.01)
1/2	000032 AA1.01	Power is not removed to FCS Source Range Detectors (resampled CE-A11 AK1.01)
2/1	003000 A3.01	FCS RCPs do not have seal injection (resampled 064000 K4.05)
2/1	076000 K3.03	No Reactor Building Closed Cooling Water System (resampled 078000 K1.04)
2/1	103000 A2.03	No phase A&B containment Isolation (resampled 103000 K3.02)
2/1	059000 2.2.42	No TS LCO associated with main FW (resampled 059000 K3.02)
3/1	000000 2.1.27	Not appropriate for a tier 3 question since it must be associated with a system (resampled 000000 2.1.37)

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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	0	0	0	N/A			0	0	N/A			0	0	3		3	6
	2	0	0	0				0	0				0	0	2		2	4
	Tier Totals	0	0	0				0	0				0	5		5	10	
2. Plant Systems	1	0	0	0	0	0	0	0	0	0	0	0	0	3		2	5	
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	
	Tier Totals	0	0	0	0	0	0	0	0	0	0	0	0	5		3	8	
3. Generic Knowledge And Abilities Categories				1		2		3		4		0		1	2	3	4	7
				0		0		0		0				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).
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PWR SRO Examination Outline

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ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-2

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000008 Pressurizer Vapor Space Accident / 3					X		AA2.23 - Criteria for throttling high-pressure injection after a small LOCA	4.3	1
000009 Small Break LOCA / 3					X		EA2.11 - Containment temperature, pressure, and humidity	4.1	1
000027 Pressurizer Pressure Control System Malfunction / 3						X	2.1.25 - Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	1
000054 Loss of Main Feedwater / 4					X		AA2.02 - Differentiation between loss of all MFW and trip of one MFW pump	4.4	1
000058 Loss of DC Power / 6						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
000065 Loss of Instrument Air / 8						X	2.1.32 - Ability to explain and apply system limits and precautions.	4.0	1
K/A Category Totals:	0	0	0	0	3	3		Group Point Total:	6

PWR SRO Examination Outline

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Facility: Fort Calhoun

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
000024 Emergency Boration / 1						X	2.2.37 - Ability to determine operability and/or availability of safety related equipment.	4.6	1
000033 Loss of Intermediate Range NI / 7					X		AA2.10 - Tech-Spec limits if both intermediate-range channels have failed	3.8	1
000036 Fuel Handling Accident / 8						X	2.4.18 - Knowledge of the specific bases for EOPs.	4.0	1
000067 Plant Fire On-site / 9					X		AA2.12 - Location of vital equipment within fire zone	3.9	1
K/A Category Totals:	0	0	0	0	2	2		Group Point Total:	4

Facility: Fort Calhoun

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
003 Reactor Coolant Pump											X	2.1.28 - Knowledge of the purpose and function of major system components and controls.	4.1	1
010 Pressurizer Pressure Control								X				A2.03 - PORV failures	4.2	1
013 Engineered Safety Features Actuation								X				A2.02 - Excess steam demand	4.5	1
064 Emergency Diesel Generator											X	2.4.20 - Knowledge of operational implications of EOP warnings, cautions, and notes.	4.3	1
078 Instrument Air								X				A2.01 - Air dryer and filter malfunctions	2.9	1
K/A Category Totals:	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:	5	

PWR SRO Examination Outline

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ES - 401 **Plant Systems - Tier 2 / Group 2** **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	2.4.8 - Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	4.5	1
015 Nuclear Instrumentation								X				A2.05 - Core void formation	3.8	1
056 Condensate								X				A2.04 - Loss of condensate pumps	2.8*	1
K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	1	Group Point Total:	3	

Generic Knowledge and Abilities Outline (Tier 3)

PWR SRO Examination Outline

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Form ES-401-3

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	3.9	1
	2.1.13	Knowledge of facility requirements for controlling vital / controlled access.	3.2	1
	Category Total:			2
Equipment Control	2.2.7	Knowledge of the process for conducting special or infrequent tests.	3.6	1
	2.2.22	Knowledge of limiting conditions for operations and safety limits.	4.7	1
	Category Total:			2
Radiation Control	2.3.12	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.7	1
	Category Total:			1
Emergency Procedures/Plan	2.4.6	Knowledge of EOP mitigation strategies.	4.7	1
	2.4.40	Knowledge of SRO responsibilities in emergency plan implementation.	4.5	1
	Category Total:			2
Generic Total:			7	

