

**Facility:** Fort Calhoun

Printed: 09/02/2010

Date Of Exam: 09/17/2010

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	0		0	0	
	2	2	1	2				1	1			2	9	0		0	0	
	Tier Totals	5	4	5				4	4			5	27	0		0	0	
2.  Plant Systems	1	3	2	3	3	3	2	1	3	2	4	2	28	0		0	0	
	2	0	1	1	1	1	1	1	1	1	1	1	10	0	0	0	0	
	Tier Totals	3	3	4	4	4	3	2	4	3	5	3	38	0		0	0	
3. Generic Knowledge And Abilities Categories				1		2		3		4		10	1	2	3	4	0	
				3		3		2		2			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  $\pm 1$  from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the 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**  
Revision 2

Printed: 09/02/2010

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
000008 Pressurizer Vapor Space Accident / 3					X		AA2.19 - PZR spray valve failure, using plant parameters	3.4	1
000009 Small Break LOCA / 3		X					EK2.03 - S/Gs	3.0	1
000015/000017 RCP Malfunctions / 4			X				AK3.01 - Potential damage from high winding and/or bearing temperatures	2.5	1
000022 Loss of Rx Coolant Makeup / 2						X	2.4.6 - Knowledge of EOP mitigation strategies.	3.7	1
000025 Loss of RHR System / 4				X			AA1.10 - LPI pump suction valve and discharge valve indicators	3.1*	1
000026 Loss of Component Cooling Water / 8				X			AA1.05 - The CCWS surge tank, including level control and level alarms, and radiation alarm	3.1	1
000027 Pressurizer Pressure Control System Malfunction / 3		X					AK2.03 - Controllers and positioners	2.6	1
000029 ATWS / 1						X	2.1.31 - Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.6	1
000038 Steam Gen. Tube Rupture / 3			X				EK3.04 - Automatic actions provided by each PRM	3.9	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	2.4.1 - Knowledge of EOP entry conditions and immediate action steps.	4.6	1
000056 Loss of Off-site Power / 6					X		AA2.86 - Main steam pressure meter scale	2.7*	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						AK1.01 - Battery charger equipment and instrumentation	2.8	1
000062 Loss of Nuclear Svc Water / 4					X		AA2.02 - The cause of possible SWS loss	2.9	1
000077 Generator Voltage and Electric Grid Disturbances / 6		X					AK2.01 - Motors	3.1	1
CE/E02 Reactor Trip - Stabilization - Recovery / 1	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the (Reactor Trip Recovery)	3.0	1

# PWR RO Examination Outline

Printed: 09/02/2010

Facility: Fort Calhoun

Revision 2

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
CE/E05 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	3.9	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**  
Revision 2

Printed: 09/02/2010

**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
000003 Dropped Control Rod / 1					X		AA2.01 - Rod position indication to actual rod position	3.7	1
000036 Fuel Handling Accident / 8						X	2.2.39 - Knowledge of less than or equal to one hour Technical Specification action statements for systems.	3.9	1
000037 Steam Generator Tube Leak / 3						X	2.2.22 - Knowledge of limiting conditions for operations and safety limits.	4.0	1
000059 Accidental Liquid RadWaste Rel. / 9			X				AK3.04 - Actions contained in EOP for accidental liquid radioactive-waste release	3.8	1
000061 ARM System Alarms / 7	X						AK1.01 - Detector limitations	2.5*	1
000068 Control Room Evac. / 8		X					AK2.03 - Controllers and positioners	2.9	1
CE/A11 RCS Overcooling - PTS / 4	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the (RCS Overcooling)	3.0	1
CE/A13 Natural Circ. / 4				X			EA1.2 - Operating behavior characteristics of the facility	3.1	1
CE/A16 Excess RCS Leakage / 2			X				EK3.2 - Normal, abnormal and emergency operating procedures associated with (Excess RCS Leakage)	2.8	1
<b>K/A Category Totals:</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>Group Point Total: 9</b>		

# PWR RO Examination Outline

Printed: 09/02/2010

Facility: Fort Calhoun

Revision 2

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						K6.02 - RCP seals and seal water supply	2.7	1
003 Reactor Coolant Pump										X		A4.08 - RCP cooling water supplies	3.2	1
004 Chemical and Volume Control											X	2.4.31 - Knowledge of annunciator alarms, indications, or response procedures.	4.2	1
004 Chemical and Volume Control							X					A1.07 - Maximum specified letdown flow	2.7	1
005 Residual Heat Removal					X							K5.03 - Reactivity effects of RHR fill water	2.9*	1
006 Emergency Core Cooling						X						K6.03 - Safety Injection Pumps	3.6	1
007 Pressurizer Relief/Quench Tank					X							K5.02 - Method of forming a steam bubble in the PZR	3.1	1
008 Component Cooling Water											X	2.1.28 - Knowledge of the purpose and function of major system components and controls.	4.1	1
008 Component Cooling Water								X				A2.03 - High/low CCW temperature	3.0	1
010 Pressurizer Pressure Control	X											K1.08 - PZR LCS	3.2	1
012 Reactor Protection					X							K5.02 - Power density	3.1*	1
012 Reactor Protection									X			A3.05 - Single and multiple channel trip indicators	3.6	1
013 Engineered Safety Features Actuation				X								K4.03 - Main Steam Isolation System	3.9	1
013 Engineered Safety Features Actuation										X		A4.01 - ESFAS-initiated equipment which fails to actuate	4.5	1
022 Containment Cooling									X			A3.01 - Initiation of safeguards mode of operation	4.1	1
026 Containment Spray		X										K2.01 - Containment spray pumps	3.4*	1
039 Main and Reheat Steam	X											K1.02 - Atmospheric relief dump valves	3.3	1
039 Main and Reheat Steam										X		A4.01 - Main steam supply valves	2.9*	1
059 Main Feedwater								X				A2.04 - Feeding a dry S/G	2.9*	1
061 Auxiliary/Emergency Feedwater	X											K1.02 - MFW System	3.4	1
061 Auxiliary/Emergency Feedwater				X								K4.14 - AFW automatic isolation	3.5*	1
062 AC Electrical Distribution			X									K3.02 - ED/G	4.1	1

**PWR RO Examination Outline**  
Revision 2

Printed: 09/02/2010

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
063 DC Electrical Distribution			X									K3.01 - ED/G	3.7*	1
064 Emergency Diesel Generator								X				A2.03 - Parallel operation of ED/Gs	3.1	1
073 Process Radiation Monitoring										X		A4.03 - Check source for operability demonstration	3.1	1
076 Service Water		X										K2.01 - Service water	2.7*	1
078 Instrument Air			X									K3.01 - Containment air system	3.1*	1
103 Containment				X								K4.06 - Containment isolation system	3.1	1
<b>K/A Category Totals:</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>Group Point Total: 28</b>		

# PWR RO Examination Outline

Printed: 09/02/2010

Facility: Fort Calhoun

Revision 2

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										K2.02 - One-line diagram of power supply to trip breakers	3.6	1
002 Reactor Coolant									X			A3.03 - Pressure, temperatures, and flows	4.4	1
011 Pressurizer Level Control						X						K6.04 - Operation of PZR level controllers	3.1	1
017 In-core Temperature Monitor							X					A1.01 - Core exit temperature	3.7	1
029 Containment Purge										X		A4.01 - Containment purge flow rate	2.5	1
034 Fuel Handling Equipment				X								K4.03 - Overload protection	2.6	1
035 Steam Generator								X				A2.02 - Reactor trip/turbine trip	4.2	1
045 Main Turbine Generator			X									K3.01 - Remainder of the plant	2.9	1
056 Condensate											X	2.1.23 - Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	1
086 Fire Protection					X							K5.03 - Effect of water spray on electrical components	3.1	1
<b>K/A Category Totals:</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</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)

## PWR RO Examination Outline

Printed: 09/02/2010

**Facility:** Fort Calhoun

Revision 2

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>	2.1.21	Ability to verify the controlled procedure copy.	3.5*	1
	2.1.31	Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.6	1
	2.1.43	Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc.	4.1	1
	<b>Category Total:</b>			<b>3</b>
<b>Equipment Control</b>	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	1
	2.2.18	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.	2.6	1
	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings.	3.5	1
	<b>Category Total:</b>			<b>3</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
	2.3.13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.4	1
	<b>Category Total:</b>			<b>2</b>
<b>Emergency Procedures/Plan</b>	2.4.9	Knowledge of low power /shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.	3.8	1
	2.4.37	Knowledge of the lines of authority during implementation of the emergency plan.	3.0	1
	<b>Category Total:</b>			<b>2</b>



# Generic Knowledge and Abilities Outline (Tier 3)

## PWR RO Examination Outline

Printed: 09/02/2010

**Facility:** Fort Calhoun

Revision 2

**Form ES-401-3**

**Generic Category**

**KA**

**KA Topic**

**Imp.**

**Points**

**Generic Total:**

**10**

Tier / Group	Randomly Selected K/A	Reason for Rejection
2/1	013000 2.4.41	EAL classification not a RO task at FCS ( Replaced with 008000 2.1.28)
2/1	026000 K4.04	Containment Spray System does not start automatically during a LOCA at FCS. (Replaced with 039000 K1.02)
2/1	076000 2.1.19	No system specific plant computer interface (Replaced with 007000 K4.01)
3	000000 2.2.39	K/A addresses system specific topic, not amenable to Tier 3 question. (Replaced with 000000 2.1.43)
3	000000 2.2.44	K/A addresses system specific topic, not amenable to Tier 3 question. (Replaced with 000000 2.2.41)
3	000000 2.3.15	K/A addresses system specific topic, not amenable to Tier 3 question. (Replaced with 000000 2.4.9)
3	000000 2.3.12	Redundant to 2.3.13 which is included in outline (replaced by 2.3.5)
3	000000 2.4.02	K/A addresses system specific topic, not amenable to Tier 3 question. (Replaced with 000000 2.2.18)
1/2	000076 Ak2.01	No RCS activity radiation monitor (Replaced with 000068 AK2.03)
2/1	078000 A4.01	Topic has been addressed adequately in this exam and last NRC exam (Replaced with 013000 A4.01)
3	000000 2.1.45	K/A addresses system specific topic, not amenable to Tier 3 question. (Replaced with 000000 2.1.21)
2/1	064000 A2.14	Could not write a discriminating question fitting this K/A (Replaced with 064000 A2.03)
2/1	073000 A1.01	Could not write a discriminating question fitting this K/A that had not already been used on audit exam (Replaced with 073000 A4.03)
2/1	007000 K4.01	Could not write a discriminating question fitting this K/A (Replaced with 061000 K4.14)

**Facility:** Fort Calhoun

Revision 1

Printed: 07/28/2010

Date Of Exam: 09/17/2010

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	0	0	0	N/A			0	0	N/A		0	0	3		3	6	
	2	0	0	0				0	0			2		2	4			
	Tier Totals	0	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	1	1	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	1	2	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  $\pm 1$  from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the 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 SRO Examination Outline**  
Revision 1

Printed: 07/28/2010

**Facility:** Fort Calhoun

**ES - 401**

**Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1**

**Form ES-401-2**

<b>E/APE # / Name / Safety Function</b>	<b>K1</b>	<b>K2</b>	<b>K3</b>	<b>A1</b>	<b>A2</b>	<b>G</b>	<b>KA Topic</b>	<b>Imp.</b>	<b>Points</b>
000008 Pressurizer Vapor Space Accident / 3						X	2.4.20 - Knowledge of operational implications of EOP warnings, cautions, and notes.	4.3	1
000025 Loss of RHR System / 4					X		AA2.05 - Limitations on LPI flow and temperature rates of change	3.5*	1
000029 ATWS / 1						X	2.4.11 - Knowledge of abnormal condition procedures.	4.2	1
000065 Loss of Instrument Air / 8					X		AA2.05 - When to commence plant shutdown if instrument air pressure is decreasing	4.1	1
000077 Generator Voltage and Electric Grid Disturbances / 6						X	2.4.18 - Knowledge of the specific bases for EOPs.	4.0	1
CE/E02 Reactor Trip - Stabilization - Recovery / 1					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	3.7	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: 6</b>		

**PWR SRO Examination Outline**  
Revision 1

Printed: 07/28/2010

**Facility:** Fort Calhoun

**ES - 401**

**Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2**

**Form ES-401-2**

<b>E/APE # / Name / Safety Function</b>	<b>K1</b>	<b>K2</b>	<b>K3</b>	<b>A1</b>	<b>A2</b>	<b>G</b>	<b>KA Topic</b>	<b>Imp.</b>	<b>Points</b>
000037 Steam Generator Tube Leak / 3					X		AA2.04 - Comparison of RCS fluid inputs and outputs, to detect leaks	3.7	1
000051 Loss of Condenser Vacuum / 4					X		AA2.01 - Cause for low vacuum condition	2.7*	1
000074 Inad. Core Cooling / 4						X	2.4.49 - Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.4	1
CE/E09 Functional Recovery						X	2.4.47 - Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	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: 4</b>		

# PWR SRO Examination Outline

Printed: 07/28/2010

Facility: Fort Calhoun

Revision 1

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
006 Emergency Core Cooling								X				A2.13 - Inadvertent SIS actuation	4.2	1
012 Reactor Protection											X	2.1.32 - Ability to explain and apply system limits and precautions.	4.0	1
013 Engineered Safety Features Actuation								X				A2.01 - LOCA	4.8	1
039 Main and Reheat Steam								X				A2.03 - Indications and alarms for main steam and area radiation monitors (during SGTR)	3.7	1
061 Auxiliary/Emergency Feedwater											X	2.4.46 - Ability to verify that the alarms are consistent with the plant conditions.	4.2	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>	

# PWR SRO Examination Outline

Printed: 07/28/2010

Facility: Fort Calhoun

Revision 1

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
028 Hydrogen Recombiner and Purge Control											X	2.4.30 - Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	4.1	1
034 Fuel Handling Equipment	X											K1.04 - NIS	3.5	1
075 Circulating Water								X				A2.01 - Loss of intake structure	3.2	1
<b>K/A Category Totals:</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</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

Printed: 07/28/2010

**Facility:** Fort Calhoun

Revision 1

**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>	2.1.34	Knowledge of primary and secondary plant chemistry limits.	3.5	1
	2.1.43	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	1
	<b>Category Total:</b>			<b>2</b>
<b>Equipment Control</b>	2.2.6	Knowledge of the process for making changes to procedures.	3.6	1
	<b>Category Total:</b>			<b>1</b>
<b>Radiation Control</b>	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.7	1
	2.3.11	Ability to control radiation releases.	4.3	1
	<b>Category Total:</b>			<b>2</b>
<b>Emergency Procedures/Plan</b>	2.4.8	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	4.5	1
	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	1
	<b>Category Total:</b>			<b>2</b>

**Generic Total:** 7



[illegible]

Facility: <u>Fort Calhoun</u>		Date of Examination: 9/20/2010
Examination Level: <b>RO</b>		Revision Number: 3
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
<u>A-1</u> Conduct of Operations	N, R	Determine Boron Addition Rate Without Using ERF Computer KA: 2.1.37 (4.3)
<u>A-2</u> Conduct of Operations	D, R	Determine Maximum Diesel Generator Load Based on Weather Conditions KA: 2.1.32 (3.8)
<u>A-3</u> Equipment Control	M, R	Use P&IDs to Determine Equipment Affected by Closure of Instrument Air Valve KA: 2.2.41 (3.5)
<u>A-4</u> Radiation Control	N, R	Read a Survey Map and Apply RWP Requirements KA: 2.3.7 (3.5)
Emergency Procedures/Plan		
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 ( $\leq 3$ for ROs; $\leq 4$ for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		

Facility: <u>Fort Calhoun</u>		Date of Examination: 9/20/2010
Examination Level: <b>SRO</b>		Revision Number: 2
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
<u>A-5</u> Conduct of Operations	M, R	Approve Movement of Spent Fuel Assemblies  KA : 2.1.42 (3.4)
<u>A-6</u> Conduct of Operations	D, R	SRO Review of Surveillance Test Results  KA: 2.1.25 (4.2)
<u>A-7</u> Equipment Control	D, R	Determine Equipment Operability Requirements during Mode Change  KA: 2.2.37 (4.6)
<u>A-8</u> Radiation Control	D, R	Approve Gas Decay Tank Release  KA: 2.3.6 (3.8)
<u>A-9</u> Emergency Procedures/Plan	M, R	Classify Emergency Action Levels and make Protective Action Recommendations  KA: 2.4.41 (4.6)  KA: 2.4.44 (4.4)
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 ( $\leq 3$ for ROs; $\leq 4$ for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		

Facility: <u>Fort Calhoun</u> Exam Level: <b>RO</b>		Date of Examination: 9/20/2010 Revision Number.: 2	
Control Room Systems <sup>@</sup> (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
System / JPM Title	Type Code*	Safety Function	
<b>S-1.</b> Emergency Boration with Loss of BASTs / KA: 004000 A2.14 (3.8/3.9)	M, A, L, S	1	
<b>S-2.</b> Transfer Clutch Power Supply/X-Tie Instrument Buses / KA 062000 A4.01 (3.3/3.1)	D, S	6	
<b>S-3</b> Lower RCS Pressure with a Steam Bubble in the Pressurizer / KA 010000 A4.03 (4.0/3.8)	N,A,S	3	
<b>S-4.</b> Alternate Decay Heat Removal using S/G's (shutdown cooling)/ KA 041000 A4.06 (2.9/3.1)	N,A,L,S	4S	
<b>S-5</b> Rotate CEDM Cooling Fans K/A 022000 A4.01 (3.6/3.6)	N, A, S	5	
<b>S-6</b> Adjust T-Cold Calibration / KA 012000 A4.02 (3.3/3.4)	D, S	7	
<b>S-7</b> LPSI (SDC) Pump Operability Test / KA 005000 A4.01 (3.6/3.4)	N, EN,S	4P	
<b>S-8.</b> Align HPSI Pump, SI-2C, for Automatic Start /KA 013000 A3.02 (4.1/4.2)	N, S, EN	2	
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
<b>P-1</b> Minimize DC Loads / KA 000055 EA1.04 (3.5/3.9)	D, E,L	6	
<b>P-2</b> Manual Operation of Raw Water Strainer to clear blockage / 076000 A2.01 (3.5/3.7)	N, A	4S	
<b>P-3</b> Fire Protection System Backup Cooling for CCW / KA 008000 A2.03 (3.0/3.2)	N, R, E, A	8	
@ 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 (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ - / - / $\geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$		

Facility: <u>Fort Calhoun</u>		Date of Examination: 9/20/2010	
Exam Level: <b>ISRO</b>		Revision Number.: 2	
Control Room Systems <sup>@</sup> (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
System / JPM Title	Type Code*	Safety Function	
<b>S-1.</b> Emergency Boration with Loss of BASTs / KA: 004000 A2.14 (3.8/3.9)	M, A, L, S	1	
<b>S-2.</b> Transfer Clutch Power Supply/X-Tie Instrument Buses / KA 062000 A4.01 (3.3/3.1)	D, S	6	
<b>S-3</b> Lower RCS Pressure with a Steam Bubble in the Pressurizer / KA 010000 A4.03 (4.0/3.8)	N,A,S	3	
<b>S-4.</b> Alternate Decay Heat Removal using S/G's (shutdown cooling)/ KA 041000 A4.06 (2.9/3.1)	N,A,L,S	4S	
<b>S-5</b> Rotate CEDM Cooling Fans K/A 022000 A4.01 (3.6/3.6)	N, A, S	5	
<b>S-6</b> Adjust T-Cold Calibration / KA 012000 A4.02 (3.3/3.4)	D, S	7	
<b>S-7</b> LPSI (SDC) Pump Operability Test / KA 005000 A4.01 (3.6/3.4)	N, EN,S	4P	
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
<b>P-1</b> Minimize DC Loads / KA 000055 EA1.04 (3.5/3.9)	D, E,L	6	
<b>P-2</b> Manual Operation of Raw Water Strainer to clear blockage / 076000 A2.01 (3.5/3.7)	N, A	4S	
<b>P-3</b> Fire Protection System Backup Cooling for CCW / KA 008000 A2.03 (3.0/3.2)	N, R, E, A	8	
@ 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 (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ - / - / $\geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$		

Facility: <u>Fort Calhoun</u> Exam Level: <b>USRO</b>		Date of Examination: 9/20/2010 Revision Number.: 2	
Control Room Systems <sup>@</sup> (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
System / JPM Title	Type Code*	Safety Function	
<b>S-3</b> Lower RCS Pressure with a Steam Bubble in the Pressurizer / KA 010000 A4.03 (4.0/3.8)	N,A,S	3	
<b>S-8.</b> Align HPSI Pump, SI-2C, for Automatic Start /KA 013000 A3.02 (4.1/4.2)	N, S, EN	2	
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
<b>P-1</b> Minimize DC Loads / KA 000055 EA1.04 (3.5/3.9)	D, E,L	6	
<b>P-2</b> Manual Operation of Raw Water Strainer to clear blockage / KA 076000 A2.01 (3.5/3.7)	N, A	4S	
<b>P-3</b> Fire Protection System Backup Cooling for CCW / KA 008000 A2.03 (3.0/3.2)	N, R, E, A	8	
@ 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 (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ - / - / $\geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$		

Facility: Fort Calhoun		Scenario No: 2010-1		Revision: 3	
Examiners: _____ _____ _____			Operators: _____ _____ _____		
Initial Conditions: Plant at 100% power. Auxiliary Feedwater Pump, FW-54, OOS. HPSI Pump, SI-2B, OOS. S/G "A" Blowdown Radiation Monitor, RM-054A, OOS, Containment Cooling Fan, VA-3B OOS, RM-054B lined up to sample both S/G's.					
Turnover: A Tornado Watch has been issued, AOP-01 has been entered. Shift Manager directs that rotation of Charging Pumps be continued at beginning of shift. (CH-1B on and CH-1A off)					
Event No.	Malf No.	Event Type*	Event Description		
1		N-ATCO	Rotate Charging Pumps		
2		I-ATCO	VCT Level Transmitter Fails Low.		
3		N-BOPO	A Tornado Warning is issued for the plant		
4		C- BOPO	Condensate pump FW-2B trips, no backup autostart		
5		C-ATCO T-CRS	Charging Pump, CH-1B, Degraded Performance		
6		C-ATCO T-CRS	Component Cooling Water Pump AC-3A trips, No autostart		
7		M-All	Steam Generator A Tube Rupture		
8		C-ATCO	HPSI Pump, SI-2A, Fails to start		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor (T)echnical Specification					

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	6
2. Malfunctions after EOP entry (1–2)	1
3. Abnormal events (2–4)	2
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	0
7. Critical tasks (2–3)	3

Facility: Fort Calhoun		Scenario No: 2010-2		Revision: 2	
Examiners: _____ _____ _____			Operators: _____ _____ _____		
Initial Conditions: Plant at 50% due to only having one condensate pump available					
Turnover: Diesel Generator D-2 out of service. Condensate Pumps FW-2A and FW-2C tagged out. FW-10 Surveillance Test OP-ST-AFW-0004 in Progress.					
Event No.	Malf No.	Event Type*	Event Description		
1		N-BOPO T-CRS	FW-10 Surveillance Test (fails)		
2		C-ATCO T-CRS	CR HVAC Unit VA-46B Fails		
3		I-ATCO T-CRS	WR NI Channel "D" Fails Low		
4		C-ALL	Waste Gas Decay Tank "D" Ruptures		
5		C-ATCO	Two Reactor Coolant Pumps Seals Fail on RC-3A		
6		R-ATCO N-BOPO	AOP-05 Power Reduction		
7		M-ALL	Steam line Break inside Containment from S/G A		
8		I-ATCO	CPHS Fails to actuate		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	7
2.	Malfunctions after EOP entry (1–2)	1
3.	Abnormal events (2–4)	4
4.	Major transients (1–2)	1
5.	EOPs entered/requiring substantive actions (1–2)	1
6.	EOP contingencies requiring substantive actions (0–2)	0
7.	Critical tasks (2–3)	3



Facility: Fort Calhoun		Scenario No: 2010-3		Revision: 2	
Examiners: _____ _____			Operators: _____ _____		
Initial Conditions: Plant at 100% Power.					
Turnover: Diesel Generator D-1 out of service. Power Range NI channel "A" Out of Service					
Event No.	Malf No.	Event Type*	Event Description		
1		C-ATCO T-CRS	Leak at discharge of CCW Pump. AC-3C		
2		C-BOPO	Instrument Air Compressor CA-1C Trips, backup fails to load		
3		I-ATCO T-CRS	Pressurizer Level Transmitter, LT-101Y, fails high		
4		C-ATCO T-CRS	Power Range NI Channel "C" Upper Detector Failure		
5		R-ATCO N-BOPO	OP-4 Power Reduction		
6		M-ALL	Turbine trip / Reactor Trip		
7		M-ALL	Pressurizer Safety Valve fails open		
8		I-ATCO	PPLS Fails to actuate, Diesel Generator D-2 Fails to start		
9		M-ALL	Loss of 161 KV - Station Blackout		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	8
2.	Malfunctions after EOP entry (1–2)	2
3.	Abnormal events (2–4)	2
4.	Major transients (1–2)	2
5.	EOPs entered/requiring substantive actions (1–2)	1
6.	EOP contingencies requiring substantive actions (0–2)	1
7.	Critical tasks (2–3)	3

Facility: Fort Calhoun		Scenario No: 2010-4		Revision: 3	
Examiners: _____ _____ _____			Operators: _____ _____ _____		
Initial Conditions: Plant Operating at 100% Power.					
Turnover: Continue Full Power Operation					
Event No.	Malf No.	Event Type*	Event Description		
1		I-ATCO T-CRS	RCS DP Transmitter C/114Y Fails low		
2		C-ATCO	Letdown Backpressure Controller, PIC-210, fails which closes PCV-210		
3		I-ALL T-CRS	Loss of Instrument Bus "C"		
4		C-BOPO	FW Pump trips. Backup Pumps fail to auto start		
5		C-BOPO	Bearing Water Pump, AC-9A trips, AC-9B shaft shears		
6		M-All R- ATCO	Manual Reactor Trip, 2 CEAs fail to insert		
7		C-BOPO	Condenser steam dump valves TCV-909-1 and TCV-909-2 Fail Open (SGLS Fails to actuate)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor (T)echnical Specification					

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	6
2.	Malfunctions after EOP entry (1–2)	1
3.	Abnormal events (2–4)	2
4.	Major transients (1–2)	1
5.	EOPs entered/requiring substantive actions (1–2)	1
6.	EOP contingencies requiring substantive actions (0–2)	0
7.	Critical tasks (2–3)	3