

Fort Calhoun Station

2005 NRC Hot License Exam Outline

Submitted to Mr. Tom McKernon, Chief Examiner

Scheduled Exam Dates : 7/8/05 - 7/15/05

Contents of Outline

Proposed Schedule

Outline Introduction

Written Exam Outline

- RO Written Exam Sample Plan (ES-401-2 and ES-401-3 forms, standard and enhanced versions)
- SRO Written Exam Sample Plan (ES-401-2 and ES-401-3 forms, standard and enhanced versions)
- Record of Rejected K/A's (enhanced form for ES-401-4)

Administrative Topics Outline

- Form ES-301-1 (RO)
- Form ES-301-1 (SRO)

Walk-Through Test Outline

- RO Form ES-301-2
- SRO-I Form ES-301-2
- SRO-U Form ES-301-2

Simulator Scenario Outline

- ES-D-1 forms for all scenarios
- ES-301-5 forms
- ES-301-6 forms

Copy of Form ES 201 -3 security agreement as it exists to date

Form ES-201-2 Examination Outline Quality Checklist

Preliminary Schedule for FCS Exam

Friday - 07/08/05

0800- 1300 All take written exam

Monday - 07/11/05

1300 – 1500 Simulator Scenario One (USRO1, RO1, RO3)
1500 – 1700 Simulator Scenario One (USRO2, RO4, RO6)
1700 – 1900 Simulator Scenario One (ISRO2, ISRO1, ISRO3)

Tuesday - 07/12/05

0700 – 0900 Simulator Scenario Two (USRO1, RO2, RO1)
0900 – 1100 Simulator Scenario Two (USRO2, RO5, RO4)
1100 – 1200 Lunch
1200 – 1500 RO Admin
1500 – 1700 Simulator Scenario Two (ISRO3, ISRO2, ISRO1)

Wednesday - 07/13/05

0700 – 0900 Simulator Scenario Three (USRO1, RO3, RO2)
0900 – 1100 Simulator Scenario Three (USRO2, RO6, RO5)
1100 – 1200 Lunch
1200 – 1500 SRO Admin
1500 – 1700 Simulator Scenario Three (ISRO1, ISRO3, ISRO2)

Thursday - 07/14/05

0700 – 0900 Simulator JPM set 1 (RO1, RO2)
 0900 – 1100 Simulator JPM set 1 (RO3, RO4)
 1100 - 1200 Lunch
 1200 - 1400 Simulator JPM set 1 (RO5, RO6)
 1400 - 1600 Simulator JPM set 1 (USRO1, USRO2)
 1600 – 1800 Simulator JPM set 1 (ISRO1, ISRO2)
 1800 – 1900 Simulator JPM set 1 (ISRO3)

Friday - 07/15/05

0700 – 0900 Simulator JPM set 1 (RO1, RO2)	In-Plant JPMs (USRO1, USRO2)
0900 – 1100 Simulator JPM set 1 (RO3, RO4)	In-Plant JPMs (RO1, RO2)
1100 - 1200 Lunch	
1200 - 1400 Simulator JPM set 1 (RO5, RO6)	In-Plant JPMs (RO3, RO4)
1400 – 1600 Simulator JPM set 1 (ISRO1, ISRO2)	In-Plant JPMs (RO5, RO6)
1600 – 1800 Simulator JPM set 1 (ISRO3)	In Plant JPMs (ISRO1, ISRO2)
1800 – 1900	In-Plant JPMs (ISRO3)

Outline Development for 7/2005 Fort Calhoun NRC Exam

This exam outline was developed in accordance with NUREG-1021, Rev 9.

Written Exam Outline

Fort Calhoun has developed a methodology to ensure that the selection of K/A items for the written exam is random and unbiased. The written exam outline was developed using a Microsoft Access database. All K/A items from NUREG-1122, Rev 2 are contained in a table within the database. Items which clearly are not applicable to Fort Calhoun are assigned a flag to prevent them from being sampled. Flagged items are selected using guidance provided in ES-401, attachment 2. Flagged items include the Ice Condenser System K/A's, Non-Combustion Engineering vender specific EPE/APE K/A's, and K/A's only associated with multi-unit plants.

The sample plan is developed as follows:

- A module is run that assigns a random number to each item in the K/A catalog. This module uses a "randomize" routine to ensure that the pattern of random numbers is unique.
- A query is run that presents K/A items belonging to the tier and group being sampled ordered by their associated random number. Minimum and maximum numbers are assigned to topics and categories to prevent over and under sampling. Items are entered in the sample plan as ordered, subject to the pre-established minimums and maximums. If a sampled K/A item has an importance value less than 2.5 with no FCS specific priority, is not applicable to Fort Calhoun or not appropriate for the written exam, it will be tagged and included in the Record of Rejected K/A's along with the reason for rejection. This sampling process is repeated until the tier/group has the required number of items.
- This procedure is repeated for each tier/group combination.
- Additional items are selected for the SRO only questions to meet the SRO tier/group requirements. These items are also presented in order of their associated random number. An additional requirement, for this step, is that the selected K/A items must be associated with 10 CFR 55.43 items.

In addition to the ES-401-2 and ES-401-3 forms, a more detailed listing of the selected K/A item including the full text and a cross reference to the applicable 10 CFR 55.41/43/45 items is provided.

Operating Exam Outline

The Fort Calhoun “PRA Summary Notebook” was used as a resource to ensure that risk-significant items identified in the Fort Calhoun IPE are reflected in the exam. The following risk significant initiating events are included in the operating exams:

- Steam Generator Tube Rupture
- Station Blackout
- Loss of Coolant Accident

It also resulted in the following risk-significant operator actions being evaluated:

- Manually opening a closed breaker to allow D/G to power vital bus.
- Minimizing DC loads following a loss of offsite power.
- Emergency Boration
- Emergency Start of a Diesel-Generator
- Determination of minimum HPSI flow in response to a clogged containment sump strainer

All four simulator scenarios are new.

Audit Exam

There will be no duplication of questions, scenarios, system JPMs or administrative JPMs between the audit exam and the license exam.

Facility: Fort Calhoun		Date of Exam: 07/11/05																
Tier	Group	RO K/A Category Points											SRO-Only Points					
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1	2	1	4	N/A			4	3	N/A			4	18			6	
	2	1	3	1				2	0				2	9			4	
	Tier Totals	3	4	5				6	3				6	27			10	
2. Plant Systems	1	3	1	2	3	2	1	3	3	4	3	3	28			5		
	2	2	1	1	0	0	2	1	1	0	1	1	10			3		
	Tier Totals	5	2	3	3	2	3	4	4	4	4	4	38			8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7
					3		2		2		3							
<p>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).</p> <p>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.</p> <p>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 that are not included on the outline should be added. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.</p> <p>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.</p> <p>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.</p> <p>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</p> <p>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.</p> <p>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. Use duplicate pages for RO and SRO-only exams.</p> <p>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.</p>																		

PWR RO Examination Outline

Printed: 03/29/2005

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			AA1.06 - Control of PZR level	3.6	1
000009 Small Break LOCA / 3					X		EA2.08 - Letdown isolation valve position indication	2.9*	1
000011 Large Break LOCA / 3						X	2.4.6 - Knowledge symptom based EOP mitigation strategies.	3.1	1
000015 RCP Malfunctions / 4				X			AA1.16 - Low-power reactor trip block status lights	3.2*	1
000022 Loss of Rx Coolant Makeup / 2				X			AA1.03 - PZR level trend	3.2	1
000025 Loss of RHR System / 4		X					AK2.03 - Service water or closed cooling water pumps	2.7	1
000026 Loss of Component Cooling Water / 8			X				AK3.02 - The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS	3.6	1
000027 Pressurizer Pressure Control System Malfunction / 3					X		AA2.07 - Makeup flow indication	3.1	1
000038 Steam Gen. Tube Rupture / 3	X						EK1.03 - Natural circulation	3.9	1
000054 Loss of Main Feedwater / 4						X	2.4.50 - Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	3.3	1
000055 Station Blackout / 6						X	2.1.23 - Ability to perform specific system and integrated plant procedures during all modes of plant operation.	3.9	1
000056 Loss of Off-site Power / 6				X			AA1.02 - ESF bus synchronization select switch to close bus tie breakers	4.0*	1
000057 Loss of Vital AC Inst. Bus / 6					X		AA2.01 - Safety injection tank pressure and level indicators	3.7	1
000058 Loss of DC Power / 6						X	2.4.4 - Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0	1
000062 Loss of Nuclear Svc Water / 4			X				AK3.02 - The automatic actions (alignments) within the nuclear service water resulting from the actuation of the ESFAS	3.6	1
000065 Loss of Instrument Air / 8			X				AK3.08 - Actions contained in EOP for loss of instrument air	3.7	1

PWR RO 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	KA Topic	Imp.	Points
CE/E02 Reactor Trip - Stabilization - Recovery / 1			X				EK3.1 - Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics	3.2	1
CE/E05 Steam Line Rupture - Excessive Heat Transfer / 4	X						EK1.1 - Components, capacity, and function of emergency systems	3.0	1
K/A Category Totals:	2	1	4	4	3	4	Group Point Total:	18	

PWR RO 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
000001 Continuous Rod Withdrawal / 1		X					AK2.08 - Individual rod display lights and indications	3.1	1
000024 Emergency Boration / 1	X						AK1.04 - Low temperature limits for boron concentration	2.8	1
000037 Steam Generator Tube Leak / 3				X			AA1.13 - S/G blowdown radiation monitors	3.9	1
000060 Accidental Gaseous Radwaste Rel. / 9		X					AK2.02 - Auxiliary building ventilation system	2.7	1
000068 Control Room Evac. / 8		X					AK2.02 - Reactor trip system	3.7	1
000074 Inad. Core Cooling / 4				X			EA1.05 - PORV	3.9	1
CE/A11 RCS Overcooling - PTS / 4						X	2.2.22 - Knowledge of limiting conditions for operations and safety limits.	3.4	1
CE/A16 Excess RCS Leakage / 2						X	2.1.30 - Ability to locate and operate components, including local controls.	3.9	1
CE/E09 Functional Recovery			X				EK3.2 - Normal, abnormal and emergency operating procedures associated with (Functional Recovery)	3.2	1
K/A Category Totals:	1	3	1	2	0	2	Group Point Total:	9	

PWR RO Examination Outline

Printed: 03/29/2005

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					A1.08 - Seal water temperature	2.5	1
003 Reactor Coolant Pump									X			A3.04 - RCS flow	3.6	1
004 Chemical and Volume Control								X				A2.16 - T-ave. and T-ref. deviations	3.2	1
004 Chemical and Volume Control										X		A4.12 - Boration/dilution batch control	3.8	1
005 Residual Heat Removal				X								K4.02 - Modes of operation	3.2	1
005 Residual Heat Removal					X							K5.02 - Need for adequate subcooling	3.4	1
006 Emergency Core Cooling									X			A3.06 - Valve lineups	3.9	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									K3.02 - CRDS	2.9	1
010 Pressurizer Pressure Control							X					A1.09 - Tail pipe temperature and acoustic monitors	3.4	1
012 Reactor Protection											X	2.1.32 - Ability to explain and apply all system limits and precautions.	3.4	1
013 Engineered Safety Features Actuation											X	2.1.2 - Knowledge of operator responsibilities during all modes of plant operation.	3.0	1
013 Engineered Safety Features Actuation	X											K1.12 - ED/G	4.1	1
022 Containment Cooling								X				A2.04 - Loss of service water	2.9*	1
026 Containment Spray	X											K1.02 - Cooling water	4.1	1
039 Main and Reheat Steam				X								K4.05 - Automatic isolation of steam line	3.7	1
059 Main Feedwater				X								K4.18 - Automatic feedwater reduction on plant trip	2.8*	1
059 Main Feedwater									X			A3.06 - Feedwater isolation	3.2*	1
061 Auxiliary/Emergency Feedwater							X					A1.04 - AFW source tank level	3.9	1
062 AC Electrical Distribution											X	2.4.50 - Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	3.3	1
063 DC Electrical Distribution										X		A4.03 - Battery discharge rate	3.0*	1
063 DC Electrical Distribution	X											K1.02 - AC electrical system	2.7	1

PWR RO Examination Outline

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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						K6.07 - Air receivers	2.7	1
064 Emergency Diesel Generator								X				A2.11 - Conditions (minimum load) required for unloading an ED/G	2.6	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									K3.02 - Systems having pneumatic valves and controls	3.4	1
103 Containment									X			A3.01 - Containment isolation	3.9	1
K/A Category Totals:	3	1	2	3	2	1	3	3	4	3	3	Group Point Total:	28	

PWR RO Examination Outline

Printed: 03/29/2005

Facility: Fort Calhoun

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											K1.05 - NIS and RPS	4.5	1
002 Reactor Coolant						X						K6.03 - Reactor vessel level indication	3.1	1
011 Pressurizer Level Control		X										K2.01 - Charging pumps	3.1	1
014 Rod Position Indication										X		A4.02 - Control rod mode-select switch	3.4	1
017 In-core Temperature Monitor	X											K1.01 - Plant computer	3.2*	1
033 Spent Fuel Pool Cooling							X					A1.02 - Radiation monitoring systems	2.8	1
035 Steam Generator								X				A2.06 - Small break LOCA	4.5	1
041 Steam Dump/Turbine Bypass Control											X	2.4.4 - Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0	1
045 Main Turbine Generator			X									K3.01 - Remainder of the plant	2.9	1
086 Fire Protection						X						K6.04 - Fire, smoke, and heat detectors	2.6	1
K/A Category Totals:	2	1	1	0	0	2	1	1	0	1	1	Group Point Total:	10	

PWR RO Examination Outline

Printed: 03/29/2005

Facility: Fort Calhoun

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											K1.05 - NIS and RPS	4.5	1
002 Reactor Coolant						X						K6.03 - Reactor vessel level indication	3.1	1
011 Pressurizer Level Control		X										K2.01 - Charging pumps	3.1	1
014 Rod Position Indication										X		A4.02 - Control rod mode-select switch	3.4	1
017 In-core Temperature Monitor	X											K1.01 - Plant computer	3.2*	1
033 Spent Fuel Pool Cooling							X					A1.02 - Radiation monitoring systems	2.8	1
035 Steam Generator								X				A2.06 - Small break LOCA	4.5	1
041 Steam Dump/Turbine Bypass Control											X	2.4.4 - Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0	1
045 Main Turbine Generator			X									K3.01 - Remainder of the plant	2.9	1
086 Fire Protection						X						K6.04 - Fire, smoke, and heat detectors	2.6	1
K/A Category Totals:	2	1	1	0	0	2	1	1	0	1	1	Group Point Total:	10	

Generic Knowledge and Abilities Outline (Tier 3)

PWR RO Examination Outline

Printed: 03/29/2005

Facility: Fort Calhoun

Form ES-401-3

<u>Generic Category</u>	<u>KA</u>	<u>KA Topic</u>	<u>Imp.</u>	<u>Points</u>
Conduct of Operations	2.1.2	Knowledge of operator responsibilities during all modes of plant operation.	3.0	1
	2.1.3	Knowledge of shift turnover practices.	3.0	1
	2.1.29	Knowledge of how to conduct and verify valve lineups.	3.4	1
	Category Total:			3
Equipment Control	2.2.13	Knowledge of tagging and clearance procedures.	3.6	1
	2.2.30	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.5	1
	Category Total:			2
Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	2.6	1
	2.3.2	Knowledge of facility ALARA program.	2.5	1
	Category Total:			2
Emergency Procedures/Plan	2.4.6	Knowledge symptom based EOP mitigation strategies.	3.1	1
	2.4.15	Knowledge of communications procedures associated with EOP implementation.	3.0	1
	2.4.23	Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.	2.8	1
	Category Total:			3

Generic Total: 10

EPE/APE Tier 1 / Group 1

000008	Pressurizer Vapor Space Accident				1		
000009	Small Break LOCA					1	
000011	Large Break LOCA						1
000017	Reactor Coolant Pump Malfunctions (Loss of RC Flow)				1		
000022	Loss of Reactor Coolant Makeup				1		
000025	Loss of Residual Heat Removal System		1				
000026	Loss of Component Cooling Water			1			
000027	Pressurizer Pressure Control System Malfunction					1	
000038	Steam Generator Tube Rupture	1					
000054	Loss of Main Feedwater						1
000055	Station Blackout						1
000056	Loss of Off-Site Power				1		
000057	Loss of Vital AC Electrical Instrument Bus					1	
000058	Loss of DC Power						1
000062	Loss of Nuclear Service Water			1			
000065	Loss of Instrument Air			1			
CE-E02	Reactor Trip Recovery			1			
CE-E05	Excess Steam Demand	1					
		2	1	4	4	3	4

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18

EPE/APE Tier 1 / Group 2

000001	Continuous Rod Withdrawal		1				
000024	Emergency Boration	1					
000037	Steam Generator Tube Leak				1		
000060	Accidental Gaseous Radwaste Release		1				
000068	Control Room Evacuation		1				
000074	Inadequate Core Cooling				1		
CE-A11	RCS Overcooling						1
CE-A16	Excess RCS Leakage						1
CE-E09	Functional Recovery			1			
		1	3	1	2		2

1
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1
9

Grand Total of EPE/APE K&A Selection:

3	4	5	6	3	6
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27

PWR RO Written Examination Outline Summary

Mar 29, 2005 10:47 AM

Page 1 of 1

System/Mode	System Title	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Points
Plant System Tier 2 / Group 1													
003000	Reactor Coolant Pump System							1		1			2
004000	Chemical and Volume Control System								1		1		2
005000	Residual Heat Removal System				1	1							2
006000	Emergency Core Cooling System									1			1
007000	Pressurizer Relief Tank / Quench Tank System					1							1
008000	Component Cooling Water System			1									1
010000	Pressurizer Pressure Control System							1					1
012000	Reactor Protection System											1	1
013000	Engineered Safety Features Actuation System	1										1	2
022000	Containment Cooling System								1				1
026000	Containment Spray System	1											1
039000	Main and Reheat Steam System				1								1
059000	Main Feedwater System				1					1			2
061000	Auxiliary / Emergency Feedwater System							1					1
062000	A.C. Electrical Distribution											1	1
063000	D.C. Electrical Distribution	1									1		2
064000	Emergency Diesel Generators						1		1				2
073000	Process Radiation Monitoring System										1		1
076000	Service Water System		1										1
078000	Instrument Air System			1									1
103000	Containment System									1			1
		3	1	2	3	2	1	3	3	4	3	3	28

Plant System Tier 2 / Group 2													
001000	Control Rod Drive System	1											1
002000	Reactor Coolant System						1						1
011000	Pressurizer Level Control System		1										1
014000	Rod Position Indication System									1			1
017000	In-Core Temperature Monitor System	1											1
033000	Spent Fuel Pool Cooling System							1					1
035000	Steam Generator System								1				1
041000	Steam Dump System and Turbine Bypass Control											1	1
045000	Main Turbine Generator System			1									1
086000	Fire Protection System						1						1
		2	1	1			2	1	1		1	1	10

Grand Total of Plant System K&A Selection:

5	2	3	3	2	3	4	4	4	4	4	4	38
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PWR RO Written Examination Outline Summary

System/Mode	System Title	Cat 1	Cat 2	Cat 3	Cat 4	Points
Generic Knowledge and Abilities Tier 3						
000000	Generic Knowledges and Abilities	3	2	2	3	10
		3	2	2	3	10

Grand Total of Generic K&A Selection:

3	2	2	3	10
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PWR RO Written Examination Outline

Mar 29, 2005 10:47 AM

Page 1 of 8

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier	1	Group	1		
000008	Pressurizer Vapor Space Accident	AA1.06	Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident:: Control of PZR level	3.6	41.7 / 45.5 / 45.6
000009	Small Break LOCA	EA2.08	Ability to determine or interpret the following as they apply to a small break LOCA:: Letdown isolation valve position indication	2.9*	43.5 / 45.13
000011	Large Break LOCA	2.4.06	: Knowledge symptom based EOP mitigation strategies.	3.1	41.10 / 43.5 / 45.13
000017	Reactor Coolant Pump Malfunctions (Loss of RC Flow)	AA1.16	Ability to operate and / or monitor the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow):: Low-power reactor trip block status lights	3.2*	41.7 / 45.5 / 45.6
000022	Loss of Reactor Coolant Makeup	AA1.03	Ability to operate and / or monitor the following as they apply to the Loss of Reactor Coolant Pump Makeup:: PZR level trend	3.2	41.7 / 45.5 / 45.6
000025	Loss of Residual Heat Removal System	AK2.03	Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following:: Service water or closed cooling water pumps	2.7	41.7 / 45.7
000026	Loss of Component Cooling Water	AK3.02	Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water:: The automatic actions (alignments) within the CCWS/nuclear service water resulting from the actuation of the ESFAS	3.6	41.5 / 41.10 / 45.6 / 45.13
000027	Pressurizer Pressure Control System Malfunction	AA2.07	Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions:: Makeup flow indication	3.1	43.5 / 45.13
000038	Steam Generator Tube Rupture	EK1.03	Knowledge of the operational implications of the following concepts as they apply to the SGTR:: Natural circulation	3.9	41.8 / 41.10 / 45.3
000054	Loss of Main Feedwater	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	3.3	45.3
000055	Station Blackout	2.1.23	: Ability to perform specific system and integrated plant procedures during all modes of plant operation.	3.9	45.2 / 45.6

PWR RO Written Examination Outline (Continued)

Mar 29, 2005 10:47 AM

Page 2 of 8

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
000056	Loss of Off-Site Power	AA1.02	Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power:: ESF bus synchronization select switch to close bus tie breakers	4.0*	41.7 / 45.5 / 45.6
000057	Loss of Vital AC Electrical Instrument Bus	AA2.01	Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus:: Safety injection tank pressure and level indicators	3.7	43.5 / 45.13
000058	Loss of DC Power	2.4.04	: Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0	41.10 / 43.2 / 45.6
000062	Loss of Nuclear Service Water	AK3.02	Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: The automatic actions (alignments) within the nuclear service water resulting from the actuation of the ESFAS	3.6	41.4,41.8/45.7
000065	Loss of Instrument Air	AK3.08	Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air:: Actions contained in EOP for loss of instrument air	3.7	41.5 / 41.10 / 45.6 / 45.13
CE-E02	Reactor Trip Recovery	EK3.01	Knowledge of the reasons for the following responses as they apply to the (Reactor Trip Recovery): Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	3.2	41.5 / 41.10 / 45.6 / 45.13
CE-E05	Excess Steam Demand	EK1.01	Knowledge of the operational implications of the following concepts as they apply to the (Excess Steam Demand): Components, capacity, and function of emergency systems.	3.0	41.8 / 41.10 / 45.3

PWR RO Written Examination Outline (Continued)

Mar 29, 2005 10:47 AM

Page 3 of 8

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier	1	Group	2		
000001	Continuous Rod Withdrawal	AK2.08	Knowledge of the interrelations between the Continuous Rod Withdrawal and the following:: Individual rod display lights and indications	3.1	41.7 / 45.7
000024	Emergency Boration	AK1.04	Knowledge of the operational implications of the following concepts as they apply to Emergency Boration:: Low temperature limits for boron concentration	2.8	41.8 / 41.10 / 45.3
000037	Steam Generator Tube Leak	AA1.13	Ability to operate and / or monitor the following as they apply to the Steam Generator Tube Leak:: S/G blowdown radiation monitors	3.9	41.7 / 45.5 / 45.6
000060	Accidental Gaseous Radwaste Release	AK2.02	Knowledge of the interrelations between the Accidental Gaseous Radwaste Release and the following:: Auxiliary building ventilation system	2.7	41.7 / 45.7
000068	Control Room Evacuation	AK2.02	Knowledge of the interrelations between the Control Room Evacuation and the following:: Reactor trip system	3.7	41.7 / 45.7
000074	Inadequate Core Cooling	EA1.05	Ability to operate and monitor the following as they apply to a Inadequate Core Cooling:: PORV	3.9	41.7 / 45.5 / 45.6
CE-A11	RCS Overcooling	2.2.22	: Knowledge of limiting conditions for operations and safety limits.	3.4	43.2 / 45.2
CE-A16	Excess RCS Leakage	2.1.30	: Ability to locate and operate components, including local controls.	3.9	41.7 / 45.7
CE-E09	Functional Recovery	EK3.02	Knowledge of the reasons for the following responses as they apply to the (Functional Recovery): Normal, abnormal and emergency operating procedures associated with (Functional Recovery).	3.0	41.5 / 41.10 / 45.6 / 45.13

PWR RO Written Examination Outline (Continued)

Mar 29, 2005 10:47 AM

Page 4 of 8

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier	2	Group	1		
003000	Reactor Coolant Pump System	A1.08	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCPS controls including:: Seal water temperature	2.5	41.5 / 45.5
003000	Reactor Coolant Pump System	A3.04	Ability to monitor automatic operation of the RCPS, including:: RCS flow	3.6	41.7 / 45.5
004000	Chemical and Volume Control System	A2.16	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:: T-ave. and T-ref. deviations	3.2	41.5 / 43.5 / 45.3 / 45.5
004000	Chemical and Volume Control System	A4.12	Ability to manually operate and/or monitor in the control room:: Boration/dilution batch control	3.8	41.7 / 45.5 to 45.8
005000	Residual Heat Removal System	K4.02	Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following:: Modes of operation	3.2	41.7
005000	Residual Heat Removal System	K5.02	Knowledge of the operational implications of the following concepts as they apply the RHRS:: Need for adequate subcooling	3.4	41.5 / 45.7
006000	Emergency Core Cooling System	A3.06	Ability to monitor automatic operation of the ECCS, including:: Valve lineups	3.9	41.7 / 45.5
007000	Pressurizer Relief Tank / Quench Tank System	K5.02	Knowledge of the operational implications of the following concepts as the apply to PRTS:: Method of forming a steam bubble in the PZR	3.1	41.5 / 45.7
008000	Component Cooling Water System	K3.02	Knowledge of the effect that a loss or malfunction of the CCWS will have on the following:: CRDS	2.9	41.7 / 45.6
010000	Pressurizer Pressure Control System	A1.09	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PZR PCS controls including:: Tail pipe temperature and acoustic monitors	3.4	41.5 / 45.5
012000	Reactor Protection System	2.1.32	: Ability to explain and apply all system limits and precautions.	3.4	41.10 / 43.2 / 45.12

PWR RO Written Examination Outline (Continued)

Mar 29, 2005 10:47 AM

Page 5 of 8

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
013000	Engineered Safety Features Actuation System	2.1.02	: Knowledge of operator responsibilities during all modes of plant operation.	3.0	41.10 / 45.13
013000	Engineered Safety Features Actuation System	K1.12	Knowledge of the physical connections and/or cause effect relationships between the ESFAS and the following systems:: ED/G	4.1	41.2 to 41.9 / 45.7 to 45.8
022000	Containment Cooling System	A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:: Loss of service water	2.9*	41.5 / 43.5 / 45.3 / 45.13
026000	Containment Spray System	K1.02	Knowledge of the physical connections and/or cause-effect relationships between the CSS and the following systems:: Cooling water	4.1	41.2 to 41.9 / 45.7 to 45.8
039000	Main and Reheat Steam System	K4.05	Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following:: Automatic isolation of steam line	3.7	41.7
059000	Main Feedwater System	A3.06	Ability to monitor automatic operation of the MFW, including:: Feedwater isolation	3.2*	41.7 / 45.5
059000	Main Feedwater System	K4.18	Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following:: Automatic feedwater reduction on plant trip	2.8*	41.7
061000	Auxiliary / Emergency Feedwater System	A1.04	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including:: AFW source tank level	3.9	41.5 / 45.5
062000	A.C. Electrical Distribution	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	3.3	45.3
063000	D.C. Electrical Distribution	A4.03	Ability to manually operate and/or monitor in the control room:: Battery discharge rate	3.0*	41.7 / 45.5 to 45.8
063000	D.C. Electrical Distribution	K1.02	Knowledge of the physical connections and/or cause-effect relationships between the dc electrical system and the following systems:: AC electrical system	2.7	41.2 to 41.9 / 45.7 to 45.8

PWR RO Written Examination Outline (Continued)

Mar 29, 2005 10:47 AM

Page 6 of 8

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
064000	Emergency Diesel Generators	A2.11	Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:: Conditions (minimum load) required for unloading an ED/G	2.6	41.5 / 43.5 / 45.3 / 45.13
064000	Emergency Diesel Generators	K6.07	Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system:: Air receivers	2.7	41.7 / 45.7
073000	Process Radiation Monitoring System	A4.03	Ability to manually operate and/or monitor in the control room:: Check source for operability demonstration	3.1	41.7 / 45.5 to 45.8
076000	Service Water System	K2.01	Knowledge of bus power supplies to the following:: Service water	2.7*	41.7
078000	Instrument Air System	K3.02	Knowledge of the effect that a loss or malfunction of the IAS will have on the following:: Systems having pneumatic valves and controls	3.4	41.7 / 45.6
103000	Containment System	A3.01	Ability to monitor automatic operation of the containment system, including:: Containment isolation	3.9	41.7 / 45.5

PWR RO Written Examination Outline (Continued)

Mar 29, 2005 10:47 AM

Page 7 of 8

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier	2	Group	2		
001000	Control Rod Drive System	K1.05	Knowledge of the physical connections and/or cause-effect relationships between the CRDS and the following systems:: NIS and RPS	4.5	41.2 to 41.9 / 45.7 to 45.8
002000	Reactor Coolant System	K6.03	Knowledge of the effect or a loss or malfunction on the following RCS components:: Reactor vessel level indication	3.1	41.7 / 45.7
011000	Pressurizer Level Control System	K2.01	Knowledge of bus power supplies to the following:: Charging pumps	3.1	41.7
014000	Rod Position Indication System	A4.02	Ability to manually operate and/or monitor in the control room:: Control rod mode-select switch	3.4	41.7 / 45.5 to 45.8
017000	In-Core Temperature Monitor System	K1.01	Knowledge of the physical connections and/or cause-effect relationships between the ITM system and the following systems:: Plant computer	3.2*	41.2 to 41.9 / 45.7 to 45.8
033000	Spent Fuel Pool Cooling System	A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Spent Fuel Pool Cooling System operating the controls including:: Radiation monitoring systems	2.8	41.5 / 45.5
035000	Steam Generator System	A2.06	Ability to (a) predict the impacts of the following malfunctions or operations on the GS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:: Small break LOCA	4.5	41.5 / 43.5 / 45.3 / 45.5
041000	Steam Dump System and Turbine Bypass Control	2.4.04	: Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0	41.10 / 43.2 / 45.6
045000	Main Turbine Generator System	K3.01	Knowledge of the effect that a loss or malfunction of the MT/G system will have on the following:: Remainder of the plant	2.9	41.7 / 45.6
086000	Fire Protection System	K6.04	Knowledge of the effect of a loss or malfunction on the Fire Protection System following will have on the :: Fire, smoke, and heat detectors	2.6	41.7 / 45.7

PWR RO Written Examination Outline (Last Page)

Mar 29, 2005 10:47 AM

Page 8 of 8

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier	3	Group	4		
000000	Generic Knowledges and Abilities	2.1.02	: Knowledge of operator responsibilities during all modes of plant operation.	3.0	41.10 / 45.13
000000	Generic Knowledges and Abilities	2.1.03	: Knowledge of shift turnover practices.	3.0	41.10 / 45.13
000000	Generic Knowledges and Abilities	2.1.29	: Knowledge of how to conduct and verify valve lineups.	3.4	41.10 / 45.1 / 45.12
000000	Generic Knowledges and Abilities	2.2.13	: Knowledge of tagging and clearance procedures.	3.6	41.10 / 45.13
000000	Generic Knowledges and Abilities	2.2.30	: Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.5	45.12
000000	Generic Knowledges and Abilities	2.3.01	: Knowledge of 10CFR20 and related facility radiation control requirements.	2.6	41.12 / 43.4 / 45.9 / 45.10
000000	Generic Knowledges and Abilities	2.3.02	: Knowledge of facility ALARA program.	2.5	41.12 / 43.4 / 45.9 / 45.10
000000	Generic Knowledges and Abilities	2.4.06	: Knowledge symptom based EOP mitigation strategies.	3.1	41.10 / 43.5 / 45.13
000000	Generic Knowledges and Abilities	2.4.15	: Knowledge of communications procedures associated with EOP implementation.	3.0	41.10 / 45.13
000000	Generic Knowledges and Abilities	2.4.23	: Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.	2.8	41.10 / 45.13

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/1	000025 AA1.13	Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System:SWS radiation monitors	No Raw Water Rad monitor in service at FCS
1/1	000025 AA1.19	Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System:Block orifice bypass valve controller and indicators	Not a FCS design feature
1/1	000029 EA1.05	Ability to operate and monitor the following as they apply to a ATWS:BIT outlet valve switches	No BIT at FCS
1/1	000029 EK1.02	Knowledge of the operational implications of the following concepts as they apply to the ATWS:Definition of reactivity	GFE Topic
1/1	000029 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	GFE Topic

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/1	000038 EA2.03	Ability to determine or interpret the following as they apply to a SGTR:Which S/G is ruptured	Will be evaluated during operating exam.
1/1	000038 EA1.37	Ability to operate and monitor the following as they apply to a SGTR:Controlling of thermal shock during PZR spray operation	No specific concern at FCS
1/1	000038 EA1.08	Ability to operate and monitor the following as they apply to a SGTR:Core cooling monitor	Core cooling monitor?
1/1	000062 AA2.06	Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water:The length of time after the loss of SWS flow to a component before that component may be damaged	No specified time limits at FCS
1/2	000001 AA1.01	Ability to operate and / or monitor the following as they apply to the Continuous Rod Withdrawal:Bank select switch	Redundant to sampled K/A 014000 A4.02

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/2	000001 AK1.19	Knowledge of the operational implications of the following concepts as they apply to Continuous Rod Withdrawal: Voids coefficient	GFE Topic
1/2	000001 AK2.02	Knowledge of the interrelations between the Continuous Rod Withdrawal and the following: Controllers and positioners	Rod control is manual only
1/2	000003 AK1.13	Knowledge of the operational implications of the following concepts as they apply to Dropped Control Rod: Interaction of ICS control stations as well as purpose, function, and modes of operation of ICS	No ICS at FCS
1/2	000003 AK1.22	Knowledge of the operational implications of the following concepts as they apply to Dropped Control Rod: Calculation of power defect: algebraic sum of moderator temperature and fuel temperature defects	GFE Topic
1/2	000003 AK1.05	Knowledge of the operational implications of the following concepts as they apply to Dropped Control Rod: CVCS response to dropped rod	Low Importance, no FCS specific priority

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/2	000005 AA2.04	Ability to determine and interpret the following as they apply to the Inoperable / Stuck Control Rod: Interpretation of computer in-core TC map for dropped rod location	Not used by operators to determine dropped rod location
1/2	000060 AK1.02	Knowledge of the operational implications of the following concepts as they apply to Accidental Gaseous Radwaste Release: Biological effects on humans of the various types of radiation, exposure levels that are acceptable for personnel in a nuclear reactor power plant; the units used for radiation intensity measurements and for radiation exposure	Not an RO task related to event
1/2	000060 AA2.03	Ability to determine and interpret the following as they apply to the Accidental Gaseous Radwaste: The steps necessary to isolate a given radioactive-gas leak, using P&IDs	Difficult to provide P&IDs of required size in written exam setting
1/2	000067 AA1.04	Ability to operate and / or monitor the following as they apply to the Plant Fire on Site: Bypass of a heat detector	Not an FCS design feature
2/1	059000 K4.19	Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: Automatic feedwater isolation of MFW	Redundant to sampled K/A 059000 A3.06

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
2/1	076000 K3.02	Knowledge of the effect that a loss or malfunction of the SWS will have on the following:Secondary closed cooling water	No relationship
2/1	076000 K1.09	Knowledge of the physical connections and/or cause- effect relationships between the SWS and the following systems:Reactor building closed cooling water	No separate reactor building CCW system at FCS
2/2	041000 A4.02	Ability to manually operate and/or monitor in the control room:Cooldown valves	Not an FCS design feature
2/2	045000 K4.44	Knowledge of MT/G system design feature(s) and/or interlock(s) which provide for the following:Impulse pressure mode control of steam dumps	Not used at FCS
2/2	071000 A4.19	Ability to manually operate and/or monitor in the control room:Bringing an empty WDGS decay tank on line and shutting down a full tank	Not performed from control room

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
2/2	072000 K4.02	Knowledge of ARM system design feature(s) and/or interlock(s) which provide for the following:Fuel building isolation	Not part of FCS design
2/2	086000 2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	No immediate actions that would be performed prior to implementing procedure for this system

Facility: Fort Calhoun		Date of Exam: 07/11/05																
Tier	Group	RO K/A Category Points											SRO-Only Points					
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1	2	1	4	N/A			4	3	N/A			4	18	3	3	6	
	2	1	3	1				2	0				2	9	3	1	4	
	Tier Totals	3	4	5				6	3				6	27	6	4	10	
2. Plant Systems	1	3	1	2	3	2	1	3	3	4	3	3	28	2	3	5		
	2	2	1	1	0	0	2	1	1	0	1	1	10	1 & K4FH	1	3		
	Tier Totals	5	2	3	3	2	3	4	4	4	4	4	38	4	4	8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7
					3		2		2		3			2	2	1	2	
<p>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).</p> <p>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.</p> <p>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 that are not included on the outline should be added. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.</p> <p>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.</p> <p>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.</p> <p>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</p> <p>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.</p> <p>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. Use duplicate pages for RO and SRO-only exams.</p> <p>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.</p>																		

PWR SRO Examination Outline

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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
000009 Small Break LOCA / 3					X		EA2.25 - Reactor trip setpoints	4.1	1
000015 RCP Malfunctions / 4						X	2.1.32 - Ability to explain and apply all system limits and precautions.	3.8	1
000025 Loss of RHR System / 4					X		AA2.07 - Pump cavitation	3.7	1
000026 Loss of Component Cooling Water / 8					X		AA2.02 - The cause of possible CCW loss	3.6	1
000038 Steam Gen. Tube Rupture / 3						X	2.4.30 - Knowledge of which events related to system operations/status should be reported to outside agencies.	3.6	1
CE/E02 Reactor Trip - Stabilization - Recovery / 1						X	2.2.25 - Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7	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
000068 Control Room Evac. / 8					X		AA2.10 - Source range count rate	4.4*	1
000074 Inad. Core Cooling / 4					X		EA2.02 - Availability of main or auxiliary feedwater	4.6	1
000076 High Reactor Coolant Activity / 9						X	2.1.14 - Knowledge of system status criteria which require the notification of plant personnel.	3.3	1
CE/E09 Functional Recovery					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.4	1
K/A Category Totals:	0	0	0	0	3	1	Group Point Total:	4	

PWR SRO Examination Outline

Printed: 03/29/2005

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
004 Chemical and Volume Control								X				A2.11 - Loss of IAS	4.2	1
006 Emergency Core Cooling											X	2.1.33 - Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4.0	1
007 Pressurizer Relief/Quench Tank								X				A2.05 - Exceeding PRT high-pressure limits	3.6	1
063 DC Electrical Distribution											X	2.2.22 - Knowledge of limiting conditions for operations and safety limits.	4.1	1
103 Containment											X	2.1.32 - Ability to explain and apply all system limits and precautions.	3.8	1
K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	3	Group Point Total:	5	

PWR SRO Examination Outline

Printed: 03/29/2005

Facility: Fort Calhoun

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				A2.13 - ATWS	4.6	1
002 Reactor Coolant											X	2.2.22 - Knowledge of limiting conditions for operations and safety limits.	4.1	1
034 Fuel Handling Equipment				X								K4.01 - Fuel protection from binding and dropping	3.4	1
K/A Category Totals:	0	0	0	1	0	0	0	1	0	0	1	Group Point Total:	3	

Generic Knowledge and Abilities Outline (Tier 3)

PWR SRO Examination Outline

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Facility: Fort Calhoun

Form ES-401-3

<u>Generic Category</u>	<u>KA</u>	<u>KA Topic</u>	<u>Imp.</u>	<u>Points</u>
Conduct of Operations	2.1.4	Knowledge of shift staffing requirements.	3.4	1
	2.1.34	Ability to maintain primary and secondary plant chemistry within allowable limits.	2.9	1
	Category Total:			2
Equipment Control	2.2.5	Knowledge of the process for making changes in the facility as described in the safety analysis report.	2.7	1
	2.2.19	Knowledge of maintenance work order requirements.	3.1	1
	Category Total:			2
Radiation Control	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3	1
	Category Total:			1
Emergency Procedures/Plan	2.4.29	Knowledge of the emergency plan.	4.0	1
	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.	3.6	1
	Category Total:			2
Generic Total:				7

PWR SRO Written Examination Outline

Mar 29, 2005 10:48 AM

Page 1 of 5

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier	1	Group	1		
000009	Small Break LOCA	EA2.25	Ability to determine or interpret the following as they apply to a small break LOCA:: Reactor trip setpoints	4.1	43.5 / 45.13
000017	Reactor Coolant Pump Malfunctions (Loss of RC Flow)	2.1.32	: Ability to explain and apply all system limits and precautions.	3.8	41.10 / 43.2 / 45.12
000025	Loss of Residual Heat Removal System	AA2.07	Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System:: Pump cavitation	3.7	43.5 / 45.13
000026	Loss of Component Cooling Water	AA2.02	Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water:: The cause of possible CCW loss	3.6	43.5 / 45.13
000038	Steam Generator Tube Rupture	2.4.30	: Knowledge of which events related to system operations/status should be reported to outside agencies.	3.6	43.5 / 45.11
CE-E02	Reactor Trip Recovery	2.2.25	: Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7	43.2

PWR SRO Written Examination Outline (Continued)

Mar 29, 2005 10:48 AM

Page 2 of 5

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier	1	Group	2		
000068	Control Room Evacuation	AA2.10	Ability to determine and interpret the following as they apply to the Control Room Evacuation:: Source range count rate	4.4*	43.5 / 45.13
000074	Inadequate Core Cooling	EA2.02	Ability to determine or interpret the following as they apply to a Inadequate Core Cooling:: Availability of main or auxiliary feedwater	4.6	43.5 / 45.13
000076	High Reactor Coolant Activity	2.1.14	: Knowledge of system status criteria which require the notification of plant personnel.	3.3	43.5 / 45.12
CE-E09	Functional Recovery	EA2.01	Ability to determine and interpret the following as they apply to the (Functional Recovery): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.4	43.5 / 45.13

PWR SRO Written Examination Outline (Continued)

Mar 29, 2005 10:48 AM

Page 3 of 5

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier	2	Group	1		
004000	Chemical and Volume Control System	A2.11	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:: Loss of IAS	4.2	41.5 / 43.5 / 45.3 / 45.5
006000	Emergency Core Cooling System	2.1.33	: Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4.0	43.2 / 43.3 / 45.3
007000	Pressurizer Relief Tank / Quench Tank System	A2.05	Ability to (a) predict the impacts of the following malfunctions or operations on the P S; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:: Exceeding PRT high-pressure limits	3.6	41.5 / 43.5 / 45.3 / 45.13
063000	D.C. Electrical Distribution	2.2.22	: Knowledge of limiting conditions for operations and safety limits.	4.1	43.2 / 45.2
103000	Containment System	2.1.32	: Ability to explain and apply all system limits and precautions.	3.8	41.10 / 43.2 / 45.12

PWR SRO Written Examination Outline (Continued)

Mar 29, 2005 10:48 AM

Page 4 of 5

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier	2	Group	2		
001000	Control Rod Drive System	A2.13	Ability to (a) predict the impacts of the following malfunction or operations on the CRDS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:: ATWS	4.6	41.5 / 43.5 / 45.3 / 45.13
002000	Reactor Coolant System	2.2.22	: Knowledge of limiting conditions for operations and safety limits.	4.1	43.2 / 45.2
034000	Fuel Handling Equipment System	K4.01	Knowledge of design feature(s) and/or interlock(s) which provide for the following:: Fuel protection from binding and dropping	3.4	41.7

PWR SRO Written Examination Outline (Last Page)

Mar 29, 2005 10:48 AM

Page 5 of 5

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier	3	Group	4		
000000	Generic Knowledges and Abilities	2.1.04	: Knowledge of shift staffing requirements.	3.4	41.10 / 43.2
000000	Generic Knowledges and Abilities	2.1.34	: Ability to maintain primary and secondary plant chemistry within allowable limits.	2.9	41.10 / 43.5 / 45.12
000000	Generic Knowledges and Abilities	2.2.05	: Knowledge of the process for making changes in the facility as described in the safety analysis report.	2.7	43.3 / 45.13
000000	Generic Knowledges and Abilities	2.2.19	: Knowledge of maintenance work order requirements.	3.1	43.5 / 45.13
000000	Generic Knowledges and Abilities	2.3.10	: Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3	43.4 / 45.10
000000	Generic Knowledges and Abilities	2.4.29	: Knowledge of the emergency plan.	4.0	43.5 / 45.11
000000	Generic Knowledges and Abilities	2.4.45	: Ability to prioritize and interpret the significance of each annunciator or alarm.	3.6	43.5 / 45.3 / 45.12

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/1	000008 AA2.05	Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: PORV isolation (block) valve switches and indicators	not SRO level K/A
1/1	000017 2.4.30	Knowledge of which events related to system operations/status should be reported to outside agencies.	RCP Malfunction would not be reported to outside agencies
1/1	000017 AA2.07	Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Calculation of expected values of flow in the loop with RCP secured	Operators do not calculate flow in this situation
1/1	000022 2.4.30	Knowledge of which events related to system operations/status should be reported to outside agencies.	Event would not be reported

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/1	000038 EA2.05	Ability to determine or interpret the following as they apply to a SGTR:Causes and consequences of shrink and swell in S/Gs	Difficult to write SRO level question
1/1	000056 AA2.29	Ability to determine and interpret the following as they apply to the Loss of Offsite Power:Service water booster pump ammeter and flowmeter	No service water booster pump at FCS
1/1	000056 AA2.28	Ability to determine and interpret the following as they apply to the Loss of Offsite Power:Auxiliary building gas treatment indicator	No AB gas treatment indicator at FCS
1/1	000062 AA2.06	Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water:The length of time after the loss of SWS flow to a component before that component may be damaged	No specified time limits at FCS

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/2	000003 2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	Will be evaluated in operating exam
1/2	000003 AA2.02	Ability to determine and interpret the following as they apply to the Dropped Control Rod:Signal inputs to rod control system	Rod Control is manual at FCS
1/2	000005 AA2.04	Ability to determine and interpret the following as they apply to the Inoperable / Stuck Control Rod:Interpretation of computer in-core TC map for dropped rod location	Not used by operators to determine dropped rod location
1/2	000028 2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	No Tech Spec on pressurizer level

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/2	000033 AA2.12	Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation:Maximum allowable channel disagreement	No maximum allowable for wide range NI's, not used for RPS
1/2	000037 AA2.13	Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak:Which S/G is leaking	Will be evaluated in operating exam
1/2	000037 AA2.02	Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak:Agreement/disagreement among redundant radiation monitors	Will be evaluated during simulator scenario
1/2	CE-A13 2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	RO level knowledge, Difficult to write SRO level question

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
2/1	039000 2.4.30	Knowledge of which events related to system operations/status should be reported to outside agencies.	Would not be reported to outside agencies
2/1	062000 A2.09	Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:Consequences of exceeding current limitations	Difficult to write operationally valid SRO level Question.
2/2	001000 A2.20	Ability to (a) predict the impacts of the following malfunction or operations on the CRDS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:Isolation of left coil on affected rod to prevent coil burnout	Does not apply to FCS CRD system
2/2	056000 2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	Not an SRO Task

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
2/2	056000 A2.12	Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:Opening of the heater string bypass valve	Low SRO importance, no plant specific priority
3/4	000000 2.2.22	Knowledge of limiting conditions for operations and safety limits.	Already used as system generic
3/4	000000 2.3.06	Knowledge of the requirements for reviewing and approving release permits.	Will be evaluated in operating exam
3/4	000000 2.2.33	Knowledge of control rod programming.	Not an RO or SRO task at FCS

Facility: Fort CalhounDate of Examination: 07/11/05

Examination Level : RO

Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M	Administrative JPM – Calculate shutdown margin with a known inoperable CEA K/A 2.1.7 (RO 3.7)
Conduct of Operations	N	Administrative JPM – Determine minimum HPSI flow required to remove decay heat following sump strainer blockage K/A 2.1.25 (RO 2.8)
Equipment Control	N	Administrative JPM - Verify boration path during plant shutdown conditions with equipment out of service K/A 2.2.24 (RO 2.6)
Radiation Control	M	Administrative JPM – RCA Entry and Exit (Discover spill of potentially radioactive liquid) K/A 2.3.1 (RO 2.6) (Conducted in Radiation Worker Training Facility)
Emergency 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 (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) (S)imulator		

Facility: Fort CalhounDate of Examination: 07/11/05

Examination Level : SRO

Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M	Administrative JPM – Review shutdown margin calculation with a known inoperable CEA K/A 2.1.7 (SRO 3.7)
Conduct of Operations	M	Administrative JPM – Determine equipment operability requirements during mode transition K/A 2.1.22 (SRO 3.3)
Equipment Control	D	Administrative JPM – Review required shift surveillance OP-ST-SHIFT-0001 K/A 2.2.12 (SRO 3.4)
Radiation Control	N	Administrative JPM – Authorize Waste Gas Decay Tank Release K/A 2.3.6 (SRO 3.1)
Emergency Plan	M	Administrative JPM – Classify Event and make Protective Action Recommendations K/A 2.4.41 (SRO 4.1), K/A 2.4.44 (SRO 4.0)

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
- (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)
- (S)imulator

Facility: <u>Fort Calhoun</u>	Date of Examination: <u>07/11/05</u>
Exam Level : RO	Operating Test No.: _____

Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)		
System / JPM Title	Type Code*	Safety Function
a. 006 / JPM-0329 Fill Safety Injection Tank K/A 006000 A3.01 (RO 4.0 / SRO 3.9)	S , D	2
b. 022 / JPM-0718 Place Containment Cooling Unit in Service K/A 022000 A4.01 (RO 3.6 / SRO 3.6)	S , D	5
c. 012 / JPM-0778 Adjust T-Cold Calibration K/A 012000 A1.01 (RO 2.9 / SRO 3.4)	S , D	7
d. 086 JPM-NRC4 Restore CR Ventilation following smoke alarm K/A 000067 AA1.05 (RO 3.0 / SRO 3.1)	S, D, A	8
e. 062 / JPM-0042 Cross Connect Instrument Busses K/A 062000 A2.10 (RO 3.0 / SRO 3.3)	S, D	6
f. 003 / JPM-0613A Shutdown a Reactor Coolant Pump K/A 003000 A4.06 (RO 2.9 / SRO 2.9)	S, M, A, L	4P
g. 061 / AFW Functional Test of Circuits and Components K/A 061000 K4.02 (RO 4.5 / SRO 4.6)	S, N, L	4S
h. 003 / Reduce RCS Pressure using Auxiliary Spray K/A 010000 A4.01 (RO 3.7 / SRO 3.5)	S, N	3
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i. 078 / JPM-0225 Air Compressor Backup Cooling K/A 078000 K1.04 (RO 2.6 / SRO 2.9)	M, E	8
j. 064 / Local Emergency Start of a Diesel Generator K/A 064000 A4.06 (RO 3.9 / SRO 3.9)	N, A, E	6
k. 071 / Transfer waste gas from vent header to decay tank K/A 071000 A4.05 (RO 2.6 / SRO 2.6)	D, P, R, A	9
@ All control room (and in-plant) systems must be different and 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	$\geq 1 / \geq 1 / \geq 1$
(L)ow-Power	$\geq 1 / \geq 1 / \geq 1$
(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>Fort Calhoun</u>	Date of Examination: <u>07/11/05</u>
Exam Level : SRO-I	Operating Test No.: _____
Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)	
System / JPM Title	Type Code*
Safety Function	
a. 006 / JPM-0329 Fill Safety Injection Tank K/A 006000 A3.01 (RO 4.0 / SRO 3.9)	S , D
b. 022 / JPM-0718 Place Containment Cooling Unit in Service K/A 022000 A4.01 (RO 3.6 / SRO 3.6)	S , D
c. 012 / JPM-0778 Adjust T-Cold Calibration K/A 012000 A1.01 (RO 2.9 / SRO 3.4)	S , D
d. 086 JPM-NRC4 Restore CR Ventilation following smoke alarm K/A 000067 AA1.05 (RO 3.0 / SRO 3.1)	S, D, A
e.	
f. 003 / JPM-0613A Shutdown a Reactor Coolant Pump K/A 003000 A4.06 (RO 2.9 / SRO 2.9)	S, M, A, L
g. 061 / AFW Functional Test of Circuits and Components K/A 061000 K4.02 (RO 4.5 / SRO 4.6)	S, N, L
h. 003 / Reduce RCS Pressure using Auxiliary Spray K/A 010000 A4.01 (RO 3.7 / SRO 3.5)	S, N
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)	
i. 078 / JPM-0225 Air Compressor Backup Cooling K/A 078000 K1.04 (RO 2.6 / SRO 2.9)	M, E
j. 064 / Local Emergency Start of a Diesel Generator K/A 064000 A4.06 (RO 3.9 / SRO 3.9)	N, A, E
k. 071 / Transfer waste gas from vent header to decay tank K/A 071000 A4.05 (RO 2.6 / SRO 2.6)	D, P, R, A
@ All control room (and in-plant) systems must be different and 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	$\geq 1 / \geq 1 / \geq 1$
(L)ow-Power	$\geq 1 / \geq 1 / \geq 1$
(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>Fort Calhoun</u>	Date of Examination: <u>07/11/05</u>
Exam Level : SRO-U	Operating Test No.: _____
Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)	
System / JPM Title	Type Code*
Safety Function	
a.	
b.	
c.	
d.	
e.	
f. 003 / JPM-0613A Shutdown a Reactor Coolant Pump K/A 003000 A4.06 (RO 2.9 / SRO 2.9)	S, M, A, L
g. 061 / AFW Functional Test of Circuits and Components K/A 061000 K4.02 (RO 4.5 / SRO 4.6)	S, N, L
h.	
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)	
i. 078 / JPM-0225 Air Compressor Backup Cooling K/A 078000 K1.04 (RO 2.6 / SRO 2.9)	M, E
j. 064 / Local Emergency Start of a Diesel Generator K/A 064000 A4.06 (RO 3.9 / SRO 3.9)	N, A, E
k. 071 / Transfer waste gas from vent header to decay tank K/A 071000 A4.05 (RO 2.6 / SRO 2.6)	D, P, R, A
@ All control room (and in-plant) systems must be different and 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	$\geq 1 / \geq 1 / \geq 1$
(L)ow-Power	$\geq 1 / \geq 1 / \geq 1$
(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: Fort Calhoun		Scenario No: 2005 - 1		Op-Test No. _____	
Examiners: _____ _____ _____			Operators: _____ _____ _____		
Initial Conditions: 100% Power					
Turnover: CCW-Pump, AC-3A and Diesel Driven AFW pump FW-54 are tagged out of service Maintain Power Operations					
Event No.	Malf No.	Event Type*	Event Description		
1		I - ATC	Letdown flow transmitter fails high – letdown isolates		
2		I - BOP	S/G pressure transmitter fails high – manual FW flow control required		
3		C - BOP	IA compressor trips, standby does not load		
4		C – ATC	Dropped CEA – T/S Entry		
5		R – ATC N - BOP	TS Required power reduction to 70%		
6		C - ATC	Instrument Bus Fails – T/S Entry		
7		M - ALL	Main steam line break inside containment		
8		C - BOP	Turbine fails to trip		
9		I – ATC or BOP	CPHS Fails to Actuate		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Facility: Fort Calhoun		Scenario No: 2005 - 2		Op-Test No. _____
Examiners: _____ _____ _____			Operators: _____ _____ _____	
Initial Conditions: 100% Power				
Turnover: CCW-Pump, AC-3A and Diesel Driven AFW pump FW-54 are tagged out of service Maintain Power Operations				
Event No.	Malf No.	Event Type*	Event Description	
1		I - ATC	Power Range NI Channel Fails – T/S entry	
2		I - BOP	S/G flow transmitter fails low	
3		C - BOP	Bearing Water Pump Trips	
4		I -ATC	RCS T-hot fails – T/S entry	
5		C - ATC	Charging Pump degraded performance	
6		M - ALL	Steam Generator Tube Rupture	
7		R - ATC	2 CEAs fail to insert – Emergency Boration Required	
8		I - BOP	RM-057 (Condenser offgas radiation monitor) fails “as is” (Aux Steam Isolation valve, RC-978, does not get close signal)	
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor				

Facility: Fort Calhoun	Scenario No: 2005 - 3	Op-Test No. _____	
Examiners: _____ _____ _____		Operators: _____ _____ _____	
Initial Conditions: 50% Power			
Turnover: Heater Drain pumps FW- 5A and FW-5C are tagged out of service. Power held at 50% pending repair of at least one of the heater drain pumps.			
Event No.	Malf No.	Event Type*	Event Description
1		C – ATC or BOP	D/G Radiator Leak – T/S Entry
2		I - BOP	PT-910 Fails High
3		I - ATC	Letdown heat exchanger temperature transmitter fails low
4		C - BOP	Loss of 161 KV – T/S Entry
5		I - ATC	Pressurizer pressure transmitter fails high
6		I - BOP	S/G level transmitter fails high
7		C - ATC	Raw Water header leak
8		M - ALL	LOCA with Loss of offsite power
9		C-BOP	Circulating Water Pump Breaker fails to open, D/G breaker does not close.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: Fort Calhoun		Scenario No: 2005 – 4 (spare)		Op-Test No. _____	
Examiners: _____ _____ _____			Operators: _____ _____ _____		
Initial Conditions: 50% Power					
Turnover: Heater Drain pumps FW- 5A and FW-5C are tagged out of service. Power held at 50% pending repair of at least one of the heater drain pumps.					
Event No.	Malf No.	Event Type*	Event Description		
1		I - ATC	VCT Level Transmitter Fails Low		
2		I - BOP	S/G pressure transmitter fails low		
3		I - ATC	RCS Flow transmitter failure – T/S Entry		
4		I - BOP	Inadvertent AFAS actuation – T/S Entry		
5		C - ATC	Instrument air to containment isolates		
6		C - BOP	Loss of condenser vacuum		
7		M - ALL	Reactor Trip – no steam dump and bypass valves		
8		C - BOP	S/G safety valve sticks open		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Simulator Scenario/Candidate Cross Reference

Candidates	Scenario One Position	Scenario Two Position	Scenario Three Position
RO1 RO4	ATC	BOP	
RO2 RO5		ATC	BOP
RO3 RO6	BOP		ATC
USRO1 USRO2	SRO	SRO	SRO
ISRO1	ATC	BOP	SRO
ISRO2	SRO	ATC	BOP
ISRO3	BOP	SRO	ATC

Facility: FORT CALHOUN		Date of Exam: 7/11/05		Operating Test No.:											
A P P L I C A N T	E V E N T T Y P E	Scenarios												T O T A L	M I N I M U M
		1			2			3			4				
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION				
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P		
R01 R04 R02 R05 R03 R06 USR01 USR02	RO		5											1	1*
	NOR														1*
	SRO-I		1,4,6			2,3,8								6	4*
	SRO-U		7			6								2	2
	TS														2
	RO				7									1	1*
	NOR														1*
	SRO-I					1,4,5			2,4,6,7					7	4*
	SRO-U					6			8					2	2
	TS														2
	RO														1*
	NOR			5										1	1*
	SRO-I			2,3,8				3,5,7						6	4*
	SRO-U			7				8						2	2
	TS														2
	RO														1*
	NOR														1*
	SRO-I														4*
	SRO-U														2
	TS	4,6			1,4			1,4						6	2

Instructions:

- Circle the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must do one scenario, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position.
- Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. * Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.
- Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author:



NRC Reviewer:

Facility: <u>Fort Calhoun</u> Date of Examination: <u>7/11/05</u> Operating Test No.:																	
Competencies	APPLICANTS																
	R01 R04				R02 R05				R03 R06				USR01, USR02				
	RO/SRO-I/SRO-U				RO/SRO-I/SRO-U				RO/SRO-I/SRO-U				RO/SRO-I/SRO-U				
	SCENARIO				SCENARIO				SCENARIO				SCENARIO				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
	ATC	BOP			ATC	BOP			BOP	ATC			SR0	SR0	SR0		
Interpret/Diagnose Events and Conditions	1,4 6	2,3 6,8			1,4 5,7	2,4 6,8 9			2,3 8	3,5 7,8			1,2 3,6 8,9	1,2 4,6	2 3 8		
Comply With and Use Procedures (1)	5 7	3,6 8			1,4 6,7	4,6 8			5 7 8	5 7 8			5 7 8	1,6	4 7 8		
Operate Control Boards (2)	1 5 6,7	2,3 6,8			1,6 7	2,4 6,9			2,3 5,8	3 5 7,8							
Communicate and Interact	1,4 5,7	2,3 6,8			1,4 6,7	2,4 6,8 9			2 5 8	3 5 7,8			1,2 3,4 7,8	1,2 4,6	1 4 7,8		
Demonstrate Supervisory Ability (3)													2 4 6,7	1 4 6	1 4 7,8		
Comply With and Use Tech. Specs. (3)													4 6	1 4	1 4		

Notes:

(1) Includes Technical Specification compliance for an RO.

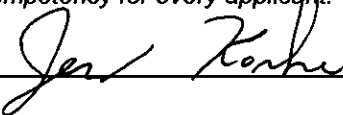
(2) Optional for an SRO-U.

(3) Only applicable to SROs.

Instructions:

Circle the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author:



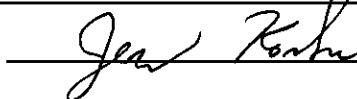
NRC Reviewer:

Facility:		Date of Exam:									Operating Test No.:				
A P P L I C A N T	E V E N T T Y P E	Scenarios												T O T A L	M I N I M U M
		1			2			3			4				
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION				
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P		
ISR01 RO (SRO-I) SRO-U	RX		5											1	1*
	NOR														1*
	I/C		1,4,6			2,3,8								6	4*
	MAJ		7			6								2	2
	TS						1,4							2	2
ISR02 RO (SRO-I) SRO-U	RX				7									1	1*
	NOR														1*
	I/C				1,4,5			2,4,6,9						7	4*
	MAJ				6			8						2	2
	TS	4,6												2	2
ISR03 RO (SRO-I) SRO-U	RX														1*
	NOR			5										1	1*
	I/C			2,3,8				3,5,7						6	4*
	MAJ			7				8						2	2
	TS				1,4									2	2
RO SRO-I SRO-U	RX														1*
	NOR														1*
	I/C														4*
	MAJ														2
	TS														2

Instructions:

1. Circle the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must do one scenario, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position.
2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. * Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.
3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author:



NRC Reviewer:

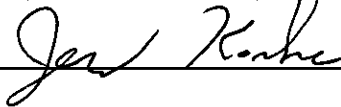
Facility: <u>Fort Calhoun</u> Date of Examination: <u>7/11/05</u> Operating Test No.:																
Competencies	APPLICANTS															
	<u>ISRO1</u>				<u>ISRO2</u>				<u>ISRO3</u>							
	<u>RO/SRO- I/SRO-U</u>				<u>RO/SRO- I/SRO-U</u>				<u>RO/SRO- I/SRO-U</u>				<u>RO/SRO- I/SRO-U</u>			
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	ATC	BoP	SRo		SRo	ATC	BoP		BoP	SRo	ATC					
Interpret/Diagnose Events and Conditions	1,4 6	2,3 6,8	2 3 8		1,2 3,6 8,9	1,4 5,7	2,4 6,8 9		2 3 8	1,2 4,6	3,5 7,8					
Comply With and Use Procedures (1)	5 7	3,6 8	4 7 8		5 7 8	1,4 6,7	4,6 8		5 7 8	1 6	5 7 8					
Operate Control Boards (2)	1,5 6,7	2,3 6,8				1,6 7	2,4 6,9		2,3 5,7 8		3 5 7,8					
Communicate and Interact	1,4 5,7	2,3 6,8	1,4 7,8		1,2 3,4 7,8	1,4 6,7	2,4 6,8 9		2 5 8	1 2 4,6	3,5 7,8					
Demonstrate Supervisory Ability (3)			1,4 7,8		2 4 6,7					1 4 6						
Comply With and Use Tech. Specs. (3)			1 4		4 6					1 4						

Notes:
 (1) Includes Technical Specification compliance for an RO.
 (2) Optional for an SRO-U.
 (3) Only applicable to SROs.

Instructions:

Circle the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author:



NRC Reviewer:

1. Pre-Examination

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of 7/11/05 as of the date of my signature. I agree that I will not knowingly divulge any information about these examinations to any persons who have not been authorized by the NRC chief examiner. I understand that I am not to instruct, evaluate, or provide performance feedback to those applicants scheduled to be administered these licensing examinations from this date until completion of examination administration, except as specifically noted below and authorized by the NRC (e.g., acting as a simulator booth operator or communicator is acceptable if the individual does not select the training content or provide direct or indirect feedback). Furthermore, I am aware of the physical security measures and requirements (as documented in the facility licensee's procedures) and understand that violation of the conditions of this agreement may result in cancellation of the examinations and/or an enforcement action against me or the facility licensee. I will immediately report to facility management or the NRC chief examiner any indications or suggestions that examination security may have been compromised.

2. Post-Examination

To the best of my knowledge, I did not divulge to any unauthorized persons any information concerning the NRC licensing examinations administered during the week(s) of _____. From the date that I entered into this security agreement until the completion of examination administration, I did not instruct, evaluate, or provide performance feedback to those applicants who were administered these licensing examinations, except as specifically noted below and authorized by the NRC.

PRINTED NAME	JOB TITLE / RESPONSIBILITY	SIGNATURE (1)	DATE	SIGNATURE (2)	DATE NOTE
1. <u>Terry Hoske</u>	<u>Training Consultant</u>	<u>Terry E Hoske</u>	<u>1/10/05</u>		
2. <u>DAVID WEAVERS</u>	<u>SUPERVISOR - Ops & Tech Team</u>	<u>David Weavers</u>	<u>3/28/05</u>		
3. _____	_____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____	_____
6. _____	_____	_____	_____	_____	_____
7. _____	_____	_____	_____	_____	_____
8. _____	_____	_____	_____	_____	_____
9. _____	_____	_____	_____	_____	_____
10. _____	_____	_____	_____	_____	_____
11. _____	_____	_____	_____	_____	_____
12. _____	_____	_____	_____	_____	_____
13. _____	_____	_____	_____	_____	_____
14. _____	_____	_____	_____	_____	_____
15. _____	_____	_____	_____	_____	_____

NOTES:

Facility: <u>Fort Calhoun</u>		Date of Examination: <u>7/11/05</u>		
Item	Task Description	Initials		
		a	b*	c#
1. W R I T T E N	a. Verify that the outline(s) fit(s) the appropriate model, in accordance with ES-401.	EK	AW	
	b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 and whether all K/A categories are appropriately sampled.	EK	AW	
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	EK	AW	
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.	EK	AW	
2. S I M U L A T O R	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, technical specifications, and major transients.	EK	AW	
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity, and ensure that each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s), and that scenarios will not be repeated on subsequent days.	EK	AW	
	c. To the extent possible, assess whether the outline(s) conform(s) with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D.	EK	AW	
3. W / T	a. Verify that the systems walk-through outline meets the criteria specified on Form ES-301-2: (1) the outline(s) contain(s) the required number of control room and in-plant tasks distributed among the safety functions as specified on the form (2) task repetition from the last two NRC examinations is within the limits specified on the form (3) no tasks are duplicated from the applicants' audit test(s) (4) the number of new or modified tasks meets or exceeds the minimums specified on the form (5) the number of alternate path, low-power, emergency, and RCA tasks meet the criteria on the form.	EK	AW	
	b. Verify that the administrative outline meets the criteria specified on Form ES-301-1: (1) the tasks are distributed among the topics as specified on the form (2) at least one task is new or significantly modified (3) no more than one task is repeated from the last two NRC licensing examinations	EK	AW	
	c. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on subsequent days.	EK	AW	
4. G E N E R A L	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam sections.	EK	AW	
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	EK	AW	
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	EK	AW	
	d. Check for duplication and overlap among exam sections.	EK	AW	
	e. Check the entire exam for balance of coverage.	EK	AW	
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	EK	AW	
a. Author <u>Jerry E. Hastic</u> Printed Name/Signature <u>[Signature]</u>		Date <u>3/28/05</u>		
b. Facility Reviewer (*) <u>David E. Weaver</u> <u>[Signature]</u>		Date <u>3/28/05</u>		
c. NRC Chief Examiner (#) _____		_____		
d. NRC Supervisor _____		_____		
Note: # Independent NRC reviewer initial items in Column "c"; chief examiner concurrence required.				

WHAT CHANGED?	CHANGE	Reason for Change
SRO form ES-401-4	Removed K/A 062000 A2.09 from rejected K/A list.	Discussion with Lead Examiner
SRO form ES-401-2	Replaced K/A 007000 A2.05 with 062000 A2.09 (Tier 2/Group 1)	Added previously rejected K/A back into exam (see above)
RO ES-301-2	Replaced Transfer Waste Gas JPM	Lead Examiner Request
	Modified JPM-0042 to an alternate path and renamed it	Too simple as written
	Changed JPM-0613A from "M" to "D"	correction
	Changed JPM-0627 to "A"	correction
SRO-I ES-301-2	Replaced Transfer Waste Gas JPM	Lead Examiner Request
	Replaced JPM-0778 with JPM-0042	To prevent overlap with Administrative JPM
	Modified JPM-0042 to an alternate path and renamed it	Too simple as written
	Changed JPM-0613A from "M" to "D"	correction
	Changed JPM-0627 to "A"	correction
SRO-U ES-301-2	Replaced Transfer Waste Gas JPM	Lead Examiner Request
	Changed JPM-0613A from "M" to "D"	correction
SRO Form ES-301-1	Changed review SDM JPM from SDM with inoperable CEA to SDM with boron depletion	Review SDM with inoperable CEA was used on last SRO exam
Form ES-D-1 scenario 1	Changed event 2 from S/G pressure transmitter to S/G level.	Automatic control system handles failure without operator action

Form ES-D-1 scenario 2	Changed event 2 from S/G flow transmitter to S/G level.	Automatic control system handles failure without operator action
Form ES-D-1 scenario 4 (spare)	Changed event 2 from S/G pressure transmitter to S/G level.	Automatic control system handles failure without operator action

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/1	000008 AA2.05	Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: PORV isolation (block) valve switches and indicators	not SRO level K/A
1/1	000017 2.4.30	Knowledge of which events related to system operations/status should be reported to outside agencies.	RCP Malfunction would not be reported to outside agencies
1/1	000017 AA2.07	Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Calculation of expected values of flow in the loop with RCP secured	Operators do not calculate flow in this situation
1/1	000022 2.4.30	Knowledge of which events related to system operations/status should be reported to outside agencies.	Event would not be reported

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/1	000038 EA2.05	Ability to determine or interpret the following as they apply to a SGTR:Causes and consequences of shrink and swell in S/Gs	Difficult to write SRO level question
1/1	000056 AA2.29	Ability to determine and interpret the following as they apply to the Loss of Offsite Power:Service water booster pump ammeter and flowmeter	No service water booster pump at FCS
1/1	000056 AA2.28	Ability to determine and interpret the following as they apply to the Loss of Offsite Power:Auxiliary building gas treatment indicator	No AB gas treatment indicator at FCS
1/1	000062 AA2.06	Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water:The length of time after the loss of SWS flow to a component before that component may be damaged	No specified time limits at FCS

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/2	000003 2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	Will be evaluated in operating exam
1/2	000003 AA2.02	Ability to determine and interpret the following as they apply to the Dropped Control Rod:Signal inputs to rod control system	Rod Control is manual at FCS
1/2	000005 AA2.04	Ability to determine and interpret the following as they apply to the Inoperable / Stuck Control Rod:Interpretation of computer in-core TC map for dropped rod location	Not used by operators to determine dropped rod location
1/2	000028 2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	No Tech Spec on pressurizer level

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
1/2	000033 AA2.12	Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation:Maximum allowable channel disagreement	No maximum allowable for wide range NI's, not used for RPS
1/2	000037 AA2.13	Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak:Which S/G is leaking	Will be evaluated in operating exam
1/2	000037 AA2.02	Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak:Agreement/disagreement among redundant radiation monitors	Will be evaluated during simulator scenario
1/2	CE-A13 2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	RO level knowledge, Difficult to write SRO level question

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
2/1	039000 2.4.30	Knowledge of which events related to system operations/status should be reported to outside agencies.	Would not be reported to outside agencies
2/2	001000 A2.20	Ability to (a) predict the impacts of the following malfunction or operations on the CRDS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:Isolation of left coil on affected rod to prevent coil burnout	Does not apply to FCS CRD system
2/2	056000 2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	Not an SRO Task
2/2	056000 A2.12	Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:Opening of the heater string bypass valve	Low SRO importance, no plant specific priority

Tier/Group	Randomly Selected K/A	Description	Reason for Rejection
3/4	000000 2.2.22	Knowledge of limiting conditions for operations and safety limits.	Already used as system generic
3/4	000000 2.3.06	Knowledge of the requirements for reviewing and approving release permits.	Will be evaluated in operating exam
3/4	000000 2.2.33	Knowledge of control rod programming.	Not an RO or SRO task at FCS

Facility: Fort Calhoun

Printed: 05/30/2005

Date Of Exam: 07/11/2005

Tier	Group	RO K/A Category Points												SRO-Only Points				
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	K	A	A2	G*	
1. Emergency & Abnormal Plant Evolutions	1	0	0	0				0	0			0	0	0	0	3	3	6
	2	0	0	0				0	0			0	0	0	0	3	1	4
	Tier Totals	0	0	0				0	0			0	0	0	0	6	4	10
2. Plant Systems	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	5
	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	3
	Tier Totals	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	4	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 K/A category are sampled within each tier of the RO outline (i.e., the "Tier Totals" in each K/A category shall not be less than two). Refer to Section D.1.c for additional guidance regarding the SRO sampling.
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. Select topics from many systems and evolutions; avoid selecting more than two K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category /tier.
- 6.* 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. The SRO K/As must also be linked to 10 CFR 55.43 or an SRO-level learning objective.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) 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 columns labeled "K" and "A". Use duplicate pages for RO and SRO-only exams.
8. For Tier 3, enter the K/A numbers, descriptions, importance ratings, and point totals on Form ES-401-3.
9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.

PWR SRO Examination Outline

Printed: 05/30/2005

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
000009 Small Break LOCA / 3					X		EA2.25 - Reactor trip setpoints	4.1	1
000015 RCP Malfunctions / 4						X	2.1.32 - Ability to explain and apply all system limits and precautions.	3.8	1
000025 Loss of RHR System / 4					X		AA2.07 - Pump cavitation	3.7	1
000026 Loss of Component Cooling Water / 8					X		AA2.02 - The cause of possible CCW loss	3.6	1
000038 Steam Gen. Tube Rupture / 3						X	2.4.30 - Knowledge of which events related to system operations/status should be reported to outside agencies.	3.6	1
CE/E02 Reactor Trip - Stabilization - Recovery / 1						X	2.2.25 - Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7	1
K/A Category Totals:	0	0	0	0	3	3	Group Point Total:		6

PWR SRO Examination Outline

Printed: 05/30/2005

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
000068 Control Room Evac. / 8					X		AA2.10 - Source range count rate	4.4*	1
000074 Inad. Core Cooling / 4					X		EA2.02 - Availability of main or auxiliary feedwater	4.6	1
000076 High Reactor Coolant Activity / 9						X	2.1.14 - Knowledge of system status criteria which require the notification of plant personnel.	3.3	1
CE/E09 Functional Recovery					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.4	1
K/A Category Totals:	0	0	0	0	3	1	Group Point Total:		4

PWR SRO Examination Outline

Printed: 05/30/2005

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
004 Chemical and Volume Control								X				A2.11 - Loss of IAS	4.2	1
006 Emergency Core Cooling											X	2.1.33 - Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4.0	1
062 AC Electrical Distribution								X				A2.09 - Consequences of exceeding current limitations	3.0*	1
063 DC Electrical Distribution											X	2.2.22 - Knowledge of limiting conditions for operations and safety limits.	4.1	1
103 Containment											X	2.1.32 - Ability to explain and apply all system limits and precautions.	3.8	1
K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	3	Group Point Total:	5	

PWR SRO Examination Outline

Printed: 05/30/2005

Facility: Fort Calhoun

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				A2.13 - ATWS	4.6	1
002 Reactor Coolant											X	2.2.22 - Knowledge of limiting conditions for operations and safety limits.	4.1	1
034 Fuel Handling Equipment				X								K4.01 - Fuel protection from binding and dropping	3.4	1
K/A Category Totals:	0	0	0	1	0	0	0	1	0	0	1	Group Point Total:	3	

Generic Knowledge and Abilities Outline (Tier 3)

PWR SRO Examination Outline

Printed: 05/30/2005

Facility: Fort Calhoun

Form ES-401-3

<u>Generic Category</u>	<u>KA</u>	<u>KA Topic</u>	<u>Imp.</u>	<u>Points</u>
Conduct of Operations	2.1.4	Knowledge of shift staffing requirements.	3.4	1
	2.1.34	Ability to maintain primary and secondary plant chemistry within allowable limits.	2.9	1
	Category Total:			2
Equipment Control	2.2.5	Knowledge of the process for making changes in the facility as described in the safety analysis report.	2.7	1
	2.2.19	Knowledge of maintenance work order requirements.	3.1	1
	Category Total:			2
Radiation Control	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3	1
	Category Total:			1
Emergency Procedures/Plan	2.4.29	Knowledge of the emergency plan.	4.0	1
	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.	3.6	1
	Category Total:			2
Generic Total:				7

Facility: <u>Fort Calhoun</u>	Date of Examination: <u>07/11/05</u>
Exam Level : RO	Operating Test No.: _____

Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)		
System / JPM Title	Type Code*	Safety Function
a. 006 / JPM-0329 Fill Safety Injection Tank K/A 006000 A3.01 (RO 4.0 / SRO 3.9)	S , D	2
b. 022 / JPM-0718 Place Containment Cooling Unit in Service K/A 022000 A4.01 (RO 3.6 / SRO 3.6)	S , D	5
c. 012 / JPM-0778 Adjust T-Cold Calibration K/A 012000 A1.01 (RO 2.9 / SRO 3.4)	S , D	7
d. 086 JPM-0726 Restore CR Ventilation following smoke alarm K/A 000067 AA1.05 (RO 3.0 / SRO 3.1)	S, D, A	8
e. 062 / JPM-0042 Transfer Clutch Power Supply/x-tie inst busses K/A 062000 A2.10 (RO 3.0 / SRO 3.3)	S, M, A	6
f. 003 / JPM-0613A Shutdown a Reactor Coolant Pump K/A 003000 A4.06 (RO 2.9 / SRO 2.9)	S, D, A, L	4P
g. 061 / JPM-0387AFW Functional Test of Circuits and Components K/A 061000 K4.02 (RO 4.5 / SRO 4.6)	S, N, L	4S
h. 003 / JPM-0627 Reduce RCS Pressure using Auxiliary Spray K/A 010000 A4.01 (RO 3.7 / SRO 3.5)	S, N, A	3
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i. 078 / JPM-0225 Air Compressor Backup Cooling K/A 078000 K1.04 (RO 2.6 / SRO 2.9)	M, E	8
j. 064 / JPM-0356 Local Emergency Start of a Diesel Generator K/A 064000 A4.06 (RO 3.9 / SRO 3.9)	N, A, E	6
k. 028 / JPM-0719M Startup Containment Hydrogen Purge and Makeup K/A 068000 A3.02 (RO 3.6 / SRO 3.6)	M, R, E	5
@ All control room (and in-plant) systems must be different and 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	$\geq 1 / \geq 1 / \geq 1$	
(L)ow-Power	$\geq 1 / \geq 1 / \geq 1$	
(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>Fort Calhoun</u>	Date of Examination: <u>07/11/05</u>	
Exam Level : ISRO	Operating Test No.: _____	
Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)		
System / JPM Title	Type Code*	
Safety Function		
a. 006 / JPM-0329 Fill Safety Injection Tank K/A 006000 A3.01 (RO 4.0 / SRO 3.9)	S , D	2
b. 022 / JPM-0718 Place Containment Cooling Unit in Service K/A 022000 A4.01 (RO 3.6 / SRO 3.6)	S , D	5
c.		
d. 086 JPM-0726 Restore CR Ventilation following smoke alarm K/A 000067 AA1.05 (RO 3.0 / SRO 3.1)	S, D, A	8
e. 062 / JPM-0042 Transfer Clutch Power Supply/x-tie inst busses K/A 062000 A2.10 (RO 3.0 / SRO 3.3)	S, M, A	6
f. 003 / JPM-0613A Shutdown a Reactor Coolant Pump K/A 003000 A4.06 (RO 2.9 / SRO 2.9)	S, D, A, L	4P
g. 061 / JPM-0387AFW Functional Test of Circuits and Components K/A 061000 K4.02 (RO 4.5 / SRO 4.6)	S, N, L	4S
h. 003 / JPM-0627 Reduce RCS Pressure using Auxiliary Spray K/A 010000 A4.01 (RO 3.7 / SRO 3.5)	S, N, A	3
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i. 078 / JPM-0225 Air Compressor Backup Cooling K/A 078000 K1.04 (RO 2.6 / SRO 2.9)	M, E	8
j. 064 / JPM-0356 Local Emergency Start of a Diesel Generator K/A 064000 A4.06 (RO 3.9 / SRO 3.9)	N, A, E	6
k. 028 / JPM-0719M Startup Containment Hydrogen Purge and Makeup K/A 068000 A3.02 (RO 3.6 / SRO 3.6)	M, R, E	5
@ All control room (and in-plant) systems must be different and 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	$\geq 1 / \geq 1 / \geq 1$	
(L)ow-Power	$\geq 1 / \geq 1 / \geq 1$	
(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>Fort Calhoun</u>	Date of Examination: <u>07/11/05</u>	
Exam Level : <u>USRO</u>	Operating Test No.: _____	
Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)		
System / JPM Title	Type Code*	Safety Function
a.		
b.		
c.		
d.		
e.		
f. 003 / JPM-0613A Shutdown a Reactor Coolant Pump K/A 003000 A4.06 (RO 2.9 / SRO 2.9)	S, D, A, L	4P
g. 061 / JPM-0387AFW Functional Test of Circuits and Components K/A 061000 K4.02 (RO 4.5 / SRO 4.6)	S, N, L	4S
h.		
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i. 078 / JPM-0225 Air Compressor Backup Cooling K/A 078000 K1.04 (RO 2.6 / SRO 2.9)	M, E	8
j. 064 / JPM-0356 Local Emergency Start of a Diesel Generator K/A 064000 A4.06 (RO 3.9 / SRO 3.9)	N, A, E	6
k. 028 / JPM-0719M Startup Containment Hydrogen Purge and Makeup K/A 068000 A3.02 (RO 3.6 / SRO 3.6)	M, R, E	5
@ All control room (and in-plant) systems must be different and 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	$\geq 1 / \geq 1 / \geq 1$	
(L)ow-Power	$\geq 1 / \geq 1 / \geq 1$	
(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: Fort CalhounDate of Examination: 07/11/05

Examination Level : SRO

Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M	Administrative JPM – Review shutdown margin calculation with boron depletion K/A 2.1.7 (SRO 3.7)
Conduct of Operations	D	Administrative JPM – Determine equipment operability requirements during mode transition K/A 2.1.22 (SRO 3.3)
Equipment Control	M	Administrative JPM – Review required shift surveillance OP-ST-SHIFT-0001 K/A 2.2.12 (SRO 3.4)
Radiation Control	N	Administrative JPM – Authorize Waste Gas Decay Tank Release K/A 2.3.6 (SRO 3.1)
Emergency Plan	M	Administrative JPM – Classify Event and make Protective Action Recommendations K/A 2.4.41 (SRO 4.1), K/A 2.4.44 (SRO 4.0)

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
- (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)
- (S)imulator

Facility: Fort Calhoun		Scenario No: 2005 - 1		Op-Test No. _____	
Examiners: _____ _____ _____			Operators: _____ _____ _____		
Initial Conditions: 100% Power IC#1 { Preset malfunctions: COP RCAF2U1 0%, COP RCAF2U2 0%, MFP EHC02, MFP ESF02A OFF, MFP ESF02B OFF }					
Turnover: CCW-Pump, AC-3A and Diesel Driven AFW pump FW-54 are tagged out of service Maintain Power Operations					
Event No.	Malf No.	Event Type*	Event Description		
1 (3:00)	COP T:F212 160	I - ATC	Letdown flow transmitter fails high – letdown isolates		
2 (10:00)	COP T:L903X 0% 60 sec ramp	I - BOP	S/G “A” level transmitter fails low – manual FW flow control required		
3 (15:00)	COP NCAPCA1C TRIP	C - BOP	IA Compressor trips, standby does not load		
4 (20:00)	MFP CRD06 R1G1 Deenergized	C – ATC	Dropped CEA – T/S Entry		
5	N/A	R – ATC N - BOP	TS Required power reduction to 70%		
6 (35:00)	MFP EDS04B	C - ATC	Instrument Bus Fails – T/S Entry		
7 (45:00)	MSS01A 20% 2 min ramp	M - ALL	Main steam line break inside containment		
8	Preset	C - BOP	Turbine fails to trip		
9	Preset	I – ATC or BOP	CPHS Fails to Actuate		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Facility: Fort Calhoun		Scenario No: 2005 - 2		Op-Test No. _____	
Examiners: _____ _____ _____			Operators: _____ _____ _____		
Initial Conditions: 100% Power (IC#1) (PRESET MFP CRD05I untrip, MFP CRD05H untrip, COP T:R057 69, Start CH-1B, Stop CH-1C)					
Turnover: CCW-Pump, AC-3A and Diesel Driven AFW pump FW-54 are tagged out of service Maintain Power Operations					
Event No.	Malf No.	Event Type*	Event Description		
1 (3:00)	MFP NIS04C	I - ATC	Power Range NI Channel "C" Fails – T/S entry		
2 (10:00)	COP T:L906X 55%	I - BOP	S/G "B" level transmitter fails to 55%		
3 (16:00)	COP NBWPAC9 A trip	C - BOP	Bearing Water Pump AC-9A Trips		
4 (20:00)	T:T122H2 665°F	I - ATC	RCS T-hot fails – T/S entry		
5 (30:00)	MFP CVC16B	C - ATC	Charging Pump CH-1B degraded performance		
6 (40:00)	MFP SGN01A 25%	M - ALL	Steam Generator Tube Rupture		
7	Preset	R - ATC	2 CEAs fail to insert – Emergency Boration Required		
8	Preset	I - BOP	RM-057 (Condenser offgas radiation monitor) fails "as is" (Aux Steam Isolation valve, RC-978, does not get close signal)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Facility: Fort Calhoun		Scenario No: 2005 – 4 (spare)		Op-Test No. _____	
Examiners: _____ _____ _____			Operators: _____ _____ _____		
Initial Conditions: 49% Power {Preset MSS02F 100% E1 30 sec delay} { Place 1A1 and 1A2 on 22 KV, S/D CH-1A}					
Turnover: Heater Drain pumps FW- 5A and FW-5C are tagged out of service. Power held at 50% pending repair of at least one of the heater drain pumps.					
Event No.	Malf No.	Event Type*	Event Description		
1 (3:00)	COP JLB218LL Fail_set	I - ATC	VCT Level Transmitter Fails Low		
2 (8:00)	COP T:L903X 100% 45 sec ramp	I - BOP	S/G “A” Level transmitter fails high		
3 (15:00)	COP T:F114YA 0	I - ATC	RCS Flow transmitter failure – T/S Entry		
4 (22:00)	MFP AFW05A	I - BOP	Inadvertent AFAS actuation – T/S Entry		
5 (30:00)	COP RCAP 849A&B 0%	C - ATC	Instrument air to containment isolates		
6 (40:00)	MFP CND01 100% 300 sec ramp	C - BOP	Loss of condenser vacuum		
7	N/A	M - ALL	Reactor Trip – no steam dump and bypass valves		
8	Preset	C - BOP	S/G safety valve sticks open		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					