PWR RO Written Examination Outline Summary

System/Mode	System Title	K1	K2	K3	A1	A2	G	Points
EPE/APE Tier 1 / Group 1								
000005	Inoperable/Stuck Control Rod						1	1
000015	Reactor Coolant Pump Malfunctions				1		1	2
000024	Emergency Boration	1	1					2
000062	Loss of Nuclear Service Water				1		1	2
000067	Plant Fire on Site					1	1	2
000068	Control Room Evacuation			1	1			2
000074	Inadequate Core Cooling					1		1
000076	High Reactor Coolant Activity					1		1
CE-A11	RCS Overcooling				1			1
CE-E05	Excess Steam Demand			1			1	2
		1	**1**	**2**	**4**	**3**	**5**	**16**
EPE/APE Tier 1 / Group 2								
000001	Continuous Rod Withdrawal						1	1
000003	Dropped Control Rod	1	1					2
000007	Reactor Trip			1	1			2
000008	Pressurizer Vapor Space Accident				1	1		2
000009	Small Break LOCA					1		1
000011	Large Break LOCA			1		1		2
000029	Anticipated Transient Without Scram (ATWS)						1	1
000033	Loss of Intermediate Range Nuclear Instrumentation						1	1
000037	Steam Generator Tube Leak						1	1
000038	Steam Generator Tube Rupture					1		1
000059	Accidental Liquid Radwaste Release			1				1
000061	Area Radiation Monitoring (ARM) System Alarms						1	1
CE-E06	Loss of Feedwater	1						1
		2	**1**	**3**	**2**	**4**	**5**	**17**
EPE/APE Tier 1 / Group 3								
000028	Pressurizer Level Control Malfunction					1		1
000036	Fuel Handling Incidents						1	1
000056	Loss of Off-Site Power					1		1
						2	**1**	**3**
	Grand Total of EPE/APE K&A Selectio	**3**	**2**	**5**	**6**	**9**	**11**	**36**

PWR RO Written Examination Outline Summary

System/Mode	System Title	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Points
Plant System Tier 2 / Group 1													
001000	Control Rod Drive System				1		1						2
003000	Reactor Coolant Pump System	1									1		2
004000	Chemical and Volume Control System			1						1			2
013000	Engineered Safety Features Actuation System	1										1	2
015000	Nuclear Instrumentation System							1				1	2
017000	In-Core Temperature Monitor System			1								1	2
022000	Containment Cooling System	1								1			2
059000	Main Feedwater System	1										1	2
061000	Auxiliary / Emergency Feedwater System		1						1				2
068000	Liquid Radwaste System						1				1		2
071000	Waste Gas Disposal System					1					1		2
072000	Area Radiation Monitoring System				1								1
		4	**1**	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**3**	**4**	**23**
Plant System Tier 2 / Group 2													
002000	Reactor Coolant System						1					1	2
006000	Emergency Core Cooling System				1			1					2
010000	Pressurizer Pressure Control System								1				1
011000	Pressurizer Level Control System		1						1				2
012000	Reactor Protection System	1											1
014000	Rod Position Indication System										1		1
016000	Non-Nuclear Instrumentation System					1							1
026000	Containment Spray System							1				1	2
035000	Steam Generator System										1		1
039000	Main and Reheat Steam System								1				1
062000	A.C. Electrical Distribution								1			1	2
064000	Emergency Diesel Generators			1						1			2
075000	Circulating Water System										1		1
079000	Station Air System											1	1
		1	**1**	**1**	**1**	**1**	**1**	**2**	**4**	**1**	**3**	**4**	**20**
Plant System Tier 2 / Group 3													
005000	Residual Heat Removal System	1				1							2
008000	Component Cooling Water System			1									1
041000	Steam Dump System and Turbine Bypass Control									1			1
076000	Service Water System			1								1	2
103000	Containment System	1										1	2

PWR RO Written Examination Outline Summary

System/Mode	System Title	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Points
		2		2		1				1		2	8
	Grand Total of Plant System K&A Selecti	7	2	5	3	3	3	3	5	4	6	10	51

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	4	3	2	4	13
		4	**3**	**2**	**4**	**13**
	Grand Total of Generic K&A Selectic	**4**	**3**	**2**	**4**	**13**

PWR RO Written Examination Outline

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier 1	**Group** 1				
000005	Inoperable/Stuck Control Rod	2.1.32	: Ability to explain and apply all system limits and precautions.	3.4	41.10 / 43.2 / 45.12
000015	Reactor Coolant Pump Malfunctions	2.4.49	: Ability to perform without reference to procedures those actions that require immediate operatio system components and controls.	4.0	41.10 / 43.2 / 45.6
000015	Reactor Coolant Pump Malfunctions	AA1.05	Ability to operate and / or monitor the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow):: RCS flow	3.8	41.7 / 45.5 / 45.6
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
000024	Emergency Boration	AK2.03	Knowledge of the interrelations between the Emergency Boration and the following:: Controllers a positioners	2.6	41.7 / 45.7
000062	Loss of Nuclear Service Water	2.2.25	: Knowledge of bases in technical specifications for limiting conditions for operations and safety l	2.5	43.2
000062	Loss of Nuclear Service Water	AA1.06	Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Wate Control of flow rates to components cooled by the SWS	2.9	41.7 / 45.5 / 45.6
000067	Plant Fire on Site	2.1.02	: Knowledge of operator responsibilities during all modes of plant operation.	3.0	41.10 / 45.13
000067	Plant Fire on Site	AA2.17	Ability to determine and interpret the following as they apply to the Plant Fire on Site:: Systems tha may be affected by the fire	3.5	43.5 / 45.13
000068	Control Room Evacuation	AA1.23	Ability to operate and / or monitor the following as they apply to the Control Room Evacuation:: Ma trip of reactor and turbine	4.3	41.7 / 45.5 / 45.6
000068	Control Room Evacuation	AK3.14	Knowledge of the reasons for the following responses as they apply to the Control Room Evacua Safety injection setpoint of main steam line pressure	3.2*	41.5 / 41.10 / 45.6 / 45.13

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
000074	Inadequate Core Cooling	EA2.04	Ability to determine or interpret the following as they apply to a Inadequate Core Cooling:: Relation between RCS temperature and main steam pressure	3.7	43.5 / 45.13
000076	High Reactor Coolant Activity	AA2.02	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity:: Corrective actions required for high fission product activity in RCS	2.8	43.5 / 45.13
CE-A11	RCS Overcooling	AA1.02	Ability to operate and / or monitor the following as they apply to the (RCS Overcooling): Operating behavior characteristics of the facility.	3.2	41.7 / 45.5 / 45.6
CE-E05	Excess Steam Demand	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response mar	3.3	45.3
CE-E05	Excess Steam Demand	EK3.04	Knowledge of the reasons for the following responses as they apply to the (Excess Steam Dema RO or SRO function within the control room team as appropriate to the assigned position, in such way that procedures are adhered to and the limitations in the facilities license and amendments ar not violated.	3.2	41.5 / 41.10 / 45.6 / 45.13

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier 1	**Group** 2				
000001	Continuous Rod Withdrawal	2.4.11	: Knowledge of abnormal condition procedures.	3.1	41.10 / 43.5 / 45.13
000003	Dropped Control Rod	AK1.15	Knowledge of the operational implications of the following concepts as they apply to Dropped Co Rod:: Definition and application of power defect	2.8	41.8 / 41.10 / 45.3
000003	Dropped Control Rod	AK2.03	Knowledge of the interrelations between the Dropped Control Rod and the following:: Metroscope	3.1*	41.7 / 45.7
000007	Reactor Trip	EA1.07	Ability to operate and monitor the following as they apply to a reactor trip:: MT/G trip; verification t the MT/G has been tripped	4.3	41.7 / 45.5 / 45.6
000007	Reactor Trip	EK3.01	Knowledge of the reasons for the following as the apply to a reactor trip:: Actions contained in EC reactor trip	4.0	41.5 / 41.10 / 45.6 / 45.13
000008	Pressurizer Vapor Space Accident	AA1.05	Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident:: LPI System	3.4	41.7 / 45.5 / 45.6
000008	Pressurizer Vapor Space Accident	AA2.12	Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Acci PZR level indicators	3.4	43.5 / 45.13
000009	Small Break LOCA	EA2.13	Ability to determine or interpret the following as they apply to a small break LOCA:: Charging pump flow indication	3.4	43.5 / 45.13
000011	Large Break LOCA	EA2.03	Ability to determine or interpret the following as they apply to a Large Break LOCA:: Consequenc managing LOCA with loss of CCW	3.7	43.5 / 45.13
000011	Large Break LOCA	EK3.10	Knowledge of the reasons for the following responses as the apply to the Large Break LOCA:: PT limits on RCS pressure and temperature	3.7	41.5 / 41.10 / 45.6 / 45.13
000029	Anticipated Transient Without Scram (ATWS)	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response mar	3.3	45.3

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
000033	Loss of Intermediate Range Nuclear Instrumentation	2.2.25	: Knowledge of bases in technical specifications for limiting conditions for operations and safety l	2.5	43.2
000037	Steam Generator Tube Leak	2.1.14	: Knowledge of system status criteria which require the notification of plant personnel.	2.5	43.5 / 45.12
000038	Steam Generator Tube Rupture	EA2.07	Ability to determine or interpret the following as they apply to a SGTR:: Plant conditions, from surv of control room indications	4.4	43.5 / 45.13
000059	Accidental Liquid Radwaste Release	AK3.03	Knowledge of the reasons for the following responses as they apply to the Accidental Liquid Rad Release:: Declaration that a radioactive-liquid monitor is inoperable	3.0	41.5 / 41.10 / 45.6 / 45.13
000061	Area Radiation Monitoring (ARM) System Alarms	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
CE-E06	Loss of Feedwater	EK1.03	Knowledge of the operational implications of the following concepts as they apply to the (Loss of Feedwater): Annunciators and conditions indicating signals, and remedial actions associated with (Loss of Feedwater).	3.2	41.8 / 41.10 / 45.3

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier 1	**Group** 3				
000028	Pressurizer Level Control Malfunction	AA2.09	Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions:: Charging and letdown flow capacities	2.9	43.5 / 45.13
000036	Fuel Handling Incidents	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response mar	3.3	43.7/45.3
000056	Loss of Off-Site Power	AA2.24	Ability to determine and interpret the following as they apply to the Loss of Offsite Power:: CCW p ammeter, flowmeter and run indicator	3.0	43.5 / 45.13

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier 2		**Group** 1			
001000	Control Rod Drive System	K4.17	Knowledge of CRDS design feature(s) and/or interlock(s) which provide for the following:: Overr (bypass) for rod bank motion when one rod is bottomed	2.9*	41.7/43.6
001000	Control Rod Drive System	K6.11	Knowledge of the effect of a loss or malfunction on the following CRDS components:: Location ar operation of CRDS fault detection (trouble alarms) and reset system, including rod control annunc	2.9	41.7 / 45.7
003000	Reactor Coolant Pump System	A4.03	Ability to manually operate and/or monitor in the control room:: RCP lube oil and lift pump motor controls	2.8	41.7 / 45.5 to 45.8
003000	Reactor Coolant Pump System	K1.12	Knowledge of the physical connections and/or cause-effect relationships between the RCPS and following systems:: CCWS	3.0	41.2 to 41.9 / 45.7 to 45.8
004000	Chemical and Volume Control System	A3.04	Ability to monitor automatic operation of the CVCS, including:: VCT pressure control	2.8	41.7 / 45.5
004000	Chemical and Volume Control System	K3.02	Knowledge of the effect that a loss or malfunction of the CVCS will have on the following:: PZR L	3.7	41.7 / 45.6
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	K1.13	Knowledge of the physical connections and/or cause effect relationships between the ESFAS an following systems:: HVAC	2.8	41.2 to 41.9 / 45.7 to 45.8
015000	Nuclear Instrumentation System	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response mar	3.3	45.3
015000	Nuclear Instrumentation System	A1.01	Ability to predict and/or monitor changes in parameters to prevent exceeding design limits) associ with operating the NIS controls including:: NIS calibration by heat balance	3.5	41.5 / 45.5
017000	In-Core Temperature Monitor 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)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
017000	In-Core Temperature Monitor System	K3.01	Knowledge of the effect that a loss or malfunction of the ITM system will have on the following:: Natural circulation indications	3.5*	41.7 / 45.6
022000	Containment Cooling System	A3.01	Ability to monitor automatic operation of the CCS, including:: Initiation of safeguards mode of opera	4.1	41.7 / 45.5
022000	Containment Cooling System	K1.01	Knowledge of the physical connections and/or cause-effect relationships between the CCS and t following systems:: SWS/cooling system	3.5	41.2 to 41.9 / 45.7 to 45.8
059000	Main Feedwater System	2.2.22	: Knowledge of limiting conditions for operations and safety limits.	3.4	43.2 / 45.2
059000	Main Feedwater System	K1.05	Knowledge of the physical connections and/or cause-effect relationships between the MFW and following systems:: RCS	3.1*	41.2 to 41.9 / 45.7 to 45.8
061000	Auxiliary / Emergency Feedwater Syster	A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of t malfunctions or operations:: Loss of air to steam supply valve	3.2*	41.5 / 43.5 / 45.3 / 45.13
061000	Auxiliary / Emergency Feedwater Syster	K2.03	Knowledge of bus power supplies to the following:: AFW diesel driven pump	4.0*	41.7
068000	Liquid Radwaste System	A4.02	Ability to manually operate and/or monitor in the control room:: Remote radwaste release	3.2*	41.7 / 45.5 to 45.8
068000	Liquid Radwaste System	K6.10	Knowledge of the effect of a loss or malfunction on the following will have on the Liquid Radwas System :: Radiation monitors	2.5	41.7 / 45.7
071000	Waste Gas Disposal System	A4.27	Ability to manually operate and/or monitor in the control room:: Opening and closing of the decay ta discharge control valve	3.0*	41.7 / 45.5 to 45.8
071000	Waste Gas Disposal System	K5.04	Knowledge of the operational implication of the following concepts as they apply to the Waste Ga Disposal System:: Relationship of hydrogen/oxygen concentrations to flammability	2.5	41.5 / 45.7

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
072000	Area Radiation Monitoring System	K4.03	Knowledge of ARM system design feature(s) and/or interlock(s) which provide for the following:: ventilation systems	3.2*	41.7

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier 2	**Group** 2				
002000	Reactor Coolant System	2.1.32	: Ability to explain and apply all system limits and precautions.	3.4	41.10 / 43.2 / 45.12
002000	Reactor Coolant System	K6.06	Knowledge of the effect or a loss or malfunction on the following RCS components:: Sensors and detectors	2.5	41.7 / 45.7
006000	Emergency Core Cooling System	A1.16	Ability to predict and/or monitor changes in parameters: RCS temperature, including superheat, saturation, and subcooled	4.1	41.5 / 45.5
006000	Emergency Core Cooling System	K4.05	Knowledge of ECCS design feature(s) and/or interlock(s) which provide for the following:: Autos HPI/LPI/SIP	4.3	41.7
010000	Pressurizer Pressure Control System	A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and based on those predictions, use procedures to correct, control, or mitigate the consequences of malfunctions or operations:: Spray valve failures	3.9	41.5 / 43.5 / 45.3 / 45.13
011000	Pressurizer Level Control System	A2.10	Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and based on those predictions, use procedures to correct, control, or mitigate the consequences of malfunctions or operations:: Failure of PZR level instrument - high	3.4	41.5 / 43.5 / 45.3 / 45.13
011000	Pressurizer Level Control System	K2.01	Knowledge of bus power supplies to the following:: Charging pumps	3.1	41.7
012000	Reactor Protection System	K1.04	Knowledge of the physical connections and/or cause effect relationships between the RPS and t following systems:: RPIS	3.2*	41.2 to 41.9 / 45.7 to 45.8
014000	Rod Position Indication System	A4.01	Ability to manually operate and/or monitor in the control room:: Rod selection control	3.3	41.7 / 45.5 to 45.8
016000	Non-Nuclear Instrumentation System	K5.01	Knowledge of the operational implication of the following concepts as they apply to the NNIS:: Separation of control and protection circuits	2.7*	41.5 / 45.7
026000	Containment Spray System	2.1.23	: Ability to perform specific system and integrated plant procedures during all modes of plant oper	3.9	45.2 / 45.6

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
026000	Containment Spray System	A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) assoc with operating the CSS controls including:: Containment temperature	3.6*	41.5 / 45.5
035000	Steam Generator System	A4.02	Ability to manually operate and/or monitor in the control room:: Fill of dry S/G	2.7	41.7 / 45.5 to 45.8
039000	Main and Reheat Steam System	A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:: Indications and alarms for main steam and area radiation monitors (during SGTR)	3.4	41.5 / 43.5 / 45.3 / 45.13
062000	A.C. Electrical Distribution	2.1.02	: Knowledge of operator responsibilities during all modes of plant operation.	3.0	41.10 / 45.13
062000	A.C. Electrical Distribution	A2.06	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:: Keeping the safeguards buses electrically separate	3.4*	41.5 / 43.5 / 45.3 / 45.13
064000	Emergency Diesel Generators	A3.13	Ability to monitor automatic operation of the ED/G system, including:: Rpm controller/megawatt loa control (breaker-open/breaker-closed effects)	3.0*	41.7 / 45.5
064000	Emergency Diesel Generators	K3.03	Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: ED/G (manual loads)	3.6	41.7 / 45.6
075000	Circulating Water System	A4.01	Ability to manually operate and/or monitor in the control room:: Emergency/essential SWS pumps	3.2*	41.7 / 45.5 to 45.8
079000	Station Air System	2.4.31	: Knowledge of annunciators alarms and indications, and use of the response instructions.	3.3	41.10 / 45.3

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier 2		**Group** 3			
005000	Residual Heat Removal System	K1.11	Knowledge of the physical connections and/or cause-effect relationships between the RHRS and following systems:: RWST	3.5	41.2 to 41.9 / 45.7 to 45.8
005000	Residual Heat Removal System	K5.01	Knowledge of the operational implications of the following concepts as they apply the RHRS:: Nil ductility transition temperature (brittle fracture)	2.6	41.5 / 45.7
008000	Component Cooling Water System	K3.01	Knowledge of the effect that a loss or malfunction of the CCWS will have on the following:: Load cooled by CCWS	3.4	41.7 / 45.6
041000	Steam Dump System and Turbine Bypass Control	A3.05	Ability to monitor automatic operation of the SDS, including:: Main steam pressure	2.9*	41.7 / 45.5
076000	Service Water System	2.1.27	: Knowledge of system purpose and or function.	2.8	41.7
076000	Service Water System	K3.05	Knowledge of the effect that a loss or malfunction of the SWS will have on the following:: RHR components, controls, sensors, indicators, and alarms, including rad monitors	3.0*	41.7 / 45.6
103000	Containment System	2.2.25	: Knowledge of bases in technical specifications for limiting conditions for operations and safety l	2.5	43.2
103000	Containment System	K1.05	Knowledge of the physical connections and/or cause-effect relationships between the containme system and the following systems:: Personnel access hatch and emergency access hatch	2.8*	41.2 to 41.9 / 45.7 to 45.8

PWR RO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
Tier 3		**Group** 4			
000000	Generic Knowledges and Abilities	2.1.11	: Knowledge of less than one hour technical specification action statements for systems.	3.0	43.2 / 45.13
000000	Generic Knowledges and Abilities	2.1.23	: Ability to perform specific system and integrated plant procedures during all modes of plant oper	3.9	45.2 / 45.6
000000	Generic Knowledges and Abilities	2.1.24	: Ability to obtain and interpret station electrical and mechanical drawings.	2.8	45.12 / 45.13
000000	Generic Knowledges and Abilities	2.1.33	: Ability to recognize indications for system operating parameters which are entry-level condition technical specifications.	3.4	43.2 / 43.3 / 45.3
000000	Generic Knowledges and Abilities	2.2.01	: Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	3.7	45.1
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	2.2.23	: Ability to track limiting conditions for operations.	2.6	43.2 / 45.13
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	2.3.09	: Knowledge of the process for performing a containment purge.	2.5	43.4 / 45.10
000000	Generic Knowledges and Abilities	2.4.26	: Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.	2.9	43.5 / 45.12
000000	Generic Knowledges and Abilities	2.4.37	: Knowledge of the lines of authority during an emergency.	2.0	45.13

PWR RO Written Examination Outline (Last Page)

System/Mode	System Title	KA Number	Title	RO Value	10 CFR 55
000000	Generic Knowledges and Abilities	2.4.46	: Ability to verify that the alarms are consistent with the plant conditions.	3.5	43.5 / 45.3 / 45.12
000000	Generic Knowledges and Abilities	2.4.48	: Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions.	3.5	43.5 / 45.12

PWR SRO Written Examination Outline Summary

System/Mode	System Title	K1	K2	K3	A1	A2	G	Points
EPE/APE Tier 1 / Group 1								
000001	Continuous Rod Withdrawal		1				1	2
000003	Dropped Control Rod		1					1
000005	Inoperable/Stuck Control Rod						2	2
000011	Large Break LOCA			1		1		2
000017	Reactor Coolant Pump Malfunctions (Loss of RC Flow)			1				1
000024	Emergency Boration	1						1
000029	Anticipated Transient Without Scram (ATWS)						1	1
000057	Loss of Vital AC Electrical Instrument Bus					1		1
000059	Accidental Liquid Radwaste Release	1						1
000062	Loss of Nuclear Service Water				1		1	2
000067	Plant Fire on Site			1	1			2
000068	Control Room Evacuation			1	1			2
000074	Inadequate Core Cooling					1		1
000076	High Reactor Coolant Activity	1				1		2
CE-A11	RCS Overcooling				1			1
CE-E05	Excess Steam Demand			1			1	2
		3	**2**	**5**	**4**	**4**	**6**	**24**
EPE/APE Tier 1 / Group 2								
000007	Reactor Trip				1		1	2
000008	Pressurizer Vapor Space Accident				1	1		2
000009	Small Break LOCA			1		1		2
000022	Loss of Reactor Coolant Makeup						1	1
000033	Loss of Intermediate Range Nuclear Instrumentation						1	1
000037	Steam Generator Tube Leak						1	1
000038	Steam Generator Tube Rupture					1		1
000058	Loss of DC Power					1		1
000060	Accidental Gaseous Radwaste Release			1				1
000061	Area Radiation Monitoring (ARM) System Alarms						1	1
CE-E06	Loss of Feedwater	1			1			2
CE-E09	Functional Recovery		1					1
		1	**1**	**2**	**3**	**4**	**5**	**16**
EPE/APE Tier 1 / Group 3								
000028	Pressurizer Level Control Malfunction					1		1
000036	Fuel Handling Incidents						1	1
000056	Loss of Off-Site Power					1		1

PWR SRO Written Examination Outline Summary

System/Mode	System Title	K1	K2	K3	A1	A2	G	Points
						2	1	3
	Grand Total of EPE/APE K&A Selectio	4	3	7	7	10	12	43

PWR SRO Written Examination Outline Summary

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System/Mode	System Title	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Points
Plant System Tier 2 / Group 1													
001000	Control Rod Drive System				1							1	2
003000	Reactor Coolant Pump System	1									1		2
004000	Chemical and Volume Control System			1						1			2
013000	Engineered Safety Features Actuation System	1										1	2
014000	Rod Position Indication System										1		1
015000	Nuclear Instrumentation System						1					1	2
017000	In-Core Temperature Monitor System			1									1
022000	Containment Cooling System	1											1
026000	Containment Spray System							1				1	2
061000	Auxiliary / Emergency Feedwater System		1						1				2
071000	Waste Gas Disposal System					1					1		2
		3	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**4**	**19**
Plant System Tier 2 / Group 2													
002000	Reactor Coolant System											1	1
006000	Emergency Core Cooling System						1	1					2
010000	Pressurizer Pressure Control System								1				1
011000	Pressurizer Level Control System		1						1				2
012000	Reactor Protection System	1											1
016000	Non-Nuclear Instrumentation System					1							1
033000	Spent Fuel Pool Cooling System				1								1
035000	Steam Generator System										1		1
039000	Main and Reheat Steam System								1				1
062000	A.C. Electrical Distribution											1	1
064000	Emergency Diesel Generators			1						1			2
075000	Circulating Water System										1		1
079000	Station Air System											1	1
103000	Containment System											1	1
		1	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**2**	**4**	**17**
Plant System Tier 2 / Group 3													
005000	Residual Heat Removal System					1							1
008000	Component Cooling Water System			1									1
041000	Steam Dump System and Turbine Bypass Control									1			1
076000	Service Water System				1								1
				1	**1**	**1**				**1**			**4**
Grand Total of Plant System K&A Selecti		**4**	**2**	**4**	**3**	**3**	**2**	**2**	**4**	**3**	**5**	**8**	**40**

PWR SRO 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	5	4	3	5	17
		5	**4**	**3**	**5**	**17**
	Grand Total of Generic K&A Selectic	**5**	**4**	**3**	**5**	**17**

PWR SRO Written Examination Outline

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier 1	**Group** 1				
000001	Continuous Rod Withdrawal	2.4.11	: Knowledge of abnormal condition procedures.	4.0	41.10 / 43.5 / 45.13
000001	Continuous Rod Withdrawal	AK2.03	Knowledge of the interrelations between the Continuous Rod Withdrawal and the following:: Se and detectors	2.6	41.7 / 45.7
000003	Dropped Control Rod	AK2.03	Knowledge of the interrelations between the Dropped Control Rod and the following:: Metrosco	3.2*	41.7 / 45.7
000005	Inoperable/Stuck Control Rod	2.1.14	: Knowledge of system status criteria which require the notification of plant personnel.	3.3	43.5 / 45.12
000005	Inoperable/Stuck Control Rod	2.1.32	: Ability to explain and apply all system limits and precautions.	3.8	41.10 / 43.2 / 45.12
000011	Large Break LOCA	EA2.03	Ability to determine or interpret the following as they apply to a Large Break LOCA:: Consequer managing LOCA with loss of CCW	4.2	43.5 / 45.13
000011	Large Break LOCA	EK3.10	Knowledge of the reasons for the following responses as the apply to the Large Break LOCA:: limits on RCS pressure and temperature	3.9	41.5 / 41.10 / 45.6 / 45.13
000017	Reactor Coolant Pump Malfunctions (Loss of RC Flow)	AK3.06	Knowledge of the reasons for the following responses as they apply to the Reactor Coolant Pu Malfunctions (Loss of RC Flow) :: Performance of a core power map, calculations of quadrant tilt, monitoring of core imbalance	3.1*	41.5 / 41.10 / 45.6 / 45.13
000024	Emergency Boration	AK1.04	Knowledge of the operational implications of the following concepts as they apply to Emergenc Boration:: Low temperature limits for boron concentration	3.6	41.8 / 41.10 / 45.3
000029	Anticipated Transient Without Scram (ATWS)	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response m	3.3	45.3
000057	Loss of Vital AC Electrical Instrument Bu	AA2.10	Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument I Turbine load limiter control	2.5	43.5 / 45.13

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
000059	Accidental Liquid Radwaste Release	AK1.03	Knowledge of the operational implications of the following concepts as they apply to Accidenta Radwaste Release:: Effects of placing a radioactive source near a radiation monitor; in particula a radioactive-liquid radiation monitor	2.9*	41.8 / 41.10 / 45.3
000062	Loss of Nuclear Service Water	2.2.25	: Knowledge of bases in technical specifications for limiting conditions for operations and safety	3.7	43.2
000062	Loss of Nuclear Service Water	AA1.06	Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Wa Control of flow rates to components cooled by the SWS	2.9	41.7 / 45.5 / 45.6
000067	Plant Fire on Site	AA1.02	Ability to operate and / or monitor the following as they apply to the Plant Fire on Site:: Re-install of a fire detector	2.5*	41.7 / 45.5 / 45.6
000067	Plant Fire on Site	AK3.03	Knowledge of the reasons for the following responses as they apply to the Plant Fire on Site:: F detector surveillance test	2.5*	41.5 / 41.10 / 45.6 / 45.13
000068	Control Room Evacuation	AA1.23	Ability to operate and / or monitor the following as they apply to the Control Room Evacuation:: M trip of reactor and turbine	4.4	41.7 / 45.5 / 45.6
000068	Control Room Evacuation	AK3.14	Knowledge of the reasons for the following responses as they apply to the Control Room Evacu Safety injection setpoint of main steam line pressure	3.4*	41.5 / 41.10 / 45.6 / 45.13
000074	Inadequate Core Cooling	EA2.04	Ability to determine or interpret the following as they apply to a Inadequate Core Cooling:: Relatio between RCS temperature and main steam pressure	4.2	43.5 / 45.13
000076	High Reactor Coolant Activity	AA2.02	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity Corrective actions required for high fission product activity in RCS	3.4	43.5 / 45.13
000076	High Reactor Coolant Activity	AK1.02	Knowledge of the operational implications of the following concepts as they apply to High Reac Coolant Activity:: Radiation source term and transport pathway	2.5	41.8 / 41.10 / 45.3
CE-A11	RCS Overcooling	AA1.02	Ability to operate and / or monitor the following as they apply to the (RCS Overcooling): Operati behavior characteristics of the facility.	3.4	41.7 / 45.5 / 45.6

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
CE-E05	Excess Steam Demand	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response m	3.3	45.3
CE-E05	Excess Steam Demand	EK3.04	Knowledge of the reasons for the following responses as they apply to the (Excess Steam Der RO or SRO function within the control room team as appropriate to the assigned position, in suc way that procedures are adhered to and the limitations in the facilities license and amendments not violated.	3.6	41.5 / 41.10 / 45.6 / 45.13

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier 1	**Group** 2				
000007	Reactor Trip	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response m	3.3	45.3
000007	Reactor Trip	EA1.07	Ability to operate and monitor the following as they apply to a reactor trip:: MT/G trip; verificatior the MT/G has been tripped	4.3	41.7 / 45.5 / 45.6
000008	Pressurizer Vapor Space Accident	AA1.05	Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident:: LPI System	3.3	41.7 / 45.5 / 45.6
000008	Pressurizer Vapor Space Accident	AA2.06	Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Ac PORV logic control under low-pressure conditions	3.6	43.5 / 45.13
000009	Small Break LOCA	EA2.13	Ability to determine or interpret the following as they apply to a small break LOCA:: Charging pur flow indication	3.6	43.5 / 45.13
000009	Small Break LOCA	EK3.10	Knowledge of the reasons for the following responses as the apply to the small break LOCA:: Observation of PZR level	3.6	41.5 / 41.10 / 45.6 / 45.13
000022	Loss of Reactor Coolant Makeup	2.4.30	: Knowledge of which events related to system operations/status should be reported to outside agencies.	3.6	43.5 / 45.11
000033	Loss of Intermediate Range Nuclear Instrumentation	2.2.25	: Knowledge of bases in technical specifications for limiting conditions for operations and safety	3.7	43.2
000037	Steam Generator Tube Leak	2.1.14	: Knowledge of system status criteria which require the notification of plant personnel.	3.3	43.5 / 45.12
000038	Steam Generator Tube Rupture	EA2.07	Ability to determine or interpret the following as they apply to a SGTR:: Plant conditions, from su of control room indications	4.8	43.5 / 45.13
000058	Loss of DC Power	AA2.01	Ability to determine and interpret the following as they apply to the Loss of DC Power:: That a l dc power has occurred; verification that substitute power sources have come on line	4.1	43.5 / 45.13

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
000060	Accidental Gaseous Radwaste Release	AK3.01	Knowledge of the reasons for the following responses as they apply to the Accidental Gaseou Radwaste:: Implementation of E-plan	4.2	41.5 / 41.10 / 45.6 / 45.13
000061	Area Radiation Monitoring (ARM) System Alarms	2.4.04	: Ability to recognize abnormal indications for system operating parameters which are entry-lev conditions for emergency and abnormal operating procedures.	4.3	41.10 / 43.2 / 45.6
CE-E06	Loss of Feedwater	EA1.03	Ability to operate and / or monitor the following as they apply to the (Loss of Feedwater): Desir operating results during abnormal and emergency situations.	4.0	41.7 / 45.5 / 45.6
CE-E06	Loss of Feedwater	EK1.03	Knowledge of the operational implications of the following concepts as they apply to the (Loss Feedwater): Annunciators and conditions indicating signals, and remedial actions associated w (Loss of Feedwater).	3.7	41.8 / 41.10 / 45.3
CE-E09	Functional Recovery	EK2.02	Knowledge of the interrelations between the (Functional Recovery) and the following:: Facility's removal systems, including primary coolant, emergency coolant, the decay heat removal systen relations between the proper operation of these systems to the operation of the facility.	4.2	41.7 / 45.7

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier 1	**Group** 3				
000028	Pressurizer Level Control Malfunction	AA2.09	Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions:: Charging and letdown flow capacities	3.2	43.5 / 45.13
000036	Fuel Handling Incidents	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response m	3.3	43.7/45.3
000056	Loss of Off-Site Power	AA2.24	Ability to determine and interpret the following as they apply to the Loss of Offsite Power:: CCW ammeter, flowmeter and run indicator	3.1	43.5 / 45.13

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier 2	**Group** 1				
001000	Control Rod Drive System	2.1.33	: Ability to recognize indications for system operating parameters which are entry-level conditic technical specifications.	4.0	43.2 / 43.3 / 45.3
001000	Control Rod Drive System	K4.17	Knowledge of CRDS design feature(s) and/or interlock(s) which provide for the following:: Ove (bypass) for rod bank motion when one rod is bottomed	3.1*	41.7/43.6
003000	Reactor Coolant Pump System	A4.03	Ability to manually operate and/or monitor in the control room:: RCP lube oil and lift pump motor controls	2.5	41.7 / 45.5 to 45.8
003000	Reactor Coolant Pump System	K1.12	Knowledge of the physical connections and/or cause-effect relationships between the RCPS a following systems:: CCWS	3.3	41.2 to 41.9 / 45.7 to 45.8
004000	Chemical and Volume Control System	A3.04	Ability to monitor automatic operation of the CVCS, including:: VCT pressure control	2.9	41.7 / 45.5
004000	Chemical and Volume Control System	K3.02	Knowledge of the effect that a loss or malfunction of the CVCS will have on the following:: PZR	4.1	41.7 / 45.6
013000	Engineered Safety Features Actuation System	2.1.02	: Knowledge of operator responsibilities during all modes of plant operation.	4.0	41.10 / 45.13
013000	Engineered Safety Features Actuation System	K1.13	Knowledge of the physical connections and/or cause effect relationships between the ESFAS following systems:: HVAC	3.1	41.2 to 41.9 / 45.7 to 45.8
014000	Rod Position Indication System	A4.01	Ability to manually operate and/or monitor in the control room:: Rod selection control	3.1	41.7 / 45.5 to 45.8
015000	Nuclear Instrumentation System	2.4.50	: Ability to verify system alarm setpoints and operate controls identified in the alarm response m	3.3	45.3
015000	Nuclear Instrumentation System	K6.05	Knowledge of the effect of a loss or malfunction on the following will have on the NIS:: Audio indication, including deaf spots in control room and containment	2.6	41.7 / 45.7

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
017000	In-Core Temperature Monitor System	K3.01	Knowledge of the effect that a loss or malfunction of the ITM system will have on the following: Natural circulation indications	3.7*	41.7 / 45.6
022000	Containment Cooling System	K1.01	Knowledge of the physical connections and/or cause-effect relationships between the CCS an following systems:: SWS/cooling system	3.7	41.2 to 41.9 / 45.7 to 45.8
026000	Containment Spray System	2.1.23	: Ability to perform specific system and integrated plant procedures during all modes of plant op	4.0	45.2 / 45.6
026000	Containment Spray System	A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) ass with operating the CSS controls including:: Containment temperature	3.9	41.5 / 45.5
061000	Auxiliary / Emergency Feedwater Syste	A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b based on those predictions, use procedures to correct, control, or mitigate the consequences c malfunctions or operations:: Loss of air to steam supply valve	3.6*	41.5 / 43.5 / 45.3 / 45.13
061000	Auxiliary / Emergency Feedwater Syste	K2.03	Knowledge of bus power supplies to the following:: AFW diesel driven pump	3.8*	41.7
071000	Waste Gas Disposal System	A4.27	Ability to manually operate and/or monitor in the control room:: Opening and closing of the decay discharge control valve	2.7*	41.7 / 45.5 to 45.8
071000	Waste Gas Disposal System	K5.04	Knowledge of the operational implication of the following concepts as they apply to the Waste (Disposal System:: Relationship of hydrogen/oxygen concentrations to flammability	3.1	41.5 / 45.7

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier 2	**Group** 2				
002000	Reactor Coolant System	2.1.32	: Ability to explain and apply all system limits and precautions.	3.8	41.10 / 43.2 / 45.12
006000	Emergency Core Cooling System	A1.16	Ability to predict and/or monitor changes in parameters: RCS temperature, including superheat, saturation, and subcooled	4.2	41.5 / 45.5
006000	Emergency Core Cooling System	K6.04	Knowledge of the effect of a loss or malfunction on the following will have on the ECCS:: Breal relays and disconnects	2.5	41.7 / 45.7
010000	Pressurizer Pressure Control System	A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; an based on those predictions, use procedures to correct, control, or mitigate the consequences c malfunctions or operations:: Spray valve failures	3.9	41.5 / 43.5 / 45.3 / 45.13
011000	Pressurizer Level Control System	A2.10	Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; an based on those predictions, use procedures to correct, control, or mitigate the consequences c malfunctions or operations:: Failure of PZR level instrument - high	3.6	41.5 / 43.5 / 45.3 / 45.13
011000	Pressurizer Level Control System	K2.01	Knowledge of bus power supplies to the following:: Charging pumps	3.2	41.7
012000	Reactor Protection System	K1.04	Knowledge of the physical connections and/or cause effect relationships between the RPS and following systems:: RPIS	3.3*	41.2 to 41.9 / 45.7 to 45.8
016000	Non-Nuclear Instrumentation System	K5.01	Knowledge of the operational implication of the following concepts as they apply to the NNIS:: Separation of control and protection circuits	2.8*	41.5 / 45.7
033000	Spent Fuel Pool Cooling System	K4.02	Knowledge of design feature(s) and/or interlock(s) which provide for the following:: Maintena spent fuel cleanliness	2.7	41.7
035000	Steam Generator System	A4.02	Ability to manually operate and/or monitor in the control room:: Fill of dry S/G	2.8	41.7 / 45.5 to 45.8
039000	Main and Reheat Steam System	A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (based on predictions, use procedures to correct, control, or mitigate the consequences of thos malfunctions or operations:: Indications and alarms for main steam and area radiation monitors (during SGTR)	3.7	41.5 / 43.5 / 45.3 / 45.13

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
062000	A.C. Electrical Distribution	2.1.02	: Knowledge of operator responsibilities during all modes of plant operation.	4.0	41.10 / 45.13
064000	Emergency Diesel Generators	A3.13	Ability to monitor automatic operation of the ED/G system, including:: Rpm controller/megawatt lo control (breaker-open/breaker-closed effects)	2.9	41.7 / 45.5
064000	Emergency Diesel Generators	K3.03	Knowledge of the effect that a loss or malfunction of the ED/G system will have on the followin ED/G (manual loads)	3.9*	41.7 / 45.6
075000	Circulating Water System	A4.01	Ability to manually operate and/or monitor in the control room:: Emergency/essential SWS pumps	3.2*	41.7 / 45.5 to 45.8
079000	Station Air System	2.4.31	: Knowledge of annunciators alarms and indications, and use of the response instructions.	3.4	41.10 / 45.3
103000	Containment System	2.2.25	: Knowledge of bases in technical specifications for limiting conditions for operations and safety	3.7	43.2

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier 2	**Group** 3				
005000	Residual Heat Removal System	K5.01	Knowledge of the operational implications of the following concepts as they apply the RHRS:: N ductility transition temperature (brittle fracture)	2.9	41.5 / 45.7
008000	Component Cooling Water System	K3.01	Knowledge of the effect that a loss or malfunction of the CCWS will have on the following:: Lo cooled by CCWS	3.5	41.7 / 45.6
041000	Steam Dump System and Turbine Bypass Control	A3.05	Ability to monitor automatic operation of the SDS, including:: Main steam pressure	2.9	41.7 / 45.5
076000	Service Water System	K4.05	Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following:: Serv water train flow and discharge pressure when service water flow to heat exchanger for close water is throttled	2.6*	41.7

PWR SRO Written Examination Outline (Continued)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
Tier 3	**Group** 4				
000000	Generic Knowledges and Abilities	2.1.10	: Knowledge of conditions and limitations in the facility license.	3.9	43.1 / 45.13
000000	Generic Knowledges and Abilities	2.1.15	: Ability to manage short-term information such as night and standing orders.	3.0	45.12
000000	Generic Knowledges and Abilities	2.1.23	: Ability to perform specific system and integrated plant procedures during all modes of plant op	4.0	45.2 / 45.6
000000	Generic Knowledges and Abilities	2.1.24	: Ability to obtain and interpret station electrical and mechanical drawings.	3.1	45.12 / 45.13
000000	Generic Knowledges and Abilities	2.1.33	: Ability to recognize indications for system operating parameters which are entry-level conditic technical specifications.	4.0	43.2 / 43.3 / 45.3
000000	Generic Knowledges and Abilities	2.2.07	: Knowledge of the process for conducting tests or experiments not described in the safety an report.	3.2	43.3 / 45.13
000000	Generic Knowledges and Abilities	2.2.11	: Knowledge of the process for controlling temporary changes.	3.4*	41.10 / 43.3 / 45.13
000000	Generic Knowledges and Abilities	2.2.23	: Ability to track limiting conditions for operations.	3.8	43.2 / 45.13
000000	Generic Knowledges and Abilities	2.2.24	: Ability to analyze the affect of maintenance activities on LCO status.	3.8	43.2 / 45.13
000000	Generic Knowledges and Abilities	2.3.01	: Knowledge of 10CFR20 and related facility radiation control requirements.	3.0	41.12 / 43.4 / 45.9 / 45.10
000000	Generic Knowledges and Abilities	2.3.08	: Knowledge of the process for performing a planned gaseous radioactive release.	3.2	43.4 / 45.10

PWR SRO Written Examination Outline (Last Page)

System/Mode	System Title	KA Number	Title	SRO Value	10 CFR 55
000000	Generic Knowledges and Abilities	2.3.09	: Knowledge of the process for performing a containment purge.	3.4	43.4 / 45.10
000000	Generic Knowledges and Abilities	2.4.26	: Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.	3.3	43.5 / 45.12
000000	Generic Knowledges and Abilities	2.4.37	: Knowledge of the lines of authority during an emergency.	3.5	45.13
000000	Generic Knowledges and Abilities	2.4.42	: Knowledge of emergency response facilities.	3.7	45.11
000000	Generic Knowledges and Abilities	2.4.46	: Ability to verify that the alarms are consistent with the plant conditions.	3.6	43.5 / 45.3 / 45.12
000000	Generic Knowledges and Abilities	2.4.48	: Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions.	3.8	43.5 / 45.12

Facility: Fort Calhoun		Date of Examination:
Examination Level: RO		Operating Test Number: _____
Administrative Topic/ Subject Description		Describe method of evaluation: 1. ONE Administrative JPM OR 2. TWO Administrative Questions
A.1	Plant parameter verification	Administrative JPM – Calculate critical boron concentration for startup
	Mode changes	Administrative JPM – Verify conditions are met for changing modes
A.2	Maintenance – shutdown condition	Administrative JPM – Time to boil determination
A.3	Radiation Control	Administrative JPM – RCA Entry and exit with personnel contamination
A.4	Emergency Plan	Question: Control room operator response to accountability determination
		Question: Escort response to declaration of an emergency event

Facility: Fort Calhoun		Date of Examination:
Examination Level: SRO		Operating Test Number: _____
Administrative Topic/ Subject Description		Describe method of evaluation: 1. ONE Administrative JPM OR 2. TWO Administrative Questions
A.1	Plant parameter verification	Administrative JPM – Review Estimated Critical Condition calculation
	Fuel Handling	Administrative JPM – Approve Movement of spent fuel assemblies
A.2	Tagging and clearances	Administrative JPM – Equipment Clearance
A.3	Control of radiation releases	Administrative JPM – Authorize containment pressure reduction
A.4	Emergency Plan	Administrative JPM - Emergency Plan classification and Protective Action Recommendations (Security Event)

Facility: Fort Calhoun	Date of Examination:
Exam Level: RO	Operating Test No. _____

B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a. Emergency Boration from the control room (004000 A2.14 - RO 3.8/SRO 3.9)	E, D, A, S	I
b. Perform monthly Recirculation Actuation Signal Surveillance Test. (013000 K4.06 - RO 4.0/SRO 4.3)	D, S	II
c. Transfer pressurizer pressure control from manual to automatic (010000 A1.07 - RO 3.7/SRO 3.7)	D, A, S	III
d. Initiate Shutdown cooling (005000 K1.09 – RO 3.6/SRO 3.9)	D, L, A, S	IV-P
e.Shift 4160V busses between unit auxiliary transformer and house service transformer (062000 K1.04 - RO 3.7 /SRO 4.2)	D, S	VI
f. Diverse Scram System Surveillance test (012000 A4.04 RO 3.3/SRO 3.3)	N, S	VII
g. Operate AFW System from AI-179 (aux shutdown panel) (000068 AA1.03 – RO 4.1/SRO 4.3)	D, E	IV-S

B.2 Facility Walk-Through

a. Align condenser evacuation to AB stack (000037 AA2.07 – RO 3.1/SRO 3.6)	N, E	IV-S
b. Startup hydrogen purge system (028000 A2.02 – RO 3.5/SRO 3.9)	D, R, L, E	V
c. Switch Inverter supply from bypass to normal (000057 AA1.01 – RO 3.7/SRO 3.7)	D, A	VI

* Type Codes: (D)irect from bank, (M)odified from Bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA, (E)mergency or abnormal condition

Facility: Fort Calhoun	Date of Examination:
Exam Level: SRO(I) /	Operating Test No. _____

B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a. Emergency Boration from the control room (004000 A2.14 - RO 3.8/SRO 3.9)	E, D, A, S	I
b. Perform monthly Recirculation Actuation Signal Surveillance Test. (013000 K4.06 - RO 4.0/SRO 4.3)	D, S	II
c. Fuel handling Incident (000036 AA2.02 – RO 3.4/SRO 4.1)	D, E	VIII
d. Initiate Shutdown cooling (005000 K1.09 – RO 3.6/SRO 3.9)	D, L,A, S	IV-P
e.Shift 4160V busses between unit auxiliary transformer and house service transformer (062000 K1.04 - RO 3.7 /SRO 4.2)	D, S	VI
f. Diverse Scram System Surveillance test (012000 A4.04 RO 3.3/SRO 3.3)	N, S	VII
g. Operate AFW System from AI-179 (aux shutdown panel) (000068 AA1.03 – RO 4.1/SRO 4.3)	D, E	IV-S

B.2 Facility Walk-Through

a. Align condenser evacuation to AB stack (000037 AA2.07 – RO 3.1/SRO 3.6)	N, E	IV-S
b. Transfer waste gas from vent header to in service decay tank (071000 A4.05 – RO 2.6/SRO 2.6)	D, A, R	IX
c. Switch Inverter supply from bypass to normal (000057 AA1.01 – RO 3.7/SRO 3.7)	D, A	VI

* Type Codes: (D)irect from bank, (M)odified from Bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA, (E)mergency or abnormal condition

Facility: Fort Calhoun	Date of Examination:
Exam Level: SRO(U)	Operating Test No. _____

B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a.		
b.		
c.		
d. Initiate Shutdown cooling (005000 K1.09 – RO 3.6/SRO 3.9)	D, L,A, S	IV-P
e.		
f. Diverse Scram System Surveillance test (012000 A4.04 RO 3.3/SRO 3.3)	N, S	VII
g.		

B.2 Facility Walk-Through

a. Align condenser evacuation to AB stack (000037 AA2.07 – RO 3.1/SRO 3.6)	N, E	IV-S
b. Transfer waste gas from vent header to in service decay tank (071000 A4.05 – RO 2.6/SRO 2.6)	D, A, R	IX
c. Switch Inverter supply from bypass to normal (000057 AA1.01 – RO 3.7/SRO 3.7)	D, A	VI

* Type Codes: (D)irect from bank, (M)odified from Bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA, (E)mergency or abnormal condition

Facility: Fort Calhoun	Scenario No: 2002-1	Op-Test No. _____
Examiners: _____ _____ _____	Operators: _____ _____ _____	

Initial Conditions: **[IC#124]** 50% Reactor Power. 940 ppm boron D/G-1 is tagged out of service for generator brush replacement. Waste Monitor Tank, WD-22A, release is in progress.
[Take off CH-1B, Take RM-052 out of service]
[MFP ESF05A] [MFP ESF05B]

Turnover: Return RM-052 to service on the stack. It was taken out of service to install a new tape drive motor for RM-051. The maintenance is now complete. OI-RM-1-CL-B has been completed. The local ratemeter keyswitch is on.

Event No.	Malf No.	Event Type*	Event Description
1		N	Return RM-052 to service
2 [+10]	NIS02D	I	WR NI channel "D" power supply failure **[MFP NIS02D]**
3 [+20]	NBWPAC 9A	C	Running Bearing water pump trips (must start backup) **[RFP BCW10A OPEN]**
4 [+25]	RCP09B RCP10B	C	Lower and middle seals on RCP, RC-3B fails **[MFP RCP09B 100%] [MFP RCP10B 100%]**
5		R, N	Plant shutdown due to two failed RCS seals
6 [+40]	T:L903X	I	Steam Generator level channel fails low **[COP T:L903X 0%]**
7 [+45]	GEN01A	I	Main Generator voltage regulator fails **[MFP GEN01A full 120 sec ramp]**
8 [+50]	RCS01E	M	300 gpm LOCA caused by third seal failure on RC-3B **[MFP RCS01E 0.5%]**
9	Preset: ESF05A ESF05B	C	PPLS fails to actuate

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

Facility: Fort Calhoun	Scenario No: 2002-2	Op-Test No. _____
Examiners: _____ _____ _____	Operators: _____ _____ _____	

Initial Conditions**: [IC# 122]** 100% Reactor Power. 517 ppm boron D/G-1 is tagged out of service for generator brush replacement.
[Make AC-3A running CCW pump] [MFP ESF06A OFF] [MFP ESF06B OFF] [COP RSGH042A 100%] [ovr A9 B1U turb diff exp alarm off]

Turnover: Place CCW Pump, AC-3C in service and remove AC-3A from service.

Event No.	Malf No.	Event Type*	Event Description
1		N	Rotate CCW pumps **[will need RFP CCW12A]**
2 [+8]	T:P910	I	PIC-910 fails high causing turbine bypass valve to open **[COP T:P910 1000 psi]**
3 [+13]	T:T2897	I	Letdown HX CCW outlet temperature transmitter, T-2897, fails low. (results in high letdown temperature) **[COP T:T2897 50]**
4 [+20]	CRD06	C	Dropped Control rod **[MFP CRD06 rod 1 grp 4 deenergized]**
5		R, N	Reduce power to 70% due to dropped rod
6 [+35]	T:P103Y	I	Controlling pressurizer pressure channel fails high **[COP T:P103Y]**
7 [+40]	MSS03B	M	Main steam line break in turbine building **[MFP MSS03B 20% 60 sec ramp]**
8	Preset RSGH042A	C	SGIS fails to actuate
9	Preset ESF06A,B	C	S/G “B” MSIV will not close

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

Facility: Fort Calhoun	Scenario No: 2002-3 (spare)	Op-Test No. _____

Examiners: _____	Operators: _____
_____	_____
_____	_____

Initial Conditions**: [IC#2]** 100% Power. FW-54 tagged out to replace fuel pump. Power Range NI channel "A" is out of service due to failed power supply. "A" Trip units 1,9 and 12 have been bypassed. FIA-236 is failed. In T.S.2.14

[RFP RCP12B close] [File ATWAS PLUS] [RFP AFW25A STOP] [RFP AFW26A local] [COP T:F236 0%] [MFP NIS07A] [MFP AFW01] [bypass keys in A TU's 1,9,12] [A RPS to delta T power]

Turnover: Place CH-1A in service remove CH-1C from service CH-1A packing cooling pump has been operating for 45 minutes.

Event No.	Malf No.	Event Type*	Event Description
1		N	Place CH-1A in service remove CH-1C from service
2 [+5]	JLB218LL	I	VCT level fails low causing charging pump suction to realign to SIRWT. **[COP JLB218LL fail set]**
3 [+12]	NIS07D	I	Power Range NI Channel "D" Fails **[MFP NIS07D]**
4		R, N	Power reduction to 70% power.
5 [+40]	SWD02A,B	M	Loss of offsite power (both 161KV and 345 KV) **[MFP SWD02A] [MFP SWD 02B]**
6	preset	C, M	Auto Reactor trip fails (ATWS)
7	preset	C	Turbine driven AFW pump, FW-10 fails to start.
8	preset	C	RC-3C breaker does not open. (D/G-1 output breaker does not close)

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

Facility: Fort Calhoun	Scenario No: 2002-4 (spare)	Op-Test No. _____

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: **[IC#2]**100% Power. FW-54 tagged out to replace fuel pump. Safety Injection Tank SI-6B has a low level alarm.
[Lower level in SI-6B] [Disable autostart of CCW pumps]

Turnover: Raise level in Safety Injection Tank SI-6B

Event No.	Malf No.	Event Type*	Event Description
1		N	Raise level in Safety Injection tank SI-6B
2	NCCPAC3B	C	CCW pump trips **[COP NCCPAC3B]**
3	SGN01B	C	Tube leak on steam generator RC-2B **[MFP SGN01B 1%]**
4		R, N	AOP-5 plant shutdown
5	T:P907	I	Steam generator pressure transmitter on RC-2A fails low **[COP T:P907 45.1 psi]**
6	CND01	M	Loss of condenser vacuum – Reactor Trip **[MFP CND01 100% 300 sec ramp]**
7	SGN01A	M	Steam Generator Tube Rupture – RC-2A **[MFP SGN01A 40%]**

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