Facility: SEABROOK RO Section Date of Exam: 10/1/9

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	3	2	3	N/A			4	3	N/A		3 / 18			6
	2	1	1	1				3	2			1 / 9			4
	Tier Totals	4	3	4				7	5			4 / 27			10
2. Plant Systems	1	3	3	5	4	1	2	2	2	1	2	3 / 28			5
	2	2	1	0	3	1	0	1	1	1	0	0 / 10			3
	Tier Totals	5	4	5	7	2	2	3	3	2	2	3 / 38			8
3. Generic Knowledge and Abilities Categories		1: 3			2: 2			3: 2			4: 3	10	1	2 / 3 / 4	7

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1	X						EK1 Knowledge of the operational implications of the following concepts as they apply to the reactor trip: EK1.06 Relationship of emergency feedwater flow to S/G and decay heat removal following reactor trip. (CFR 41.8/41.10/45.3)	3.7	1
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3	X						EK1 Knowledge of the following concepts as they apply to the small break LOCA: EK1.02 Use of steam tables (CFR 41.8/41.10/45.3)	3.5	1
000011 Large Break LOCA / 3			X				EK3 Knowledge of the reasons for the following responses as they apply to the Large Break LOCA EK3.12 Actions contained in EOP for emergency LOCA (large break) (CFR 41.5/41.10/45.6/45.13)	4.4	1
000015/17 RCP Malfunctions / 4					X		AA2 Ability to determine and interpret the following as they apply to the Reactor Coolant Malfunctions: AA2.01 Cause of RCP failure (CFR 43.5/45.13)	3.0	1
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4									
000026 Loss of Component Cooling Water / 8						X	2.4.6 Knowledge of EOP mitigation strategies. (CFR 41.10/43.5/45.13)	3.7	1
000027 Pressurizer Pressure Control System Malfunction / 3		X					AK2 Knowledge of the interrelationships beween the Pressurizer Pressure Control Malfunctions and the following: AK2.03 Controllers and positioners (CFR 41.7/45.7)	2.6	1
000029 ATWS / 1				X			EA1 Ability to operate and monitor the following as they apply to ATWS: EA1.14 Driving of control rods into the core (CFR 41.7/45.5/45.6)	4.2	1
000038 Steam Gen. Tube Rupture / 3						X	2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operation and safety limits. (CFR 41.5/41.7/43.2)	3.2	1

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4				X			AA1 Ability to operate and/or monitor the following as they apply to the Steam Line Rupture: AA1.09 Setpoints of main steam safety and PORV's. (CFR 41.7/45.5/45.6	3.4	1
000054 (CE/E06) Loss of Main Feedwater / 4						x	2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc. (CFR 41.7/43.5/45.12)	4.0	1
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6			X				AK3 Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: AK3.02 Actions contained in the EOP for loss of offsite power (CFR 41.5/41.10/45.6/45.13)	4.4	1
000057 Loss of Vital AC Inst. Bus / 6					X		AA2 Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: AA2.06 AC instrument bus alarms for the inverter and alternate power source (CFR 43.5/45.13)	3.2	1
000058 Loss of DC Power / 6	x						AK1 Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: AK1.01 Battery charger equipment and instrumentation (CFR 41.8/41.10/45.3)	2.8	1
000062 Loss of Nuclear Svc Water / 4			X				AK3 Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: AK3.03 Guidance actions contained in EOP for loss of nuclear service water (CFR 41.4/41.8/45.7)	4.0	1
000065 Loss of Instrument Air / 8				X			AA1 Ability to operate and/or monitor the following as they apply to the Loss of Instrument Air: AA1.05 RPS (CFR 41.7/45.5/45.6)	3.3	1

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
W/E04 LOCA Outside Containment / 3		X					EK2 Knowledge of the interrelations between the LOCA Outside Containment and the following: EK2.1 Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features (CFR 41.7/45.7)	3.5	1
W/E11 Loss of Emergency Coolant Recirc. / 4				X			EA1 Ability to operate and/or monitor the following as they apply to the Loss of Emergency Coolant Recirculation EA1.2 Operating behavior characteristics of the facility (CFR 41.7/45.5/45.6)	3.5	1
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4					X		EA2 Ability to determine and interpret the following as they apply to the Loss of Secondary Heat Sink EA2.1 Facility conditions and the selection of appropriate procedures during abnormal and emergency operations (CFR 43.5/45.13)	3.4	1
000077 Generator Voltage and Electric Grid Disturbances / 6									
K/A Category Totals:	3	2	3	4	3	3	Group Point Total:		18/ 6

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1				x			AA1 Ability to operate and/or monitor the following as they apply to the Dropped Control Rod AA1.02 Controls and components necessary to recover rod (CFR 41.7/45.5/45.6)	3.6	1
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2	x						AK1 Knowledge of the operational implications of the following concepts as they apply to Pressurizer Level Control Malfunctions AK1.01 PZR reference leg abnormalities (CFR 41.8/41.10/45.3)	2.8	
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7									
000036 (BW/A08) Fuel Handling Accident / 8		x					AK2 Knowledge of the interrelationships between Fuel Handling Accidents and the following: AK2.02 Radiation monitoring equipment (portable and installed) (CFR 41.7/45.7)	3.4	1
000037 Steam Generator Tube Leak / 3				x			AA1 Ability to operate and/or monitor the following as they apply to the Steam Generator Tube Leak: AA1.11 PZR level indication (CFR 41.7/45.5/45.6)	3.4	1
000051 Loss of Condenser Vacuum / 4			x				AK3 Knowledge of the reasons for the following responses as they apply to the Loss of Condenser Vacuum: AK3.01 Loss of steam dump capability upon loss of condenser vacuum (CFR 41.5/41.10/45.6/45.13)	2.8	1
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8					x		AA2 Ability to determine and interpret the following as they apply to the Plant Fire on site: AA2.06 Need for pressurizing control room (recirculation mode) (CFR 43.5/45.13)	3.3	1
000068 (BW/A06) Control Room Evac. / 8									

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000069 (W/E14) Loss of CTMT Integrity / 5									
000074 (W/E06&E07) Inad. Core Cooling / 4									
000076 High Reactor Coolant Activity / 9									
W/EO1 & E02 Rediagnosis & SI Termination / 3									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5					x		EA2 Ability to determine and interpret the following as they apply to the Containment Flooding: EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency conditions (CFR 43.5/45.13)	2.7	1
W/E16 High Containment Radiation / 9				x			EA1 Ability to operate and/or monitor the following as they apply to the High Containment Radiation: EA1.1 Components and functions of control and safety systems including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.1	1
BW/A01 Plant Runback / 1									
BW/A02&A03 Loss of NNI-X/Y / 7									
BW/A04 Turbine Trip / 4									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
BW/E03 Inadequate Subcooling Margin / 4									
BW/E08; W/E03 LOCA Cooldown - Depress. / 4									
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4									
BW/E13&E14 EOP Rules and Enclosures									
CE/A11; W/E08 RCS Overcooling - PTS / 4						x	2.4.18 Knowledge for the specific bases for EOP's (CFR 41.10/43.1/45.13)	3.3	1
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:	1	1	1	3	2	1	Group Point Total:		9/4

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
003 Reactor Coolant Pump		x										K2 Knowledge of bus power supplies to the following: K2.01 RCPs (CFR 41.7)	3.1	1
004 Chemical and Volume Control						x					x	K6 Knowledge of the effect of a loss or malfunction on the following CVCS components: K6.07 Heat exchangers and condensers (CFR 41.7/45.7) --- 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of operation (CFR 41.10/43.5/45.2/45.6)	2.7 3.9	2
005 Residual Heat Removal				x							x	K4 Knowledge of RHRS design feature (s) and/or interlock (s) which provide the following: K4.03 RHR heat exchanger bypass flow control (CFR 41.7) --- 2.1.32 Ability to explain and apply system limits and precautions (CFR 41.10/43.2/45.12)	2.9 3.8	2
006 Emergency Core Cooling										x		A4 Ability to manually operate and/or monitor from the control room A4.11 Over pressure protection system.	4.2	1
007 Pressurizer Relief/Quench Tank			x									K3 Knowledge of the effect that a loss or malfunction of the PRTS will have on the following: K3.01 Containment (CFR 41.7/45.6)	3.3	1

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
008 Component Cooling Water	x							x				K1 Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: K1.02 Loads cooled by CCWS (CFR 41.2 to 41.9/45.7 to 45.9) --- A2 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCWS controls including: A2.01 Loss of CCW pump	3.3 3.3	2
010 Pressurizer Pressure Control				x								K4 Knowledge of PZR PCS design features and/or interlocks which provide for the following: K4.03 Over pressure control (CFR 41.7)	3.8	1
012 Reactor Protection						x		x				K6 Knowledge of the effect of loss or malfunction that the following will have on the RPS: K6.10 Permissive circuits (CFR 41.7/45.7) --- A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.02 Loss of instrument power (CFR 41.5/43.5/45.3/45.5)	3.3 3.6	2
013 Engineered Safety Features Actuation										x		A4 Ability to manually operate and/or monitor in the control room: A4.01 ESFAS –initiation equipment which fails to actuate (CFR 41.7/45.5 to 45.8)	4.5	1
022 Containment Cooling		x										K2 Knowledge of power supplies for the following: K2.01 Containment cooling fans (CFR 41.7/45.6)	3.0	1
025 Ice Condenser														

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
026 Containment Spray				x								K4 Knowledge of the CSS design feature(s) and/or interlock(s) which provide for the following: K4.08 Automatic swapover to containment sump suction for recirculation phase after LOCA(RWST low-low level alarm) (CFR 41.7)	4.1	1
039 Main and Reheat Steam					x							K5 Knowledge of the operational implications of the following concepts as they apply to the MRSS: K5.05 Bases for RCS cooldown limits (CFR 41.5/45.7)	2.7	1
059 Main Feedwater			x									K3 Knowledge of the effect that a loss or malfunction of the MFW will have on the following: K3.02 AFW system (CFR 41.7/45.6)	3.6	1
061 Auxiliary/Emergency Feedwater		x	x									K2 Knowledge of bus power supplies to the following: K2.02 AFW electric drive pumps (CFR 41.7) --- K4 Knowledge of AFW design feature(s) and/or interlock(s) which provide for the following: K4.08 AFW recirculation (CFR 41.7)	3.7 2.7	2
062 AC Electrical Distribution							x		x			A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ac distribution system controls including: A1.01 Significance of D/G load limits (CFR 41.5/45.5) --- A3 Ability to monitor automatic operation of the ac distribution system, including: A3.05 Safety related indicators and controls (CFR 41.7/45.5)	3.4 3.5	2

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)											Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
063 DC Electrical Distribution	x											K1 Knowledge of the physical connections and/or cause-effect relationships between the DC electrical system and the following systems: K1.02 AC electrical system (CFR 41.2 to 41.9/45.7 to 45.8)	2.7	1
064 Emergency Diesel Generator											x	2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR 41.5/43.5/45.12/45.13)	4.4	1
073 Process Radiation Monitoring							x					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRM system controls including: A1.01 Radiation levels (CFR 41.5/45.7)	3.2	1
076 Service Water			x									K3 Knowledge of the effect that a loss or malfunction of the SWS will have on the following: K3.01 Closed cooling water. (CFR 41.7/45.6)	3.4	1
078 Instrument Air	x		x									K1 Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: K1.02 Service air (CFR 41.2 to 41.9/45.7 to 45.8) --- K3 Knowledge of the effect that a loss or malfunction of the IAS will have on the following: K3.02 Systems having pneumatic valves and controls (CFR 41.7/45.6)	2.7 3.4	2
103 Containment				x								K4 Knowledge of the containment system design feature(s) and/or interlock(s) which provide for the following: K4.06 Containment isolation system (CFR 41.7)	3.1	1
K/A Category Point Totals:	3	3	5	4	1	2	2	2	1	2	3	Group Point Total:		28/ 5

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
001 Control Rod Drive				x								K4 Knowledge of CRDS design feature(s) and/or interlock(s) which provide for the following: K4.03 Rod control logic (CFR 41.7)	3.5	1
002 Reactor Coolant														
011 Pressurizer Level Control									x			A3 Ability to monitor automatic operation of the PZR LCS, including: A3.03 Charging and letdown	3.2	1
014 Rod Position Indication							x					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RPIS controls, including: A1.03 PDIL,PPDIL (CFR 41.5/45.5)	3.6	1
015 Nuclear Instrumentation														
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor				x								K4 Knowledge of the ITM system design features an/or interlocks which provide for the following: K4.01 Input to subcooling monitors. (CFR 41.7)	3.4	1
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment														
035 Steam Generator					x							K5 Knowledge of the operational implications of the following concepts as they apply to the S/Gs: K5.01 Effect of secondary parameters, pressure, and temperature on reactivity (CFR 41.5/45.7)	3.4	1

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)											Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
041 Steam Dump/Turbine Bypass Control								x				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SDS; and (b) based on those predictions use procedures to correct, control, or mitigate the consequences of those malfunctions or operations A2.02 Steam valve stuck open (CFR 41.5/43.5/45.3/45.13)	3.6	1
045 Main Turbine Generator														
055 Condenser Air Removal	x											K1 Knowledge of the physical connections and/or cause-effect relationships between the CARS and the following systems: K1.06 PRM (process radiation monitoring) system (CFR 41.2 to 41.9/45.7 to 45.8)	2.6	1
056 Condensate	x											K1 Knowledge of the physical connections and/or cause-effect relationships between the condensate system and the following systems: K1.03 MFW (CFR 41.2 to 41.9/ 45.7 to 45.8)	2.6	1
068 Liquid Radwaste														
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
075 Circulating Water		x										K2 Knowledge of bus power supplies to the following: K2.03 Emergency/essential SWS pumps (CFR 41.7)	2.6	1
079 Station Air				x								K4 Knowledge of SAS design feature(s) and/or interlock(s) which provide for the following: K4.01 Cross-connect with IAS (CFR 41.7)	2.9	1
086 Fire Protection														
K/A Category Point Totals:	2	1	0	3	1	0	1	1	1	0	0	Group Point Total:		10/ 3

Facility: SEABROOK		Date of Exam: 6/15/09				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.3	Knowledge of shift or short-term relief turnover practices. (CFR 41.10/45.13)	3.7	1		
	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR 41.10/43.5/45.12)	3.9	1		
	2.1.26	Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen, and hydrogen. (CFR 41.10/45.12)	3.4	1		
	2.1.					
	2.1.					
	2.1.					
	Subtotal			3		
2. Equipment Control	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels. (CFR 4160/41.7/45.2)	4.6	1		
	2.2.22	Knowledge of limiting conditions for operation and safety limits. (CFR 41.5/43.2/45.2)	4.0	1		
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	Subtotal			2		
3. Radiation Control	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personal monitoring equipment, etc. (CFR 41.11/41.12/43.4/45.9)	2.9	1		
	2.3.11	Ability to control radiation releases. (CFR 41.11/43.4/45.10)	3.8	1		
	2.3.					
	2.3.					
	2.3.					

Facility: SEABROOK		Date of Exam: 6/15/09				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
	2.3.					
	Subtotal			2		
4. Emergency Procedures / Plan	2.4.6	Knowledge of EOP mitigation strategies. (CFR 41.10/43.5/45.13)	3.7	1		
	2.4.11	Knowledge of abnormal condition procedures. (CFR 41.10/43.5/45.13)	4.0	1		
	2.4.42	Knowledge of emergency response facilities. (CFR 41.10/45.11)	2.6	1		
	2.4.					
	2.4.					
	2.4.					
	Subtotal			3		
Tier 3 Point Total				10		7

Facility: SEABROOK SRO section Date of Exam: 10/1/9

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				N/A								18	4	2	6
	2												9	2	2	4
	Tier Totals												27	6	4	10
2. Plant Systems	1												28	2	3	5
	2												10	3	0	3
	Tier Totals												38	5	3	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1 2	2 3	1 4	7
														2	2	1 2	

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5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3					x		EA2 Ability to determine or interpret the following as they apply to a small break LOCA: EA2.34 Conditions for throttling or stopping HPI (CFR 43.5/45.13)	4.2	1
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4						x	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of operation. (CFR 41.10/43.5/45.2/45.6)	4.4	1
000022 Loss of Rx Coolant Makeup / 2					x		AA2 Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: AA2.03 Failures of flow control valve or controller (CFR 43.5/45.13)	3.6	1
000025 Loss of RHR System / 4									
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3					x		AA2 Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: AA2.06 Conditions requiring plant shutdown (CFR 43.5/45.13)	3.9	1
000029 ATWS / 1									
000038 Steam Gen. Tube Rupture / 3					x		EA2 Ability to determine or interpret the following as they apply to a SGTR: EA2.10 Flowpath for charging and letdown flows (CFR 43.5/45.13)	3.3	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4									
000054 (CE/E06) Loss of Main Feedwater / 4									
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6									
000057 Loss of Vital AC Inst. Bus / 6									

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4									
000065 Loss of Instrument Air / 8						x	2.1.32 Ability to explain and apply system limits and precautions. (CFR 41.10/43.2/45.12)	4.0	1
W/E04 LOCA Outside Containment / 3									
W/E11 Loss of Emergency Coolant Recirc. / 4									
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
000077 Generator Voltage and Electric Grid Disturbances / 6									
K/A Category Totals:					4	2	Group Point Total:		18/ 6

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-2		
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1									
000005 Inoperable/Stuck Control Rod / 1					x		AA2 Ability to determine and interpret the following as they apply to the Inoperabel/Stuck Rod: AA2.03 Required actions if more than one rod is stuck or inoperable (CFR 43.5/45.13)	4.4	1
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2									
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7									
000036 (BW/A08) Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid RadWaste Rel. / 9						x	2.3.11 Ability to control radiation releases. (CFR 41.11/43.4/45.10)	4.3	1
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8									
000068 (BW/A06) Control Room Evac. / 8									
000069 (W/E14) Loss of CTMT Integrity / 5									
000074 (W/E06&E07) Inad. Core Cooling / 4									
000076 High Reactor Coolant Activity / 9									
W/EO1 & E02 Rediagnosis & SI Termination / 3									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
W/E16 High Containment Radiation / 9									
BW/A01 Plant Runback / 1									
BW/A02&A03 Loss of NNI-X/Y / 7									
BW/A04 Turbine Trip / 4									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
BW/E03 Inadequate Subcooling Margin / 4									
BW/E08; W/E03 LOCA Cooldown - Depress. / 4						x	2.4.20 Knowledge of operational implcations of EOP warnings, cautions, and notes. (CFR 41.10/43.5/45.13)	4.3	1
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					x		E09 EA2 Ability to determine and interpret the following as they apply to the Natural Circulation Operations: EA2.2 Adherence to appropriate procedures and operation within the limitations in the facilities license and amendments. (CFR 43.5/45.13)	3.8	1
BW/E13&E14 EOP Rules and Enclosures									
CE/A11; W/E08 RCS Overcooling - PTS / 4									
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:					2	2	Group Point Total:		9/4

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
003 Reactor Coolant Pump														
004 Chemical and Volume Control											x	2.2.22 Knowledge of limiting conditions for operations and safety limits. (CFR 41.5/43.2/45.2)	4.7	1
005 Residual Heat Removal														
006 Emergency Core Cooling														
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water											x	2.4.11 Knowledge of abnormal condition procedures. (CFR 41.10/43.5/45.13)	4.2	1
010 Pressurizer Pressure Control														
012 Reactor Protection								x				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.06 Failure of RPS signal to trip the reactor. (CFR 41.5/43.5/45.3/45.5)	4.7	1
013 Engineered Safety Features Actuation														
022 Containment Cooling														
025 Ice Condenser														
026 Containment Spray														
039 Main and Reheat Steam														
059 Main Feedwater														
061 Auxiliary/Emergency Feedwater														
062 AC Electrical Distribution														
063 DC Electrical Distribution														

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
064 Emergency Diesel Generator											x	2.2.40 Ability to apply Technical Specifications for a system. (CFR41.10/43.2/43.5/45.3)	4.7	1
073 Process Radiation Monitoring														
076 Service Water														
078 Instrument Air														
103 Containment								x				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the containment system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.03 Phase A and B isolation (CFR 41.5/43.5/45.3/45.13)	3.8	1
K/A Category Point Totals:								2			3	Group Point Total:		28/ 5

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
001 Control Rod Drive														
002 Reactor Coolant								x				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.02 Loss of coolant pressure (CFR 41.5/43.5/45.3/45.5)	4.4	1
011 Pressurizer Level Control														
014 Rod Position Indication														
015 Nuclear Instrumentation								x				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.02 Faulty or erratic operation of detectors or compensating components (CFR 41.5/43.5/45.3/45.5)	3.5	1
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling								x				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.03 Abnormal spent fuel pool water level or loss of water level (CFR 41.5/43.5/45.3/45.13)	3.5	1
034 Fuel Handling Equipment														
035 Steam Generator														

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator														
055 Condenser Air Removal														
056 Condensate														
068 Liquid Radwaste														
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
075 Circulating Water														
079 Station Air														
086 Fire Protection														
K/A Category Point Totals:								3			0	Group Point Total:		10/ 3

Facility: SEABROOK Date of Exam: 6/15/09

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.20	Ability to interpret and execute procedure steps. (CFR 41.10/43.5/45.12)			4.6	1
	2.1.41	Knowledge of refueling process. (CFR 41.2/41.10/43.6/45.13)			3.7	1
	2.1.					
	2.1.					
	2.1.					
	2.1.					
	Subtotal					2
2. Equipment Control	2.2.5	Knowledge of the process for making design or operating changes to the facility. (CFR 41.10/43.3/45.13)			3.2	1
	2.2.38	Knowledge of conditions and limitations in the facility license. (CFR 41.7/41.10/43.1/45.13)			4.5	1
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	Subtotal					2
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions. (CFR 41.12/43.4/45.10)			3.7	1
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal					1
4. Emergency	2.4.5	Knowledge of the organization of the operating procedure network for normal, abnormal, and emergency evolutions. (CFR 41.10/43.5/45.13)			4.3	1

Facility: SEABROOK		Date of Exam: 6/15/09				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
Procedures / Plan	2.4.38	Ability to take actions called for in the facility emergency plan, including support or acting as emergency coordinator if required. (CFR 41.10/43.5/45.13)			4.4	1
	2.4.					
	2.4.					
	2.4.					
	2.4.					
	Subtotal					2
Tier 3 Point Total						7

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 2/ Group 1 RO and SRO section	025 Ice Condenser	During exam outline generation the K/A's associated with Ice Condenser (025) were suppressed. This system is N/A to Seabrook.
Tier 2/ Group 2 RO and SRO section	016 Non-nuclear Instrumentation	During exam outline generation the K/A's associated with Non-Nuclear Instrumentation (016) were suppressed. This system is N/A to Seabrook
Tier 2/ Group 2 RO and SRO section	027 Containment Iodine Removal	During exam outline generation the K/A's associated with Containment Iodine Removal (027) were suppressed. This system is included as part of the Containment Building Spray System at Seabrook
Tier 1/ Group 1 RO section	007 Reactor Trip-Stabilization-Recovery	Originally selected K/A EK1.05, Decay power as a function of time. Rejected K/A as this subject is considered a generic fundamental topic. Selected K/A EK1.06, Relationship of emergency feedwater flow to S/G and decay heat removal following reactor trip.
Tier 1/ Group 1 RO section	040 Steam Line Rupture-Excessive Heat Transfer	Originally selected K/A AA1.15, T-avg protection indicators. Rejected K/A as this is not applicable to Seabrook. The facility utilizes core/vessel temperature parameters with regard to excessive cooldown conditions. Selected K/A AA1.09, Setpoint of Main Steam Safety and PORV.
Tier 1/ Group 2 RO section	061 ARM System Alarms	Originally selected K/A AA1.01, Ability to operated and/or monitor the following as they apply to the ARM system alarms: Automatic actuation. Rejected this K/A as it presents too similar a topic to the K/A selected for Tier 1/ Group 2 036, Fuel Handling Accident. Seabrook Station does not have automatic actuations from area rad monitors with the exception of the refueling crane monitor that is placed in service during refueling. This topic is covered by the 036, Fuel Handling Accident associated K/A. Selected K/A AA2.05, Need for area evacuation.

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 2/ Group 1 RO section	007 Pressurizer Relief/Quench Tank	Originally selected K/A A1.03, Monitoring quench tank temperature. Rejected this K/A as the subject matter appears to overlap that of Question 1 on the original 2009 written exam. Selected K/A 3.01, Knowledge of the effect that a loss or malfunction of the PRTS will have on the following: Containment
Tier 2/ Group 1 RO section	022 Containment Cooling	Originally selected K/A A2.05, Major leak in CCS. Rejected K/A as Seabrook Station does not have a Service Water interface for it's CCS. Any major leak associated with the CCS system would be associated with the Component Cooling System, which is covered by another category. Selected new K/A K2.01, Knowledge of power supplies for the following: Containment Cooling Fans
Tier 2/ Group 1 RO section	063 DC Electrical System	Originally selected K/A K1.03, Knowledge of the physical connections and/or cause-effect relationships between the DC electrical system and the following: Battery charger and battery. Rejected the K/A as it appeared too close to the subject matter for the K/A selected for Tier 1/ Group 1, 058, Loss of DC power. Selected new K/A K1.02, Knowledge of the physical connections and/or cause-effect relationships between the DC electrical system and the following: AC electrical system
Tier 1/ Group 2 SRO section	059 Accidental Liquid Rad Waste Release	Originally selected K/A 2.3.7, Ability to comply with radiation work permits during normal or abnormal conditions. K/A was rejected as the topic pertains to accidental rad releases vice a planned release associated with rad permits. Selected new K/A 2.3.1, Ability to control radiation releases.
Tier 2/ Group 1 SRO section	063 DC Electrical System	Originally selected category 063 DC Electrical System. Rejected K/A category 063 as the same category appears multiple times on the exam. Change made pursuant to achieving diversity of subject matter. Selected new K/A category 064 Emergency Diesel Generator

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 2/ Group 2 SRO section	002 Reactor Coolant	Originally selected K/A A2.04, Ability to a) predict the impacts of the following malfunctions or operations on the RCS; and b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of heat sinks. Rejected the K/A as the subject matter was too similar to the K/A selected for RO section, Tier 1/Group1, BW/E04, Inadequate Heat Transfer-Loss of Secondary Heat Sink, K/A EA2.1. Selected new K/A A2.02, Loss of coolant pressure.
Tier 2/Group 2	017 In-Core Temperature Monitoring	Originally selected K/A K1.02, Knowledge of the physical connections and/or cause effect relationships between ITM and the following systems: RCS Rejected the K/A as it duplicates the subject matter associated with submitted test question #2. Selected new K/A K4.01, Knowledge if the ITM system design features and/or interlocks which provide for the following: Input to subcooling monitors.
Tier 2/ Group 1	076 Service Water	Originally selected K/A K3.07 Knowledge of the effect that a loss or malfunction of the SWS will have on the following: ESF Loads. Rejected the K/A as the main ESF load is the Emergency Diesel Generator. The exam already has questions pertaining to the Emergency Diesel Generator and another discriminatory question could not be found. Selected new K/A K3.01, Knowledge of the effect that a loss or malfunction of the SWS will have on the following: Closed cooling water.

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 1/ Group 2	061 Area Rad Monitoring System Alarms	Originally selected K/A AA2.05 Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System alarms: Need for area evacuation, check against existing limits. Rejected the K/A based on a) could not select/create a discriminatory question. The facilities actions in the Area High Radiation abnormal procedure appeared too simplistic to author a valid question and b) the exam already contains questions pertaining to Area Rad Monitor interface with Containment Ventilation Isolation equipment and also Refueling/Spent Fuel abnormal procedures. Reselected new Category and K/A from same tier. Selected W/E16 High Containment Radiation, K/A EA1.1 Ability to operate and/or monitor the following as they apply to the High Containment Radiation, Components and functions of control and safety systems including instrumentation, signals, interlocks, failure modes, and automatic and manual features.