

Facility: SEABROOK		Date of Exam: MARCH 2015																
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	3	2	N/A			4	2	N/A			4	18			6	
	2	2	2	2				0	1				2	9			4	
	Tier Totals	5	5	4				4	3				6	27			10	
2. Plant Systems	1	3	2	4	3	1	4	1	3	4	2	1	28			5		
	2	2	0	1	2	1	0	2	1	0	0	1	10			3		
	Tier Totals	5	2	5	5	2	4	3	4	4	2	2	38			8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7
					3		2		2		3							

**Note:**

- 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).
- The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by  $\pm 1$  from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
- 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.
- 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.
- 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.
- Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
- \* 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.
- 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.
- 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						<b>007 Reactor Trip</b>  <b>EK1</b> Knowledge of the operational implications of the following concepts as they apply to the reactor trip:  <b>EK1.04</b> Decrease in reactor power following reactor trip (prompt drop and subsequent decay)	3.6	Q1
000008 Pressurizer Vapor Space Accident / 3				X			<b>008 Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)</b>  <b>AA1.</b> Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident:  <b>AA1.02</b> HPI pump to control PZR level/pressure	4.1	Q2
000009 Small Break LOCA / 3			X				<b>009 Small Break LOCA</b>  <b>EK3</b> Knowledge of the reasons for the following responses as they apply to the small break LOCA:  <b>EK3.03</b> Reactor trip and safety initiation	4.1	Q3
000011 Large Break LOCA / 3	X						<b>011 Large Break LOCA</b>  <b>EK1</b> Knowledge of the operational implications of the following concepts as they apply to the Large Break LOCA :  <b>EK1.01</b> Natural circulation and cooling, including reflux boiling	4.1	Q4
000015/17 RCP Malfunctions / 4		X					<b>015/017 Reactor Coolant Pump (RCP) Malfunctions</b>  <b>AK2.</b> Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following:  <b>AK2.07</b> RCP seals	2.9	Q5
000022 Loss of Rx Coolant Makeup / 2					X		<b>022 Loss of Reactor Coolant Makeup</b>  <b>AA2.</b> Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup:  <b>AA2.04</b> How long PZR level can be maintained within limits	2.9	Q6
000025 Loss of RHR System / 4				X			<b>025 Loss of Residual Heat Removal System (RHRS)</b>  <b>AA1.</b> Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System:  <b>AA1.08</b> RHR cooler inlet and outlet temperature indicators	2.9*	Q7

000026 Loss of Component Cooling Water / 8				X			<b>026 Loss of Component Cooling Water (CCW)</b> <b>AA1.</b> Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: <b>AA1.07</b> Flow rates to the components and systems that are serviced by the CCWS; interactions among the components	2.9	Q8
000027 Pressurizer Pressure Control System Malfunction / 3		X					<b>027 Pressurizer Pressure Control System (PZR PCS) Malfunction</b> <b>AK2.</b> Knowledge of the interrelations between the Pressurizer Pressure Control Malfunctions and the following: <b>AK2.03</b> Controllers and positioners	2.6	Q9
000029 ATWS / 1		X					<b>029 Anticipated Transient Without Scram (ATWS)</b> <b>EK2</b> Knowledge of the interrelations between the and the following an ATWS: <b>EK2.06</b> Breakers, relays, and disconnects	2.9*	Q10
000038 Steam Gen. Tube Rupture / 3				X			<b>038 Steam Generator Tube Rupture (SGTR)</b> <b>EA1</b> Ability to operate and monitor the following as they apply to a SGTR: <b>EA1.40</b> Adding boron, to raise its ppm to the required shutdown concentration	4.0	Q11
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4									
000054 (CE/E06) Loss of Main Feedwater / 4			X				<b>054 Loss of Main Feedwater (MFW)</b> <b>AK3.</b> Knowledge of the reasons for the following responses as they apply to the Loss of Main Feedwater (MFW): <b>AK3.01</b> Reactor and/or turbine trip, manual and automatic	4.1	Q12
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6	X						<b>056 Loss of Offsite Power</b> <b>AK1.</b> Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: <b>AK1.01</b> Principle of cooling by natural convection	3.7	Q13
000057 Loss of Vital AC Inst. Bus / 6					X		<b>057 Loss of Vital AC Electrical Instrument Bus</b> <b>AA2.</b> Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: <b>AA2.16</b> Normal and abnormal PZR level for various modes of plant operation	3.0	Q14
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4						X	<b>062 Loss of Nuclear Service Water</b> <b>2.2.12</b> Knowledge of surveillance procedures.	3.7	Q15

000065 Loss of Instrument Air / 8						X	<b>065 Loss of Instrument Air</b> <b>2.4.45</b> Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	Q16
W/E04 LOCA Outside Containment / 3									
W/E11 Loss of Emergency Coolant Recirc. / 4						X	<b>W/E11 Loss of Emergency Coolant Recirculation</b> <b>2.4.3</b> Ability to identify post-accident instrumentation.	3.7	Q17
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
000077 Generator Voltage and Electric Grid Disturbances / 6						X	<b>077 Generator Voltage and Electric Grid Disturbances</b> <b>2.4.4</b> Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5	Q18
K/A Category Totals:	3	3	2	4	2	4	Group Point Total:	18/6	

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000074 (W/E06&E07) Inad. Core Cooling / 4										
000076 High Reactor Coolant Activity / 9										
W/E01 & E02 Rediagnosis & SI Termination / 3										
W/E13 Steam Generator Over-pressure / 4						X			W/E13 Steam Generator Overpressure 2.4.1 Knowledge of EOP entry conditions and immediate action steps..	4.6 Q25
W/E15 Containment Flooding / 5										
W/E16 High Containment Radiation / 9	X								W/E16 High Containment Radiation EK1. Knowledge of the operational implications of the following concepts as they apply to the (High Containment Radiation) EK1.2 Normal, abnormal and emergency operating procedures associated with (High Containment Radiation).	2.7 Q26
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	X								W/E09 Natural Circulation Operations EK1. Knowledge of the operational implications of the following concepts as they apply to the (Natural Circulation Operations) EK1.1 Components, capacity, and function of emergency systems.	3.0 Q27
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	2	0	1	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			X									<b>003 Reactor Coolant Pump System (RCPS)</b>  <b>K3</b> Knowledge of the effect that a loss or malfunction of the RCPS will have on the following:  <b>K3.03</b> Feedwater and emergency feedwater	2.8	Q28
004 Chemical and Volume Control					X							<b>004 Chemical and Volume Control System (CVCS)</b>  <b>K5</b> Knowledge of the operational implications of the following concepts as they apply to the CVCS:  <b>K5.37</b> Effects of boron saturation on ion exchanger behavior	2.6	Q29
005 Residual Heat Removal				X								<b>005 Residual Heat Removal System (RHRS)</b>  <b>K4</b> Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following:  <b>K4.06</b> Function of RHR pump miniflow recirculation	2.7	Q30
006 Emergency Core Cooling						X					X	<b>006 Emergency Core Cooling System (ECCS)</b>  <b>K6</b> Knowledge of the effect of a loss or malfunction on the following will have on the ECCS:  <b>K6.02</b> Core flood tanks (accumulators)  <b>2.1.27</b> Knowledge of system purpose and/or function.	3.4	Q31
007 Pressurizer Relief/Quench Tank				X						X		<b>007 Pressurizer Relief Tank/Quench Tank System (PRTS)</b>  <b>K4</b> Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following:  <b>K4.01</b> Quench tank cooling  <b>A4</b> Ability to manually operate and/or monitor in the control room:  <b>A4.10</b> Recognition of leaking PORV/code safety	2.6	Q33
												<b>2.1.27</b> Knowledge of system purpose and/or function.	3.9	Q32
												<b>A4</b> Ability to manually operate and/or monitor in the control room:  <b>A4.10</b> Recognition of leaking PORV/code safety	3.6	Q34

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039 Main and Reheat Steam							X						<b>039 Main and Reheat Steam System (MRSS)</b>  <b>A2</b> 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:  <b>A2.03</b> Indications and alarms for main steam and area radiation monitors (during SGTR)	3.4	Q43
059 Main Feedwater							X	X					<b>059 Main Feedwater (MFW) System</b>  <b>A2</b> Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:  <b>A2.03</b> Overfeeding event  <b>A3</b> Ability to monitor automatic operation of the MFW, including:  <b>A3.03</b> Feedwater pump suction flow pressure	2.7  2.5	Q44  Q45
061 Auxiliary/Emergency Feedwater						X							<b>061 Auxiliary / Emergency Feedwater (AFW) System</b>  <b>K6</b> Knowledge of the effect of a loss or malfunction of the following will have on the AFW components:  <b>K6.01</b> Controllers and positioners	2.5	Q46
062 AC Electrical Distribution			X				X						<b>062 A.C. Electrical Distribution</b>  <b>K3</b> Knowledge of the effect that a loss or malfunction of the ac distribution system will have on the following:  <b>K3.01</b> Major system loads  <b>A2</b> 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:  <b>A2.08</b> Consequences of exceeding voltage limitations	3.5  2.7	Q47  Q48
063 DC Electrical Distribution	X												<b>063 D.C. Electrical Distribution</b>  <b>K1</b> Knowledge of the physical connections and/or cause effect relationships between the DC electrical system and the following systems:  <b>K1.03</b> Battery charger and battery	2.9	Q49

<b>064 Emergency Diesel Generator</b>	X																<b>064 Emergency Diesel Generators (ED/G)</b>  <b>K1 Knowledge of the physical connections and/or cause effect relationships between the ED/G system and the following systems:</b>  <b>K1.05 Starting air system</b>	3.4	Q50
<b>073 Process Radiation Monitoring</b>			X														<b>073 Process Radiation Monitoring (PRM) System.</b>  <b>K3 Knowledge of the effect that a loss or malfunction of the PRM system will have on the following:</b>  <b>K3.01 Radioactive effluent releases</b>	3.6	Q51
<b>076 Service Water</b>										X							<b>076 Service Water System (SWS)</b> <b>A3 Ability to monitor automatic operation of the SWS, including:</b>  <b>A3.02 Emergency heat loads</b>	3.7	Q52
<b>078 Instrument Air</b>		X	X														<b>078 Instrument Air System (IAS)</b> <b>K2 Knowledge of bus power supplies to the following:</b>  <b>K2.01 Instrument air compressor</b>  <b>K3 Knowledge of the effect that a loss or malfunction of the IAS will have on the following:</b>  <b>K3.01 Containment air system</b>	2.7  3.1*	Q53  Q54
<b>103 Containment</b>										X							<b>103 Containment System</b> <b>A3 Ability to monitor automatic operation of the containment system, including:</b>  <b>A3.01 Containment isolation</b>	3.9	Q55
<b>K/A Category Point Totals:</b>	3	2	4	3	1	4	1	3	4	2	1						<b>Group Point Total:</b>		<b>28/5</b>

[illegible]

045 Main Turbine Generator				X														045 Main Turbine Generator (MT/G) System  K4 Knowledge of MT/G system design feature(s) and/or interlock(s) which provide for the following:  K4.02 Automatic shut of reheat stop valves as well as main control valves when tripping turbine	2.5*	Q61
055 Condenser Air Removal	X																	055 Condenser Air Removal System (CARS)  K1 Knowledge of the physical connections and/or cause-effect relationships between the CARS and the following systems:  K1.06 PRM system	2.6	Q62
056 Condensate								X										056 Condensate System  A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:  A2.04 Loss of condensate pumps	2.6	Q63
068 Liquid Radwaste																				
071 Waste Gas Disposal				X														071 Waste Gas Disposal System (WGDS)  K3 Knowledge of the effect that a loss or malfunction of the Waste Gas Disposal System will have on the following:  K3.05 ARM and PRM systems	3.2	Q64
072 Area Radiation Monitoring																				
075 Circulating Water																				
079 Station Air				X														079 Station Air System (SAS)  K4 Knowledge of SAS design feature(s) and/or interlock(s) which provide for the following:  K4.01 Cross-connect with IAS	2.9	Q65
086 Fire Protection																				
K/A Category Point Totals:	2	0	1	2	1	0	2	1	0	0	1							Group Point Total:		10/3

Facility: SEABROOK		Date of Exam: 3/23/15 – 4/1/15				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.19	<b>2.1.19</b> Ability to use plant computers to evaluate system or component status.	3.9	Q66		
	2.1.29	<b>2.1.29</b> Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.	4.1	Q67		
	2.1.37	<b>2.1.37</b> Knowledge of procedures, guidelines, or limitations associated with reactivity management.	4.3	Q68		
	2.1.					
	2.1.					
	2.1.					
	Subtotal			3		
2. Equipment Control	2.2.1	<b>2.2.1</b> Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	4.5	Q69		
	2.2.6	<b>2.2.6</b> Knowledge of the process for making changes to procedures.	3.0	Q70		
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	Subtotal			2		
3. Radiation Control	2.3.7	<b>2.3.7</b> Ability to comply with radiation work permit requirements during normal or abnormal conditions.	3.5	Q71		
	2.3.15	<b>2.3.15</b> Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	Q72		
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal			2		
4. Emergency Procedures / Plan	2.4.17	<b>2.4.17</b> Knowledge of EOP terms and definitions.	3.9	Q73		
	2.4.23	<b>2.4.23</b> Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.	3.4	Q74		
	2.4.34	<b>2.4.34</b> Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	Q75		
	2.4.					

	2.4.				
	2.4.				
	Subtotal			3	
Tier 3 Point Total				10	7

Facility: SEABROOK		Date of Exam: MARCH 2015																			
Tier	Group	RO K/A Category Points											SRO-Only Points								
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1. Emergency & Abnormal Plant Evolutions	1												18	2	4	6					
	2												9	2	2	4					
	Tier Totals												27	4	6	10					
2. Plant Systems	1												28	4	1	5					
	2												10	0	2	3					
	Tier Totals												38	6	2	8					
3. Generic Knowledge and Abilities Categories		1		2		3		4		10		1		2		3		4		7	
												2		2		1		2			

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[illegible]



W/E11 Loss of Emergency Coolant Recirc. / 4					X		W/E11 Loss of Emergency Coolant Recirculation  EA2. Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation)  EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.2	Q81
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:					2	4	Group Point Total:		18/6

[illegible]

BW/E08; W/E03 LOCA Cooldown - Depress. / 4						X	W/E03 LOCA Cooldown and Depressurization  2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.7	Q84
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	W/E08 Pressurized Thermal Shock  EA2. Ability to determine and interpret the following as they apply to the (Pressurized Thermal Shock  EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.2	Q85
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				<b>004 Chemical and Volume Control System (CVCS)</b>  <b>A2</b> Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:  <b>A2.09</b> High primary and/or secondary activity	3.9	Q86
005 Residual Heat Removal														
006 Emergency Core Cooling														
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water														
010 Pressurizer Pressure Control														
012 Reactor Protection														
013 Engineered Safety Features Actuation														
022 Containment Cooling														
025 Ice Condenser														
026 Containment Spray														
039 Main and Reheat Steam								X				<b>039 Main and Reheat Steam System (MRSS)</b>  <b>A2</b> 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:  <b>A2.04</b> Malfunctioning steam dump	3.7	Q87
059 Main Feedwater														

061 Auxiliary/Emergency Feedwater							X				061 Auxiliary / Emergency Feedwater (AFW) System  A2 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 those malfunctions or operations:  A2.07 Air or MOV failure	3.5	Q88
062 AC Electrical Distribution													
063 DC Electrical Distribution													
064 Emergency Diesel Generator									X		064 Emergency Diesel Generators (ED/G)  2.2.22 Knowledge of limiting conditions for operations and safety limits.	4.7	Q89
073 Process Radiation Monitoring													
076 Service Water							X				076 Service Water System (SWS)  A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:  A2.01 Loss of SWS	3.7*	Q90
078 Instrument Air													
103 Containment													
K/A Category Point Totals:							4		1		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				<b>002 Reactor Coolant System (RCS)</b>  <b>A2</b> 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:  <b>A2.01</b> Loss of coolant inventory	4.4	Q91
011 Pressurizer Level Control														
014 Rod Position Indication														
015 Nuclear Instrumentation														
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor								X				<b>017 In-Core Temperature Monitor System (ITM)</b>  <b>A2</b> Ability to (a) predict the impacts of the following malfunctions or operations on the ITM system; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations:  <b>A2.02</b> Core damage	4.1	Q92
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														
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator														
055 Condenser Air Removal														
056 Condensate														

068 Liquid Radwaste																		X	068 Liquid Radwaste System (LRS)  2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.4	Q93
071 Waste Gas Disposal																					
072 Area Radiation Monitoring																					
075 Circulating Water																					
079 Station Air																					
086 Fire Protection																					
K/A Category Point Totals:										2								1	Group Point Total:		10/3

Facility:		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.7	<b>2.1.7</b> Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.			4.7	Q94
	2.1.32	<b>2.1.32</b> Ability to explain and apply system limits and precautions.			4.0	Q95
	2.1.					
	2.1.					
	2.1.					
	2.1.					
	Subtotal					2
2. Equipment Control	2.2.7	<b>2.2.7</b> Knowledge of the process for conducting special or infrequent tests.			3.6	Q96
	2.2.21	<b>2.2.21</b> Knowledge of pre- and post-maintenance operability requirements.			4.1	Q97
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	Subtotal					2
3. Radiation Control	2.3.4	<b>2.3.4</b> Knowledge of radiation exposure limits under normal or emergency conditions.			3.7	Q98
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal					1
4. Emergency Procedures / Plan	2.4.8	<b>2.4.8</b> Knowledge of how abnormal operating procedures are used in conjunction with EOPs.			4.5	Q99
	2.4.28	<b>2.4.28</b> Knowledge of procedures relating to a security event (non-safeguards information).			4.1	Q100
	2.4.					
	2.4.					
	2.4.					
	2.4.					
	Subtotal					2



Tier 3 Point Total

10

7

Tier / Group	Randomly Selected K/A	Reason for Rejection
RO 1/2	CE/E09	Randomly selected CE/E09 Functional Recovery. This is a CE item not applicable to Seabrook. Randomly reselected W/E09 Natural Circulation.
RO 1/1	009 EK3.09	Randomly selected 009 EK3.09 Small Break LOCA knowledge of the reason for closing CCW surge tank vent as it applies to the Small Break LOCA. No Abnormal or Emergency procedure at Seabrook closes the CCW surge tank vent. Randomly reselected EK3.03.
RO 2/1	003 K3.05	Randomly selected 003 K3.05 Reactor Coolant Pump system knowledge of the effect Loss/Malfunction of RCP will have on ICS. ICS is a B&W system that is not applicable to Seabrook. Randomly reselected K3.03
SRO 1/1	011 G 2.4.34	Randomly selected generic 2.4.34. Knowledge of RO tasks outside Main Control Room during Large Break LOCA. There are no RO tasks outside the Main Control Room during a Large Break LOCA. Randomly reselected 2.4.6 Knowledge of EOP mitigation strategies.
SRO 2/1	004 A2.25	Randomly selected 004 A2.25 Chemical and Volume Control System, Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Uncontrolled boration or dilution. Was unable to create an adequate SRO only level question for this KA. Randomly reselected from the same category 004 A2.09 High primary and/or secondary activity.
SRO 2/1	076 A2.02	Randomly selected 076 A2.02 Service Water System (SWS), Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Service water header pressure. Seabrook has no service water header pressure instruments, only SW pump discharge pressure instruments. Could not develop question for this KA. Reselected only other KA under 076 A2 which is A2.01 Loss of SWS.
RO 1/2	037 AA2.05	Randomly selected 037 AA2.05 Steam Generator (S/G) Tube Leak, Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Past history of leakage with current problem. This KA is too similar to SRO Question 82. Randomly reselected AA2.10 Tech-Spec limits for RCS leakage, from same category.
RO 1/2	W/E13 2.1.25	Randomly selected W/E13 2.1.25 Steam Generator Overpressure, Ability to interpret reference materials, such as graphs, curves, tables, etc. Was unable to generate question to meet this KA. Randomly selected new KA from Generic Section. First random selection was 2.4.11 Knowledge of abnormal condition procedures. This generic does not for KA topic for EOP FR-H.2 Response to Steam Generator Overpressure. Second Random selection was 2.4.1 Knowledge of EOP entry conditions and immediate action steps.
RO 2/1	062 A2.16	Randomly selected 062 A2.16 AC Electrical Distribution System, 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: Degraded system voltages. This KA is too similar to KA and question developed for Q18. Randomly reselected from same category A2.08 Consequences of exceeding voltage limitations.

**RANDOM SAMPLING PROCESS**  
**2015 SEABROOK LOIT NRC WRITTEN EXAM**

As required by NUREG 1021, Rev 9, Supplement 1, (ES-401 D.1.b), the licensee shall submit along with the NRC examination outline, a description of the systematic and random selection process used to develop the examination outline.

The manual random sampling process described in Attachment 1 of ES-401 was used to generate the NRC Examination RO and SRO outlines.

- During the exam outline generation the following K/A statements were eliminated as not applicable to Seabrook design.
  - All K/As associated with Ice Condenser (025) – This system is N/A to Seabrook.
  - All K/As associated with Containment Iodine Removal (27) – This system is included as part of the Containment Building Spray System at Seabrook.
  - Generic K/A statements 2.2.3 and 2.2.4 (multi-unit) were not sampled – Seabrook is a single unit facility.
- During the examination development, any K/A statements eliminated and resampled were documented on ES-401-4, Record of Rejected K/As as required by ES-401, Attachment 2.

The facility lead exam developer is overseeing the audit exam development to ensure no specific subject matter overlap occurs between the exams.

## Seabrook Station 2015 NRC Exam JPM – RO

Facility: Seabrook  
 Examination Level: RO ☒ SRO ☐

Date of Examination: March 2015  
 Operating Test Number: \_\_\_\_\_

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,M	Steady State Leak Rate Calculation (OX1401.02) KA: 2.1.7 Ability to evaluate plant performance and make operational judgments based on the operating characteristics, reactor behavior, and instrument interpretation.
Conduct of Operations	R,M	ECP Calculation (RS1735) KA: 2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management.
Equipment Control	R,M	Shutdown Margin Calculation for Mode 2 (RX1707) KA: 2.2.12 Knowledge of Surveillance Procedures
Radiation Control	R,M	COP Exhaust Rad Monitor Setpoints (OS1023.69) KA: 2.3.11 Ability to control radiation releases.

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

## \* Type Codes &amp; Criteria:

(C)ontrol room, (S)imulator, or Class(R)oom  
 (D)irect from bank ( $\leq 3$  for ROs;  $\leq 4$  for SROs & RO retakes)  
 (N)ew or (M)odified from bank ( $\geq 1$ )  
 (P)revious 2 exams ( $\leq 1$ ; randomly selected)

## Seabrook Station 2015 NRC Exam JPM – SRO-I

Facility: <u>Seabrook</u>		Date of Examination: <u>March 2015</u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: _____

  

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,M	Verify Steady State Leak Rate Calculation (OX1401.02) KA: 2.1.7 Ability to evaluate plant performance and make operational judgments based on the operating characteristics, reactor behavior, and instrument interpretation.
Conduct of Operations	R,M	Approve ECP Calculation (RS1735) KA: 2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management.
Equipment Control	R,M	Review Shutdown Margin Calculation for Mode 2 (RX1707) KA: 2.2.12 Knowledge of Surveillance Procedures
Radiation Control	R,M	Verify COP Exhaust Rad Monitor Setpoints (OS1023.69) KA: 2.3.11 Ability to control radiation releases.
Emergency Procedures/Plan	R,M	Post Scenario Emergency Plan Classification and Notification (ER-1.1, ER-1.2) KA: 2.4.40 Knowledge of the Emergency Plan

  

**NOTE:** All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

  

\* Type Codes & Criteria:

- (C)ontrol room, (S)imulator, or Class(R)oom
- (D)irect from bank ( $\leq 3$  for ROs;  $\leq 4$  for SROs & RO retakes)
- (N)ew or (M)odified from bank ( $\geq 1$ )
- (P)revious 2 exams ( $\leq 1$ ; randomly selected)

Seabrook Station 2015 NRC Exam JPM – **SRO-U**Facility: SeabrookDate of Examination: March 2015Examination Level: RO ☐ SRO ☒

Operating Test Number: \_\_\_\_\_

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,M	Verify Steady State Leak Rate Calculation (OX1401.02) KA: 2.1.7 Ability to evaluate plant performance and make operational judgments based on the operating characteristics, reactor behavior, and instrument interpretation.
Conduct of Operations	R,M	Approve ECP Calculation (RS1735) KA: 2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management.
Equipment Control	R,M	Review Shutdown Margin Calculation for Mode 2 (RX1707) KA: 2.2.12 Knowledge of Surveillance Procedures
Radiation Control	R,M	Verify COP Exhaust Rad Monitor Setpoints (OS1023.69) KA: 2.3.11 Ability to control radiation releases.
Emergency Procedures/Plan	R,M	Post Scenario Emergency Plan Classification and Notification (ER-1.1, ER-1.2) KA: 2.4.40 Knowledge of the Emergency Plan

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

\* Type Codes & Criteria:

(C)ontrol room, (S)imulator, or Class(R)oom  
(D)irect from bank ( $\leq 3$  for ROs;  $\leq 4$  for SROs & RO retakes)  
(N)ew or (M)odified from bank ( $\geq 1$ )  
(P)revious 2 exams ( $\leq 1$ ; randomly selected)

Facility: Seabrook Date of Examination: March 2015  
 Exam Level: RO ☒ SRO-I ☐ SRO-U ☐ Operating Test No.: \_\_\_\_\_

Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. Perform a Blended Makeup to the VCT	A,M,S	1
b. Trip all RCPs	A,D,E,S	2
c. Perform SI Termination/Reduction	E,EN,M,S	3
d. Steam Header Pressure PT-507 Fails High	N,S	4 (Secondary)
e. Start Hydrogen Recombiners	D,E,P,S	5
f. Emergency Trip of Emergency Diesel 1B	A,M,S	6
g. FR-H.1 Bleed and Feed	A,E,M,S	4 (Primary)
h. Placing the Containment On-Line Purge (COP) System in Service	M,S	8

In-Plant Systems® (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. ASDV Local Operation	D,E,R	5
j. Reset Steam Driven EFW Pump Trip Valve	M,E,L	4
k. Transfer Vital Instrument Bus	D,L	6

All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	$\leq 9 / \leq 8 / \leq 4$
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$
(EN)gineered safety feature	- / - / $\geq 1$ (control room system)
(L)ow-Power / Shutdown	$\geq 1 / \geq 1 / \geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)
(R)CA	$\geq 1 / \geq 1 / \geq 1$
(S)imulator	

Facility: <u>Seabrook</u> Date of Examination: <u>March 2015</u> Exam Level: RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/> Operating Test No.: _____		
Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. Perform a Blended Makeup to the VCT	A,M,S	1
b. Trip all RCPs	A,D,E,S	2
c. Perform SI Termination/Reduction	E,EN,M,S	3
d. Steam Header Pressure PT-507 Fails High	N,S	4 (Secondary)
e. Start Hydrogen Recombiners	D,E,P,S	5
f. Emergency Trip of Emergency Diesel 1B	A,M,S	6
g. FR-H.1 Bleed and Feed	A,E,M,S	4 (Primary)
In-Plant Systems® (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. ASDV Local Operation	D,E,R	5
j. Reset Steam Driven EFW Pump Trip Valve	M,E,L	4
k. Transfer Vital Instrument Bus	D,L	6
All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.		
* Type Codes	Criteria for RO / SRO-I / SRO-U	
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ - / - / $\geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$	



Facility: Seabrook Date of Examination: March 2015  
 Exam Level: RO ☐ SRO-I ☐ SRO-U ☒ Operating Test No.: \_\_\_\_\_

Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
b. Trip all RCPs	A,D,E,S	2
c. Perform SI Termination/Reduction	E,EN,M,S	3
f. Emergency Trip of Emergency Diesel 1B	A,M,S	6

In-Plant Systems® (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. ASDV Local Operation	D,E,R	5
j. Reset Steam Driven EFW Pump Trip Valve	M,E,L	4

All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ - / - / $\geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$

## Seabrook Station 2015 NRC Exam-Simulator Scenario

Facility: SEABROOK

Scenario No.: A

Op-Test No.: 2015

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Initial Conditions:** MOL 100% power with stable Xenon, Boron Concentration at 1058 ppm, CB D at 230 steps.

**Turnover:**

- 'B' Emergency Diesel Generator is out of service.

Event No.	Malf. No.	Event Type*	Event Description
1		PSO R BOP N US N	Rapid down power to 800 MW electric in 30 minutes.
2	ltRCLT459	PSO I US I, TS	RC-LT-459 fails low.
3	ptFWPT508	BOP I US I	FW-PT-508 fails high.
4	mfED038 mfED033	PSO M BOP M US M	Loss of offsite power with no EDG response.
5	mfCC013 mfCC015	PSO C	'B' Train of PCCW fails to auto start.
6	mfSW013 mfSW015	BOP C	'B' Train of SW fails to auto start.

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

Anticipated AOP/EOP flow-path: OS1231.04, OS1201.07, ON1230.01, E-0, ECA-0.0

## Seabrook Station 2015 NRC Exam-Simulator Scenario

Facility: SEABROOK

Scenario No.: B

Op-Test No.: 2015

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Initial Conditions:** MOL 75% power with stable Xenon, Boron Concentration at 1166 ppm, CB D at 187 steps and both Heater Drain pumps in service.

**Turnover:**

- 'B' Emergency Diesel Generator is out of service.
- The crew will begin a power increase at 10%/hr to 90% power.

Event No.	Malf. No.	Event Type*	Event Description
1		PSO R BOP N US N	Crew begins a 10%/hr power increase.
2	ptRCPT455	PSO I US I,TS	RC-PT-455 Failed Low.
3	mfCSP2B	PSO C US C, TS	CS-P-2B overcurrent trip.
4	ltFWLT551	BOP I US I,TS	FW-LT-551 fails high.
5	mfRC050A	PSO M BOP M US M	600 gpm RCS leak (simulated with int leg leak). Reactor trip and Safety injection required which also triggers a loss of offsite power.
6	cSWV16	BOP C US C	SW-V16, 'A' EDG Service Water supply isolation valve fails to auto open.
7	mfMSPCV 3004	BOP C US C	On reactor trip 'D' SG ASDV fails open and will not close from the MCB.

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

Anticipated AOP/EOP flow-path: OS1202.02, OS1235.03, E-0, E-2, E-1

## Seabrook Station 2015 NRC Exam-Simulator Scenario

Facility: SEABROOK

Scenario No.: C

Op-Test No.: 2015

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Initial Conditions:** MOL 55% power with Rods in Auto, boron concentration at 1254 ppm and CB D at 156 steps and both Main Feed pumps in service.

**Turnover:**

- The crew will begin a rapid down power at 25%/hr to 45% power for FW-P-32-A high vibrations.

Event No.	Malf. No.	Event Type*	Event Description
1		PSO R BOP N US N	Crew begins a 25%/hr rapid down power for FW-P-32-A high vibrations.
2	mfRC020	PSO C BOP C US C, TS	'A' RCP vibration levels increase requiring tripping of the 'A' RCP.
3	trFWFT520	BOP I US I	'B' SG Controlling Feed Flow Channel fails high.
4	mfSG001A	PSO C US C, TS	'A' SG 30 gpm tube leak.
5	svMSV92 mfRPS001 mfRPS002	PSO M BOP M US M	'D' MSIV fails closed requiring manual reactor trip. ATWS requiring NSO to locally trip the Reactor followed by 'A' SG tube rupture requiring SI.

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

Anticipated AOP/EOP flow-path: OS1231.04, OS1201.01, OS1235.04, OS1227.02, E-0, FR-S.1, E-3