Seabrook Station 2013 NRC Exam JPM - **RO**

Facility: Seabrook Date of Examination: July 2013
Examination Level: RO ☒ SRO ☐ Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,M	Manual QPTR Calculation with fault (RX1703) 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	Calculate a blended makeup for the Spent Fuel Pool. (RS1735) KA: 2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management.
Equipment Control	R,M	Shutdown Margin Calculation for Mode 3 (RX1707) KA: 2.2.12 Knowledge of Surveillance Procedures
Radiation Control	R,M	Initiate a Liquid Effluent Waste Sample Request (form CP 4.1A) KA: 2.3.11 Ability to control radiation releases.
Emergency Procedures/Plan		

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

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Seabrook Station 2013 NRC Exam JPM – **SRO-I**

Facility: Seabrook Date of Examination: July 2013
Examination Level: RO ☐ SRO ☒ Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,M	Verify Manual QPTR Calculation with fault (RX1703) 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 a calculated blended makeup for the Spent Fuel Pool. (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 3 (RX1707) KA: 2.2.12 Knowledge of Surveillance Procedures
Radiation Control	R,M	Verify a Liquid Effluent Waste Sample Request (Form CP 4.1A) KA: 2.3.11 Ability to control radiation releases.
Emergency Procedures/Plan	R,M	Determine Emergency Action Level -PARS 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 (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Seabrook Station 2013 NRC Exam JPM – **SRO-U**

Facility: Seabrook Date of Examination: July 2013
Examination Level: RO ☐ SRO ☒ Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,M	Verify Manual QPTR Calculation with fault (RX1703) 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 a calculated blended makeup for the Spent Fuel Pool. (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 3 (RX1707) KA: 2.2.12 Knowledge of Surveillance Procedures
Radiation Control	R,M	Verify a Liquid Effluent Waste Sample Request (Form CP 4.1A) KA: 2.3.11 Ability to control radiation releases.
Emergency Procedures/Plan	R,M	Determine Emergency Action Level -PARS 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 (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Seabrook Station 2013 NRC Exam JPM – **RO**

Facility: Seabrook Date of Examination: July 2013
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. PZR Level Channel fails LOW	D,S	7
b. Transfer of SW from the Ocean to the Cooling Tower	A,M,S	4 (Secondary)
c. Post LOCA Cool-down PORV operations	A,D,E,L,S	3
d. Transfer FAH to the Fuel Handling mode	D,S	8
e. ASDV fails open on SG with tube leak	N,S	4 (Primary)
f. Raise Accumulator Pressure	D,S,EN	2
g. Establish Charging and Letdown	A,M,E,L,S	1
h. Restore offsite power to Emergency Bus 6	E,M,S	6

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

a. DC Start of Elgars UPS	A,D,L	6
b. Locally close MSIV	D,E	5
c. Align Alternate (Demin) Cooling to CCP Lube Oil Cooler	D,E,R	8

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

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

ES-301 **Control Room/In-Plant Systems Outline** **Form ES-301-2**

Seabrook Station 2013 NRC Exam JPM – **SRO-I**

Facility: Seabrook Date of Examination: July 2013

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. PZR Level Channel fails LOW	D,S	7
b. Transfer of SW from the Ocean to the Cooling Tower	A,M,S	4 (Secondary)
c. Post LOCA Cool-down PORV operations	A,D,E,L,S	3
d. Transfer FAH to the Fuel Handling mode	D,S	8
e. ASDV fails open on SG with tube leak	N,S	4 (Primary)
f. Establish Charging and Letdown	A,M,E,L,S	1
g. Restore offsite power to Emergency Bus 6	E,M,S	6

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

a. DC Start of Elgars UPS	A,D,L	6
b. Locally close MSIV	D,E	5
c. Align Alternate (Demin) Cooling to CCP Lube Oil Cooler	D,E,R	8

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

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

ES-301 **Control Room/In-Plant Systems Outline** **Form ES-301-2**

Seabrook Station 2013 NRC Exam JPM – **SRO-U**

Facility: Seabrook Date of Examination: July 2013

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. Establish Charging and Letdown	A,M,E,L,S	1
b. Raise Accumulator Pressure	D,S,EN	2

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

a. DC Start of Elgars UPS	A,D,L	6
b. Locally close MSIV	D,E	5
c. Align Alternate (Demin) Cooling to CCP Lube Oil Cooler	D,E,R	8

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

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

Appendix D **Scenario Outline** **Form ES-D-1**

Seabrook Station 2013 NRC Exam-Simulator Scenarios

Facility: Seabrook **Scenario No.: 1** **Op-Test No.:**

Examiners: D. Silk Operators: _____

Initial Conditions: MOL 55% power, stable xenon, CB D at 200 steps with both Main feed Pumps and one Heater Drain pump is in service (IC38).

Turnover:

- Plant has been at 55% power for 3 days for maintenance.
- Maintenance is complete and power increase has been authorized.
- Procedure OS1000.05, Power Increase is being performed and is completed to step 4.2.39.
- Maintain AFD on target.
- Increase power to 75% at 5%/hour.

Event No.	Malf. No.	Event Type*	Event Description
1		PSO **R** BOP **N** US **N**	Crew begins a 5%/hr power increase.
2	ltFWLT551	BOP **I** US **I, TS**	'A' SG Level Instrument controlling channel fails low.
3	cCCV341	PSO **C** US **C**	CC-V-341 fails closed. Crew is forced to use excess letdown.
4	mfSM001 mfCP018	PSO **C** BOP **C** US **C, TS**	Seismic event causes rod H8 to drop.
5	mfCP011 mfMS049C	PSO **M** BOP **M** US **M**	While I&C is checking fuses for dropped rod recovery, rod F8 drops, requiring a manual reactor trip. On reactor trip the 'C' SG faults inside containment.
6	mfCS002 mfCS016	PSO **C**	When SI occurs, CS-P-2A trip and lockout. CS-P-2-B blocked from starting on SI. CS-P-2B must be manually started by PSO.
7	FWFV4234A FWFV4234B	BOP **C**	Defeat the auto isolation for the 'C' SG. Manual action to close the valves will be required.

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

Note: Anticipated AOP/EOP flow-path: OS1235.03, OS1202.01, OS1210.05, E-0, ES-0.1 possible, E-0, E-2, E-1, ES-1.1

Seabrook Station 2013 NRC Exam-Simulator Scenarios

Facility: Seabrook **Scenario No.: 2** **Op-Test No.:**

Examiners: D. Silk Operators: _____

Initial Conditions: MOL 75% power, power increase in progress, CB D at 207 steps with both Heater Drain pump in service (IC32).

Turnover:

- Plant is at 75% power.
- Procedure OS1000.05, Power Increase is being performed and completed up to step 4.2.49.
- Raise power at 10% per hour.
- Maintain AFD on target.

Event No.	Malf. No.	Event Type*	Event Description
1		PSO **R** BOP **N** US **N**	Crew begins a 10%/hr power increase.
2	ptFWPT505	PSO **I** BOP **I** US **I, TS**	MS-PT-505 fails high causing outward rod motion.
3	mfSW014 cSWV20 mfSW001	BOP **C** US **C, TS**	SW-P-41-A trip and lockout, standby pump C fails to auto start and cannot be manually started requiring manual TA. SW-V-20 fails to auto actuate but can be manually aligned.
4	mfRC020	PSO **C** US **C**	'A' RCP vibration ramps up, requiring a reactor trip.
5	mfRC050A mfED038	PSO **M** BOP **M** US **M**	When 'A' RCP is secured after immediate actions, trigger starts 300 gpm RCP seal leak (simulated with int leg leak). Also triggers a loss of offsite power.
6	mfED031 mfED034	BOP **C**	'A' EDG fails to auto start, Operator emergency starts from MCB. 'B' EDG trip due to lube oil failure.
7	mfCC012	PSO **C**	CC-P-11-A fails to auto start. RMO must be reset and either A Train CC pump may be started manually.

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

Note: Anticipated AOP/EOP flow-path: OS1235.05, OS1216.01, OS1202.01, E-0, ES-0.1, E-0, E-1

Appendix D **Scenario Outline** **Form ES-D-1**

Seabrook Station 2013 NRC Exam-Simulator Scenarios

Facility: Seabrook **Scenario No.: 3** **Op-Test No.:**

Examiners: D. Silk Operators: _____

Initial Conditions: MOL 100% power, Rods in Auto, CB D at 230 steps (IC30).

Turnover:

- Plant is at 100% power.
- FW-P-37-B taken out of service for maintenance 4 hours ago.
- TS 3.7.1.2, action a

Event No.	Malf. No.	Event Type*	Event Description
	bkFWp37 mvFWv347		FW-P-37-B out of service for maintenance.
1	ptRCPT455	PSO **I** US **I,TS**	RC-PT-455 Failed High
2	mfSG001C	PSO **C** US **C,TS**	'C' SG Tube Leak at 60 gpm.
3		PSO **R** BOP **R**	Commence rapid down power.
4	mfCP002 mfSG001C	PSO **M** BOP **M** US **M**	Continuous Rod Insertion and manual Rod Selector switch does not stop insertion (time this failure with auto rod insertion from down power). Manual reactor trip required. 'C' SG Tube Rupture at 400 gpm triggered by manual reactor trip.
5	svMSV90	BOP **C**	MS-V-90, 'C' MSIV, fails as is. Isolate ruptured SGs from remaining SGs.
6	svMS1V395	BOP **C**	MS-V-395 Prevented from auto opening. Manually open MS-V-395.

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

Note: Anticipated AOP/EOP flow-path: OS1201.06, OS1227.02, OS1231.04, OS1210.03, E-0, ES-0.1, E-0, E-3

Appendix D **Scenario Outline** **Form ES-D-1**

Seabrook Station 2013 NRC Exam-Simulator Scenarios

Facility: Seabrook **Scenario No.: 4** **Op-Test No.:**

Examiners: D. Silk Operators: _____

Initial Conditions: MOL 100% power, Rods in Auto, CB D at 230 steps (IC30).

Turnover:

- Plant is at 100% power.

Event No.	Malf. No.	Event Type*	Event Description
1	cCCP322B cCCP322A	PSO **C** US **C**	CC-P-322-B trips and standby pump fails to auto start, can be started manually.
2	mfED025	PSO **C** BOP **C** US **C,TS**	Loss of EDE-PP-1A due to EDE-I-1A failure. Instrument Bus 1A recovered on maintenance supply. Requires manual control of FRV's and charging.
3	mfAR005B	BOP **C** US **C**	AR-P-50-B trips, auto start of third blocked but can be manually started.
4	mfFW038 bkCPRTA bkCPRTA	PSO **M** BOP **M** US **M**	FW-P-32-A trips. Power level too high for Setback to be successful. Auto and Manual Rx trips blocked resulting in ATWS.
5	mfCP005	PSO **C**	Auto rod insertion blocked, manual rod insertion required.
6	avMSVSV2 avMSVCV2	BOP **C**	On manual turbine trip, turbine Stop Valve 2 and Control Valve 2 stick open, requiring manual MSI.

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

Note: Anticipated AOP/EOP flow-path: OS1201.01, OS1247.01, VAS F5118, ON1233.01, OS1231.03 (possible), E-0, FR-S.1, E-0, ES-0.1

Facility: SEABROOK Date of Exam: 7/12/13 – 7/19/13

Tier	Group	RO K/A Category Points											SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2		G*		Total
1. Emergency & Abnormal Plant Evolutions	1	2	2	2	N/A			5	4			3	18					6
	2	0	3	1				1	2			2	9					4
	Tier Totals	2	5	3				6	6			5	27					10
2. Plant Systems	1	4	2	3	5	3	1	1	2	3	3	1	28					5
	2	2	0	0	0	0	1	1	2	1	2	1	10					3
	Tier Totals	6	2	3	5	3	2	2	4	4	5	2	38					8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7
		2			3			2			3							

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				**007** Reactor Trip **EK3** Knowledge of the reasons for the following as they apply to a reactor trip: **EK3.01** Actions contained in EOP for reactor trip	4.0	1
000008 Pressurizer Vapor Space Accident / 3	X						**008** Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) **AK1** Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident: **AK1.01** Thermodynamics and flow characteristics of open or leaking valves	3.2	1
000009 Small Break LOCA / 3					X		**009** Small Break LOCA **EA2** Ability to determine or interpret the following as they apply to a small break LOCA: **EA2.36** Difference between overcooling and LOCA indications	4.2	1
000011 Large Break LOCA / 3		X					**011** Large Break LOCA **EK2** Knowledge of the interrelations between the and the following Large Break LOCA: **EK2.02** Pumps	2.6 *	1
000015/17 RCP Malfunctions / 4						X	**015/017** Reactor Coolant Pump (RCP) Malfunctions **2.2.40** Ability to apply Technical Specifications for a system.	3.4	1
000022 Loss of Rx Coolant Makeup / 2						X	**022** Loss of Reactor Coolant Makeup **2.4.35** Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	3.8	1
000025 Loss of RHR System / 4									
000026 Loss of Component Cooling Water / 8				X			**026** Loss of Component Cooling Water (CCW) **AA1** Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: **AA1.02** Loads on the CCWS in the control room	3.2	1
000027 Pressurizer Pressure Control System Malfunction / 3				X			**027** Pressurizer Pressure Control System (PZR PCS) Malfunction **AA1** Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: **AA1.03** Pressure control when on a steam bubble	3.6	1

000029 ATWS / 1						X	**029** Anticipated Transient Without Scram (ATWS) **2.1.19** Ability to use plant computers to evaluate system or component status.	3.9	1
000038 Steam Gen. Tube Rupture / 3				X			**038** Steam Generator Tube Rupture (SGTR) **EA1** Ability to operate and monitor the following as they apply to a SGTR: **EA1.27** Steam dump valve status lights and indicators	3.9	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4					X		**040** Steam Line Rupture **AA2** Ability to determine and interpret the following as they apply to the Steam Line Rupture: **AA2.05** When ESFAS systems may be secured	4.1	1
000054 (CE/E06) Loss of Main Feedwater / 4									
000055 Station Blackout / 6			X				**055** Loss of Offsite and Onsite Power (Station Blackout) **EK3** Knowledge of the reasons for the following responses as the apply to the Station Blackout: **EK3.01** Length of time for which battery capacity is designed	2.7	1
000056 Loss of Off-site Power / 6	X						**056** Loss of Offsite Power **AK1**. Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: **AK1.01** Principle of cooling by natural convection	3.7	1
000057 Loss of Vital AC Inst. Bus / 6									
000058 Loss of DC Power / 6				X			**058** Loss of DC Power **AA1**. Ability to operate and / or monitor the following as they apply to the Loss of DC Power: **AA1.01** Cross-tie of the affected dc bus with the alternate supply	3.4 *	1
000062 Loss of Nuclear Svc Water / 4									
000065 Loss of Instrument Air / 8									
W/E04 LOCA Outside Containment / 3				X			**Westinghouse E04** LOCA Outside Containment **EA1**. Ability to operate and / or monitor the following as they apply to the (LOCA Outside Containment) **EA1.2** Operating behavior characteristics of the facility.	3.6	1
W/E11 Loss of Emergency Coolant Recirc. / 4		X					**Westinghouse E11** Loss of Emergency Coolant Recirculation **EK2**. Knowledge of the interrelations between the (Loss of Emergency Coolant Recirculation) and the following: **EK2.2** Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.9	1

BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4					X		**Westinghouse E05** Loss of Secondary Heat Sink **EA2**. Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink) **EA2.2** Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.7	1
000077 Generator Voltage and Electric Grid Disturbances / 6					X		**077** Generator Voltage and Electric Grid Disturbances **AA2**. Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: **AA2.04** VARs outside the capability curve	3.6	1
K/A Category Totals:	2	2	2	5	4	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		**003** Dropped Control Rod **AA2**. Ability to determine and interpret the following as they apply to the Dropped Control Rod: **AA2.01** Rod position indication to actual rod position	3.7	1
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1						X	**024** Emergency Boration **2.1.30** Ability to locate and operate components, including local controls.	4.4	1
000028 Pressurizer Level Malfunction / 2		X					**028** Pressurizer (PZR) Level Control Malfunction **AK2**. Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following: **AK2.03** Controllers and positioners	2.6	1
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			X				**037** Steam Generator (S/G) Tube Leak **AK3**. Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: **AK3.08** Criteria for securing RCP	4.1	1
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid RadWaste Rel. / 9		X					**059** Accidental Liquid Radwaste Release **AK2.** Knowledge of the interrelations between the Accidental Liquid Radwaste Release and the following: **AK2.01** Radioactive-liquid monitors	2.7	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					X		**076** High Reactor Coolant Activity **AA2.** Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: **AA2.03** RCS radioactivity level meter	2.5	1

W/EO1 & E02 Rediagnosis & SI Termination / 3									
W/E13 Steam Generator Over-pressure / 4				X			**Westinghouse E13** Steam Generator Overpressure **EA1.** Ability to operate and / or monitor the following as they apply to the (Steam Generator Overpressure) **EA1.3** Desired operating results during abnormal and emergency situations.	3.1	1
W/E15 Containment Flooding / 5		X					**Westinghouse E15** Containment Flooding **EK2**. Knowledge of the interrelations between the (Containment Flooding) and the following: **EK2.2** Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	2.7	1
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									
BW/E03 Inadequate Subcooling Margin / 4									
BW/E08; W/E03 LOCA Cooldown - Depress. / 4						X	**Westinghouse E03** LOCA Cooldown and Depressurization **2.4.3** Ability to identify post-accident instrumentation.	3.7	1
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									
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:	0	3	1	1	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		X										**003** Reactor Coolant Pump System (RCPS) **K2** Knowledge of bus power supplies to the following: **K2.01** RCPS	3.1	1
004 Chemical and Volume Control		X										**004** Chemical and Volume Control System (CVCS) **K2** Knowledge of bus power supplies to the following: **K2.05** MOVs	2.7	1
005 Residual Heat Removal	X			X								**005** Residual Heat Removal System (RHRS) **K1** Knowledge of the physical connections and/or cause effect relationships between the RHRS and the following systems: **K1.04** CVCS **K4** Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following: **K4.10** Control of RHR heat exchanger outlet flow	2.9 3.1	2
006 Emergency Core Cooling										X		**006** Emergency Core Cooling System (ECCS) **A4** Ability to manually operate and/or monitor in the control room: **A4.07** ECCS pumps and valves	4.4	1
007 Pressurizer Relief/Quench Tank			X						X			**007** Pressurizer Relief Tank/Quench Tank System (PRTS) **K3** Knowledge of the effect that a loss or malfunction of the PRTS will have on the following: **K3.01** Containment **A3** Ability to monitor automatic operation of the PRTS, including: **A3.01** Components which discharge to the PRT	3.3 2.7 *	2

008 Component Cooling Water									X			**008** Component Cooling Water System (CCWS) **A3** Ability to monitor automatic operation of the CCWS, including: **A3.01** Setpoints on instrument signal levels for normal operations, warnings, and trips that are applicable to the CCWS	3.2 *	1
010 Pressurizer Pressure Control	X					X						**010** Pressurizer Pressure Control System (PZR PCS) **K1** Knowledge of the physical connections and/or cause-effect relationships between the PZR PCS and the following systems: **K1.01** RPS **K6** Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: **K6.03** PZR sprays and heaters	3.9 3.2	2
012 Reactor Protection									X			**012** Reactor Protection System **A3** Ability to monitor automatic operation of the RPS, including: **A3.06** Trip logic	3.7	1
013 Engineered Safety Features Actuation			X					X				**013** Engineered Safety Features Actuation System (ESFAS) **K3** Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: **K3.02** RCS **A2** Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; **A2.02** Excess steam demand	4.3 4.3	2
022 Containment Cooling				X							X	**022** Containment Cooling System (CCS) **K4** Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: **K4.04** Cooling of control rod drive motors **2.1.20** Ability to interpret and execute procedure steps.	2.8 4.6	2
025 Ice Condenser														

026 Containment Spray										X		**026** Containment Spray System (CSS) **A4** Ability to manually operate and/or monitor in the control room: **A4.05** Containment spray reset switches	3.5	1
039 Main and Reheat Steam				X	X							**039** Main and Reheat Steam System **K4** Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following: **K4.02** Utilization of T-ave. program control when steam dumping through atmospheric relief/dump valves, including T-ave. limits **K5** Knowledge of the operational implications of the following concepts as the apply to the MRSS: **K5.05** Bases for RCS cooldown limits	3.1 2.7	2
059 Main Feedwater	X											**059** Main Feedwater (MFW) System **K1** Knowledge of the physical connections and/or cause effect relationships between the MFW and the following systems: **K1.05** RCS	3.1 *	1
061 Auxiliary/Emergency Feedwater					X							**061** Auxiliary / Emergency Feedwater (AFW) System **K5** Knowledge of the operational implications of the following concepts as the apply to the AFW: **K5.02** Decay heat sources and magnitude	3.2	1
062 AC Electrical Distribution				X								**062** A.C. Electrical Distribution **K4** Knowledge of ac distribution system design feature(s) and/or interlock(s) which provide for the following: **K4.05** Paralleling of ac sources (synchroscope)	2.7 *	1
063 DC Electrical Distribution			X									**063** D.C. Electrical Distribution **K3** Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: **K3.02** Components using DC control power	3.5	1

064 Emergency Diesel Generator								X				**064** Emergency Diesel Generators (ED/G) **A2** Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **A2.18** Consequences of premature opening of breaker under load	2.6 *	1
073 Process Radiation Monitoring	X				X							**073** Process Radiation Monitoring (PRM) System **K1** Knowledge of the physical connections and/or causeeffect relationships between the PRM system and the following systems: **K1.01** Those systems served by PRMs **K5** Knowledge of the operational implications as they apply to concepts as they apply to the PRM system: **K5.01** Radiation theory, including sources, types, units, and effects	3.6 2.5	2
076 Service Water							X					**076** Service Water System (SWS) **A1** Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: **A1.02** Reactor and turbine building closed cooling water temperatures	2.6 *	1
078 Instrument Air										X		**078** Instrument Air System (IAS) **A4** Ability to manually operate and/or monitor in the control room: **A4.01** Pressure gauges	3.1	1
103 Containment				X								**103** Containment System **K4** Knowledge of containment system design feature(s) and/or interlock(s) which provide for the following: **K4.06** Containment isolation system	3.1	1
K/A Category Point Totals:	4	2	3	5	3	1	1	2	3	3	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														
011 Pressurizer Level Control														
014 Rod Position Indication														
015 Nuclear Instrumentation														
016 Non-nuclear Instrumentation	X											**016** Non-Nuclear Instrumentation System (NNIS) **K1** Knowledge of the physical connections and/or cause effect relationships between the NNIS and the following systems: **K1.10** CCS	3.1 *	1
017 In-core Temperature Monitor														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling							X					**033** Spent Fuel Pool Cooling System (SFPCS) **A1** Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Spent Fuel Pool Cooling System operating the controls including: **A1.01** Spent fuel pool water level	2.7	1
034 Fuel Handling Equipment										X		**034** Fuel Handling Equipment System (FHES) **A4** Ability to manually operate and/or monitor in the control room: **A4.02** Neutron levels	3.5	1
035 Steam Generator						X						**035** Steam Generator System (S/GS) **K6** Knowledge of the effect of a loss or malfunction on the following will have on the S/GS: **K6.01** MSIVs	3.2	1

041 Steam Dump/Turbine Bypass Control									X			**041** Steam Dump System (SDS) and Turbine Bypass Control **A3** Ability to monitor automatic operation of the SDS, including: **A3.02** RCS pressure, RCS temperature, and reactor power	3.3	1
045 Main Turbine Generator											X	**045** Main Turbine Generator (MT/G) System **2.4.49** Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	1
055 Condenser Air Removal														
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	1
068 Liquid Radwaste	X											**068** Liquid Radwaste System (LRS) **K1** Knowledge of the physical connections and/or cause effect relationships between the Liquid Radwaste System and the following systems: **K1.07** Sources of liquid wastes for LRS	2.7	1
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
075 Circulating Water								X				**075** Circulating Water System **A2** Ability to (a) predict the impacts of the following malfunctions or operations on the circulating water system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **A2.01** Loss of intake structure	3.0 *	1
079 Station Air														
086 Fire Protection										X		**086** Fire Protection System (FPS) **A4** Ability to manually operate and/or monitor in the control room: **A4.05** Deluge valves	3.0	1
K/A Category Point Totals:	2	0	0	0	0	1	1	2	1	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.	**2.1.5** Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	2.9*	1		
	2.1.	**2.1.6** Ability to manage the control room crew during plant transients.	3.8*	1		
	2.1.					
	2.1.					
	2.1.					
	2.1.					
	Subtotal			2		
2. Equipment Control	2.2.	**2.2.20** Knowledge of the process for managing troubleshooting activities.	2.6	1		
	2.2.	**2.2.22** Knowledge of limiting conditions for operations and safety limits.	4.0	1		
	2.2.	**2.2.38** Knowledge of conditions and limitations in the facility license.	3.6	1		
	2.2.					
	2.2.					
	2.2.					
	Subtotal			3		
3. Radiation Control	2.3.	**2.3.4** Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	1		
	2.3.	**2.3.12** Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.2	1		
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal			2		
4. Emergency Procedures / Plan	2.4.	**2.4.8** Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	3.8	1		
	2.4.	**2.4.41** Knowledge of the emergency action level thresholds and classifications.	2.9	1		
	2.4.	**2.4.50** Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.2	1		
	2.4.					
	2.4.					
	2.4.					

	Subtotal		3		
Tier 3 Point Total			10		7

Facility: SEABROOK Date of Exam: 7/12/13 – 7/19/13

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					N/A			18	2	4	6
	2												9	1	3	4
	Tier Totals												27	3	7	10
2. Plant Systems	1												28	2	3	5
	2												10	1 / 0	2	3
	Tier Totals												38	3	5	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1 / 2	2 / 1	3 / 2	4 / 2	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	**007** Reactor Trip **2.1.32** Ability to explain and apply system limits and precautions.	4.0	1
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3					X		**009** Small Break LOCA **EA2** Ability to determine or interpret the following as they apply to a small break LOCA: **EA2.15** RCS parameters	3.4	1
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4									
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3									
000029 ATWS / 1									
000038 Steam Gen. Tube Rupture / 3					X		**038** Steam Generator Tube Rupture (SGTR) **EA2** Ability to determine or interpret the following as they apply to a SGTR: **EA2.07** Plant conditions, from survey of control room indications	4.8	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4									
000054 (CE/E06) Loss of Main Feedwater / 4						X	**054** Loss of Main Feedwater (MFW) **2.4.41** Knowledge of the emergency action level thresholds and classifications.	4.6	1
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6									
000057 Loss of Vital AC Inst. Bus / 6									
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4						X	**062** Loss of Nuclear Service Water **2.1.7** Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	1

000065 Loss of Instrument Air / 8									
W/E04 LOCA Outside Containment / 3									
W/E11 Loss of Emergency Coolant Recirc. / 4						X	**Westinghouse E11** Loss of Emergency Coolant Recirculation **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	1
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

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									
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						X	**036** Fuel Handling Incidents **2.2.39** Knowledge of less than or equal to one hour Technical Specification action statements for systems.	4.5	1
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8						X	**067**: Plant fire on site **2.4.18** Knowledge of the specific bases for EOPs.	4.0	1
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					X		**Westinghouse E02** SI Termination **EA2.** Ability to determine and interpret the following as they apply to the (SI Termination) **EA2.2** Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	4.0	1
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									
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	**Westinghouse E08** Pressurized Thermal Shock **2.4.20** Knowledge of the operational implications of EOP warnings, cautions, and notes.	4.3	1
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:					1	3	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														
005 Residual Heat Removal								X				**005** Residual Heat Removal System (RHRS) **A2** Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **A2.02** Pressure transient protection during cold shutdown	3.7	1
006 Emergency Core Cooling														
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water											X	**008** Component Cooling Water System (CCWS) **2.2.40** Ability to apply Technical Specifications for a system.	4.7	1
010 Pressurizer Pressure Control														
012 Reactor Protection														
013 Engineered Safety Features Actuation														
022 Containment Cooling														
025 Ice Condenser														
026 Containment Spray											X	**026** Containment Spray System (CSS) **2.2.37** Ability to determine operability and/or availability of safety related equipment.	4.6	1
039 Main and Reheat Steam														
059 Main Feedwater														
061 Auxiliary/Emergency Feedwater														
062 AC Electrical Distribution														
063 DC Electrical Distribution														
064 Emergency Diesel Generator														
073 Process Radiation Monitoring														

076 Service Water											X	**076** Service Water System (SWS) **2.4.30** Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	4.1	1
078 Instrument Air								X				**078** Instrument Air System (IAS) **A2** Ability to (a) predict the impacts of the following malfunctions or operations on the IAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **A2.01** Air dryer and filter malfunctions	2.9	1
103 Containment														
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														
011 Pressurizer Level Control														
014 Rod Position Indication														
015 Nuclear Instrumentation														
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control											X	**028** Hydrogen Recombiner and Purge Control System (HRPS) **2.1.20** Ability to interpret and execute procedure steps.	4.6	1
029 Containment Purge														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment				X								**034** Fuel Handling Equipment System (FHES) **K4** Knowledge of design feature(s) and/or interlock(s) which provide for the following: **K4.03** Overload protection	3.3	1
035 Steam Generator														
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											X	**072** Area Radiation Monitoring (ARM) System **2.2.42** Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	4.6	1
075 Circulating Water														
079 Station Air														
086 Fire Protection														

K/A Category Point Totals:				1						2	Group Point Total:			10/3

Facility:		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.	**2.1.4** Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.			3.8	1
	2.1.	**2.1.41** Knowledge of the refueling process.			3.7	1
	2.1.					
	2.1.					
	2.1.					
	2.1.					
	Subtotal					2
2. Equipment Control	2.2.	**2.2.36** Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.			4.2	1
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	Subtotal					1
3. Radiation Control	2.3.	**2.3.5** Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.			2.9	1
	2.3.	**2.3.11** Ability to control radiation releases.			4.3	1
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal					2
4. Emergency Procedures / Plan	2.4.	**2.4.5** Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.			4.3	1
	2.4.	**2.4.40** Knowledge of SRO responsibilities in emergency plan implementation.			4.5	1
	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 1/1	**027** PZR Press control system malf. **AA1.04**	**AA1.04** is Pressure recovery using emergency only heaters. Seabrook does not have emergency only heaters. Randomly selected **AA1.03** Pressure control when on a steam bubble for replacement.
SRO 1/2	**076** High Reactor Coolant Activity. **A2**	**076 A2** was randomly selected for SRO exam. RO exam already contains this KA in same Tier/Group. Randomly selected **036** Fuel Handling Accident **2.2.39** as replacement.
RO 1/2	**BW/A01** Plant Runback	This is not applicable to Seabrook. Rejected and randomly selected **W/E15** Containment Flooding.
RO 1/2	**BW/A02&A03** Loss of NNI-X/Y	This is not applicable to Seabrook. Rejected and randomly selected **076** High Reactor Coolant Activity.
RO 1/2	**BW/A05** Emergency Diesel actuation	This is not applicable to Seabrook. Rejected and randomly selected **W/E03** LOCA Cooldown – Depress.
RO 1/2	**009** Small Break LOCA	Randomly selected, **EA2** Ability to determine or interpret the following as they apply to a small break LOCA: **EA2.28** Leak rate, from change in reactor coolant drain tank level. System interrelations and piping sizes make it unlikely to get flow to the RCDT that meet the Small Break LOCA criteria. Randomly selected **EA2.36** Difference between overcooling and LOCA indications.
RO 2/1	**063** D.C. Electrical Distribution	Randomly selected, **A1** Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including: **A1.01** Battery capacity as it is affected by discharge rate. This is too similar to already selected **055 EK3.01.** Station Blackout, Length of time for which battery capacity is designed. Since only other item for 063 A1 is <2.5, randomly selected new KA. **K3** Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: **K3.02,** Components using DC control power.
RO 2/1	**005** Residual Heat Removal System (RHRS)	Randomly selected **A4** Ability to manually operate and/or monitor in the control room: **A4.03,** RHR temperature, PZR heaters and flow, and nitrogen. This KA describes a process of nitrogen bubble in PZR to start RCPs for bubble generation that Seabrook station does not employ. Randomly reselected **K4** Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following: **K4.10,** Control of RHR heat exchanger outlet flow
RO 2/1	**006** Emergency Core Cooling System (ECCS	**A4** Ability to manually operate and/or monitor in the control room: **A4.04,** RHRS. Tier 2 Group 1 Plant systems **005,** Residual Heat Removal System (RHRS) already has 2 KA's selected for the RHR system. Randomly selected **A4.07,** ECCS pumps and valves to balance exam.

RO 2/1	**022** Containment Cooling System	Generic **2.4.9,** Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies. CCS is not a part of the accident mitigation strategy at Seabrook. It is tripped and locked out for SI/LOP. Randomly reselected Generic **2.1.20,** Ability to interpret and execute procedure steps.
SRO 1/2	**W/E08** Pressurized Thermal Shock	Randomly selected Generic **2.4.4,** Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. 2.4.4 is not a KA that supports an SRO only question (ie entry conditions for major EOP is RO level). Randomly reselected Generic **2.4.20,** Knowledge of the operational implications of EOP warnings, cautions, and notes.
SRO 3	**2.4** Emergency Procedures / Plan	Randomly selected Generic **2.4.1** Knowledge of EOP entry conditions and immediate action steps. This KA does not support SRO only questions. Randomly reselected Generic **2.4.5** Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.
SRO 3	**2.4** Emergency Procedures / Plan	Randomly selected Generic **2.4.50** Ability to verify system alarm setpoints and operate controls identified in the alarm response manual. This KA has already been selected for Tier 3 in the RO exam. Randomly reselected Generic **2.4.40** Knowledge of SRO responsibilities in emergency plan implementation.
SRO 1/1	**009** Small Break LOCA	Randomly selected **EA2** Ability to determine or interpret the following as they apply to a small break LOCA: **EA2.37** Existence of adequate natural circulation. This is too similar to **056 AK1.01** (Loss of Offsite Power. Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: Principle of cooling by natural convection) on the RO exam. Randomly reselected **EA2.15** RCS parameters.
SRO 2/2	**034** Fuel Handling Equipment System	Randomly selected **K3** Knowledge of the effect that a loss or malfunction of the Fuel Handling System will have on the following: **K3.01** Containment ventilation. FH malfunctions interact with containment ventilation via CVI. RO exam already contains a question very similar under KA **103 K4.06** (Containment System, Knowledge of containment system design feature(s) and/or interlock(s) which provide for the following: Containment isolation system). Randomly reselected **K4** Knowledge of design feature(s) and/or interlock(s) which provide for the following: **K4.03** Overload protection.
RO 2/1	**005** Residual Heat Removal System (RHRS)	Randomly selected **A1** Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including: **A1.07** Determination of test acceptability by comparison of recorded valve response times with Tech-Spec requirements. This KA is more oriented to the operating exam and an operationally valid written question was not able to be generated. Randomly reselected **005** Residual Heat Removal System (RHRS). **K1** Knowledge of the physical connections and/or cause effect relationships between the RHRS and the following systems: **K1.04** CVCS

RANDOM SAMPLING PROCESS
2013 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.