

Facility: SEABROOK		Date of Exam: 6/15/9															
Tier	Group	RO K/A Category Points											SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total	
1. Emergency & Abnormal Plant Evolutions	1	3	2	2	N/A			3	4	N/A			4	18			6
	2	2	3	1	N/A			1	1	N/A			1	9			4
	Tier Totals	5	5	3	N/A			4	5	N/A			5	27			10
2. Plant Systems	1	3	2	2	4	1	2	2	3	3	3	3	3	28			5
	2	2	0	0	2	1	1	2	1	0	0	1	10			3	
	Tier Totals	5	2	2	6	2	3	4	4	3	3	4	38			8	
3. Generic Knowledge and Abilities Categories					1	2	3	4	10			1	2	3	4	7	
					3	3	2	2									

- 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 ±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							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000008 Pressurizer Vapor Space Accident / 3		√					AK2. Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: (CFR 41.7 / 45.7) AK2.02 Sensors and detectors	2.7 *	1
000009 Small Break LOCA / 3							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000011 Large Break LOCA / 3		√					EK1 Knowledge of the operational implications of the following concepts as they apply to the Large Break LOCA : (CFR 41.8 / 41.10 / 45.3) EK1.01 Natural circulation and cooling, including reflux boiling	4.1	1
000015/17 RCP Malfunctions / 4						√	2.2 Equipment Control 2.2.39 Knowledge of less than or equal to one hour Technical Specification action statements for systems. (CFR: 41.7 / 41.10 / 43.2 / 45.13)	3.9	1
000022 Loss of Rx Coolant Makeup / 2		√					AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup: (CFR 41.8 / 41.10 / 45.3) AK1.03 Relationship between charging flow and PZR level	3.0	1
000025 Loss of RHR System / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000026 Loss of Component Cooling Water / 8			√				AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.02 The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS	3.6	1
000027 Pressurizer Pressure Control System Malfunction / 3					√		AA2. Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: (CFR: 43.5 / 45.13) AA2.15 Actions to be taken if PZR pressure instrument fails high	3.7	1

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000029 ATWS / 1						√	2.1 Conduct of Operations 2.1.20 Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	1
000038 Steam Gen. Tube Rupture / 3				√			EA1 Ability to operate and monitor the following as they apply to a SGTR: (CFR 41.7 / 45.5 / 45.6) EA1.04 PZR spray, to reduce coolant system pressure	4.3	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4	√						040AK1. Knowledge of the operational implications of the following concepts as they apply to Steam Line Rupture: (CFR 41.8 / 41.10 / 45.3) AK1.07 Effects of feedwater introduction on dry S/G	3.4	1
000054 (CE/E06) Loss of Main Feedwater / 4						√	2.2 Equipment Control 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. (CFR: 41.5 / 43.5 / 45.12)	4.2	1
000055 Station Blackout / 6					√		EA2 Ability to determine or interpret the following as they apply to a Station Blackout: (CFR 43.5 / 45.13) EA2.02 RCS core cooling through natural circulation cooling to S/G cooling	4.4	1
000056 Loss of Off-site Power / 6				√			AA1. Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: (CFR 41.7 / 45.5 / 45.6) AA1.31 PZR heater group control switches	3.3	1
000057 Loss of Vital AC Inst. Bus / 6							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000058 Loss of DC Power / 6	√						AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: (CFR 41.8 / 41.10 / 45.3) AK1.01 Battery charger equipment and instrumentation	2.8	1

ES-401

PWR Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)

Form ES-401-2

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000062 Loss of Nuclear Svc Water / 4						√	2.4 Emergency Procedures / Plan 2.4.11 Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)	4.0	1
000065 Loss of Instrument Air / 8			√				AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.04 Cross-over to backup air supplies	3.0	1
W/E04 LOCA Outside Containment / 3					√		EA2. Ability to determine and interpret the following as they apply to the (LOCA Outside Containment) (CFR: 43.5 / 45.13) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations	3.4	1
W/E11 Loss of Emergency Coolant Recirc. / 4					√		EA2. Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation) (CFR: 43.5 / 45.13) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations	3.4	1
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4				√			EA1. Ability to operate and / or monitor the following as they apply to the (Loss of Secondary Heat Sink) (CFR: 41.7 / 45.5 / 45.6) EA1.2 Operating behavior characteristics of the facility.	3.7	1
000077 Generator Voltage and Electric Grid Disturbances / 6							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
									18
K/A Category Totals:	3	2	2	3	4	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		√					AK2. Knowledge of the interrelations between the Continuous Rod Withdrawal and the following: (CFR 41.7 / 45.7) AK2.01 Rod bank step counters	2.9	1
000003 Dropped Control Rod / 1							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000005 Inoperable/Stuck Control Rod / 1			√				AK 3 Knowledge of the reasons for the following responses as they apply to the Inoperable/Stuck Control Rod. AK3.04 Tech-Spec Limits for inoperable rods. (CFR: 41.5, 41.10/ 45.6 / 45.13)	3.4	1
000024 Emergency Boration / 1							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000028 Pressurizer Level Malfunction / 2							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000032 Loss of Source Range NI / 7							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000033 Loss of Intermediate Range NI / 7							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000036 (BW/A08) Fuel Handling Accident / 8							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000037 Steam Generator Tube Leak / 3							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000051 Loss of Condenser Vacuum / 4					√		AA2. Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: (CFR: 43.5 / 45.13) AA2.02 Conditions requiring reactor and/or turbine trip	3.9	1
000059 Accidental Liquid RadWaste Rel. / 9							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		

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	#
000060 Accidental Gaseous Radwaste Rel. / 9		√					AK2. Knowledge of the interrelationships between Accidental Gaseous Radwaste Release and the following: (CFR 41.5,41.10 / 45.6 / 45.13) AK2.02 Auxiliary building ventilation system	2.7	1
000061 ARM System Alarms / 7							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000067 Plant Fire On-site / 8							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000068 (BW/A06) Control Room Evac. / 8							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000069 (WE14) Loss of CTMT Integrity / 5		√					EK2. Knowledge of the interrelations between the (High Containment Pressure) and the following: (CFR: 41.7 / 45.7) EK2.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.4	1
000074 (WE06&E07) Inad. Core Cooling / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000076 High Reactor Coolant Activity / 9						√	2.2 Equipment Control 2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (CFR: 41.5 / 41.7 / 43.2)	3.2	1
W/E01 & E02 Rediagnosis & SI Termination / 3	√						EK1. Knowledge of the operational implications of the following concepts as they apply to the (SI Termination) (CFR: 41.8 / 41.10, 45.3) EK1.2 Normal, abnormal and emergency operating procedures associated with (SI Termination).	3.4	1

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	#
WE13 Steam Generator Over-pressure / 4				√			EA1. Ability to operate and/or monitor the following as they apply to the (Steam Generator Overpressure) (CFR: 41.7, 45.5, 45.6) EA1.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.1	1
WE15 Containment Flooding / 5							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
WE16 High Containment Radiation / 9							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
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; WE03 LOCA Cooldown - Depress. / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/E09; CE/A13; WE09&E10 Natural Circ. / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/E13&E14 EOP Rules and Enclosures							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
CE/A11; WE08 RCS Overcooling - PTS / 4	√						EK1. Knowledge of the operational implications of the following concepts as they apply to the (Pressurized Thermal Shock) (CFR: 41.8 / 41.10, 45.3) EK1.3 Annunciators and conditions indicating signals, and remedial actions associated with the (Pressurized Thermal Shock).	3.5	1
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:	2	3	2	0	1	1	Group Point Total:		9/4

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	#
006 Emergency Core Cooling			√								√	K3 Knowledge of the effect that a loss or malfunction of the ECCS will have on the following: (CFR: 41.7 / 45.6) K3.03 Containment A4 Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.11 Overpressure protection system	4.2 4.2	2
007 Pressurizer Relief/Quench Tank											√	2.4 Emergency Procedures / Plan 2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)	3.8	1
008 Component Cooling Water	√							√				K1 Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.9) K1.02 Loads cooled by CCWS A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.02 High/low surge tank level	3.3 3.2	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	#
010 Pressurizer Pressure Control								√				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Heater failures	3.3	1
012 Reactor Protection						√						K6 Knowledge of the effect of a loss or malfunction of the following will have on the RPS: (CFR: 41.7 / 45/7) K6.02 Redundant channels	2.9	1
013 Engineered Safety Features Actuation						√						K6 Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: (CFR: 41.7 / 45.5 to 45.8) K6.01 Sensors and detectors	2.7	1
022 Containment Cooling									√			A3 Ability to monitor automatic operation of the CCS, including: (CFR: 41.7 / 45.5) A3.01 Initiation of safeguards mode of operation	4.1	1
025 Ice Condenser														
026 Containment Spray											√	2.4 Emergency Procedures / Plan 2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)	4.5	1

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	#
073 Process Radiation Monitoring				√								K4 Knowledge of PRM system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Release termination when radiation exceeds setpoint	4.0	1
076 Service Water											√	2.1 Conduct of Operations 2.1.30 Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)	4.4	1
078 Instrument Air		√		√								K2 Knowledge of bus power supplies to the following: (CFR: 41.7) K2.02 Emergency air compressor K4 Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.02 Cross-over to other air systems	3.3 3.2	2
103 Containment											√	A4 Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4 04 Phase A and phase B resets	3.5	1
K/A Category Point Totals:	3	2	2	4	1	2	2	3	3	3	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					√							K5 Knowledge of the following operational implications as they apply to the CRDS: (CFR: 41.5/45.7) K5.65 CRDS circuitry, including effects of primary/secondary power mismatch on rod control	3.2	1
002 Reactor Coolant						√						K6 Knowledge of the effect or a loss or malfunction on the following RCS components: (CFR: 41.7 / 45.7) K6.12 Code Safety valves	3.0	1
011 Pressurizer Level Control												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
014 Rod Position Indication							√					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RPIS controls, including: (CFR: 41.5 / 45.5) A1.02 Control rod position indication on control room panels	3.2	1
015 Nuclear Instrumentation	√											K1 Knowledge of the physical connections and/or cause effect relationships between the NIS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.04 ESF	3.5	1
016 Non-nuclear Instrumentation												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
017 In-core Temperature Monitor				√								K4 Knowledge of In-Core Temperature Monitoring System design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.5 / 45.7) K4.01 Input to subcooling Monitors	3.4	1

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)											Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
027 Containment Iodine Removal												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
028 Hydrogen Recombiner and Purge Control												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
029 Containment Purge												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
033 Spent Fuel Pool Cooling								√				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.03 Abnormal spent fuel pool water level or loss of water level	3.1	1
034 Fuel Handling Equipment												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
035 Steam Generator							√					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the S/GS controls including: (CFR: 41.5 / 45.5) A1.01 S/G wide and narrow range level during startup, shutdown, and normal operation	3.6	1
041 Steam Dump/Turbine Bypass Control												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
045 Main Turbine Generator	√											K1 Knowledge of the physical connections and/or cause effect relationships between the MT/G system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.20 Protection system	3.4	1
055 Condenser Air Removal												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		

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	#
056 Condensate												√ 2.1 Conduct of Operations 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)	4.4	1
068 Liquid Radwaste												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
071 Waste Gas Disposal												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
072 Area Radiation Monitoring				√								K4 Knowledge of ARM system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Containment ventilation isolation	3.3	1
075 Circulating Water												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
079 Station Air												De-selected and removed as described in ES-401 section D.1.d. See ES-4-1-4		
086 Fire Protection												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
K/A Category Point Totals:	2	0	1	1	1	1	2	1	0	0	1	Group Point Total:		10/ 3

Facility: SEABROOK		Date of Exam: 6/15/09				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.	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. (CFR: 41.10 / 43.2)	3.3	1		
	2.1.	2.1.15 Knowledge of administrative requirements for temporary management directives, such as standing operating orders, night orders, Operations Memos, etc. (CFR: 41.10 / 45.2)	2.7	1		
	2.1.	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2 / 45.6)	4.3	1		
	2.1.					
	2.1.					
	2.1.					
	Subtotal				3	
2. Equipment Control	2.2.	2.2.1 Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity. (CFR: 41.5 / 41.10 / 43.5 / 43.6 / 45.1)	4.5	1		
	2.2.	2.2.20 Knowledge of the process for managing troubleshooting activities. (CFR: 41.10 / 43.5 / 45.13)	2.6	1		
	2.2.	2.2.40 Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)	3.4	1		
	2.2.					
	2.2.					
	2.2.					
	Subtotal				3	
	2.3.	2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)	3.2	1		

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Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
3. Radiation Control	2.3.	2.3.13 Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 43.4 / 45.9 / 45.10)	3.4	1		
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal				2	
4. Emergency Procedures / Plan	2.4.	2.4.28 Knowledge of procedures relating to a security event (non-safeguards information). (CFR: 41.10 / 43.5 / 45.13)	3.2	1		
	2.4.	2.4.41 Knowledge of the emergency action level thresholds and classifications. (CFR: 41.10 / 43.5 / 45.11)	2.9	1		
	2.4.					
	2.4.					
	2.4.					
	2.4.					
	Subtotal				2	
Tier 3 Point Total				10		7

Facility: SEABROOK		Date of Exam: 6/15/09															
Tier	Group	RO K/A Category Points											SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total	
1. Emergency & Abnormal Plant Evolutions	1	3	2	2	N/A			3	4	N/A			4	18	3	3	6
	2	2	3	1	N/A			1	1	N/A			2	9	1	3	4
	Tier Totals	5	5	5	N/A			4	5	N/A			6	27	4	6	10
2. Plant Systems	1	3	2	2	4	1	2	2	3	3	3	3	28	3	2	5	
	2	2	0	0	2	1	1	2	1	0	0	1	10	K4	1	1	3
	Tier Totals	5	2	2	6	2	3	4	4	3	3	4	38				8
3. Generic Knowledge and Abilities Categories					1	2	3	4	10				1	2	3	4	7
					3	3	2	2					2	2	1	2	

- 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 ±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							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000008 Pressurizer Vapor Space Accident / 3							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000009 Small Break LOCA / 3							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000011 Large Break LOCA / 3							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000015/17 RCP Malfunctions / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000022 Loss of Rx Coolant Makeup / 2						√	2.4 Emergency Procedures / Plan 2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.3	1
000025 Loss of RHR System / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000026 Loss of Component Cooling Water / 8						√	2.4 Emergency Procedures / Plan 2.4.4. Ability to recognize abnormal indications for system operating parameters that are entry level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)	4.1	1
000027 Pressurizer Pressure Control System Malfunction / 3							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000029 ATWS / 1							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000038 Steam Gen. Tube Rupture / 3						√	EA2 Ability to determine or interpret the following as they apply to a SGTR: (CFR 43.5 / 45.13) EA2.12 Status of MSIV activating system	4.2	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000054 (CE/E06) Loss of Main Feedwater / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000055 Station Blackout / 6							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000056 Loss of Off-site Power / 6							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000057 Loss of Vital AC Inst. Bus / 6							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-2		
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000058 Loss of DC Power / 6							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000062 Loss of Nuclear Svc Water / 4						√	2.2 Equipment Control 2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (CFR: 41.5 / 41.7 / 43.2)	4.2	1
000065 Loss of Instrument Air / 8							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
W/E04 LOCA Outside Containment / 3							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
W/E11 Loss of Emergency Coolant Recirc. / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4						√	EA2. Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink) (CFR: 43.5 / 45.13) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.4	1
000077 Generator Voltage and Electric Grid Disturbances / 6						√	AA2. Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.5 and 43.5 / 45.5, 45.7, and 45.8) AA2.07 Operational status of engineered safety features	4.0	1
K/A Category Totals:					3	3	Group Point Total:		18/ 6

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-2		
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000003 Dropped Control Rod / 1						√	2.2 Equipment Control 2.2.38 Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)	4.5	1
000005 Inoperable/Stuck Control Rod / 1							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000024 Emergency Boration / 1						√	2.4 Emergency Procedures / Plan 2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)	4.1	1
000028 Pressurizer Level Malfunction / 2							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000032 Loss of Source Range NI / 7							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000033 Loss of Intermediate Range NI / 7							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000036 (BW/A08) Fuel Handling Accident / 8							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000037 Steam Generator Tube Leak / 3							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000051 Loss of Condenser Vacuum / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000059 Accidental Liquid RadWaste Rel. / 9							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000060 Accidental Gaseous Radwaste Rel. / 9							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000061 ARM System Alarms / 7							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000067 Plant Fire On-site / 8							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000068 (BW/A06) Control Room Evac. / 8						√	AA2. Ability to determine and interpret the following as they apply to the Control Room Evacuation: (CFR: 43.5 / 45.13) AA2.05 Availability of heat sink	4.3	1
000069 (W/E14) Loss of CTMT Integrity / 5							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000074 (W/E06&E07) Inad. Core Cooling / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
000076 High Reactor Coolant Activity / 9							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
W/E01 & E02 Rediagnosis & SI Termination / 3							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
W/E13 Steam Generator Over-pressure / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
W/E15 Containment Flooding / 5							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
W/E16 High Containment Radiation / 9							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/A01 Plant Runback / 1							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/A02&A03 Loss of NNI-X/Y / 7							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/A04 Turbine Trip / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/A05 Emergency Diesel Actuation / 6							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/A07 Flooding / 8							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/E03 Inadequate Subcooling Margin / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/E08; W/E03 LOCA Cooldown - Depress. / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4						√	2.1 Conduct of Operations 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12)	4.2	1
BW/E13&E14 EOP Rules and Enclosures							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
CE/A11; W/E08 RCS Overcooling - PTS / 4							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
CE/A16 Excess RCS Leakage / 2							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
CE/E09 Functional Recovery							Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
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								√				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5/ 45.3 / 45/13) A2.05 Effects of VCT pressure on RCP seal leakoff flows	2.8	1
004 Chemical and Volume Control												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
005 Residual Heat Removal												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
006 Emergency Core Cooling												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
007 Pressurizer Relief/Quench Tank												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
008 Component Cooling Water												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
010 Pressurizer Pressure Control												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
012 Reactor Protection											√	2.4 Emergency Procedures / Plan 2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)	4.7	1
013 Engineered Safety Features Actuation												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		

ES-401

PWR Examination Outline
Plant Systems - Tier 2/Group 1 (RO / SRO)

Form ES-401-2

System # / Name	K	K	K	K	K	K	A	A	A	A	G	K/A Topic(s)	IR	#
	1	2	3	4	5	6	1	2	3	4				
022 Containment Cooling								√				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.05 Major leak in CCS	3.5	1
025 Ice Condenser												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
026 Containment Spray								√				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.04 Failure of spray pump	4.2	1
039 Main and Reheat Steam												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
059 Main Feedwater												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
061 Auxiliary/Emergency Feedwater												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
062 AC Electrical Distribution												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
063 DC Electrical Distribution												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
064 Emergency Diesel Generator												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
073 Process Radiation Monitoring												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		

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	#
076 Service Water												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
078 Instrument Air												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
103 Containment											√	2.2 Equipment Control 2.2.42 Ability to recognize system parameters that are entry-level conditions for Technical Specifications. (CFR: 41.7 / 41.10 / 43.2 / 43.3 / 45.3)	4.6	1
K/A Category Point Totals:							3				2	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												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
002 Reactor Coolant												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
011 Pressurizer Level Control												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
014 Rod Position Indication												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
015 Nuclear Instrumentation												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
016 Non-nuclear Instrumentation												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
017 In-core Temperature Monitor												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
027 Containment Iodine Removal												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
028 Hydrogen Recombiner and Purge Control												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
029 Containment Purge												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
033 Spent Fuel Pool Cooling												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		
034 Fuel Handling Equipment				√								K4 Knowledge of design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.03 Overload protection	3.3	1
035 Steam Generator												Randomly selected and removed as described in ES-401 Attachment 1, item 2.c		

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

Facility: SEABROOK		Date of Exam: 6/15/09		RO		SRO-Only	
Category	K/A #	Topic	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. (CFR: 41.10 / 43.5 / 45.12)		
2.1.	2.1.45 Ability to identify and interpret diverse indications to validate the response of another indication. (CFR: 41.7 / 43.5 / 45.4)				4.3	1	
2.1.							
2.1.							
2.1.							
2.1.							
Subtotal							2
2. Equipment Control	2.2.	2.2.21 Knowledge of pre- and post-maintenance operability requirements. (CFR: 41.10 / 43.2)			4.1	1	
	2.2.	2.2.37 Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)			4.6	1	
	2.2.						
	2.2.						
	2.2.						
	2.2.						
Subtotal						2	
3. Radiation Control	2.3.	2.3.13 Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 43.4 / 45.9 / 45.10)			3.8	1	
	2.3.						
	2.3.						
	2.3.						
	2.3.						
	2.3.						
Subtotal						1	

Facility: SEABROOK		Date of Exam: 6/15/09				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
4. Emergency Procedures / Plan	2.4.	2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)			4.7	1
	2.4.	2.4.29 Knowledge of the emergency plan. (CFR: 41.10 / 43.5 / 45.11)			4.4	1
	2.4.					
	2.4.					
	2.4.					
	2.4.					
	Subtotal					
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 1/ Group 1	000055 Station Blackout	<p>The first KA drawn was “EA2 Ability to determine or interpret the following as they apply to a Station Blackout”, EA2.05 “When battery is approaching fully discharged”.</p> <p>No additional plant change or change in strategy is anticipated when the station batteries are discharged.</p> <p>Reselected K/A category to EA2.02, RCS core cooling through natural circulation cooling to S/G cooling.</p>
Tier 1/ Group 1	000058 Loss of DC Power	<p>Randomly drawn K2 was rejected because it contains no K/A statement with a RO importance greater than 2.5.</p> <p>Reselected K/A category to K1</p>
Tier 1/ Group 2	000051 Loss of Condenser Vacuum	<p>Randomly drawn AA1 was rejected because it only contains one K/A statement with an RO importance greater than 2.5, “Ability to operate and / or monitor ‘rod position’ as it applies to the loss of condenser vacuum.” No suitable question could be generated from that constraint.</p> <p>Reselected K/A category to AA2.</p>
Tier 1/ Group 2	000076 High Reactor Coolant Activity	<p>The first K/A drawn was Generic KA “2.4.34, Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects”.</p> <p>This was rejected because the topic does not have any clear actions that an RO would conceivably be required to perform outside the control room under these circumstances.</p> <p>Reselected K/A category to generic K/A 2.2.25, Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.</p>
Tier 2/ Group 1	025 Ice Condenser	<p>During exam outline generation the K/A associated with Ice Condenser (025) were suppressed.</p> <p>This system is N/A to Seabrook.</p>
Tier 2/ Group 1	059 Main Feedwater	<p>Randomly drawn K6 was rejected because it contains no K/A statement with a RO importance greater than 2.5.</p> <p>Reselected K/A category K3</p>
Tier 2/ Group 1	064 Emergency Diesel Generator	<p>Randomly drawn K5 was rejected because it contains no K/A statement with a RO importance greater than 2.5.</p> <p>Reselected K/A category K4</p>

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 2/ Group 1	073 Process Radiation Monitor	Randomly drawn K2 was rejected because it contains no K/A statement with a RO importance greater than 2.5. Reselected K/A category K4
Tier 2/ Group 1	078 Instrument Air	Category 5 was randomly drawn for the 2 nd item in this KA. (7 KA categories in Tier2/Group1 had to be sampled twice in order to generate 28 total questions. This was done in accordance with the ES 401, attachment 1 sampling methodology). Category K5 was then rejected because it contains no K/A statement with a RO importance greater than 2.5. Reselected K/A category K2. Randomly drawn A2 was also rejected because it contains no K/A statement with an RO importance greater than 2.5. Reselected K/A category K4.
Tier 2/ Group 2	016 Non-nuclear Instrumentation	During exam outline generation the K/A associated with Non-Nuclear Instrumentation (016) were suppressed. This system is N/A to Seabrook
Tier 2/ Group 2	027 Containment Iodine Removal	During exam outline generation the K/A associated with Containment Iodine Removal (027) were suppressed. This system is included as part of the Containment Building Spray System at Seabrook
Tier 2/ Group 2	033 Spent Fuel Pool Cooling	Randomly drawn A4 was rejected because it contains no K/A statement with a RO importance greater than 2.5. Reselected K/A category A2
Tier 2/ Group 2	072 Area Radiation Monitoring	Randomly drawn K2 was rejected because it contains no K/A statement with a RO importance greater than 2.5. Reselected K/A category K4
Tier 2/ Group 2	079 Station Air	Randomly drawn K5 was rejected because it contains no K/A statement with a RO importance greater than 2.5. Reselected K/A category A4
Tier 2/ Group 2	079 Station Air	Plant system de-selected after review of aggregate balance of outline plan as described in ES-401, section D.1.d. Two Station air supply questions had already been selected. Reselected Plant System 002, Reactor Coolant as a replacement.

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 1/ Group 1	062 Loss of Nuclear Service Water	<p>Original K/A selected was G 2.4.30, Emergency Procedures, Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the States, the NRC, or the Transmission system operator.</p> <p>No discriminating question could be generated within this narrow scope for the SW system.</p> <p>Randomly reselected within the generic category of 2.4 Emergency procedures for 062 Loss of Service Water and chose G 2.4.11, knowledge of abnormal condition procedures.</p>
Tier 1/ Group 2	005 Inoperable/ Stuck Control Rod	<p>Original K/A selected was G 2.4.35, Emergency Procedures, Knowledge of local auxiliary operator task during an emergency and the resultant operational effects.</p> <p>No local Auxiliary Operator tasks are performed with a stuck control rod for Seabrook.</p> <p>Randomly reselected within the APE 005, Inoperable/Stuck Control Rod, to choose AK3.04, Tech Spec limits for inoperable rods.</p>
Tier 1/ Group 2	W/E13 Steam Generator Overpressure	<p>Original K/A selected was EK3/EK3.3, Knowledge of the reasons for the following responses as they apply to the (Steam Generator Overpressure): EK3.3 Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.</p> <p>SG overpressure conditions are addressed by the H-2 yellow path procedure which are optional entry procedures. No discriminating operationally valid question could be generated that did not also have a more overriding safety concern to address.</p> <p>Reselected within W/E13 Steam Generator Overpressure and selected EA1: Ability to operate and/or monitor the following as they apply to the (Steam Generator Overpressure): EA1.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.</p>

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 1/ Group 2	060 Accidental Gaseous Radwaste Release	<p>Original K/A selected was K3/AK3.02, Knowledge of the reasons for the following responses as they apply to the Accidental Gaseous Radwaste: AK3.02 Isolation of the auxiliary building ventilation.</p> <p>No automatic or manual actions are performed to isolate auxiliary building ventilation for Seabrook.</p> <p>Reselected within the APE 060 Accidental Gaseous Radwaste Release and selected AK2.02: Knowledge of the interrelationship between the Accidental Gaseous Radwaste Release and the following: AK2.02: Auxiliary Building Ventilation.</p>
Tier 2/ Group 1	026 Containment Spray System	<p>Original K/A selected was G 2.4.47, Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.</p> <p>Re-chose K/A to minimize open reference material questions on the test.</p> <p>Randomly reselected within 026 Containment Spray and within generic category 2.4, Emergency Procedures/Plan, to choose G 2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry level conditions for emergency and abnormal operating procedures.</p>
Tier 2/ Group 2	001 Control Rod Drive System	<p>Original K/A selected was K5/AK5.13, Knowledge of the following operational implication as they apply to the CRDS, K 5.13 Effects of past power history on xenon concentration and samarium concentration.</p> <p>Question topic is tied to GFES subject material vs. initial license operator test material.</p> <p>Reselected within K5 of the 001 Control Rod Drive system and selected K5.65: Knowledge of the following operational implication as they apply to the CRDS K5.65, CRDS circuitry, including effects of primary/secondary power mismatch on rod control</p>

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 2/ Group 2	017 In-Core Temperature Monitoring System	<p>Original K/A selected was K3/K3.01, Knowledge of the effect that a loss or malfunction of the ITM system will have on the following: K3.01 Natural Circulation indications.</p> <p>The core exit thermocouples are one of 4 diverse and widely redundant subsystems used to verify natural circulation at Seabrook. A suitable operationally valid and discriminating question could not be generated for this topic. Additionally, only limited K/A statements are contained within this plant system.</p> <p>Reselected within the 017 In-Core Temperature Monitoring system and selected K4: Knowledge of the ITM system design feature(s) and/or interlock(s) which provide for the following: K4.01, Input to Subcooling Monitors.</p>
Tier 3/ Category 1	Conduct of Operations	<p>Original K/A selected was G 2.4.38, Knowledge of the station's requirements for verbal communications when implementing procedures.</p> <p>Generic KA is too simplistic to write a valid discriminating question.</p> <p>Randomly reselected within the Conduct of Operations generic category to choose G 2.1.15. Knowledge of administrative requirements for temporary management directives, such as standing operating orders, night orders, Operations Memos, etc. .</p>
SRO SCREENING BELOW		
Tier 1/ Group 1	062 Loss of Nuclear Service Water	<p>Generic Knowledge and Abilities 2.1.28 selected during SRO random sampling.</p> <p>KA statement is tied to 10CFR55.41, but not tied to 10CFR55.43 (as identified in NUREG -1122, rev.2, supp 1).</p> <p>Reselected KA Statement 2.2.25.</p>
Tier 1/ Group 2	003 Dropped Control Rod	<p>Generic Knowledge and Abilities 2.1.31 selected during SRO random sampling.</p> <p>KA statement is tied to 10CFR55.41 and 55.45, but not tied to 10CFR55.43 (as identified in NUREG -1122, rev.2, suppl).</p> <p>Reselected KA Statement 2.2.38.</p>

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 2/ Group 2	041 Steam Dump/Turbine Bypass Controls	<p>Generic Knowledge and Abilities 2.2.39 selected during SRO random sampling.</p> <p>Equipment Category does not have any associated Technical Specifications with 1 hour or less action statements.</p> <p>Reselected KA Statement 2.4.9.</p>
Tier 2/ Group 2	034 Fuel Handling	<p>Selected during SRO random sampling.</p> <p>Randomly drawn K2 was rejected because it contains no K/A statement with a SRO importance greater than 2.5.</p> <p>Reselected K/A category K4</p>
Tier 3/ Category 2	2. Equipment Control	<p>Selected generic KA 2.2.13 during SRO random sampling.</p> <p>KA statement is not identified as being tied to 10 CFR 55.43.</p> <p>Reselected KA Statement 2.2.21</p>
Tier 1/ Group 1	026 Loss of Component Cooling Water	<p>Original K/A selected was G 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.</p> <p>No discerning, operationally valid SRO level question that also meets the 10CFR55.43 criteria and still relates to this KA topic could be generated.</p> <p>Reselected within Generic K/A category 2.4 Emergency Procedures/Plan and selected G 2.4.4, Ability to recognize abnormal indications for system operating parameters that are entry level conditions for emergency and abnormal operating procedures.</p>

Seabrook Station 2009 NRC Exam JPM - RO

Facility: <u>Seabrook</u>		Date of Examination: <u>6/15/09</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: _____
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, D	2.1.25 Ability to interpret reference materials, such as graphs, tables, etc. Activity – Shutdown Margin Calculation (L0043J) (RO ADMIN#1)
Conduct of Operations	R, D	2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management. Activity – Perform Estimated Critical Position Calculation (L0033J) (SRO-ADMIN#2/RO-ADMIN#4)
Equipment Control	R, M	2.2.12 Knowledge of Surveillance procedures Activity – Verify RCS Steady State Leak Rate Determination (L0082J - Modified) (RO- ADMIN#2)
Radiation Control	R, N	2.3.6 Ability to Approve Release Permits Activity - Initiate a Liquid Effluent Waste Sample Request (RO-ADMIN#3)
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 2009 NRC Exam JPM – SRO -I

Facility: <u>Seabrook</u>		Date of Examination: <u>6/15/09</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, N	2.1.25 Ability to interpret reference materials, such as graphs, tables, etc. Activity – Calculate Blended Makeup 2000 gallon flush of Reactor Coolant Mixed Bed (New) (SRO-ADMIN#1)
Conduct of Operations	R, D	2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management. Activity – Perform Estimated Critical Position Calculation (L0033J) (SRO-ADMIN#2)
Equipment Control	R, M	2.2.12 Knowledge of Surveillance procedures Activity – Verify RCS Steady State Leak Rate Determination (L0082J - Modified)(SRO-ADMIN#3)
Radiation Control	R, N	2.3.11 Ability to Control Radiation Releases Activity - Verify COP Exhaust RM Setpoints prior to Gaseous Effluent Release (New) (SRO-ADMIN#4)
Emergency Procedures/Plan	R, N	2.4.40 Knowledge of the SRO's responsibilities in emergency plan implementation Activity – Determine Emergency Action Level - PARS (New) (SRO-ADMIN#5)
<p>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.</p>		
<p>* 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)</p>		

Seabrook Station 2009 NRC Exam JPM – SRO-U

Facility: Seabrook
 Examination Level: RO SRO

Date of Examination: 6/15/09
 Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, N	2.1.25 Ability to interpret reference materials, such as graphs, tables, etc. Activity – Calculate Blended Makeup 2000 gallon flush of Reactor Coolant Mixed Bed (New) (SRO-ADMIN#1)
Conduct of Operations	R, D	2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management. Activity – Perform Estimated Critical Position Calculation (L0033J) (SRO-ADMIN#2)
Equipment Control	R, M	2.2.12 Knowledge of Surveillance procedures Activity – Verify RCS Steady State Leak Rate Determination (L0082J)(SRO-ADMIN#3)
Radiation Control	R, N	2.3.11 Ability to Control Radiation Releases Activity - Verify COP Exhaust RM Setpoints prior to Gaseous Effluent Release (New) (SRO-ADMIN#4)
Emergency Procedures/Plan	R, N	2.4.40 Knowledge of the SRO’s responsibilities in emergency plan implementation Activity – Determine Emergency Action Level - PARS (New) (SRO-ADMIN#5)

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)

Facility: <u>Seabrook</u> Date of Examination: <u>6/15/09</u>		
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input 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. (Pair A1) Isolate Open PORV – E-0 , L0069JAP(all)	A, D, E, L, S	3
b.(Pair A2) Transfer SW to the Cooling Tower using manual TA Signal, NEW (all)	A, E, EN, N, S	8
c.(Pair B1) Trip all RCPs, L0083JAP (all)	A, D, E, L, S	2
d.(Pair B2) Start Hydrogen Recombiners, L0084J (used on 2005 NRC) (all)	D, EN, L, S, P	5
e.(Pair C1) Off-site Power Restoration, L0129J (all)	D, E, L, S	6
f.(Pair C2) Pressurizer Pressure Channel Failure (all)	E, N, S	7
g. (Pair D1) Blended Makeup performance, L0035J (RO 1, 3)	A, M, S	1
h.(Pair D2) Recover from a CRFRM actuation, L0121J (RO 2, 4)	D, E, EN, S	9
i.(Sim pair E-1RO) Transfer to Cold Leg Recirculation (CBS-V-2), L0139JAP (used on 2007 NRC) (all)	A, D, L, S, P	4
In-Plant Systems [@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
j. (In-plant #1) Align Alternate (FP) cooling to CCP, L0134J (all)	D, E, L, R	2
k. (In-plant #2) Locally Close an MSIV, L004J (all)	D, E, R	4
l. (In-plant #3) Deenergize Bus 5 due to Fire during RSS, L0162J (all)	E, L, N	6
<p>[@] 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.</p>		
* 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		

Seabrook Station 2009 NRC Exam JPM – SRO-I

Facility: <u>Seabrook</u> Date of Examination: <u>6/15/09</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. (Pair A1) Isolate Open PORV – E-0, L0069JAP (all)	A, D, E, L, S	3
b.(Pair A2) Transfer SW to the Cooling Tower using manual TA Signal, NEW (all)	A, E, EN, N, S	8
c.(Pair B1) Trip all RCPs, L0083JAP (all)	A, D, E, L, S	2
d.(Pair B2) Start Hydrogen Recombiners, L0084J (used on 2005 NRC) (all)	D, EN, L, S, P	5
e.(Pair C1) Off-site Power Restoration, L0129J (SROI 1,2,3,4)	D, E, L, S	6
f.(Pair C2) Pressurizer Pressure Channel Failure (SROI 5,6,7,8)	E, N, S	7
g. (Pair D1) Blended Makeup performance, L0035J (All)	A, M, S	1
h.(Pair D2) Recover from a CRFRM actuation, L0121J (SROI 5,6,7,8)	D, E, EN, S	9
i.(Sim pair E-1SRO) SAE Notifications, L0094J (SROI 1,2,3,4)	D, L, S	4
In-Plant Systems [@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. (In-plant #1) Align Alternate (FP) cooling to CCP, L0134J (All)	D, E, L, R	2
j. (In-plant #2) Locally Close an MSIV, L004J (All)	D, E, R	4
k. (In-plant #3) Deenergize Bus 5 due to Fire during RSS, L0162J (All)	E, L, N	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	≤ 9 / ≤ 8 / ≤ 4	
(D)irect from bank	≥ 1 / ≥ 1 / ≥ 1	
(E)mergency or abnormal in-plant	- / - / ≥ 1 (control room system)	
(EN)gineered safety feature	≥ 1 / ≥ 1 / ≥ 1	
(L)ow-Power / Shutdown	≥ 2 / ≥ 2 / ≥ 1	
(N)ew or (M)odified from bank including 1(A)	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	
(P)revious 2 exams	≥ 1 / ≥ 1 / ≥ 1	
(R)CA		
(S)imulator		

Seabrook Station 2009 NRC Exam JPM – SRO-U

Facility: <u>Seabrook</u> Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>	Date of Examination: <u>6/15/09</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. (Pair A1) Isolate Open PORV, L0069JAP (all)	A, D, E, L, S	2
b. (Pair A2) Transfer SW to the Cooling Tower using manual TA Signal, NEW (all)	A, E, EN, N, S	8
In-Plant Systems [®] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. (In-plant #1) Align Alternate (FP) cooling to CCP, L0134J (all)	D, E, L, R	2
j. (In-plant #2) Locally Close an MSIV, L004J (all)	D, E, R	4
k. (In-plant #3) Deenergize Bus 5 due to Fire during RSS, L0162J (all)	E, L, N	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	≤ 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		

Seabrook Station 2009 NRC Exam-Simulator Scenarios

Facility: **Seabrook**Scenario No.: **B**

Op-Test No.:

Examiners: **Peter Presby**

Operators:

Initial Conditions: Mode 1, 8% power (IC #190). Auto start of CS-P-2A is defeated. Both trains of Safety Injection fail to auto actuate. Both CBS pumps fail to auto start.

Crew is performing a power increase to warm up the Main turbine. During the power increase a leak inside containment will develop that is within the capability of a centrifugal charging pump, and therefore will not require a Safety Injection. The crew should recognize this as a Technical specification entry.

After the RCS leak abnormal, OS1201.02, has been entered and the leak rate estimated, MS-PT-507 fails HIGH. This will necessitate the manual closing of the condenser steam dumps via the P-12 Bypass/Interlock switches per ON1230.01, Steam Header Pressure PT-507 Instrument Failure. The crew may also enter OS1290.02, Response top Condensate or Feedwater Heater System Transient.

Failure of FW-LT-549 LOW will cause the "D" Bypass Feed Reg valve to fail open if it is automatic mode. The crew will respond per OS1235.03, SG Level Instrument Failure and manually control "D" SG Level.

Upon exiting ON1235.03, two control rods will simultaneously drop, causing the crew to call for a reactor trip, based upon the dropped rod abnormal procedure, OS1210.05. Upon entry into E-0, Reactor Trip or Safety Injection, the reactor coolant leak will increase requiring a Safety Injection. The crew will transition from E-0 to E-1 to ES-1.2.

E-plan: EAL SU5 (Unidentified or Pressure boundary leakage >10 GPM) Unusual Event. Upgrade E-plan: SAE FS1 Loss and Potential Loss of Reactor Coolant system barrier.

Terminate the exam at Chief Examiner discretion.

Turnover: The plant is at 8% power. Increase plant power to 18% to warm up Main Turbine. No fuel preconditioning guidelines in effect. "A" MFP is in service. OS1000.02, "Plant Startup from Hot Standby to Minimum Load", step 4.2.7 in progress. RCS temperature is being verified greater than minimum temp for criticality per T.S. 3.1.1.4.

Event No.	Malf. No.	Event Type*	Event Description
1		N,R	Increase plant power to 18%.
2	mfRC048A	C	<p>Initiation of 20 gpm RCS leak w/ 2 minute ramp inside containment.</p> <p>Insert Malfunction: Reactor Coolant mfRC048A Select: final value 20 Ramp time: 120 secs</p> <p>The crew responds using OS1201.02, RCS Leak Abnormal TS 3.4.6.2, RCS Unidentified leakage > 1 GPM. E-plan: EAL SU5 (Unidentified or Pressure boundary leakage >10 GPM) Unusual Event</p>
3	ptMSPT507	I	<p>Initiation of a malfunction of Main Steam header Pressure instrument, MS-PT-507, fails HIGH.</p> <p>Insert Malfunction: MAIN STEAM (component) Select: ptMSPT507. Select: Fails HIGH Select: INSERT</p> <p>The crew responds with ON1230.01, Steam Header Pressure PT-507 Instrument Failure. Steam Dump Valves fail open in the STM Pressure mode. BOP Operator must close the valve with the P-12 Interlock switches or operate the controller in manual to prevent excessive cooldown. Crew will have to monitor for minimum temperature for criticality, T.S. 3.1.1.4, and DNB T.R. 3.2.5, #2185 RCS psig.</p>
4	ItFWLT549	I	<p>Initiation of a malfunction of controlling level transmitter on SG D Feed Regulating Bypass Valve, fails LOW.</p> <p>Insert Malfunction: FEEDWATER (component) Select: ItFWLT549. Select: Fails LOW Select: INSERT</p> <p>The crew responds with OS1235.03, SG Level Instrument Failure” The Feed Regulating bypass Valve for SG D will open fully. The operator will take manual control to restore level. Enter T.S. 3.3.1, table 3.3-1, Item 13 and T.S 3.3-3, items 5.b, 6.a, 7.c, and 10C.</p>
5	mfCP011	C	<p>Initiation of 2 simultaneous dropped rods.</p> <p>Insert Malfunction: ROD CONTROL AND POSITION Select: mfCP011. Select: INSERT</p> <p>The crew should enter OS1210.05, Dropped Rod. Based on the caution prior to step 1 the Crew should trip the reactor and</p>

			transition to E-0.
6	mfRC048 A	M, C	<p>Upon the manual reactor trip the following will occur:</p> <ul style="list-style-type: none"> ○ RCS leakage will increase to 50,000 gpm. ○ "B" Centrifugal Charging pump trips. ○ SI will fail to auto actuate. ○ CBS pumps fail to Auto Start. <p>The crew will be required to actuate a manual Safety Injection (CCT) based on being unable to maintain RCS PZR level.</p> <p>The crew will be required to manually start High Head ECCS pump CS-P-2A.</p> <p>The crew will be required to manually start Containment Building Spray pumps as required.</p> <p>E-plan: SAE FS1 Loss and Potential Loss of Reactor Coolant system barrier.</p>
7			The crew will transition from E-0 to E-1 to ES-1.2. Terminate the exam at Chief Examiner discretion.
			<p>Crew Critical Tasks</p> <ol style="list-style-type: none"> (1) Establish flow from at least one high head ECCS pump (CS-P-2A or 2B) before transition out of E-0. (2) Manually actuate at least one train of SI before any of the following: Transition to any E-1 series, or E-3 series procedure or transition to any FRG. (3) Manually actuate at least one train of CBS or start at least one train of Containment Building Spray Equipment before transition out of E-0.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Seabrook Station 2009 NRC Exam-Simulator Scenarios

Facility: SeabrookScenario No.: C

Op-Test No.:

Examiners: Peter PresbyOperators: _____

Initial Conditions: Mode 1, 75% power (IC #31). The motor driven EFW pump is removed from service (tagged out). Main Steam line isolation fails to auto actuate for train A and train B. The Reactor Trip Breakers are failed closed. Automatic turbine trip is defeated. The manual turbine trip pushbutton is overridden to prevent a manual turbine trip from the Main Control room. The Start up feed pump will trip on overcurrent when a manual start attempt is made.

A Loop 1 Tcold failure High will occur. At the time of the Loop 1 Tcold failure, a 30 gpm RCS leak will start from the Tcold instrument line. The diagnosis of this event should lead the crew to commence a power decrease.

Main Feedwater Pump FW-P-32A will trip causing a setback of the turbine to less than 55% power. A trip of the remaining MFP will cause entry into E-0. Failure of the Reactor to trip will require transitioning to FR-S.1, Response to Nuclear Power Generation/ATWS. The turbine will fail to automatically or manually trip, and Turbine Control Valve 2 will stick open, requiring closure of the Main Steam Isolation Valves (MSIVs). The MSIVs will be prevented from automatically closing on rapidly decreasing SG pressure to ensure this must be done manually. A loss of the turbine driven EFW pump will cause a transition to FR-H.1, Response to Loss of Secondary Heat Sink upon completion of FR-S.1.

E-plan Alert classification on EAL SU5 (RCS leakage due to unidentified leakage >10GPM). Upgrade to Site Area Emergency based on SS2, ATWS and manual reactor shutdown from main control board NOT successful.

Terminate on Chief Examiners Discretion.

Turnover: The plant is at 75% power due to grid load restrictions. Current power level was achieved 6 hrs ago. The Motor driven EFW pump has been tagged out for motor inspection. T.S. Action Statement 3.7.1.2 was entered at 0600. Plant is being held at 75% power, waiting ISO direction to return plant power to 100%.

Event No.	Malf. No.	Event Type*	Event Description
1	ttRCTT411, mfRC049A	I, C	Initiation of a failure of RCS Tcold Temperature instrument, RC-TI-411, fails LOW. This failure causes a 30 gpm RCS leak with a 5 minute ramp. Insert SCENARIO "Exam #25 RCS Leak at RTD" Upon the initial instrument failure the crew responds with OS1201.08, Tavg/Delta T Instrument Failure". After verifying

			<p>Secondary Load is STABLE the crew will place rod control to MANUAL and defeat affected instrument.</p> <p>While verifying plant response the crew should recognize an RCS leak has initiated. The crew should respond to the RCS leak using OS1201.02. The crew may also enter the abnormal procedure for containment radiation Monitor going into alarm.</p> <p>T.S. 3.3.1, Rx Trip Instruments, Table 3.3-1, Items 7 & *, TR-19, FWI on Low Tav. TS T.S. 3.4.6.2, RCS Unidentified Leakage > 1gpm</p> <p>The crew should recognize the leak exceeds the and E-plan Alert classification for EAL SU5 (RCS leakage due to unidentified leakage >10GPM).</p> <p>The crew should recognize that a plant shutdown is required.</p>
2	mfFW038	C	<p>Initiation of MFP-32A trip on low lube oil pressure.</p> <p>Insert Malfunction: FEEDWATER mfFW038</p> <p>Select: INSERT</p> <p>The crew responds using OS1231.03, Turbine Runback/setback Abnormal.</p> <p>The crew will verify load decreases and plant responds in AUTO.</p>
3	avMSVCV2, mfFW054	M, C	<p>Initiation of a failure of Main Turbine Control valve to FAIL AS IS. This failure provides a CCT on subsequent plant trip. Initiate trip of Second Main Feed Pump to require plant trip.</p> <p>Insert Malfunction: MAIN STEAM (component)</p> <p>Select: avMSVCV2.</p> <p>Select: FAIL AS IS</p> <p>Select: INSERT</p> <p>Insert Malfunction: FEEDWATER</p> <p>Select: mfFW054.</p> <p>Select: INSERT</p> <p>The crew should recognize that insufficient feedwater is available and there is a need for a Reactor Trip. The crew will enter E-0, Reactor Trip or Safety Injection.</p> <p>An AUTO Reactor Trip will not occur so the PSO will perform a MANUAL Trip.</p> <p>The Reactor will not trip and the crew will transition to FR-S.1, Response to Nuclear Power Generation/ATWS.</p> <p>90 secs after the crew directs a local trip the Trip breakers will be opened locally to Shutdown the reactor.</p> <p>Site Area Emergency E-plan classification based on SS2, ATWS and manual reactor shutdown from main control board NOT successful.</p>

4	rmvMS-V-129	C	<p>BOP should recognize that AUTO turbine trip is defeated. After performing a MANUAL Turbine trip the BOP operator should recognize #2 Turbine control valve has FAILED AS IS (malfunction previously inserted). BOP operator will manually runback the turbine. When CV-2 remains OPEN the BOP will initiate a Main Steam Line Isolation Manually. BOP operator will follow up with direct trip of the Main Turbine from the front standard per FR-S.1.</p> <p>When directed by crew remove Main Turbine trip override SELECT Malfunction on the tool bar Select: mFRPS003 Select: Delete Select: EXECUTE</p> <p>After the crew has passed step 3 of FR-S.1 AND Wide Range level on all SGs >= 50% and increasing then TRIP MS-V-129, Steam Supply to Turbine Driven EFW pump.</p>
4 (cont)			<p>The crew should exit FR-S.1 at step 7.</p> <ul style="list-style-type: none"> ○ If a RED "H": does not exist, transition from FR-S.1 to E-0. When heat sink becomes RED or at step 7 of E-0 , transition to Fr-H.1. ○ Insert Remote Function: MAIN STEAM (component) Select: rmvMSV129 Select: manual adjust Select: Final Value = 0 Select: INSERT ○ If a RED "H" exists, transition to FR-H.1 from FR-S.1.
5	mfRC048A	C	<p>The crew will attempt to start the SUFP. The SUFP will trip (faulty 86 device) due to an event trigger inserted prior to the scenario.</p> <p>An SAE E-Plan classification is already valid based on the tripping of the reactor from outside the Control Room. Alert E-plan classification is also based on Fission Product Barrier Degradation Matrix: FA1, Fuel Clad barrier Potential loss on H RED, plus Reactor Coolant System Barrier Potential loss on H-RED</p>
6			<p>After entry into FR-H.1 and the crew has dispatched an NSO to start the Turbine Driven EFW Pump, then restore MS-V-129.</p> <p>Insert Remote Function: MAIN STEAM (component) Select: rmvMSV129 Select: manual adjust Select: Ramp Time = 60</p>

			<p>Select: Final Value = 1 Select: INSERT</p>
			<p>When EFW flow is restored the crew should return to step 3 to determine procedure transition.</p> <ul style="list-style-type: none"> ○ If FR-H.1 was entered from FR.S.1 then procedure and step in effect is E-0, step 1. ○ If FR-H.1 was entered from E-O or ES-0.1 then procedure and step in effect is where the transition was made. <p>Terminate the Exam at Lead Examiner Discretion.</p>
			<p><u>Crew Critical Tasks</u></p> <ol style="list-style-type: none"> (1) Insert negative reactivity into the core by at least one of the following methods in accordance with FR-S.1: <ol style="list-style-type: none"> a. Automatic and or manual insertion of the RCCAs. b. Establish Emergency Boration flow to the RCS. (2) Establish feedwater flow into at least one SG before RCS bleed and feed is required. (3) Isolate the main turbine from the SGs before proceeding to step 5 of FR-S.1 on an ATWS initiated by a loss of Feedwater.
<p>* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor</p>			

Seabrook Station 2009 NRC Exam-Simulator Scenarios

Facility: **Seabrook**Scenario No.: **D**

Op-Test No.:

Examiners: **Peter Presby**

Operators: _____

Initial Conditions: **Mode 1, 52% power (IC #32). Automatic Main Steam isolation for train A or train B is defeated. On the Manual Reactor trip the SG "B" Atmospheric Steam Dump valve (ASDV) will fail partially open (15%). Also on Manual Reactor trip the "A" Primary Component Cooling Water (PCCW) pump will trip and the "C" PCCW pump auto start will be defeated.**

After the power increase has begun, FW-PT-508, Main Feed Header Pressure transmitter will fail LOW. Both Main Feed Pumps will slow down resulting in decreasing SG levels. The crew will address the failure by taking manual control of MFP speed and restoring SG level.

When the plant is stable Pressurizer Level transmitter RC-LT-459 will fail low, causing a letdown isolation. The crew will address the failure with OS1201.07, PZR Level Instrument Failure and restore letdown flow and recover PZR level to programmed level.

The "B" SG will have a SG tube Rupture creating a Primary to Secondary leak. The crew will address this with OS1227.02, Steam Generator Tube leak. At step 2 of OS1227.02, the crew should determine that PZR Level can not be maintained. The crew should trip the reactor and initiate a Safety Injection.

On the Manual Reactor trip the "A" PCCW pump will trip, and the "C" PCCW pump will fail to auto start. The crew should recognize no PCCW cooling is available for Train A components and manually start the "C" PCCW pump.

On the Manual Reactor trip the SG "B" Atmospheric Steam Dump Valve (ASDV) will fail partially open, causing a reactor coolant release to atmosphere. The crew should recognize the "B" SG is ruptured and faulted. The crew should transition from E-0 to E-2.

The crew will isolate the Faulted Ruptured SG in E-2 and direct local closure of the "B" SG ASDV to terminate the release to the atmosphere.

Alert E-plan classification on EAL FA1, Reactor Coolant System Barrier potential loss with Unisolable leak > capacity of one Centrifugal charging pump in the normal charging mode. Upgrade Site Area Emergency E-plan classification based on Fission Product Barrier Degradation Matrix: FS1, Reactor Coolant System Barrier potential loss with Unisolable leak > capacity of one Centrifugal charging pump in the normal charging mode., plus Containment Barrier Loss for Ruptured Faulted SG outside of containment.

Terminate the Exam at Chief Examiner Discretion.

Turnover: The plant is at 52% power preparing to do a power increase of 10%/hr to 100% following repairs to FW-P-32B. Stable at current power level for 12 hrs.

The Crew is in OS1000.05, Power Increase at step 4.3.15.

Event No.	Malf. No.	Event Type*	Event Description
1		R	Power increase at 10%/hr from 50% to 100%
2	ptFWPT508	I	<p>Initiation of a failure to Main Feed Header Pressure Transmitter, FW-PT-508, LOW. Both Main Feed pumps will decrease speed resulting in decreasing SG levels.</p> <p>Insert Malfunction: FEEDWATER (component)</p> <p>Select: ptFWPT508</p> <p>Select: Fail Low</p> <p>Select: INSERT</p> <p>The crew responds with skill of the operator, and follows up with VAS procedure.</p> <p>The BOP operator will place Master Speed Pump Controller, FW-SK-509A to MANUAL and restore Feed Pump dp to the program value and restore SG level to program 50%.</p> <p>The crew should initiate instrument repairs.</p>
3	ItRCLT459	I	<p>Initiation of a failure of Pressurizer level Transmitter, RC-LT-459, LOW. This will cause an isolation of letdown flow and increasing charging flow.</p> <p>Insert Malfunction: REACTOR COOLANT (component)</p> <p>Select: ItRCLT459</p> <p>Select: Fail Low</p> <p>Select: INSERT</p> <p>The crew responds with OS1201.07, PZR Level Instrument Failure.</p> <p>The PSO will reduce charging flow to seal injection flow only. The crew will then deselect the failed instrument, restore letdown flow and restore PZR level to program.</p> <p>The crew should enter T.S. 3.3.1, table 3.3-1, item 11, 3.3.3.6, table 3.3.10, item 5, 3.3.3.5, table 3.3-9, item 5.</p>
4	svMSV88	C	<p>Initiation of a failure of the "B" Main Steam Isolation Valve, MS-V-88, OPEN. This will set up a later failure of a B SG ASDV.</p> <p>Insert Malfunction: MAIN STEAM (component)</p> <p>Select: svMSV88</p> <p>Select: Fail OPEN</p> <p>Select: INSERT</p>
5	mfSG002B	C	<p>Initiation of a "B" Steam Generator Tube rupture at 300 gpm, ramped over 5 minutes.</p> <p>Insert Malfunction: STEAM GENERATOR</p> <p>Select: mfSG002B</p> <p>Select: Final Value = 300</p> <p>Select: ramp time = 300</p>

			<p>Select: INSERT</p> <p>The crew responds with OS1227.02, Steam Generator Tube leak. Using step 2 the crew should determine that PZR Level can not be maintained. The crew should trip the reactor and initiate a Safety Injection.</p> <p>The crew should transition from OS1227.02 to E-0.</p> <p>Alert E-plan classification on EAL FA1, Reactor Coolant System Barrier potential loss with Unisolable leak > capacity of one Centrifugal charging pump in the normal charging mode.</p>
6		C	<p>On the Manual Reactor trip the "A" PCCW pump will trip, and the "C" PCCW pump will fail to auto start.</p> <p>The crew should recognize no PCCW cooling is available for Train A components and manually start the "C" PCCW pump. (CCT)</p>
7	svMSV3002	C	<p>On the Manual Reactor trip the SG "B" Atmospheric Steam Dump valve (ASDV) will fail partially open, causing a release to atmosphere.</p> <p>Insert Malfunction: MAIN STEAM (component)</p> <p>Select: svMSV3002</p> <p>Select: go to position</p> <p>Select: final value = 0.15</p> <p>Select: ramp time = 0</p> <p>Select: INSERT</p> <p>The crew should recognize the "B" SG is ruptured and faulted.</p> <p>The crew should transition from E-0 to E-2</p>
8	rFMS012	C	<p>The crew should isolate the remaining three intact Steam generators by closure of the other Main Steam Isolation valves (AUTO isolation defeated in set up).</p> <p>The crew should direct closure of the local manual isolation valve, MS-V21, for the failed ASDV.</p> <p>Insert Remote Isolation: MAIN STEAM (component)</p> <p>Select: rFMS0122</p> <p>Select: go to position</p> <p>Select: final value = 0</p> <p>Select: ramp time = 0</p> <p>Select: INSERT</p> <p>Site Area Emergency E-plan classification based on Fission Product Barrier Degradation Matrix: FS1, Reactor Coolant System Barrier potential loss with Unisolable leak > capacity of one Centrifugal charging pump in the normal charging mode., plus Containment Barrier Loss for Ruptured Faulted SG outside of containment.</p>

9			Crew should transition from E-2, to E-1
			Terminate the Exam at Chief Examiner Discretion.
			<p><u>Crew Critical Tasks</u></p> <ul style="list-style-type: none"> (1) Manually start at least one PCCW pump for the available train, to provide adequate cooling for the operating safeguards train before transition out of E-0. (2) Isolate the faulted Steam Generator before transition out of E-2. (3) Isolate feedwater flow into and steam flow from the ruptured Steam before transition to ECA-3.1 is required.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			