

**BWR RO/SRO EXAM OUTLINE ES-401-1**

Facility: Columbia Generating Station														Date of Exam:				
Tier	Group	RO 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 and Abnormal Plant Evolutions	1	1	3	5	N/A			5	3	N/A			3	20	2	5	7	
	2	1	1	1				2	2				0	7	2	1	3	
	Tier Totals	2	4	6				7	5				3	27	4	6	10	
2. Plant Systems	1	4	1	1	1	2	3	4	4	1	2	3	26	1	4	5		
	2	2	1	1	3	0	1	0	1	2	1	0	12	2	1	3		
	Tier Totals	6	2	2	4	2	4	4	5	3	3	3	38	3	5	8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7
					4		2		2		2			1	2	2	2	
<ol style="list-style-type: none"> <li>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.</li> <li>2. The point 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 + or – 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.</li> <li>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 that are not included on the outline should be added. Refer to ES-401, Attachment 2 for guidance regarding the elimination of inappropriate K/A statements.</li> <li>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 a system or evolution.</li> <li>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.</li> <li>6. Select SRO topics for Tiers 1 and 2 from the shaded system and K/A categories.</li> </ol>																		

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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.
8. On the following page, 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. 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 number, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

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## EMERGENCY &amp; ABNORMAL PLANT EVOLUTIONS - TIER 1 GROUP I

## BWR - RO

E / APE # - NAME / SAFETY FUNCTION	K1	K2	K3	A1	A2	G	K/A TOPICS	IMP	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4			X				AK3.01 – Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Reactor water level response	3.4	1
295003 Partial or Complete Loss of AC / 6						X	2.1.24 – Ability to obtain and interpret station electrical and mechanical drawings	2.8	1
295004 Partial or Total Loss of DC PWR / 6				X			AA1.02 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF DC POWER: System necessary to assure safe plant shutdown	3.8	1
295005 Main Turbine Generator Trip / 3					X		AA2.03 – Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP: Turbine valve position	3.1	1
295006 SCRAM / 1		X					AK2.06 – Knowledge of the interrelations between SCRAM and the following: Reactor Power	4.2	1
295016 Control Room Abandonment / 7		X					AK2.02 – Knowledge of the interrelations between CONTROL ROOM ABANDONMENT and the following: Local control stations	4.0	1
295018 Partial or Complete Loss of CCW / 8				X			AA1.03 - Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER	3.3	1

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E / APE # - NAME / SAFETY FUNCTION	K1	K2	K3	A1	A2	G	K/A TOPICS	IMP	#
295019 Partial or Complete Loss of Inst. Air / 8		X					AK2.03 - Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR and the following: Reactor feedwater	3.2	1
295021 Loss of Shutdown Cooling / 4				X			AA1.02 - Ability to operate and/or monitor the following as they apply to LOSS OF SHUTDOWN COOLING: RHR/Shutdown Cooling	3.5	1
295021 Loss of Shutdown Cooling / 4						X	2.4.35 – Knowledge of local operator auxiliary operator tasks during emergency operations including system geography and system implications.	3.3	1
295023 Refueling Accident / 8				X			AA1.05 - Ability to operate and/or monitor the following as they apply to REFUELING ACCIDENTS: Fuel transfer system	2.8	1
295024 High Drywell Pressure / 5			X				EK3.06 - Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE: Reactor Scram	4.0	1
295025 High Reactor Pressure / 3					X		EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE: Reactor power	4.2	1
295026 Suppression Pool High Water Temperature / 5			X				EK3.04 - Knowledge of the reasons for the following responses as they apply to HIGH SUPPRESSION POOL WATER TEMPERATURE: SLC injection	3.7	1
295027 High Containment Temperature / 5							N/A MARK III CONTAINMENT ONLY		
295028 High Drywell Temperature / 5						X	2.4.13 – Knowledge of crew roles and responsibilities during EOP flowchart use	3.3	1

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E / APE # - NAME / SAFETY FUNCTION	K1	K2	K3	A1	A2	G	K/A TOPICS	IMP	#
295030 Low Suppression Pool Water Level / 5				X			EA1.06 - Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: Condensate storage and transfer (make up to the suppression pool)	3.4	1
295031 Reactor Low Water Level / 2			X				EK3.03 - Knowledge of the reasons for the following responses as they apply to REACTOR LOW WATER LEVEL: Spray cooling	4.1	1
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1	X						EK1.03 – Knowledge of the operational implications of the following concepts as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Boron affects of reactor power	4.2	1
295038 High Off-site Release Rate / 9			X				EK3.02 - - Knowledge of the reasons for the following responses as they apply to HIGH OFF SITE RELEASE RATE: System isolations	3.9	1
600000 Plant Fire On Site / 8					X		AA2.03 - Ability to determine and/or interpret the following as they apply to PLANT FIRE ON SITE: Damper position	2.8	1
Category Point Totals:	1	3	5	5	3	3	Group Point Totals: 20/7		20

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## EMERGENCY &amp; ABNORMAL PLANT EVOLUTIONS - TIER 1 GROUP II

## BWR - RO

E / APE # - NAME / SAFETY FUNCTION	K1	K2	K3	A1	A2	G	K/A TOPICS	IMP	#
295002 Loss of Main Condenser Vacuum / 3									
295007 High Reactor Pressure / 3			X				AK3.06 – Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE: Reactor/turbine pressure regulating system	3.7	1
295008 High Reactor Water Level / 2									
295009 Low Reactor Water Level / 2					X		AA2.01 – Ability to determine and/or interpret the following as they apply to LOW REACTOR WATER LEVEL: Reactor water level	4.2	1
295010 High Drywell Pressure / 5									
295011 High Containment Temperature / 5							N/A MARK III CONTAINMENT ONLY		
295012 High Drywell Temperature / 5		X					AK2.02 – Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following: Drywell cooling	3.6	1
295013 High Suppression Pool Temperature / 5									
295014 Inadvertent Reactivity Addition / 1				X			AA1.02 – Ability to operate and or monitor the following as they apply to INADVERTENT REACTIVITY ADDITION: Recirculation Flow Control	3.6	1
295015 Incomplete SCRAM / 1									

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E / APE # - NAME / SAFETY FUNCTION	K1	K2	K3	A1	A2	G	K/A TOPICS	IMP	#
295017 High Off-site Release Rate / 9									
295020 Inadvertent Containment Isolation / 5 & 7									
295022 Loss of CRD Pumps / 1									
295029 High Suppression Pool Water Level / 5									
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9	X						EK1.02 – Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION: Personnel protection	3.8	1
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5					X		EA2.01 - Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL: Operability of components within the affected area	3.0	1
500000 High Containment Hydrogen Concentration / 5				X			EA1.06 - Ability to operate and or monitor the following as they apply to HIGH CONTAINMENT HYDROGEN CONTROL: Drywell sprays	3.3	1
Category Point Totals:	1	1	1	2	2	0	Group Point Totals: 7/3		7

**BWR RO/SRO EXAM OUTLINE ES-401-1**

## PLANT SYSTEMS - TIER 2 GROUP I

## BWR - RO

SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
203000 RHR/LPCI: Injection Mode							X					A1.05 – Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: INJECTION MODE controls including: Suppression pool level	3.8	1
205000 Shutdown Cooling	X											K1.01 – Knowledge of the physical connections and/or cause-effect relationships between SHUTDOWN COLLING SYSTEM and the following: Reactor pressure	3.6	1
206000 HPCI												N/A AT CGS		
207000 Iso (Emerg) Cond												N/A AT CGS		
209001 LPCS					X							K5.05 – Knowledge of the operational implications of the following as they apply to LOW PRESSURE CORE SPRAY SYSTEM: System venting	2.5	1
209001 LPCS						X						K6.11 – Knowledge of the effect that a loss or malfunction of the following will have on the LOW PRESSURE CORE SPRAY SYSTEM: ADS	3.6	1

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SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
209002 HPCS	X											K1.02 - Knowledge of the physical connections and/or cause-effect relationships between HIGH PRESSURE CORE SPRAY SYSTEM and the following: Suppression pool	3.5	1
209002 HPCS								X				A2.13 - Ability to predict the impacts of the following on the HPCS and based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: Low condensate storage tank level	3.4	1
211000 SLC						X						K6.03 - Knowledge of the effect that a loss or malfunction of the following will have on the STANDBY LIQUID CONTROL SYSTEM: AC power	3.2	1
212000 RPS										X		A4.05 – Ability to manually operate and/or monitor in the control room: Reactor power	4.3	1
215003 IRM									X			A3.02 – Ability to monitor automatic operations of the IRM SYSTEM including: Annunciation and alarm signals	3.3	1

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SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
215004 SRM							X					A1.06 - Ability to predict and/or monitor changes in parameters associated with operating the SRM controls including: Lights and alarms	3.1	1
215005 APRM/LPRM		X										K2.02 – Knowledge of the electrical power supplies to the following: APRM channels	2.6	1
217000 RCIC	X											K1.05 - Knowledge of the physical connections and/or cause-effect relationships between RCIC SYSTEM and the following: RHR system	2.6	1
218000 ADS					X							K5.01 - Knowledge of the operational implications of the following as they apply to ADS SYSTEM: ADS logic operation	3.8	1
218000 ADS							X					A1.04 - Ability to predict and/or monitor changes in parameters associated with operating the ADS controls including: Reactor Pressure	4.1	1
223002 PCIS/ Nuclear Steam Supply Shutoff											X	2.4.11 – Knowledge of abnormal condition procedures	3.4	1

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SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
239002 SRVs				X								K4.09 – Knowledge of RELIEF/SAFETY VALVES design features and/or interlocks which provide for the following: Manual opening of the SRV	3.7	1
239002 SRVs						X						K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the RELIEF/SAFETY VALVES: NBI pressure indication	3.2	1
259002 Reactor Water Level Control											X	2.2.27 – Knowledge of the refueling process	2.6	1
261000 SGTS											X	2.1.24 – Ability to obtain and interpret station electrical and mechanical drawings	2.8	1
262001 AC Elec Dist			X									K3.04 – Knowledge of the effect that a loss or malfunction of the AC ELECTRICAL DISTRIBUTION will have on the following: UPS	3.1	1

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SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
262001 AC Elec Dist								X				A2.01 – Ability to predict the impacts of the following on the AC ELECTRICAL DISTRIBUTION and based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: Turbine/generator trip	3.4	1
262002 UPS (AC/DC)								X				A2.02 - Ability to predict the impacts of the following on the UPS and based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: Overvoltage	2.5	1
263000 DC Elec Dist										X		A4.01 - Ability to manually operate and/or monitor in the control room: Major breakers and control power fuses	3.3	1
264000 EDGs	X											K1.02 - Knowledge of the physical connections and/or cause-effect relationships between EMERGENCY DGS and the following: DC electrical distribution	2.9	1

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SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
300000 Instrument Air								X				A2.01 - Ability to predict the impacts of the following on the INSTRUMENT AIR SYSTEM and based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: Air dryer and filter malfunctions	2.9	1
400000 Component Cooling Water							X					A1.01 - Ability to predict and/or monitor changes in parameters associated with operating the CCWS controls including: CCW flow rate	2.8	1
Category Point Totals:	4	1	1	1	2	3	4	4	1	2	3	Group Point Total: 26/5		26

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## PLANT SYSTEMS - TIER 2 GROUP II

## BWR - RO

SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
201001 CRD Hydraulic						X						K6.06 - Knowledge of the effect that a loss or malfunction of the following will have on the CRDH SYSTEM: CCW system:	2.8	1
201002 RMCS	X											K1.05 - Knowledge of the physical connections and/or cause-effect relationships between RMCS and the following: RWM	3.4	1
201003 CRD Mechanism														
201004 RSCS														
201005 RCIS												N/A AT CGS		
201006 RWM														
202001 Recirculation									X			A3.02 - Ability to monitor automatic operations of the RECIRCULATION SYSTEM including: Pump start sequence	3.1	1
202002 Recirc Flow Control														
204000 RWCU				X								K4.06 - Knowledge of RWCU design features and/or interlocks which provide for the following: Maximize plant efficiency	2.6	1

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SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
214000 RPIS														
215001 TIP														
215002 RBM														
216000 Nuclear Boiler Inst														
219000 RHR/LPCI: Pool Cooling Mode														
223001 Pri Containment and Aux			X									K3.04 - Knowledge of the effect that a loss or malfunction of the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES will have on the following: Drywell hydrogen gas concentration	3.3	1
226001 RHR/LPCI: CTMT Spray Mode									X			A3.03 - Ability to monitor automatic operations of the RHR CONTAINMENT SPRAY SYSTEM MODE including: System flow	2.8	1
230000 RHR/LPCI: Pool Spray Mode		X										K2.02 - Knowledge of the electrical power supplies to the following: Pumps	2.8	1

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SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
233000 FPC										X		A4.05 - Ability to manually operate and/or monitor in the control room: Pool temperature	2.5	1
234000 Fuel Handling Eq.				X								K4.02 - Knowledge of FUEL HANDLING EQUIPMENT design features and/or interlocks which provide for the following: Prevention of control rod movement during core alterations	3.3	1
239001 Main & Reheat Stm														
239003 MSLC														
241000 Reactor/Turbine Pressure Regulator														
245000 Main Turbine Generator/Aux														
256000 Reactor Condensate														
259001 Reactor Feedwater	X											K1.08 - Knowledge of the physical and/or cause-effect relationship between REACTOR FEEDWATER SYSTEM and the following: Reactor water level control	3.6	1
268000 Radwaste														
271000 Offgas														
272000 Radiation Monitoring														

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SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
286000 Fire Protection								X				A2.11 - Ability to predict the impacts of the following on the FIRE PROTECTION SYSTEM and based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: Pump trips	3.1	1
288000 Plant Ventilation														
290001 Secondary Containment				X								K4.02 - Knowledge of SECONDARY CONTAINMENT design features and/or interlocks which provide for the following: Protection against over pressurization	2.8	1
290002 Reactor Vessel Int														
290003 Control Room HVAC														
Category Point Totals:	2	1	1	3	0	1	0	1	2	1	0	Group Point Total: 12/3		12

**BWR RO/SRO EXAM OUTLINE ES-401-3 (Tier 3)****PLANT-WIDE GENERIC RESPONSIBILITIES TIER 3**

## BWR - RO

Category	K/A	TOPICS	RO		SRO	
			IMP	#	IMP	#
1. Conduct  of Operations	2.1.24	Ability to obtain and interpret station electrical and mechanical drawings.	2.8	1		
	2.1.32	Ability to explain and apply system limits and precautions	3.4	1		
	2.1.1	Knowledge of Conduct of Operations Requirements	3.7	1		
	2.1.30	Ability to locate and operate components / including local controls	3.9	1		
	Subtotal			4		

Category	K/A	TOPICS	RO		SRO	
			IMP	#	IMP	#
2.  Equipment  Control	2.2.30	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area / communications with fuel storage facility / system operated from the control room in support of fueling operations/ and supporting instrumentation	3.5	1		
	2.2.22	Knowledge of limiting conditions for operations and safety limits	3.4	1		
	Subtotal			2		

**BWR RO/SRO EXAM OUTLINE ES-401-3 (Tier 3)****PLANT-WIDE GENERIC RESPONSIBILITIES TIER 3**

## BWR - RO

Category	K/A	TOPICS	RO		SRO	
			IMP	#	IMP	#
3.  Radiation  Control	2.3.11	Ability to control radiation release	2.7	1		
	2.3.2	Knowledge of facility ALARA Program	2.5	1		
	Subtotal			2		

Category	K/A	TOPICS	RO		SRO	
			IMP	#	IMP	#
4.  Emergency Procedures Plan	2.4.32	Knowledge of operator response to loss of all annunciators	3.3	1		
	2.4.48	Ability to interpret control room indications to verify the status and operation of system / and understand how operator actions and directives affect plant and system conditions.	3.5	1		
	Subtotal			2		
Group point totals: 10/7				10		

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## EMERGENCY &amp; ABNORMAL PLANT EVOLUTIONS - TIER 1 GROUP I

## BWR - SRO

E / APE # - NAME / SAFETY FUNCTION	K1	K2	K3	A1	A2	G	K/A TOPICS	IMP	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4									
295003 Partial or Complete Loss of AC / 6									
295004 Partial or Total Loss of DC PWR / 6									
295005 Main Turbine Generator Trip / 3									
295006 SCRAM / 1									
295016 Control Room Abandonment / 7					X		AA2.01 – Ability to determine and/or interpret the following as they apply to Control Room Abandonment: Reactor Power 55.43.5	4.2	1
295018 Partial or Complete Loss of CCW / 8						X	2.1.12 – Ability to apply technical specifications for a system. 55.43.2	4.0	1
295019 Partial or Complete Loss of Inst. Air / 8									
295021 Loss of Shutdown Cooling / 4									
295023 Refueling Accident / 8						X	2.4.1 – Knowledge of EOP entry conditions and immediate action steps 55.43.5	4.6	1
295024 High Drywell Pressure / 5									

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E / APE # - NAME / SAFETY FUNCTION	K1	K2	K3	A1	A2	G	K/A TOPICS	IMP	#
295025 High Reactor Pressure / 3									
295026 Suppression Pool High Water Temperature / 5						X	2.4.16 – Knowledge of EOP implementation hierarchy and coordination with other support procedures 55.43.5	4.0	1
295027 High Containment Temperature / 5							N/A MARK III CONTAINMENT ONLY		
295028 High Drywell Temperature / 5									
295030 Low Suppression Pool Water Level / 5						X	2.4.21 – Knowledge of the parameters and logic used to assess the status of safety functions including: 4. Containment conditions 55.43.5	4.3	1
295031 Reactor Low Water Level / 2						X	2.4.38 – Ability to take actions called for in the facility emergency plan / including supporting or acting as emergency director 55.43.5	4.0	1
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1									
295038 High Off-site Release Rate / 9					X		EA2.04 - Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Source of off-site release 55.43.5	4.5	1
600000 Plant Fire On Site / 8									
Category Point Totals:					2	5	Group Point Totals: 20/7		7

**BWR RO/SRO EXAM OUTLINE ES-401-1**

## EMERGENCY &amp; ABNORMAL PLANT EVOLUTIONS - TIER 1 GROUP II

## BWR - SRO

E / APE # - NAME / SAFETY FUNCTION	K1	K2	K3	A1	A2	G	K/A TOPICS	IMP	#
295002 Loss of Main Condenser Vacuum / 3									
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2									
295009 Low Reactor Water Level / 2						X	2.1.14 – Knowledge of system status criteria which require the notification of plant personnel 55.43.5	3.3	1
295010 High Drywell Pressure / 5									
295011 High Containment Temperature / 5							N/A MARK III CONTAINMENT ONLY		
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temperature / 5									
295014 Inadvertent Reactivity Addition / 1									
295015 Incomplete SCRAM / 1					X		AA2.01 - Ability to determine and/or interpret the following as they apply to INCOMPLETE SCRAM: Reactor power 55.43.5	4.3	1
295017 High Off-site Release Rate / 9									
295020 Inadvertent Containment Isolation / 5 & 7									
295022 Loss of CRD Pumps / 1									

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E / APE # - NAME / SAFETY FUNCTION	K1	K2	K3	A1	A2	G	K/A TOPICS	IMP	#
295029 High Suppression Pool Water Level / 5									
295032 High Secondary Containment Area Temperature / 5					x		EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Equipment Operability 55.43.57	3.5	1
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5									
500000 High Containment Hydrogen Concentration / 5									
Category Point Totals:					2	1	Group Point Totals: 7/3		3

**BWR RO/SRO EXAM OUTLINE ES-401-1**

## PLANT SYSTEMS - TIER 2 GROUP I

## BWR - SRO

SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
203000 RHR/LPCI: Injection Mode														
205000 Shutdown Cooling														
206000 HPCI												N/A AT CGS		
207000 Iso (Emerg) Cond												N/A AT CGS		
209001 LPCS											X	2.2.24 – Ability to analyze the affect of maintenance activities on LCO status 55.43.2	3.8	1
209002 HPCS														
211000 SLC														
212000 RPS														
215003 IRM														
215004 SRM								X				A2.04 – Ability to predict the impacts of the following on the SRM System; and based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Upscale and downscale trips 55.43.5	3.7	1
215005 APRM/LPRM														

## BWR RO/SRO EXAM OUTLINE ES-401-1

SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
217000 RCIC														
218000 ADS														
223002 PCIS/ Nuclear Steam Supply Shutoff														
239002 SRVs											X	2.2.21 – Knowledge of pre and post maintenance operability requirements 55.43.2	3.5	1
259002 Reactor Water Level Control														
261000 SGTS														
262001 AC Elec Dist											X	2.2.8 – Knowledge of the process for determining if the proposed change /test/or experiment involves an unreviewed safety question 55.43.3	3.3	1
262002 UPS (AC/DC)														
263000 DC Elec Dist														
264000 EDGs											X	2.1.33 – Ability to recognize indications for system operating parameters, which are entry-level conditions for technical specifications. 55.43.2	4.0	1

**BWR RO/SRO EXAM OUTLINE ES-401-1**

SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
300000 Instrument Air														
400000 Component Cooling Water														
Category Point Totals:								1			4	Group Point Total: 26/5		5

**BWR RO/SRO EXAM OUTLINE ES-401-1**

## PLANT SYSTEMS - TIER 2 GROUP II

## BWR - SRO

SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
201001 CRD Hydraulic														
201002 RMCS														
201003 CRD Mechanism														
201004 RSCS														
201005 RCIS												N/A AT CGS		
201006 RWM														
202001 Recirculation														
202002 Recirc Flow Control														
204000 RWCU														
214000 RPIS														
215001 TIP														
215002 RBM											X	2.1.12 Ability to apply technical specifications for a system. 55.43.2	4.0	1
216000 Nuclear Boiler Inst														
219000 RHR/LPCI: Pool Cooling Mode														
223001 Pri Containment and Aux														

## BWR RO/SRO EXAM OUTLINE ES-401-1

SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
226001 RHR/LPCI: CTMT Spray Mode														
230000 RHR/LPCI: Pool Spray Mode														
233000 FPC														
234000 Fuel Handling Eq.														
239001 Main and Reheat Steam														
239003 MSLC														
241000 Reactor/Turbine Pressure Regulator														
245000 Main Turbine Generator/Aux														
256000 Reactor Condensate														
259001 Reactor Feedwater														
268000 Radwaste														
271000 Offgas								X				A2.08 - Ability to predict the impacts of the following on the OFF GAS System; and based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: AC Dist failures 55.43.5	2.7	1

**BWR RO/SRO EXAM OUTLINE ES-401-1**

SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	#
272000 Radiation Monitoring														
286000 Fire Protection														
288000 Plant Ventilation														
290001 Secondary Containment														
290002 Reactor Vessel Int								X				2.1.7 – Ability to evaluate plant performance and make operational judgments based on operation characteristics / reactor behavior / and instrument interpretation 55.43.5	4.4	1
290003 Control Room HVAC														
Category Point Totals:								2			1	Group Point Total: 12/3		3

**BWR RO/SRO EXAM OUTLINE ES-401-3 (Tier 3)****PLANT-WIDE GENERIC RESPONSIBILITIES TIER 3**

## BWR - SRO

Category	K/A	TOPICS	RO		SRO	
			IMP	#	IMP	#
1. Conduct  of Operations	2.1.10	2.1.10 – Knowledge of conditions and limitations in the facility license 55.43.5			3.9	1
	Subtotal					1

Category	K/A	TOPICS	RO		SRO	
			IMP	#	IMP	#
2.  Equipment  Control	2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits 55.43.2			3.7	1
	2.2.26	Knowledge of refuel administrative requirements 55.43.5			3.7	1
	Subtotal					2

**BWR RO/SRO EXAM OUTLINE ES-401-3 (Tier 3)****PLANT-WIDE GENERIC RESPONSIBILITIES TIER 3**

## BWR - SRO

Category	K/A	TOPICS	RO		SRO	
			IMP	#	IMP	#
3.  Radiation  Control	2.3.3	Knowledge of SRO responsibilities for auxiliary system that are outside the control room (e.g. / waste disposal and handling systems) 55.43.4			2.9	1
	2.3.9	Knowledge of the process for performing a containment purge 55.43.4			3.4	1
	Subtotal					2

Category	K/A	TOPICS	RO		SRO	
			IMP	#	IMP	#
4. Emergency Procedures Plan	2.4.7	Knowledge of how the event based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs 55.43.5			3.8	1
	2.4.27	Knowledge of fire in the plant procedure 55.43.5			3.5	1
	Subtotal					2
Group point totals: 10/7						7

SRO K/A Rejections

Tier / Group	Randomly Selected K/A	Reason for Rejection
T1, GP 1	295028 2.3.7	Generic K/A is not a 55.43 K/A.
	295025EA2.02	No significant question could be developed.
	295025EA2.05	Un secure email sent – question replaced.
T2, GP 1	209001 2.2.3	Generic K/A does not make sense with the system K/A.
	239002 2.1.22	Generic K/A does not make sense with the system K/A.
	239002 2.4.4	Generic K/A is not 55.43 related.
	239002 2.1.9	Generic K/A is not 55.43 related.
	262001 2.4.12	Generic K/A is not 55.43 related.
	262001 2.2.1	Generic K/A is not 55.43 related.
	295031 2.4.17	Generic K/A is not 55.43 related.
	264000 2.2.3	Generic K/A does not make sense with the system K/A.
T2, GP2	290002 2.3.9	Generic K/A does not make sense with the system K/A.
	290002 2.1.2	Generic K/A is not 55.43 related.
T3	2.4.20	Generic K/A is not 55.43 related.
	2.1.31	Generic K/A is not 55.43 related.
	2.1.2	Generic K/A is not 55.43 related.

RO K/A Rejections

Tier / Group	Randomly Selected K/A	Reason for Rejection
T1, GP2	2950014AA1.01	Original question similar to Q#4 on SRO exam. No significantly different question could be developed.
T2, GP1	261000 2.1.4	Generic K/A does not make sense with the system K/A.
	215005A2.06	Skyscraper model was not correct when completed. This K/A was randomly selected and deleted for balance of the outline. The replacement K/A was then randomly selected.
T2, GP2	233000K2.02	Tested same knowledge as 230000K2.02 which had already been selected.
	219000K3.01	No significant question could be developed.
	216000K5.09	Un secure email sent – question replaced.