

Facility: River Bend Station RO Exam														Date of Exam: 2-8-2021					
Tier	Group	RO K/A Category Points												SRO-Only Points					
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2	G*	Total			
1. Emergency and Abnormal Plant Evolutions	1	3	4	4	N/A			3	3	N/A			3	20			7		
	2	2	1	1	N/A			1	1	N/A			1	7			3		
	Tier Totals	5	5	5	N/A			4	4	N/A			4	27			10		
2. Plant Systems	1	3	2	3	2	2	2	2	3	2	2	3	26				5		
	2	1	1	1	1	1	1	1	1	2	1	1	12				3		
	Tier Totals	4	3	4	3	3	3	3	4	4	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: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points, and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the outline. Systems or evolutions that do not apply at the facility should be deleted with justification. Operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible. Sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' 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 a category other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2. (Note 1 does not apply.) Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

G* Generic K/As

- * These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.
- ** These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO)						Form ES-401-1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
295001 (APE 1) Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4		X					Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION and the following: (CFR: 41.7 / 45.8) AK2.06 Reactor Power	3.8	39
295003 (APE 3) Partial or Complete Loss of AC Power / 6					X		Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : (CFR: 41.10 / 43.5 / 45.13) AA2.01 Cause of partial or complete loss of A.C. power	3.4	40
295004 (APE 4) Partial or Total Loss of DC Power / 6	X						Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER : (CFR: 41.8 to 41.10) AK1.05 Loss of breaker protection	3.3	41
295005 (APE 5) Main Turbine Generator Trip / 3						X	G2.40 Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)	3.4	42
295006 (APE 6) Scram / 1			X				Knowledge of the reasons for the following responses as they apply to SCRAM: (CFR: 41.5 / 45.6) AK3.02 Reactor power response	4.1	43
295016 (APE 16) Control Room Abandonment / 7						X	G2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc. (CFR: 41.7 / 43.5 / 45.12)	4.0	44
295018 (APE 18) Partial or Complete Loss of CCW / 8				X			Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: (CFR: 41.7 / 45.6) AA1.02 System loads	3.3	45
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8		X					Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR and the following: (CFR: 41.7 / 45.8) AK2.05 Main Steam System	3.4	46
295021 (APE 21) Loss of Shutdown Cooling / 4				X			Ability to operate and/or monitor the following as they apply to LOSS OF SHUTDOWN COOLING: (CFR: 41.7 / 45.6) AA1.06 Containment/ drywell temperature	2.8	47

295023 (APE 23) Refueling Accidents / 8				X	<p>Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS:</p> <p>(CFR: 41.10 / 43.5 / 45.13)</p> <p>AA2.01 Area radiation levels</p>	3.6	48
295024 High Drywell Pressure / 5	X				<p>Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following:</p> <p>(CFR: 41.7 / 45.8)</p> <p>EK2.17 Auxiliary building isolation logic: Plant-Specific</p>	3.0	49
295025 (EPE 2) High Reactor Pressure / 3		X			<p>Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE:</p> <p>(CFR: 41.5 / 45.6)</p> <p>EK3.09 Low-low set initiation</p>	3.9	50
295026 (EPE 3) Suppression Pool High Water Temperature / 5	X				<p>Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE:</p> <p>(CFR: 41.8 to 41.10)</p> <p>EK1.02 Steam condensation</p>	3.5	51
295027 (EPE 4) High Containment Temperature (Mark III Containment Only) / 5			X		<p>Ability to operate and/or monitor the following as they apply to HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) :</p> <p>(CFR: 41.7 / 45.6)</p> <p>EA1.03 Emergency Depressurization Mark III</p>	3.5	52
295028 (EPE 5) High Drywell Temperature (Mark I and Mark II only) / 5							
295030 (EPE 7) Low Suppression Pool Water Level / 5	X				<p>Knowledge of the interrelations between LOW SUPPRESSION POOL WATER LEVEL and the following:</p> <p>(CFR: 41.7 / 45.8)</p> <p>EK2.07 Downcomer/ horizontal vent submergence</p>	3.5	53
295031 (EPE 8) Reactor Low Water Level / 2	X				<p>Knowledge of the operational implications of the following concepts as they apply to REACTOR LOW WATER LEVEL:</p> <p>(CFR: 41.8 to 41.10)</p> <p>EK1.02 Natural circulation</p>	3.8	54
295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1		X			<p>Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTO POWER ABOVE APRM DOWNSCALE OR UNKNOWN :</p> <p>(CFR: 41.5 / 45.6)</p> <p>EK3.02 SBLC injection</p>	4.3	55

295038 (EPE 15) High Offsite Radioactivity Release Rate / 9		X					Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following: (CFR: 41.7 / 45.8) EK2.01 Radwaste	3.1	56
600000 (APE 24) Plant Fire On Site / 8						X	G2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)	4.6	57
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6					X		Ability to determine and/or 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) AA2.04 VARs outside capability curve	3.6	58
K/A Category Totals:	3	4	4	3	3	3	Group Point Total:		20

295035 (EPE 12) Secondary Containment High Differential Pressure / 5	X						Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE: (CFR: 41.8 to 41.10) EK1.01 Secondary containment integrity	3.9	64
295036 (EPE 13) Secondary Containment High Sump/Area Water Level / 5									
500000 (EPE 16) High Containment Hydrogen Concentration / 5	X						Knowledge of the interrelations between HIGH CONTAINMENT HYDROGEN CONCENTRATIONS the following: (CFR: 41.7 / 45.8) EK2.04 Drywell recirculating fan	2.7	65
K/A Category Point Totals:	2	1	1	1	1	1	Group Point Total:	7	

ES-401	BWR Examination Outline Plant Systems—Tier 2/Group 1 (RO)											Form ES-401-1		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
203000 (SF2, SF4 RHR/LPCI) RHR/LPCI: Injection Mode NEW								X				Ability to (a) predict the impacts of the following on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.03 Valve closures	3.2	1
205000 (SF4 SCS) Shutdown Cooling NEW						X						Knowledge of the effect that a loss or malfunction of the following will have on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE): (CFR: 41.7 / 45.7) K6.02 D.C. electrical power	2.7	2
205000 (SF4 SCS) Shutdown Cooling NEW										X		Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.06 Reactor water level	3.8	3
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection														
207000 (SF4 IC) Isolation (Emergency) Condenser														
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray											X	G2.4.4 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	4
209002 (SF2, SF4 HPCS) High-Pressure Core Spray NEW				X								Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE CORE SPRAY SYSTEM (HPCS): (CFR: 41.5 / 45.3) K5.02 Heat removal (transfer) mechanism: BWR-5,6	2.6	5
209002 (SF2, SF4 HPCS) High-Pressure Core Spray							X					Ability to predict and/or monitor changes in parameters associated with operating the HIGH-PRESSURE CORE SPRAY SYSTEM (HPCS) controls including: (CFR: 41.5 / 45.5) A1.01 HPCS flow: BWR-5,6	3.6	6
211000 (SF1 SLCS) Standby Liquid Control						X						Knowledge of the effect that a loss or malfunction of the following will have on the STANDBY LIQUID CONTROL SYSTEM: (CFR: 41.7 / 45.7) K6.03 A.C Power	3.2	7

211000 (SF1 SLCS) Standby Liquid Control										X	G2.1.20 Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	8
212000 (SF7 RPS) Reactor Protection		X									Knowledge of the effect that a loss or malfunction of the REACTOR PROTECTION SYSTEM will have on following: (CFR: 41.7 / 45.4) K3.11 Recirculation system	3.0	9
212000 (SF7 RPS) Reactor Protection										X	Ability to monitor automatic operations of the REACTOR PROTECTION SYSTEM including: (CFR: 41.7 / 45.7) A3.06 Main turbine trip	4.2	10
215003 (SF7 IRM) Intermediate-Range Monitor	X										Knowledge of the physical connections and/or cause-effect relationships between INTERMEDIATE RANGE MONITOR (IRM) SYSTEM and the following: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.07 Reactor vessel	3.0	11
215004 (SF7 SRMS) Source-Range Monitor			X								Knowledge of SOURCE RANGE MONITOR (SRM) SYSTEM design feature(s) and/or interlocks which provide for the following: (CFR: 41.7) K4.01 Rod withdrawal blocks	3.7	12
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor										X	Ability to monitor automatic operations of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM including: (CFR: 41.7 / 45.7) A3.04 Annunciator and alarm signals	3.2	13
217000 (SF2, SF4 RCIC) Reactor Core Isolation Cooling		X									Knowledge of the effect that a loss or malfunction of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) will have on following: (CFR: 41.7 / 45.4) K3.01 Reactor water level	3.7	14
218000 (SF3 ADS) Automatic Depressurization										X	Ability to monitor automatic operations of the AUTOMATIC DEPRESSURIZATION SYSTEM including: (CFR: 41.7 / 45.7) A3.01 ADS valve operation	4.2	15

223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff							X								Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF controls including: (CFR: 41.5 / 45.5) A1.01 System indicating lights and alarms	3.5	16
239002 (SF3 SRV) Safety Relief Valves							X								Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.01 Stuck open vacuum breakers	3.0	17
259002 (SF2 RWLCS) Reactor Water Level Control	X														Knowledge of the physical connections and/or cause effect relationships between REACTOR WATER LEVEL CONTROL SYSTEM and the following: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.03 Reactor Water Level	3.8	18
261000 (SF9 SGTS) Standby Gas Treatment							X								Ability to (a) predict the impacts of the following on the STANDBY GAS TREATMENT SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.07 A.C. electrical failure	2.7	19
262001 (SF6 AC) AC Electrical Distribution				X											Knowledge of the operational implications of the following concepts as they apply to A.C. ELECTRICAL DISTRIBUTION: (CFR: 41.5 / 45.3) K5.01 Principle involved with paralleling two A.C. sources	3.1	20
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)			X												Knowledge of the effect that a loss or malfunction of the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) will have on following: (CFR: 41.7 / 45.4) K3.01 Water Level Control: Plant-Specific	3.1	21
263000 (SF6 DC) DC Electrical Distribution		X													Knowledge of electrical power supplies to the following: (CFR: 41.7) K2.01 Major D.C. loads	3.1	22

264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG	X																					Knowledge of the physical connections and/or cause effect relationships between EMERGENCY GENERATORS (DIESEL/JET) and the following: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.05 Emergency generator fuel oil supply system	3.2	23	
264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG																							G2.4.9 Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)	3.8	24
300000 (SF8 IA) Instrument Air		X																					Knowledge of electrical power supplies to the following: (CFR: 41.7) K2.01 Instrument air compressor	2.8	25
400000 (SF8 CCS) Component Cooling Water				X																			Knowledge of CCWS design feature(s) and or interlocks which provide for the following: (CFR: 41.7) K4.01 Automatic start of standby pump	3.4	26
510000 (SF4 SWS*) Service Water (Normal and Emergency)																									
K/A Category Point Totals:		3	2	3	2	2	2	2	3	2	2	3	Group Point Total:										26		

271000 (SF9 OG) Offgas	X																							Knowledge of the physical connections and/or cause effect relationships between OFFGAS SYSTEM and the following: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.04 Condensate system	2.7	37		
272000 (SF7, SF9 RMS) Radiation Monitoring																												
286000 (SF8 FPS) Fire Protection																												
288000 (SF9 PVS) Plant Ventilation																												
290001 (SF5 SC) Secondary Containment																												
290003 (SF9 CRV) Control Room Ventilation																												
290002 (SF4 RVI) Reactor Vessel Internals																									X	Ability to (a) predict the impacts of the following on the REACTOR VESSEL INTERNALS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.02 †Over pressurization transient	3.6	38
51001 (SF8 CWS*) Circulating Water																												
K/A Category Point Totals:	1	1	1	1	1	1	1	1	1	2	1	1														Group Point Total:		12

Facility: River Bend Station (RO Exam)		Date of Exam: 2/8/2021				
Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.13	Knowledge of facility requirements for controlling vital/controlled access. (CFR: 41.10 / 43.5 / 45.9 / 45.10)	2.5			66
	2.1.21	Ability to verify the controlled procedure copy. (CFR: 41.10 / 45.10 / 45.13)	3.5			67
	2.1.26	Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen). (CFR: 41.10 / 45.12)	3.4			68
	Subtotal			3		
2. Equipment Control	2.2.17	Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator. (CFR: 41.10 / 43.5 / 45.13)	2.6			69
	2.2.43	Knowledge of the process used to track inoperable alarms. (CFR: 41.10 / 43.5 / 45.13)	3.0			70
	2.2.35	Ability to determine Technical Specification Mode of Operation. (CFR: 41.7 / 41.10 / 43.2 / 45.13)	3.6			71
	Subtotal			3		
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)	3.2			72
	2.3.7	Ability to comply with radiation work permit requirements during normal or abnormal conditions. (CFR: 41.12 / 45.10)	3.5			73
	2.3.					
	Subtotal			2		
4. Emergency Procedures/Plan	2.4.3	Ability to identify post-accident instrumentation. (CFR: 41.6 / 45.4)	3.7			74
	2.4.1	Knowledge of EOP entry conditions and immediate action steps. (CFR: 41.10 / 43.5 / 45.13)	4.6			75
	2.4.					
	Subtotal			2		
Tier 3 Point Total			10	10		7

Facility: Riverbend Station (SRO Exam)														Date of Exam: 2/8/2021				
Tier	Group	RO K/A Category Points												SRO-Only Points				
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2	G*	Total		
1. Emergency and Abnormal Plant Evolutions	1												20	3	4	7		
	2				N/A					N/A			7	2	1	3		
	Tier Totals												27	5	5	10		
2. Plant Systems	1												26	3	2	5		
	2												12		1	2	3	
	Tier Totals												38	4	4	8		
3. Generic Knowledge and Abilities Categories				1	2	3	4						10	1	2	3	4	7
														2	2	1	2	

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295003 (APE 3) Partial or Complete Loss of AC Power / 6									
295004 (APE 4) Partial or Total Loss of DC Power / 6									
295005 (APE 5) Main Turbine Generator Trip / 3									
295006 (APE 6) Scram / 1									
295016 (APE 16) Control Room Abandonment / 7									
295018 (APE 18) Partial or Complete Loss of CCW / 8					X		Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: (CFR: 41.10 / 43.5 / 45.13) AA2.04 System flow	2.9	76
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8									
295021 (APE 21) Loss of Shutdown Cooling / 4									
295023 (APE 23) Refueling Accidents / 8									
295024 High Drywell Pressure / 5						X	2.1.32 Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	4.0	77
295025 (EPE 2) High Reactor Pressure / 3					X		Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE: (CFR: 41.10 / 43.5 / 45.13) EA2.05 Decay heat generation	3.6	78
295026 (EPE 3) Suppression Pool High Water Temperature / 5						X	2.2.22 Knowledge of limiting conditions for operations and safety limits. (CFR: 41.5 / 43.2 / 45.2)	4.7	79
295027 (EPE 4) High Containment Temperature (Mark III Containment Only) / 5									
295028 (EPE 5) High Drywell Temperature (Mark I and Mark II only) / 5									
295030 (EPE 7) Low Suppression Pool Water Level / 5									
295031 (EPE 8) Reactor Low Water Level / 2						X	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)	4.4	80

295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1										
295038 (EPE 15) High Offsite Radioactivity Release Rate / 9										
600000 (APE 24) Plant Fire On Site / 8					X			Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: AA2.07 Whether malfunction is due to common-mode electrical failures	3.0	81
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6						X		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	82
K/A Category Totals:					3	4		Group Point Total:		7

295036 (EPE 13) Secondary Containment High Sump/Area Water Level / 5									
500000 (EPE 16) High Containment Hydrogen Concentration / 5									
K/A Category Point Totals:					2	1	Group Point Total:		3

259002 (SF2 RWLCS) Reactor Water Level Control								X									Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.02 Loss of any number of reactor feedwater flow inputs	3.4	89	
261000 (SF9 SGTS) Standby Gas Treatment																X	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	90	
262001 (SF6 AC) AC Electrical Distribution																				
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)																				
263000 (SF6 DC) DC Electrical Distribution																				
264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG																				
300000 (SF8 IA) Instrument Air																				
400000 (SF8 CCS) Component Cooling Water																				
510000 (SF4 SWS*) Service Water (Normal and Emergency)																				
K/A Category Point Totals:																	3	2	Group Point Total:	5

ES-401	BWR Examination Outline Plant Systems—Tier 2/Group 2 (SRO)												Form ES-401-1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
201001 (SF1 CRDH) CRD Hydraulic														
201002 (SF1 RMCS) Reactor Manual Control														
201003 (SF1 CRDM) Control Rod and Drive Mechanism														
201004 (SF7 RSCS) Rod Sequence Control														
201005 (SF1, SF7 RCIS) Rod Control and Information											X	2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. (CFR: 41.10 / 43.2 / 45.13)	4.2	91
201006 (SF7 RWMS) Rod Worth Minimizer														
202001 (SF1, SF4 RS) Recirculation														
202002 (SF1 RSCTL) Recirculation Flow Control														
204000 (SF2 RWCU) Reactor Water Cleanup														
214000 (SF7 RPIS) Rod Position Information														
215001 (SF7 TIP) Traversing In-Core Probe														
215002 (SF7 RBMS) Rod Block Monitor														
216000 (SF7 NBI) Nuclear Boiler Instrumentation														
219000 (SF5 RHR SPC) RHR/LPCI: Torus/Suppression Pool Cooling Mode														
223001 (SF5 PCS) Primary Containment and Auxiliaries														
226001 (SF5 RHR CSS) RHR/LPCI: Containment Spray Mode														
230000 (SF5 RHR SPS) RHR/LPCI: Torus/Suppression Pool Spray Mode														
233000 (SF9 FPCCU) Fuel Pool Cooling/Cleanup														
234000 (SF8 FH) Fuel-Handling Equipment														
239001 (SF3, SF4 MRSS) Main and Reheat Steam														
239003 (SF9 MSV LCS) Main Steam Isolation Valve Leakage Control														
241000 (SF3 RTPRS) Reactor/Turbine Pressure Regulating														
245000 (SF4 MTGEN) Main Turbine Generator/Auxiliary														
256000 (SF2 CDS) Condensate														
259001 (SF2 FWS) Feedwater														
268000 (SF9 RW) Radwaste														
271000 (SF9 OG) Offgas														
272000 (SF7, SF9 RMS) Radiation Monitoring											X	2.4.35 Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)	4.9	92

286000 (SF8 FPS) Fire Protection										X								Ability to (a) predict the impacts of the following on the FIRE PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.01 †System logic failure: Plant-Specific	2.9	93
288000 (SF9 PVS) Plant Ventilation																				
290001 (SF5 SC) Secondary Containment																				
290003 (SF9 CRV) Control Room Ventilation																				
290002 (SF4 RVI) Reactor Vessel Internals																				
51001 (SF8 CWS*) Circulating Water																				
K/A Category Point Totals:										1							2	Group Point Total:		3

Facility: River Bend Station (SRO Exam)		Date of Exam: 2/8/2021				
Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.15	Knowledge of administrative requirements for temporary management directives, such as standing orders, night orders, operations memos, etc. (CFR: 41.10 / 45.12)			3.4	94
	2.1.3	Knowledge of shift or short-term relief turnover practices. (CFR: 41.10 / 45.13)			3.9	95
	2.1.					
	Subtotal					
2. Equipment Control	2.2.11	Knowledge of the process for controlling temporary design changes. (CFR: 41.10 / 43.3 / 45.13)			3.3	96
	2.2.37	2.2.37 Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)			4.6	97
	2.2.					
	Subtotal					
3. Radiation Control	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 43.4 / 45.9)			3.1	98
	2.3.					
	2.3.					
	Subtotal					
4. Emergency Procedures/Plan	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. (CFR: 41.10 / 43.5 / 45.11)			4.1	99
	2.4.40	Knowledge of SRO responsibilities in emergency plan implementation. (CFR: 41.10 / 43.5 / 45.11)			4.5	100
	2.4.					
	Subtotal					
Tier 3 Point Total					7	7

Tier / Group	Randomly Selected K/A	Reason for Rejection
SRO 1/1	295026 2.1.31	Chief examiner randomly selected new K/A due to ability to write an SRO only question. New randomly selected K/A 2.2.22
SRO 1/1	600000 AA2.09	Chief examiner randomly selected a new K/A due to ability to write an SRO only question. New randomly selected K/A AA2.07
SRO 2/1	259002 2.2.44	Chief examiner randomly selected a new K/A due to ability to write an SRO only question. New randomly selected K/A 2.2.25
SRO Generic	2.1.18	Chief examiner randomly selected a new K/A due to ability to write an SRO only question. New randomly selected K/A 2.1.15
SRO Generic	2.2.41	Chief examiner randomly selected a new K/A due to ability to write an SRO only question. New randomly selected K/A 2.2.37
RO Generic	2.2.25	Chief examiner randomly selected a new K/A due to overlap with the SRO written exam. New randomly selected K/A 2.2.43
Rev 1		
RO 1/1	295030 EK3.02	EK3.02 is not applicable to RBS. Chief randomly selected New K/A to be 295030 EK 2.07 Downcomer/ horizontal vent submergence
RO 2/1	211000 K6.05	K6.05 is not applicable to RBS. Chief randomly selected 211000 K6.03 A.C. Power
RO 2/1	239002 A2.10	A2.10 words on ES-401-1 do not match NUREG-1123. Cut and paste error Chief randomly selected 239002 A2.01 Stuck open Vacuum Breakers
RO 2/1	259002 K1.11	K1.11 words on ES-401-1 do not match NUREG-1123. Cut and paste error corrected to the correct wording. No change in K/A
RO 2/1	Missing K/A	Chief Randomly selected 205000 (SF4 SCS) Shutdown Cooling, A4.06 Reactor Water Level
SRO 2/1	261000 A2.15	A2.15 is not applicable to RBS. Chief randomly selected 261000 A2.12 High fuel pool ventilation radiation: Plant-Specific
SRO 2/2	268000 A2.02	Request new K/A due to ability to write an SRO only question. Chief Examiner randomly selected 286000 A2.01 †System logic failure: Plant-Specific
Rev 2		
SRO 2/1	261000 A2.12	A2.12 is not applicable to RBS. There is no direct tie between fuel pool ventilation and standby gas. Chief Examiner replaced the A2.12 K/A with Generic 2.2.25 for the same topic.

3/10/2020

Rev 3

SRO 2/1	259002 2.2.25	Request new KA due to not having any reactor water level control system ties to RBS tech specs. Chief Examiner replaced the Generic 2.2.25 K/A with A2.02 of the same topic.
Rev 3		
RO 1/1	295001 AK2.05	Request new K/A due to LPCI logic interrelationship is N/A to RBS. Chief Examiner replaced AK2.05 with AK2.06 of the same topic .
RO 1/1	295019 AK2.11	Request new K/A due to difficulty of writing question on specific interrelationship. Chief Examiner replaced AK2.11 with AK2.05 of the same topic
RO 1/1	295027 EA1.01	Request new K/A due to containment spray topic is N/A to RBS. Chief Examiner replaced Request EA1.01 with EA1.03 of the same topic.
RO 2/1	259002 K1.11	Request new K/A due to drywell pressure: FWCI/HPCI topic is N/A to RBS. Chief Examiner replaced Request K1.11 with K1.03 of the same topic.
RO 2/1	262002 K3.03	Request new K/A due to RFPT topic is N/A to RBS. Chief Examiner replaced Request K3.03 with K3.01 of the same topic.

Facility: <u> RBS </u>	Date of Examination: <u> 2/8/2021 </u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>	Operating Test Number: <u> 2021-02 </u>

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,N	DETERMINE THE PLANTS LOCATION ON THE POWER TO FLOW MAP K/A G2.1.7
Conduct of Operations	R,N	DETERMINE RPV DRAIN TIME K/A G2.1.25
Equipment Control	R,N	USING AN RPS PRINT, DETERMINE THE EFFECT OF THE PULLING TWO FUSES ON THE SYSTEM AND LIGHTS. K/A 2.2.15
Radiation Control	R,N	RHR VENTING RAD EXPOSURE K/A 2.3.4
Emergency Plan	N/A	

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

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

Facility: <u> RBS </u>	Date of Examination: <u> 2/8/2021 </u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>	Operating Test Number: <u> 2021-02 </u>

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,N	DETERMINE THE PLANTS LOCATION ON THE POWER TO FLOW MAP K/A G2.1.7
Conduct of Operations	R,N	DETERMINE RPV DRAIN TIME K/A G2.1.25
Equipment Control	R,N	USING AN RPS PRINT, DETERMINE THE EFFECT OF THE PULLING TWO FUSES ON THE SYSTEM AND LIGHTS K/A 2.2.15
Radiation Control	R,N	FAILED RAD MONITOR K/A 2.3.13
Emergency Plan	R,N	EMERGENCY DECLARATION K/A 2.4.40

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

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

Facility: <u> RBS </u>	Date of Examination: <u> 2/8/2021 </u>
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input checked="" type="checkbox"/>	Operating Test Number: <u> 2021-02 </u>

Control Room Systems: * 8 for **RO**, 7 for SRO-I, and 2 or 3 for **SRO-U**

System/JPM Title	Type Code*	Safety Function
a. RB-2021-02-S1 Transferring Recirc Pumps from Fast Speed to Slow Speed	N,S	1
b. RB-2021-02-S2 RCIC Slow Roll Startup	A,EN,N,S	2
c. RB-2021-02-S8 Alternating RPCCW Pumps (SRO-U)	A,E,N,S	8
d. RB-2021-02-S4 Alternate Decay Heat Removal Shutdown-Configuration 1 (SRO-U)	A,L,N,S	3
e. RB-2021-02-S5 Rod Withdrawal Limiter Functional Test	M,S	7
f. RB-2021-02-S6 Transfer NPS-SWG1A from normal to preferred source	A,L,N,S	6
g. RB-2021-02-S7 Adjusting Reactor Pressure using Pressure Regulator Set	A,N,S	4
h. RB-2021-02-S3 Start Containment Low Volume Purge (RO ONLY)	D,S	9

In-Plant Systems: * 3 for RO, 3 for SRO-I, and 3 or 2 for **SRO-U**

i. RB-2021-02-P1 Transferring BYS-INV04 from Normal Operation to Maintenance Bypass (SRO-U)	N	6
j. RB-2021-02-P2 Startup of the Hydrogen Purge System (SRO-U)	D,E,R	5
k. RB-2021-02-P3 Injection into RPV with Condensate via RHR C IAW Encl. 6 (SRO-U)	E,EN, L,N,R	2

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

* Type Codes	Criteria for R /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/≥ 1/≥ 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	

Facility: <u> River Bend Nuclear Station </u> Scenario No.: <u> 1 </u> Op-Test No.: <u> RB-2021-02 </u>			
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
Initial Conditions: 100% Power. Turnover: N/A			
Event No.	Malf. No.	Event Type †	Event Description
1	FWS001A RCS015A	I (ATC/CRS) TS (CRS) A (ALL)	Trip of Feedwater Pump A, and FCV A fails to runback. ATC should take manual control of FCV A and match Recirc loop flows. Reference/entry into AOP-6 and AOP-24. CRS enters TS 3.4.1 Condition A.
2		C(BOP/CRS) A (BOP/CRS) TS (CRS)	Aux Building exhaust fan, HVR-FN7A, will trip and the standby fan will fail to start. The BOP will have to manually start a Standby Gas train to maintain the D/P in the Aux building. EOP-3, Secondary Containment CRS enters TS 3.6.4.1 Condition A and TS 3.6.4.3 Condition A CT-1
3	CRD001A	C(BOP/CRS) A (BOP/CRS)	CRD Pump A will experience high amps and trip on overcurrent. The BOP will start the standby CRD Pump IAW SOP-2.
4	CRDM3617 (DRIFT)	C (ATC) TS (CRS) A(ALL)	Control Rod 36-21 will drift out. The ATC will provide a continuous insert signal to maintain the control rod full in. The BOP will lower drive water pressure or have the Reactor Building operator isolate the HCU IAW ARP H1-P680-07 to maintain the Control Rod full in. Reference/entry into AOP-61 CRS enters TS 3.1.3 for INOP rod and 3.1.5 for accumulator fault.
5	ED002B	M (ALL)	Loss of NPS-SWG1B. This results in a loss of ALL Feedwater Pumps. Reactor water level will lower causing a Reactor Scram. EOP-1, RPV Control AOP-1 and AOP-2
6	HPCS003 HPCS001 RCIC001	C (BOP)	HPCS Pump will fail to start due a loss of control power and RCIC will start but trip on Overspeed. The BOP must coordinate with the Reactor Building operator and reset the trip IAW OSP-53 attachment 40 to restore RPV water level. CT-2
7	MGEN003	C (ATC/CRS)	The Main Turbine Generator will not trip on reverse power. Must be tripped manually IAW AOP-2 within 20 minutes.
† (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (A)bnormal (TS) Tech Spec			
* Critical Task (As defined in NUREG 1021 Appendix D)			

CREW notation for Abnormal (A) and Major (M) events denotes ATC, BOP, and CRS are credited.

Reason for Revision:

Facility: <u> River Bend Nuclear Station </u> Scenario No.: <u> 3 </u> Op-Test No.: <u> RB-2021-02 </u>			
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
Initial Conditions: 100% Power. Turnover: N/A			
Event No.	Malf. No.	Event Type †	Event Description
1		I (BOP/CRS) TS (CRS) A (ALL)	Spurious initiation of RCIC due to failed Level trip units. The BOP will trip RCIC IAW AOP-34. CRS enters TS 3.3.5.3 and 3.5.3
2		C (BOP) TS (CRS) A(ALL)	RCIC steam leak occurs in the RCIC room. E51-MOVF064 will not close, but E51-MOVF063 fails to automatically close. The BOP will manually close the E51-MOVF063 valve. CRS enters TS 3.6.1.3. CT-1
3		C (ATC/CRS) A (ALL)	Heater drain pump B Trip. Crew will enter AOP-6, 7, & 24.
4		I (ATC/CRS) TS (CRS) A (ALL)	B21-N004A fails UPSCALE causing actual RPV to lower due the increase in Feedwater flow. The ATC should place the master controller in manual IAW AOP-6. The ATC should swap from "A" to "B" channel for RPV level signal. CRS enters TRM 3.3.7.3
5		M (ALL)	Drywell steam leak will occur. CRS will direct scrambling the Reactor when Drywell D/P reaches 0.8 psid. After the scram E22-S004 will have a bus fault and the Feedwater Pumps will trip due to loss of suction pressure.
6		C (BOP)	The MSIVs will fail to close when RPV level reaches Level 1.
7		C(ATC)	Manually open low pressure ECCS injection valves prior to entering the SAPs. CT-2
†	(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (A)bnormal (TS) Tech Spec		
*	Critical Task (As defined in NUREG 1021 Appendix D)		

CREW notation for Abnormal (A) and Major (M) events denotes ATC, BOP, and CRS are credited.

Facility: <u>River Bend Nuclear Station</u> Scenario No.: <u>4</u> Op-Test No.: <u>2021-NRC</u>			
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
Initial Conditions: 4% Power, 600 psig Turnover:			
Event No.	Malf. No.	Event Type †	Event Description
1		I (ATC/CRS) A (ALL)	IRM A fails downscale causing a rod block. ATC will bypass the IRM.
2		I (ATC/CRS) TS (CRS) A(ALL)	IRM C fails upscale a rod block/half scram. ATC will unbypass IRM A and bypass IRM C. Reset the half scram. CRS enters TS 3.3.1.1
3		C (BOP/CRS) TS (CRS) A (ALL)	MAIN STEAM LINE DIV 3 HI-HI RAD OR INOP alarms come in at the H13-P601 panel and B33-F019 will fail to isolate requiring manual action from the BOP. CRS enters TS 3.6.5.3
4		C (BOP/CRS) TS (CRS) A (ALL)	Suppression Pool leak into the crescent area via RHR A suction line. BOP must isolate the leak by closing RHR A suction valve. Restore Suppression pool level with HPCS IAW Encl.30 CRS enter 3.5.1, 3.6.2.2 and 3.6.2.3. AOP-13 EOP-2&3 CT-1
5		M (ALL)	Turbine bypass will fail closed and steam line drains will not open. RPV pressure will rise requiring a manual scram per AOP-17. EOP-1, RPV Control
6		C (ATC)	RPS will fail to actuate automatically. CT-2
7		C (BOP)	Small drywell steam leak.
† (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (A)bnormal (TS) Tech Spec			
* Critical Task (As defined in NUREG 1021 Appendix D)			

CREW notation for Abnormal (A) and Major (M) events denotes ATC, BOP, and CRS are credited.

Reason for Revision: