Form 4.1-BWR Boiling-Water Reactor Examination Outline

Facility: Quad Cities	**K/A Catalog Rev. 3**	**Rev.** 01/06/2023	**Date of Exam:** 05/27/2024

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	3	4				4	3			3	20	4		3		7
	2	1	1	1				1	1			1	6	2		1		3
	Tier Totals	4	4	5				5	4			4	26	6		4		10
2. Plant Systems	1	2	3	3	2	2	2	3	2	3	2	2	26	3		2		5
	2	1	1	1	1	1	1	1	1	1	1	1	11	0	1	2		3
	Tier Totals	3	4	4	3	3	3	4	3	4	3	3	37	4		4		8

3. Generic Knowledge and Abilities Categories	CO	EC	RC	EM		CO	EC	RC	EM	
	2	2	1	1	6	2	2	1	2	7

4. Theory	Reactor Theory	Thermodynamics		
	3	3	6	

Notes: CO = Conduct of Operations; EC = Equipment Control; RC = Radiation Control;
EM = Emergency Procedures/Plan

* These systems/evolutions may be eliminated from the sample when Revision 2 of the K/A catalog is used to develop the sample plan.

** These systems/evolutions are only included as part of the sample (as applicable to the facility) when Revision 2 of the K/A catalog is used to develop the sample plan.

ES-4.1-BWR	BWR Examination Outline (Quad Cities) Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/**SRO**)									
Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
1	(295001) (APE 1) PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION	X						(295001AK1.04) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to the (APE 1) PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: (CFR: 41.5 / 41.7 / 45.7 / 45.8) Thermal-hydraulic instabilities	4.3	1
2	**(295001) (APE 1) PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION**						**X**	**(295001) (APE 1) PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION (G2.4.30) EMERGENCY PROCEDURES/PLAN 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**	**76**
3	(295003) (APE 3) PARTIAL OR COMPLETE LOSS OF AC POWER		X					(295003AK2.04) Knowledge of the relationship between the (APE 3) PARTIAL OR COMPLETE LOSS OF AC POWER and the following systems or components: (CFR: 41.8 / 41.10 / 45.3) AC electrical loads	3.8	2
4	(295004) (APE 4) PARTIAL OR COMPLETE LOSS OF DC POWER						X	(295004) (APE 4) PARTIAL OR COMPLETE LOSS OF DC POWER (G2.4.14) EMERGENCY PROCEDURES/PLAN Knowledge of general guidelines for emergency and abnormal operating procedures usage (CFR: 41.10 / 43.1 / 45.13)	3.8	3
5	**(295004) (APE 4) PARTIAL OR COMPLETE LOSS OF DC POWER**					**X**		**(295004AA2.01) Ability to determine or interpret the following as they apply to (APE 4) PARTIAL OR COMPLETE LOSS OF DC POWER: (CFR: 41.10 / 43.5 / 45.13) Partial or complete loss of DC power**	**4.1**	**77**
6	(295005) (APE 5) MAIN TURBINE GENERATOR TRIP						X	(295005) (APE 5) MAIN TURBINE GENERATOR TRIP (G2.2.15) EQUIPMENT CONTROL Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, lineups or, tagouts (reference potential) (CFR: 41.10 / 43.3 / 45.13)	3.9	4
7	**(295005) (APE 5) MAIN TURBINE GENERATOR TRIP**					**X**		**(295005AA2.04) Ability to determine or interpret the following as they apply to (APE 5) MAIN TURBINE GENERATOR TRIP: (CFR: 41.10 / 43.5 / 45.13) Reactor pressure**	**4.3**	**78**
8	(295006) (APE 6) SCRAM				X			(295006AA1.03) Ability to operate or monitor the following as they apply to (APE 6) SCRAM: (CFR: 41.5 / 41.7 / 45.5 to 45.8) Reactor/turbine pressure regulating system	4.2	5
9	(295016) (APE 16) CONTROL ROOM ABANDONMENT		X					(295016AK2.08) Knowledge of the relationship between the (APE 16) CONTROL ROOM ABANDONMENT and the following systems or components: (CFR: 41.8 / 41.10 / 45.3) Isolation condensers	3.9	6
10	(295018) (APE 18) PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER (CCW)			X				(295018AK3.07) Knowledge of the reasons for the following responses or actions as they apply to (APE 18) PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER (CCW): (CFR: 41.5 / 41.10 / 45.6 / 45.13) Cross-connecting with backup systems	3.1	7
11	(295019) (APE 19) PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR				X			(295019AA1.01) Ability to operate or monitor the following as they apply to (APE 19) PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: (CFR: 41.5 / 41.7 / 45.5 to 45.8) Backup air supply	3.4	8
12	(295021) (APE 21) LOSS OF SHUTDOWN COOLING						X	(295021) (APE 21) LOSS OF SHUTDOWN COOLING (G2.2.14) EQUIPMENT CONTROL Knowledge of the process for controlling equipment configuration or status (CFR: 41.10 / 43.3 / 45.13)	3.9	9
13	(295023) (APE 23) REFUELING ACCIDENTS					X		(295023AA2.05) Ability to determine or interpret the following as they apply to (APE 23) REFUELING ACCIDENTS: (CFR: 41.10 / 43.5 / 45.13) Emergency plan implementation	4.1	10
14	**(295023) (APE 23) REFUELING ACCIDENTS**						**X**	**(295023) (APE 23) REFUELING ACCIDENTS (G2.3.12) RADIATION CONTROL Knowledge of radiological safety principles and 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, or alignment of filters (CFR: 41.12 / 43.4 / 45.9 / 45.10)**	**3.7**	**79**

ES-4.1-BWR	BWR Examination Outline (Quad Cities)									
	Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/**SRO**)									
Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
15	(295024) (EPE 1) HIGH DRYWELL PRESSURE				X			(295024EA1.09) Ability to operate or monitor the following as they apply to (EPE 1) HIGH DRYWELL PRESSURE: (CFR: 41.5 / 41.7 / 45.5 to 45.8) Suppression pool makeup	3.1	11
16	**(295024) (EPE 1) HIGH DRYWELL PRESSURE**						**X**	**(295024) (EPE 1) HIGH DRYWELL PRESSURE (G2.2.22) EQUIPMENT CONTROL Knowledge of limiting conditions for operation and safety limits (CFR: 41.5 / 43.2 / 45.2)**	**4.7**	**80**
17	(295025) (EPE 2) HIGH REACTOR PRESSURE					X		(295025EA2.03) Ability to determine or interpret the following as they apply to (EPE 2) HIGH REACTOR PRESSURE: (CFR: 41.10 / 43.5 / 45.13) Suppression pool temperature	4	12
18	(295026) (EPE 3) SUPPRESSION POOL HIGH WATER TEMPERATURE		X					(295026EK2.04) Knowledge of the relationship between the (EPE 3) SUPPRESSION POOL HIGH WATER TEMPERATURE and the following systems or components: (CFR: 41.8 / 41.10 / 45.3) Plant process computer/parameter display systems	2.9	13
	(295027) (EPE 4) HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) / 5									
19	(295028) (EPE 5) HIGH DRYWELL TEMPERATURE (MARK I AND MARK II ONLY)			X				(295028EK3.04) Knowledge of the reasons for the following responses or actions as they apply to (EPE 5) HIGH DRYWELL TEMPERATURE (MARK I AND MARK II ONLY): (CFR: 41.5 / 41.10 / 45.6 / 45.13) Increased drywell cooling	3.6	14
20	(295030) (EPE 7) LOW SUPPRESSION POOL WATER LEVEL					X		(295030EA2.04) Ability to determine or interpret the following as they apply to (EPE 7) LOW SUPPRESSION POOL WATER LEVEL: (CFR: 41.10 / 43.5 / 45.13) Drywell/suppression chamber differential pressure (Mark I, II)	4.2	15
21	(295031) (EPE 8) REACTOR LOW WATER LEVEL				X			(295031EA1.04) Ability to operate or monitor the following as they apply to (EPE 8) REACTOR LOW WATER LEVEL: (CFR: 41.5 / 41.7 / 45.5 to 45.8) High-pressure core spray	4.3	16
22	(295037) (EPE 14) SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN			X				(295037EK3.08) Knowledge of the reasons for the following responses or actions as they apply to (EPE 14) SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: (CFR: 41.5 / 41.10 / 45.6 / 45.13) Initiation of ATWS circuitry	4.1	17
23	**(295037) (EPE 14) SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN**					**X**		**(295037EA2.05) Ability to determine or interpret the following as they apply to (EPE 14) SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: (CFR: 41.10 / 43.5 / 45.13) Control rod position**	**4.5**	**81**
24	(295038) (EPE 15) HIGH OFFSITE RADIOACTIVITY RELEASE RATE	X						(295038EK1.04) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to the (EPE 15) HIGH OFFSITE RADIOACTIVITY RELEASE RATE: (CFR: 41.5 / 41.7 / 45.7 / 45.8) Elevated vs. ground level release	3.8	18
25	(600000) (APE 24) PLANT FIRE ON SITE	X						(600000AK1.02) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to the (APE 24) PLANT FIRE ON SITE: (CFR: 41.5 / 41.7 / 45.7 / 45.8) Firefighting methods for each type of fire	3.4	19
26	**(600000) (APE 24) PLANT FIRE ON SITE**					**X**		**(600000AA2.06) Ability to determine or interpret the following as they apply to (APE 24) PLANT FIRE ON SITE: (CFR: 41.10 / 43.5 / 45.13) Need for pressurizing control room (recirculating mode)**	**3.3**	**82**
27	(700000) (APE 25) GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES			X				(700000AK3.02) Knowledge of the reasons for the following responses or actions as they apply to (APE 25) GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: (CFR: 41.5 / 41.10 / 45.6 / 45.13) Actions contained in abnormal operating procedure for voltage and grid disturbances	3.8	20
K/A Category Totals:		3	3	4	4	3/**4**	3/**3**	Group Point Total:		20 / **7**

ES-4.1-BWR	BWR Examination Outline (Quad Cities) Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/**SRO**)									
Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
28	**(295002) (APE 2) LOSS OF MAIN CONDENSER VACUUM**					**X**		**(295002AA2.04) Ability to determine or interpret the following as they apply to (APE 2) LOSS OF MAIN CONDENSER VACUUM: (CFR: 41.10 / 43.5 / 45.13) Offgas system flow**	**3.6**	**83**
	(295007) (APE 7) HIGH REACTOR PRESSURE / 3									
29	(295008) (APE 8) HIGH REACTOR WATER LEVEL			X				(295008AK3.04) Knowledge of the reasons for the following responses or actions as they apply to (APE 8) HIGH REACTOR WATER LEVEL: (CFR: 41.5 / 41.10 / 45.6 / 45.13) Reactor feedwater pump trip	3.8	21
	(295009) (APE 9) LOW REACTOR WATER LEVEL / 2									
	(295010) (APE 10) HIGH DRYWELL PRESSURE / 5									
	(295011) (APE 11) HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) / 5									
30	(295012) (APE 12) HIGH DRYWELL TEMPERATURE		X					(295012AK2.01) Knowledge of the relationship between the (APE 12) HIGH DRYWELL TEMPERATURE and the following systems or components: (CFR: 41.8 / 41.10 / 45.3) Drywell ventilation	3.7	22
31	(295013) (APE 13) HIGH SUPPRESSION POOL TEMPERATURE.				X			(295013AA1.02) Ability to operate or monitor the following as they apply to (APE 13) HIGH SUPPRESSION POOL TEMPERATURE.: (CFR: 41.5 / 41.7 / 45.5 to 45.8) Systems that add heat to the suppression pool	4.1	23
	(295014) (APE 14) INADVERTENT REACTIVITY ADDITION / 1									
	(295017) (APE 17) ABNORMAL OFFSITE RELEASE RATE / 9									
32	**(295020) (APE 20) INADVERTENT CONTAINMENT ISOLATION & 7**						**X**	**(295020) (APE 20) INADVERTENT CONTAINMENT ISOLATION & 7 (G2.2.36) EQUIPMENT CONTROL Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operation (CFR: 41.10 / 43.2 / 45.13)**	**4.2**	**84**
33	(295022) (APE 22) LOSS OF CONTROL ROD DRIVE PUMPS						X	(295022) (APE 22) LOSS OF CONTROL ROD DRIVE PUMPS (G2.4.39) EMERGENCY PROCEDURES/PLAN Knowledge of RO responsibilities in emergency plan implementing procedures (CFR: 41.10 / 45.11)	3.9	24
	(295029) (EPE 6) HIGH SUPPRESSION POOL WATER LEVEL / 5									
34	(295032) (EPE 9) HIGH SECONDARY CONTAINMENT AREA TEMPERATURE	X						(295032EK1.02) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to the (EPE 9) HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: (CFR: 41.5 / 41.7 / 45.7 / 45.8) Radiation releases	3.5	25
35	(295033) (EPE 10) HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS					X		(295033EA2.01) Ability to determine or interpret the following as they apply to (EPE 10) HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS: (CFR: 41.10 / 43.5 / 45.13) Area radiation levels	4.1	26

ES-4.1-BWR	BWR Examination Outline (Quad Cities)									
	Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/**SRO**)									
Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
	(295034) (EPE 11) SECONDARY CONTAINMENT VENTILATION HIGH RADIATION / 9									
36	**(295035) (EPE 12) SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE**					**X**		**(295035EA2.01) Ability to determine or interpret the following as they apply to (EPE 12) SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE: (CFR: 41.10 / 43.5 / 45.13) Secondary containment pressure**	**3.9**	**85**
	(295036) (EPE 13) SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL / 5									
	(500000) (EPE 16) HIGH CONTAINMENT HYDROGEN CONCENTRATION / 5									
K/A Category Totals:		1	1	1	1	1**/2**	1**/1**	Group Point Total:		6 **/ 3**

ES-4.1-BWR	BWR Examination Outline (Quad Cities) Plant Systems—Tier 2/Group 1 (RO/**SRO**)														
Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
37	(203000) (SF2, SF4 RHR/LPCI) RHR/LPCI: INJECTION MODE				X								(203000K4.11) Knowledge of (SF2, SF4 RHR/LPCI) RHR/LPCI: INJECTION MODE design features and/or interlocks that provide for the following: (CFR: 41.7) Loop selection logic	3.4	27
38	(205000) (SF4 SCS) SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE)									X			(205000A3.01) Ability to monitor automatic operation of the (SF4 SCS) SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) including: (CFR: 41.7 / 45.7) Valve operation	3.7	28
39	(206000) (SF2, SF4 HPCI) HIGH PRESSURE COOLANT INJECTION SYSTEM		X										(206000K2.02) (SF2, SF4 HPCI) HIGH PRESSURE COOLANT INJECTION SYSTEM Knowledge of electrical power supplies to the following: (CFR: 41.7) Pumps	3.2	29
	(207000) (SF4 IC) ISOLATION (EMERGENCY) CONDENSER														
	(209001) (SF2, SF4 LPCS) LOW PRESSURE CORE SPRAY SYSTEM														
	(209002) (SF2, SF4 HPCS) HIGH PRESSURE CORE SPRAY SYSTEM														
40	(211000) (SF1 SLCS) STANDBY LIQUID CONTROL SYSTEM											X	(211000) (SF1 SLCS) STANDBY LIQUID CONTROL SYSTEM (G2.2.23) EQUIPMENT CONTROL Ability to track technical specification limiting conditions for operation (CFR: 41.10 / 43.2 / 45.13)	3.1	30
41	(212000) (SF7 RPS) REACTOR PROTECTION SYSTEM							X					(212000A1.08) Ability to predict and/or monitor changes in parameters associated with operation of the (SF7 RPS) REACTOR PROTECTION SYSTEM including: (CFR: 41.5 / 45.5) Valve position	3.6	31
42	(212000) (SF7 RPS) REACTOR PROTECTION SYSTEM			X									(212000K3.02) Knowledge of the effect that a loss or malfunction of the (SF7 RPS) REACTOR PROTECTION SYSTEM will have on the following systems or system parameters: (CFR: 41.7 / 45.4) PCIS/NSSSS	3.9	32
43	(215003) (SF7 IRM) INTERMEDIATE RANGE MONITOR SYSTEM			X									(215003K3.01) Knowledge of the effect that a loss or malfunction of the (SF7 IRM) INTERMEDIATE RANGE MONITOR SYSTEM will have on the following systems or system parameters: (CFR: 41.7 / 45.4) RPS	4.2	33

ES-4.1-BWR	BWR Examination Outline (Quad Cities) Plant Systems—Tier 2/Group 1 (RO/**SRO**)														
Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
44	**(215003) (SF7 IRM) INTERMEDIATE RANGE MONITOR SYSTEM**								**X**				**(215003A2.02) Ability to (a) predict the impacts of the following on the (SF7 IRM) INTERMEDIATE RANGE MONITOR SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 45.6) IRM inoperable condition**	**3.7**	**86**
45	(215004) (SF7 SRMS) SOURCE RANGE MONITOR SYSTEM	X											(215004K1.01) Knowledge of the physical connections and/or cause and effect relationships between the (SF7 SRMS) SOURCE RANGE MONITOR SYSTEM and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) RPS	3.5	34
46	(215005) (SF7 PRMS) AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR							X					(215005A1.04) Ability to predict and/or monitor changes in parameters associated with operation of the (SF7 PRMS) AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR including: (CFR: 41.5 / 45.5) SCRAM and rod block trip setpoints	4	35
47	**(215005) (SF7 PRMS) AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR**								**X**				**(215005A2.05) Ability to (a) predict the impacts of the following on the (SF7 PRMS) AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 45.6) Loss of recirculation flow signal**	**3.9**	**87**
48	(217000) (SF2, SF4 RCIC) REACTOR CORE ISOLATION COOLING SYSTEM									X			(217000A3.01) Ability to monitor automatic operation of the (SF2, SF4 RCIC) REACTOR CORE ISOLATION COOLING SYSTEM including: (CFR: 41.7 / 45.7) Valve operation	3.9	36
49	(218000) (SF3 ADS) AUTOMATIC DEPRESSURIZATION SYSTEM					X							(218000K5.05) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF3 ADS) AUTOMATIC DEPRESSURIZATION SYSTEM: (CFR: 41.5 / 45.3) Suppression pool level	3.7	37
50	(223002) (SF5 PCIS) PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF							X					(223002A1.09) Ability to predict and/or monitor changes in parameters associated with operation of the (SF5 PCIS) PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF including: (CFR: 41.5 / 45.5) Secondary containment temperature	3.6	38

ES-4.1-BWR	BWR Examination Outline (Quad Cities) Plant Systems—Tier 2/Group 1 (RO/**SRO**)														
Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
51	(239002) (SF3 SRV) SAFETY RELIEF VALVES											X	(239002) (SF3 SRV) SAFETY RELIEF VALVES (291007K1.07) DEMINERALIZERS AND ION EXCHANGERS (CFR: 41.3) Principles of demineralizer operation	2.5	39
52	(239002) (SF3 SRV) SAFETY RELIEF VALVES	X											(239002K1.01) Knowledge of the physical connections and/or cause and effect relationships between the (SF3 SRV) SAFETY RELIEF VALVES and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) Reactor vessel and internals	3.6	40
53	(259002) (SF2 RWLCS) REACTOR WATER LEVEL CONTROL SYSTEM					X							(259002K5.02) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF2 RWLCS) REACTOR WATER LEVEL CONTROL SYSTEM: (CFR: 41.5 / 45.3) Controller operation	3.8	41
54	**(259002) (SF2 RWLCS) REACTOR WATER LEVEL CONTROL SYSTEM**								**X**				**(259002A2.01) Ability to (a) predict the impacts of the following on the (SF2 RWLCS) REACTOR WATER LEVEL CONTROL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 45.6) Loss of any number of main steam flow inputs**	**3.5**	**88**
55	(261000) (SF9 SGTS) STANDBY GAS TREATMENT SYSTEM			X									(261000K3.05) Knowledge of the effect that a loss or malfunction of the (SF9 SGTS) STANDBY GAS TREATMENT SYSTEM will have on the following systems or system parameters: (CFR: 41.7 / 45.4) Secondary containment radiation/ contamination levels	3.5	42
56	(261000) (SF9 SGTS) STANDBY GAS TREATMENT SYSTEM				X								(261000K4.08) Knowledge of (SF9 SGTS) STANDBY GAS TREATMENT SYSTEM design features and/or interlocks that provide for the following: (CFR: 41.7) Fire suppression	2.7	43
57	(262001) (SF6 AC) AC ELECTRICAL DISTRIBUTION										X		(262001A4.01) Ability to manually operate and/or monitor the (SF6 AC) AC ELECTRICAL DISTRIBUTION in the control room: (CFR: 41.7 / 45.5 to 45.8) Breakers and disconnects	3.7	44
58	**(262001) (SF6 AC) AC ELECTRICAL DISTRIBUTION**											**X**	**(262001) (SF6 AC) AC ELECTRICAL DISTRIBUTION (G2.1.3) CONDUCT OF OPERATIONS Knowledge of shift or short-term relief turnover practices (CFR: 41.10 / 45.13)**	**3.9**	**89**

59	(262002) (SF6 UPS) UNINTERRUPTABLE POWER SUPPLY (AC/DC)								X				(262002A2.05) Ability to (a) predict the impacts of the following on the (SF6 UPS) UNINTERRUPTABLE POWER SUPPLY (AC/DC) and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 45.6) Loss of UPS	3.8	45

ES-4.1-BWR BWR Examination Outline (Quad Cities)

Plant Systems—Tier 2/Group 1 (RO/**SRO**)

Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
60	(263000) (SF6 DC) DC ELECTRICAL DISTRIBUTION										X		(263000A4.04) Ability to manually operate and/or monitor the (SF6 DC) DC ELECTRICAL DISTRIBUTION in the control room: (CFR: 41.7 / 45.5 to 45.8) Ground detection circuit	2.8	46
61	(264000) (SF6 EGE) EMERGENCY GENERATORS (DIESEL/JET)						X						(264000K6.05) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF6 EGE) EMERGENCY GENERATORS (DIESEL/JET): (CFR: 41.7 / 45.7) Ignition system	3	47
62	(300000) (SF8 IA) INSTRUMENT AIR SYSTEM						X						(300000K6.13) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF8 IA) INSTRUMENT AIR SYSTEM: (CFR: 41.7 / 45.7) Service air cross-connect valve	3.4	48
63	**(300000) (SF8 IA) INSTRUMENT AIR SYSTEM**											**X**	**(300000) (SF8 IA) INSTRUMENT AIR SYSTEM (G2.2.3) EQUIPMENT CONTROL (Multi-unit license) Knowledge of the design, procedural, or operational differences between units (CFR: 41.5 / 41.6 / 41.7 / 41.10 / 45.12)**	**3.9**	**90**
64	(400000) (SF8 CCS) COMPONENT COOLING WATER SYSTEM								X				(400000A2.11) Ability to (a) predict the impacts of the following on the (SF8 CCS) COMPONENT COOLING WATER SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 45.6) Loss of cooling to reactor recirculation pump	4.2	49
65	(400000) (SF8 CCS) COMPONENT COOLING WATER SYSTEM		X										(400000K2.01) (SF8 CCS) COMPONENT COOLING WATER SYSTEM Knowledge of electrical power supplies to the following: (CFR: 41.7) CCW pumps	3.4	50
66	(510000) (SF4 SWS*) SERVICE WATER SYSTEM									X			(510000A3.04) Ability to monitor automatic operation of the (SF4 SWS*) SERVICE WATER SYSTEM including: (CFR: 41.7 / 45.7) Strainer operation	2.8	51
67	(510000) (SF4 SWS*) SERVICE WATER SYSTEM		X										(510000K2.02) (SF4 SWS*) SERVICE WATER SYSTEM Knowledge of electrical power supplies to the following: (CFR: 41.7) Service water system valves (Class 1E)	3.4	52

K/A Category Totals:	2	3	3	2	2	2	3	2/3	3	2	2/2	Group Point Total:	26 / 5

ES-4.1-BWR	BWR Examination Outline (Quad Cities) Plant Systems—Tier 2/Group 2 (RO/**SRO**)														
Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
68	**(201001) (SF1 CRDH) CRD HYDRAULIC SYSTEM**								**X**				**(201001A2.11) Ability to (a) predict the impacts of the following on the (SF1 CRDH) CRD HYDRAULIC SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 45.6) Valve openings due to malfunction(s)**	**3.1**	**91**
69	(201002) (SF1 RMCS) REACTOR MANUAL CONTROL SYSTEM								X				(201002A2.02) Ability to (a) predict the impacts of the following on the (SF1 RMCS) REACTOR MANUAL CONTROL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 45.6) Rod drift	4.4	53
	(201003) (SF1 CRDM) CONTROL ROD AND DRIVE MECHANISM														
70	(201004) (SF7 RSCS) ROD SEQUENCE CONTROL SYSTEM		X										(201004K2.01) (SF7 RSCS) ROD SEQUENCE CONTROL SYSTEM Knowledge of electrical power supplies to the following: (CFR: 41.7) RSCS logic power	2.7	54
71	(201005) (SF1, SF7 RCIS) ROD CONTROL AND INFORMATION SYSTEM					X							(201005K5.12) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF1, SF7 RCIS) ROD CONTROL AND INFORMATION SYSTEM: (CFR: 41.5 / 45.3) RACS channel agreement and multiplexing	3.4	55
72	(201006) (SF7 RWMS) ROD WORTH MINIMIZER SYSTEM	X											(201006K1.02) Knowledge of the physical connections and/or cause and effect relationships between the (SF7 RWMS) ROD WORTH MINIMIZER SYSTEM and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) RPIS	3.7	56
73	(202001) (SF1, SF4 RS) RECIRCULATION SYSTEM			X									(202001K3.04) Knowledge of the effect that a loss or malfunction of the (SF1, SF4 RS) RECIRCULATION SYSTEM will have on the following systems or system parameters: (CFR: 41.7 / 45.4) Reactor water level	4	57
74	(202002) (SF1 RSCTL) RECIRCULATION FLOW CONTROL SYSTEM										X		(202002A4.02) Ability to manually operate and/or monitor the (SF1 RSCTL) RECIRCULATION FLOW CONTROL SYSTEM in the control room: (CFR: 41.7 / 45.5 to 45.8) Hydraulic power unit (BWR 5, 6)	3.4	58
	(204000) (SF2 RWCU) REACTOR WATER CLEANUP SYSTEM														

Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
	(214000) (SF7 RPIS) ROD POSITION INFORMATION SYSTEM														
	(215001) (SF7 TIP) TRAVERSING IN CORE PROBE														
	(215002) (SF7 RBMS) ROD BLOCK MONITOR SYSTEM														
	(216000) (SF7 NBI) NUCLEAR BOILER INSTRUMENTATION														
	(219000) (SF5 RHR SPC) RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE														
75	(223001) (SF5 PCS) PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES						X						(223001K6.09) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF5 PCS) PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES: (CFR: 41.7 / 45.7) Drywell vacuum relief system	3.8	59
	(226001) (SF5 RHR CSS) RHR/LPCI: CONTAINMENT SPRAY MODE SYSTEM MODE														
	(230000) (SF5 RHR SPS) RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE														
	(233000) (SF9 FPCCU) FUEL POOL COOLING/CLEANUP														
76	(234000) (SF8 FH) FUEL HANDLING				X								(234000K4.03) Knowledge of (SF8 FH) FUEL HANDLING design features and/or interlocks that provide for the following: (CFR: 41.7) Protection against inadvertently lifting radioactive components out of the water	3.7	60
	(239001) (SF3, SF4 MRSS) MAIN AND REHEAT STEAM SYSTEM														
	(239003) (SF9 MSVLCS) MAIN STEAM ISOLATION VALVE LEAKAGE CONTROL SYSTEM														
77	(241000) (SF3 RTPRS) REACTOR/TURBINE PRESSURE REGULATING SYSTEM									X			(241000A3.01) Ability to monitor automatic operation of the (SF3 RTPRS) REACTOR/TURBINE PRESSURE REGULATING SYSTEM including: (CFR: 41.7 / 45.7) Turbine speed control	3.2	61
	(245000) (SF4 MTGEN) MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS														

ES-4.1-BWR	BWR Examination Outline (Quad Cities) Plant Systems—Tier 2/Group 2 (RO/**SRO**)														
Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
	(256000) (SF2 CDS) CONDENSATE SYSTEM														
78	**(259001) (SF2 FWS) FEEDWATER SYSTEM**											**X**	**(259001) (SF2 FWS) FEEDWATER SYSTEM (G2.2.42) EQUIPMENT CONTROL 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**	**92**
79	**(268000) (SF9 RW) RADWASTE SYSTEM**											**X**	**(268000) (SF9 RW) RADWASTE SYSTEM (G2.4.3) EMERGENCY PROCEDURES/PLAN Ability to identify post-accident instrumentation (CFR: 41.6 / 45.4)**	**3.9**	**93**
80	(271000) (SF9 OG) OFFGAS SYSTEM											X	(271000) (SF9 OG) OFFGAS SYSTEM (G2.4.17) EMERGENCY PROCEDURES/PLAN Knowledge of emergency and abnormal operating procedures terms and definitions (CFR: 41.10 / 45.13)	3.9	62
	(272000) (SF7, SF9 RMS) RADIATION MONITORING SYSTEM														
	(286000) (SF8 FPS) FIRE PROTECTION SYSTEM														
	(288000) (SF9 PVS) PLANT VENTILATION SYSTEMS														
	(290001) (SF5 SC) SECONDARY CONTAINMENT														
	(290002) (SF4 RVI) REACTOR VESSEL INTERNALS														
	(290003) (SF9 CRV) CONTROL ROOM VENTILATION														
81	(510001) (SF8 CWS*) CIRCULATING WATER SYSTEM							X					(510001A1.04) Ability to predict and/or monitor changes in parameters associated with operation of the (SF8 CWS*) CIRCULATING WATER SYSTEM including: (CFR: 41.5 / 45.5) Circulating water temperatures	3.1	63
K/A Category Totals:		1	1	1	1	1	1	1	**1/1**	1	1	**1/2**	Group Point Total:		11 **/ 3**

Form 4.1-COMMON Common Examination Outline

ES-4.1-COMMON	COMMON Examination Outline (Quad Cities)						
Facility: Quad Cities					Date of Exam: 05/27/2024		
Generic Knowledge and Abilities Outline (Tier 3) (RO/SRO)							
				RO		SRO-Only	
Category	K/A #	Topic	Item #	IR	Q#	IR	Q#
1. Conduct of Operations	G2.1.18	(G2.1.18) CONDUCT OF OPERATIONS Ability to make accurate, clear, and concise logs, records, status boards, and reports (CFR: 41.10 / 45.12 / 45.13)	82	3.6	64		
	G2.1.41	(G2.1.41) CONDUCT OF OPERATIONS Knowledge of the refueling process (CFR: 41.2 / 41.10 / 43.6 / 45.13)	83	2.8	65		
	G2.1.19	**(G2.1.19) CONDUCT OF OPERATIONS Ability to use available indications to evaluate system or component status (CFR: 41.10 / 45.12)**	**84**			**3.8**	**94**
	G2.1.42	**(G2.1.42) CONDUCT OF OPERATIONS Knowledge of new and spent fuel movement procedures (SRO Only) (CFR: 43.7 / 45.13)**	**85**			**3.4**	**95**
	Subtotal			N/A	2	N/A	**2**
2. Equipment Control	G2.2.13	(G2.2.13) EQUIPMENT CONTROL Knowledge of tagging and clearance procedures (CFR: 41.10 / 43.1 / 45.13)	86	4.1	66		
	G2.2.17	(G2.2.17) EQUIPMENT CONTROL 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)	87	2.6	67		
	G2.2.7	**(G2.2.7) EQUIPMENT CONTROL Knowledge of the process for conducting infrequently performed tests or evolutions (CFR: 41.10 / 43.3 / 45.13)**	**88**			**3.6**	**96**
	G2.2.18	**(G2.2.18) EQUIPMENT CONTROL Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments and work prioritization (CFR: 41.10 / 43.5 / 45.13)**	**89**			**3.9**	**97**
	Subtotal			N/A	2	N/A	**2**
3. Radiation Control	G2.3.5	(G2.3.5) RADIATION CONTROL Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms or personnel monitoring equipment (CFR: 41.11 / 41.12 / 43.4 / 45.9)	90	2.9	68		
	G2.3.6	**(G2.3.6) RADIATION CONTROL Ability to approve liquid or gaseous release permits (CFR: 41.13 / 43.4 / 45.10)**	**91**			**3.8**	**98**
	Subtotal			N/A	1	N/A	**1**
4. Emergency Procedures / Plan	G2.4.46	(G2.4.46) EMERGENCY PROCEDURES/PLAN Ability to verify that the alarms are consistent with the plant conditions (CFR: 41.10 / 43.5 / 45.3 / 45.12)	92	4.2	69		
	G2.4.28	**(G2.4.28) EMERGENCY PROCEDURES/PLAN Knowledge of procedures relating to a security event (ensure that the test item includes no safeguards information) (CFR: 41.10 / 43.5 / 45.13)**	**93**			**4.1**	**99**
	G2.4.29	**(G2.4.29) EMERGENCY PROCEDURES/PLAN Knowledge of the emergency plan implementing procedures (CFR: 41.10 / 43.5 / 45.11)**	**94**			**4.4**	**100**
	Subtotal			N/A	1	N/A	**2**
Tier 3 Point Total				N/A	**6**	N/A	**7**

Form 4.1-COMMON Common Examination Outline

ES-4.1-COMMON	COMMON Examination Outline (Quad Cities)				
Facility: Quad Cities				Date of Exam:	05/27/2024
Theory (Tier 4) (RO)					
				RO	
Category	K/A #	Topic	Item #	IR	Q#
Reactor Theory	292004	(292004K1.04) REACTIVITY COEFFICIENTS (CFR: 41.1) Explain Doppler broadening and self-shielding	95	2.7	70
	292006	(292006K1.13) FISSION PRODUCT POISONS (CFR: 41.1) Plot the curve and explain the reasoning for the reactivity insertion by Xenon-135 versus time for the following: --Reactor shutdown	96	2.6	71
	292008	(292008K1.23) REACTOR OPERATIONAL PHYSICS (CFR: 41.1) (POWER OPERATION) Explain the necessity for rod pattern exchanges	97	3.1	72
	Subtotal				3
Thermodynamics	293003	(293003K1.22) STEAM (CFR: 41.14) Explain the usefulness of steam tables to the control	98	3.2	73
	293004	(293004K1.17) THERMODYNAMIC PROCESS (CFR: 41.14) (THROTTLING AND THE THROTTLING PROCESS) Determine the exit conditions for a throttling process based on the use of steam or water	99	2.8	74
	293008	(293008K1.08) THERMAL HYDRAULICS (CFR: 41.14) (POOL BOILING CURVE (TEMPERATURE VS. HEAT FLUX)) Describe departure from nucleate boiling	100	3.1	75
	Subtotal				3
Tier 4 Point Total				N/A	6