Facility:	Clinton	**K/A Catalog Rev. 3**	**Rev.**	05/31/2023	**Date of Exam:**	July, 2023

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	3	N/A			3	4	N/A		4	20	**3**	**4**	**7**
	2	1	1	1				1	1			1	6	**2**	**1**	**3**
	Tier Totals	4	4	4				4	5			5	26	**5**	**5**	**10**
2. Plant Systems	1	2	2	2	2	3	2	2	2	4	2	3	26	**3**	**2**	**5**
	2	1	1	1	1	1	1	1	2	0	1	1	11	**0** **1**	**2**	**3**
	Tier Totals	3	3	3	3	4	3	3	4	4	3	4	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

Form 4.1-BWR	BWR Examination Outline	ES 4.1
	Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)	

E/APE # / Name	K1	K2	K3	A1	A2	G	K/A Topic(s)	IR	#
(295001) (APE 1) PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION				X			(295001AA1.06) Ability to operate and/or monitor the following as they apply to (APE 1) PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: (CFR: 41.7 / 45.6) Power range monitoring system	3.6	1
(295003) (APE 3) PARTIAL OR COMPLETE LOSS OF AC POWER					X		(295003AA2.01) Ability to determine or interpret the following as they apply to (APE 3) PARTIAL OR COMPLETE LOSS OF AC POWER: (CFR: 41.10 / 43.5 / 45.13) Partial or complete loss of AC power	4.0	2
(295004) (APE 4) PARTIAL OR COMPLETE LOSS OF DC POWER			X				(295004AK3.01) Knowledge of the reasons for the following responses or actions as they apply to (APE 4) PARTIAL OR COMPLETE LOSS OF DC POWER: (CFR: 41.5 / 45.6) Load shedding	3.9	3
(295005) (APE 5) MAIN TURBINE GENERATOR TRIP			X				(295005AK3.02) Knowledge of the reasons for the following responses or actions as they apply to (APE 5) MAIN TURBINE GENERATOR TRIP: (CFR: 41.5 / 45.6) Recirculation pump downshift/trip	3.5	4
(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**	**76**
(295006) (APE 6) SCRAM					X		(295006AA2.03) Ability to determine or interpret the following as they apply to (APE 6) SCRAM: (CFR: 41.7 / 45.8) Reactor water level	4.3	5
(295016) (APE 16) CONTROL ROOM ABANDONMENT		X					(295016AK2.07) Knowledge of the relationship between the (APE 16) CONTROL ROOM ABANDONMENT and the following systems or components: (CFR: 41.7 / 45.8) RCIC	4.1	6
(295016) (APE 16) CONTROL ROOM ABANDONMENT						**X**	**(295016) (APE 16) CONTROL ROOM ABANDONMENT (G2.1.35) CONDUCT OF OPERATIONS Knowledge of the fuel handling responsibilities of SROs (SRO Only) (CFR: 43.7)**	**3.9**	**77**
(295018) (APE 18) PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER (CCW)				X			(295018AA1.01) Ability to operate or monitor the following as they apply to (APE 18) PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER (CCW): (CFR: 41.7 / 45.6) Backup systems	3.3	7
(295018) (APE 18) PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER (CCW)						**X**	**(295018) (APE 18) PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER (CCW) (G2.2.44) EMERGENCY PROCEDURES/PLAN Ability to interpret control room indications to verify the status and operation of a system and understand how operator actions and directives affect plant and system conditions (CFR: 41.5 / 43.5 / 45.12)**	**4.4**	**78**
(295019) (APE 19) PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR						X	(295019) (APE 19) PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR (G2.4.31) EMERGENCY PROCEDURES / PLAN Knowledge of annunciator alarms, indications, or response procedures (CFR: 41.10 / 45.3)	4.2	8
(295019) (APE 19) PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR						**X**	**(295019) (APE 19) PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR (G2.1.8) CONDUCT OF OPERATIONS Ability to coordinate personnel activities outside the control room (CFR: 41.10 / 43.1 / 45.5 / 45.12 / 45.13)**	**4.1**	**79**
(295021) (APE 21) LOSS OF SHUTDOWN COOLING						X	(295021) (APE 21) LOSS OF SHUTDOWN COOLING (G2.4.12) EMERGENCY PROCEDURES/PLAN Knowledge of operating crew responsibilities during emergency and abnormal operations (CFR: 41.10 / 45.12)	4.0	9

Form 4.1-BWR	BWR Examination Outline	ES 4.1
	Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)	

E/APE # / Name	K1	K2	K3	A1	A2	G	K/A Topic(s)	IR	#
(295023) (APE 23) REFUELING ACCIDENTS						X	(295023) (APE 23) REFUELING ACCIDENTS (G2.1.19) CONDUCT OF OPERATIONS Ability to use available indications to evaluate system or component status (CFR: 41.10 / 45.12)	3.9	10
(295024) (EPE 1) HIGH DRYWELL PRESSURE	X						(295024EK1.01) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to the (EPE 1) HIGH DRYWELL PRESSURE: (CFR: 41.8 to 41.10) Drywell integrity	4.3	11
(295025) (EPE 2) HIGH REACTOR PRESSURE			X				(295025EK3.09) Knowledge of the reasons for the following responses or actions as they apply to (EPE 2) HIGH REACTOR PRESSURE: (CFR: 41.5 / 45.6) Low-low set initiation	3.9	12
(295025) (EPE 2) HIGH REACTOR PRESSURE					**X**		**(295025EA2.04) 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 level**	**3.4**	**80**
(295026) (EPE 3) SUPPRESSION POOL HIGH WATER TEMPERATURE		X					(295026EK2.12) Knowledge of the relationship between the (EPE 3) SUPPRESSION POOL HIGH WATER TEMPERATURE and the following systems or components: (CFR: 41.7 / 45.8) Suppression pool makeup	2.8	13
(295027) (EPE 4) HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY)					X		(295027EA2.05) Ability to determine or interpret the following as they apply to (EPE 4) HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY): (CFR: 41.10 / 43.5 / 45.13) Reactor water level	4.5	14
(295027) (EPE 4) HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY)					**X**		**(295027EA2.02) Ability to determine or interpret the following as they apply to (EPE 4) HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY): (CFR: 41.10 / 43.5 / 45.13) Containment pressure**	**4.1**	**81**
(295028) (EPE 5) HIGH DRYWELL TEMPERATURE (MARK I AND MARK II ONLY) / 5									
(295030) (EPE 7) LOW SUPPRESSION POOL WATER LEVEL				X			(295030EA1.01) Ability to operate or monitor the following as they apply to (EPE 7) LOW SUPPRESSION POOL WATER LEVEL: (CFR: 41.7 / 45.6) ECCSs	4.0	15
(295031) (EPE 8) REACTOR LOW WATER LEVEL					X		(295031EA2.04) Ability to determine or interpret the following as they apply to (EPE 8) REACTOR LOW WATER LEVEL: (CFR: 41.10 / 43.5 / 45.13) Adequate core cooling	4.9	16
(295037) (EPE 14) SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN						X	(295037) (EPE 14) SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN (G2.4.18) EMERGENCY PROCEDURES / PLAN Knowledge of the specific bases for emergency and abnormal operating procedures (CFR: 41.10 / 43.1 / 45.13)	3.3	17
(295038) (EPE 15) HIGH OFFSITE RADIOACTIVITY RELEASE RATE		X					(295038EK2.09) Knowledge of the relationship between the (EPE 15) HIGH OFFSITE RADIOACTIVITY RELEASE RATE and the following systems or components: (CFR: 41.7 / 45.8) Post-accident sample system	3.0	18
(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: 41.8 / 41.10 / 45.3) Firefighting methods for each type of fire	3.4	19

Form 4.1-BWR	BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)							ES 4.1	
E/APE # / Name	K1	K2	K3	A1	A2	G	K/A Topic(s)	IR	#
(600000) (APE 24) PLANT FIRE ON SITE						**X**	**(600000) (APE 24) PLANT FIRE ON SITE (G2.4.29) EMERGENCY PROCEDURES / PLAN Knowledge of the emergency plan implementing procedures (CFR: 41.10 / 43.5 / 45.11)**	**4.4**	**82**
(700000) (APE 25) GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES	X						(700000AK1.04) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to the (APE 25) GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: (CFR: 41.4, 41.5, 41.7, 41.10 / 45.8) Frequency changes	3.2	20
K/A Category Totals:	3	3	3	3	7	8	Group Point Total:		20/**7**

Form 4.1-BWR	BWR Examination Outline	ES 4.1
	Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)	

E/APE # / Name	K1	K2	K3	A1	A2	G	K/A Topic(s)	IR	#
(295002) (APE 2) LOSS OF MAIN CONDENSER VACUUM					X		(295002AA2.07) 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) Turbine limitations	3.7	21
(295007) (APE 7) HIGH REACTOR PRESSURE						X	(295007) (APE 7) HIGH REACTOR PRESSURE (G2.2.22) EQUIPMENT CONTROL Knowledge of limiting conditions for operation and safety limits (CFR: 41.5 / 43.2 / 45.2)	4.0	22
(295008) (APE 8) HIGH REACTOR WATER LEVEL		X					(295008AK2.11) Knowledge of the relationship between the (APE 8) HIGH REACTOR WATER LEVEL and the following systems or components: (CFR: 41.7 / 45.8) Main steam	3.5	23
(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)					**X**		**(295011AA2.04) Ability to determine or interpret the following as they apply to (APE 11) HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY): (CFR: 41.10 / 43.5 / 45.13) System/component operating limitations**	**3.6**	**83**
(295012) (APE 12) HIGH DRYWELL TEMPERATURE / 5						**X**	**(295012) (APE 12) HIGH DRYWELL TEMPERATURE (G2.4.16) EMERGENCY PROCEDURES / PLAN Knowledge of emergency and abnormal operating procedures implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, or severe accident management guidelines (CFR: 41.10 / 43.5 / 45.13)**	**4.4**	**84**
(295013) (APE 13) HIGH SUPPRESSION POOL TEMPERATURE. / 5									
(295014) (APE 14) INADVERTENT REACTIVITY ADDITION				X			(295014AA1.11) Ability to operate or monitor the following as they apply to (APE 14) INADVERTENT REACTIVITY ADDITION: (CFR: 41.7 / 45.6) Feedwater system	3.9	24
(295017) (APE 17) ABNORMAL OFFSITE RELEASE RATE			X				(295017AK3.05) Knowledge of the reasons for the following responses or actions as they apply to (APE 17) ABNORMAL OFFSITE RELEASE RATE: (CFR: 41.5 / 45.6) CRV system operation	3.5	25
(295020) (APE 20) INADVERTENT CONTAINMENT ISOLATION & 7									
(295022) (APE 22) LOSS OF CONTROL ROD DRIVE PUMPS					**X**		**(295022AA2.01) Ability to determine or interpret the following as they apply to (APE 22) LOSS OF CONTROL ROD DRIVE PUMPS: (CFR: 41.10 / 43.5 / 45.13) Accumulator pressure**	**3.7**	**85**
(295029) (EPE 6) HIGH SUPPRESSION POOL WATER LEVEL / 5									
(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: 41.8 to 41.10) Radiation releases	3.5	26
(295033) (EPE 10) HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS / 9									

Form 4.1-BWR	BWR Examination Outline	ES 4.1
	Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)	

E/APE # / Name	K1	K2	K3	A1	A2	G	K/A Topic(s)	IR	#
(295034) (EPE 11) SECONDARY CONTAINMENT VENTILATION HIGH RADIATION / 9									
(295035) (EPE 12) SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE / 5									
(295036) (EPE 13) SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL / 5									
(500000) (EPE 16) HIGH CONTAINMENT HYDROGEN CONCENTRATION / 5									
K/A Category Point Totals:	1	1	1	1	3	2	Group Point Total:		6/**3**

Form 4.1-BWR	BWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO)	ES 4.1

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					X							(203000K5.03) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF2, SF4 RHR/LPCI) RHR/LPCI: INJECTION MODE: (CFR: 41.5 / 45.3) Vortex limits	3.3	27
(205000) (SF4 SCS) SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE)						X						(205000K6.08) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF4 SCS) SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE): (CFR: 41.7 / 45.7) Service water	3.3	28
(206000) (SF2, SF4 HPCI) HIGH PRESSURE COOLANT INJECTION SYSTEM														
(207000) (SF4 IC) ISOLATION (EMERGENCY) CONDENSER														
(209001) (SF2, SF4 LPCS) LOW PRESSURE CORE SPRAY SYSTEM									X			(209001A3.01) Ability to monitor automatic operation of the (SF2, SF4 LPCS) LOW PRESSURE CORE SPRAY SYSTEM including: (CFR: 41.7 / 45.7) Valve operation	4.2	29
(209001) (SF2, SF4 LPCS) LOW PRESSURE CORE SPRAY SYSTEM											**X**	**(209001) (SF2, SF4 LPCS) LOW PRESSURE CORE SPRAY SYSTEM (G2.2.45) EQUIPMENT CONTROL Ability to determine or interpret technical specifications with action statements of greater than 1 hour (SRO Only) (CFR: 43.2 / 43.5 / 45.3)**	**4.7**	**86**
(209002) (SF2, SF4 HPCS) HIGH PRESSURE CORE SPRAY SYSTEM			X									(209002K3.06) Knowledge of the effect that a loss or malfunction of the (SF2, SF4 HPCS) HIGH PRESSURE CORE SPRAY SYSTEM will have on the following systems or system parameters: (CFR: 41.7 / 45.4) Reactor pressure	3.7	30
(211000) (SF1 SLCS) STANDBY LIQUID CONTROL SYSTEM							X					(211000A1.09) Ability to predict and/or monitor changes in parameters associated with operation of the (SF1 SLCS) STANDBY LIQUID CONTROL SYSTEM including: (CFR: 41.5 / 45.5) SLCS lineup	3.8	31
(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	32
(212000) (SF7 RPS) REACTOR PROTECTION SYSTEM											**X**	**(212000) (SF7 RPS) REACTOR PROTECTION SYSTEM (G2.2.37) EQUIPMENT CONTROL Ability to determine operability or availability of safety-related equipment (SRO Only) (CFR: 43.2 / 43.5 / 45.12)**	**4.6**	**87**
(215003) (SF7 IRM) INTERMEDIATE RANGE MONITOR SYSTEM										X		(215003A4.01) Ability to manually operate and/or monitor the (SF7 IRM) INTERMEDIATE RANGE MONITOR SYSTEM in the control room: (CFR: 41.7 / 45.5 to 45.8) IRM recorder indication	3.6	33
(215004) (SF7 SRMS) SOURCE RANGE MONITOR SYSTEM				X								(215004K4.01) Knowledge of (SF7 SRMS) SOURCE RANGE MONITOR SYSTEM design features and/or interlocks that provide for the following: (CFR: 41.7) Rod withdrawal blocks	3.9	34
(215005) (SF7 PRMS) AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR											X	(215005) (SF7 PRMS) AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR (G2.1.32) CONDUCT OF OPERATIONS Ability to explain and apply system precautions, limitations, notes, or cautions (CFR: 41.10 / 43.2 / 45.12)	3.8	35
(217000) (SF2, SF4 RCIC) REACTOR CORE ISOLATION COOLING SYSTEM											X	(217000) (SF2, SF4 RCIC) REACTOR CORE ISOLATION COOLING SYSTEM (291002K1.16) SENSORS AND DETECTORS (CFR: 41.7) (POSITION DETECTORS) Failure modes of reed switches, LVDTs, limit switches, and potentiometers	2.7	36

Form 4.1-BWR	BWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO)											ES 4.1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
(218000) (SF3 ADS) AUTOMATIC DEPRESSURIZATION SYSTEM									X			(218000A3.01) Ability to monitor automatic operation of the (SF3 ADS) AUTOMATIC DEPRESSURIZATION SYSTEM including: (CFR: 41.7 / 45.7) ADS valves	4.1	37
(218000) (SF3 ADS) AUTOMATIC DEPRESSURIZATION SYSTEM	X											(218000K1.03) Knowledge of the physical connections and/or cause and effect relationships between the (SF3 ADS) AUTOMATIC DEPRESSURIZATION SYSTEM and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) Nuclear boiler instrumentation	3.9	38
(223002) (SF5 PCIS) PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF	X											(223002K1.08) Knowledge of the physical connections and/or cause and effect relationships between the (SF5 PCIS) PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) Shutdown cooling system/RHR	3.9	39
(223002) (SF5 PCIS) PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF		X										(223002K2.01) (SF5 PCIS) PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF Knowledge of electrical power supplies to the following: (CFR: 41.7) Logic power supplies	3.6	40
(239002) (SF3 SRV) SAFETY RELIEF VALVES											X	(239002) (SF3 SRV) SAFETY RELIEF VALVES (G2.1.28) CONDUCT OF OPERATIONS Knowledge of the purpose and function of major system components and controls (CFR: 41.7)	4.1	41
(239002) (SF3 SRV) SAFETY RELIEF VALVES								**X**				**(239002A2.06) Ability to (a) predict the impacts of the following on the (SF3 SRV) SAFETY RELIEF VALVES and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 43.5 / 45.6) Reactor high pressure**	**4.2**	**88**
(259002) (SF2 RWLCS) REACTOR WATER LEVEL CONTROL SYSTEM								X				(259002A2.06) 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 / 43.5 / 45.6) Loss of controller signal output	3.6	42
(259002) (SF2 RWLCS) REACTOR WATER LEVEL CONTROL SYSTEM				X								(259002K4.08) Knowledge of (SF2 RWLCS) REACTOR WATER LEVEL CONTROL SYSTEM design features and/or interlocks that provide for the following: (CFR: 41.7) TDRFP speed control	3.2	43
(261000) (SF9 SGTS) STANDBY GAS TREATMENT SYSTEM		X										(261000K2.04) (SF9 SGTS) STANDBY GAS TREATMENT SYSTEM Knowledge of electrical power supplies to the following: (CFR: 41.7) Standby gas treatment system heaters	2.9	44
(262001) (SF6 AC) AC ELECTRICAL DISTRIBUTION								X				(262001A2.01) Ability to (a) predict the impacts of the following on the (SF6 AC) AC ELECTRICAL DISTRIBUTION and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 43.5 / 45.6) Turbine/generator trip	4.0	45
(262002) (SF6 UPS) UNINTERRUPTABLE POWER SUPPLY (AC/DC)										X		(262002A4.01) Ability to manually operate and/or monitor the (SF6 UPS) UNINTERRUPTABLE POWER SUPPLY (AC/DC) in the control room: (CFR: 41.7 / 45.5 to 45.8) Transfer of power sources	3.1	46
(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 / 43.5 / 45.6) Loss of UPS**	**3.9**	**89**

Form 4.1-BWR	BWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO)											ES 4.1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
(263000) (SF6 DC) DC ELECTRICAL DISTRIBUTION									X			(263000A3.03) Ability to monitor automatic operation of the (SF6 DC) DC ELECTRICAL DISTRIBUTION including: (CFR: 41.7 / 45.7) Transfers	3.3	47
(264000) (SF6 EGE) EMERGENCY GENERATORS (DIESEL/JET)					X							(264000K5.06) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF6 EGE) EMERGENCY GENERATORS (DIESEL/JET): (CFR: 41.5 / 45.3) Load sequencing	3.9	48
(264000) (SF6 EGE) EMERGENCY GENERATORS (DIESEL/JET)						X						(264000K6.11) 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) Turbo/super charger	3.2	49
(300000) (SF8 IA) INSTRUMENT AIR SYSTEM									X			(300000A3.03) Ability to monitor automatic operation of the (SF8 IA) INSTRUMENT AIR SYSTEM including: (CFR: 41.8 / 45.7) Compressor automatic starts/trips	3.5	50
(300000) (SF8 IA) INSTRUMENT AIR SYSTEM								**X**				**(300000A2.02) Ability to (a) predict the impacts of the following on the (SF8 IA) INSTRUMENT AIR SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 43.5 / 45.6) Component cooling water system malfunction**	**3.2**	**90**
(400000) (SF8 CCS) COMPONENT COOLING WATER SYSTEM					X							(400000K5.02) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF8 CCS) COMPONENT COOLING WATER SYSTEM: (CFR: 41.5 / 45.3) Determine source(s) of RCS leakage into CCW	3.1	51
(510000) (SF4 SWS*) SERVICE WATER SYSTEM			X									(510000K3.02) Knowledge of the effect that a loss or malfunction of the (SF4 SWS*) SERVICE WATER SYSTEM will have on the following systems or system parameters: (CFR: 41.7 / 45.4) Main turbine generator and auxiliary systems	3.4	52
K/A Category Point Totals:	2	2	2	2	3	2	2	5	4	2	5	Group Point Total:		26/5

Form 4.1-BWR	BWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)											ES 4.1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
(201001) (SF1 CRDH) CRD HYDRAULIC SYSTEM							X					(201001A1.06) Ability to predict and/or monitor changes in parameters associated with operation of the (SF1 CRDH) CRD HYDRAULIC SYSTEM including: (CFR: 41.1-2 / 41.5-7 / 41.10 / 45.1-6 / 45.12) HCU pressure or level	3.6	53
(201002) (SF1 RMCS) REACTOR MANUAL CONTROL SYSTEM														
(201003) (SF1 CRDM) CONTROL ROD AND DRIVE MECHANISM						X						(201003K6.01) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF1 CRDM) CONTROL ROD AND DRIVE MECHANISM: (CFR: 41.1-6 / 45.1-6) Control rod drive hydraulic system	3.8	54
(201004) (SF7 RSCS) ROD SEQUENCE CONTROL SYSTEM														
(201005) (SF1, SF7 RCIS) ROD CONTROL AND INFORMATION SYSTEM			X									(201005K3.06) Knowledge of the effect that a loss or malfunction of the (SF1, SF7 RCIS) ROD CONTROL AND INFORMATION SYSTEM will have on the following systems or system parameters: (CFR: 41.6 and 41.7 / 45.4–45.6) Fuel handling system	3.0	55
(201006) (SF7 RWMS) ROD WORTH MINIMIZER SYSTEM														
(202001) (SF1, SF4 RS) RECIRCULATION SYSTEM														
(202002) (SF1 RSCTL) RECIRCULATION FLOW CONTROL SYSTEM														
(204000) (SF2 RWCU) REACTOR WATER CLEANUP SYSTEM					X							(204000K5.09) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF2 RWCU) REACTOR WATER CLEANUP SYSTEM: (CFR: 41.5 / 45.3) System flow	3.1	56
(214000) (SF7 RPIS) ROD POSITION INFORMATION SYSTEM								X				(214000A2.01) Ability to (a) predict the impacts of the following on the (SF7 RPIS) ROD POSITION INFORMATION 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) Failed reed switches	3.3	57
(215001) (SF7 TIP) TRAVERSING IN CORE PROBE														
(215002) (SF7 RBMS) ROD BLOCK MONITOR SYSTEM														
(216000) (SF7 NBI) NUCLEAR BOILER INSTRUMENTATION								X				(216000A2.09) Ability to (a) predict the impacts of the following on the (SF7 NBI) NUCLEAR BOILER INSTRUMENTATION and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 43.5 / 45.6) Jet pump malfunction	3.8	58
(219000) (SF5 RHR SPC) RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE														
(223001) (SF5 PCS) PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES				X								(223001K4.04) Knowledge of (SF5 PCS) PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES design features and/or interlocks that provide for the following: (CFR: 41.7) Limiting hydrogen concentration	3.8	59

Form 4.1-BWR	BWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)	ES 4.1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
(226001) (SF5 RHR CSS) RHR/LPCI: CONTAINMENT SPRAY MODE SYSTEM MODE											**X**	**(226001) (SF5 RHR CSS) RHR/LPCI: CONTAINMENT SPRAY MODE SYSTEM MODE (G2.1.9) CONDUCT OF OPERATIONS Ability to direct licensed personnel activities inside the control room (SRO Only) (CFR: 43.1 / 45.5 / 45.12 / 45.13)**	**4.5**	**91**
(230000) (SF5 RHR SPS) RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE														
(233000) (SF9 FPCCU) FUEL POOL COOLING/CLEANUP														
(234000) (SF8 FH) FUEL HANDLING														
(239001) (SF3, SF4 MRSS) MAIN AND REHEAT STEAM SYSTEM								**X**				**(239001A2.08) Ability to (a) predict the impacts of the following on the (SF3, SF4 MRSS) MAIN AND REHEAT STEAM SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: (CFR: 41.5 / 43.5 / 45.6) Low condenser vacuum**	**3.6**	**92**
(239003) (SF9 MSVLCS) MAIN STEAM ISOLATION VALVE LEAKAGE CONTROL SYSTEM														
(241000) (SF3 RTPRS) REACTOR/TURBINE PRESSURE REGULATING SYSTEM														
(245000) (SF4 MTGEN) MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS											X	(245000) (SF4 MTGEN) MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS (291004K1.13) PUMPS (CFR: 41.3) (CENTRIFUGAL) Theory of operation of a centrifugal pump	2.7	60
(256000) (SF2 CDS) CONDENSATE SYSTEM											**X**	**(256000) (SF2 CDS) CONDENSATE SYSTEM (G2.1.34) CONDUCT OF OPERATIONS Knowledge of RCS or balance of plant chemistry controls, including parameters measured and reasons for the control (CFR: 41.10 / 43.5 / 45.12)**	**3.5**	**93**
(259001) (SF2 FWS) FEEDWATER SYSTEM														
(268000) (SF9 RW) RADWASTE SYSTEM														
(271000) (SF9 OG) OFFGAS SYSTEM										X		(271000A4.02) Ability to manually operate and/or monitor the (SF9 OG) OFFGAS SYSTEM in the control room: (CFR: 41.7 / 45.5 to 45.8) System flows	3.3	61
(272000) (SF7, SF9 RMS) RADIATION MONITORING SYSTEM		X										(272000K2.06) (SF7, SF9 RMS) RADIATION MONITORING SYSTEM Knowledge of electrical power supplies to the following: (CFR: 41.7) Area radiation monitors	2.6	62
(286000) (SF8 FPS) FIRE PROTECTION SYSTEM														
(288000) (SF9 PVS) PLANT VENTILATION SYSTEMS	X											(288000K1.07) Knowledge of the physical connections and/or cause and effect relationships between the (SF9 PVS) PLANT VENTILATION SYSTEMS and the following systems: (CFR: 41.4 to 41.5 / 45.7 to 45.8) Heating, ventilation, and air conditioning system cooling water systems	2.6	63

Form 4.1-BWR	BWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)											ES 4.1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
(290001) (SF5 SC) SECONDARY CONTAINMENT														
(290002) (SF4 RVI) REACTOR VESSEL INTERNALS														
(290003) (SF9 CRV) CONTROL ROOM VENTILATION														
(510001) (SF8 CWS*) CIRCULATING WATER SYSTEM														
K/A Category Point Totals:												Group Point Total:		11/3

Facility:		Date of Exam:				
Generic Knowledge and Abilities—Tier 3 (RO/SRO)						
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	G2.1.14	(G2.1.14) CONDUCT OF OPERATIONS Knowledge of criteria or conditions that require plantwide announcements, such as pump starts, reactor trips, and mode changes (CFR: 41.10 / 43.5 / 45.12)	3.1	64		
	G2.1.43	(G2.1.43) CONDUCT OF OPERATIONS Ability to use an online power distribution monitoring system and/or procedures to determine the effects on reactivity of plant changes, such as RCS temperature, secondary plant, or fuel depletion (CFR: 41.10 / 43.6 / 45.6)	4.1	65		
	G2.1.5	**(G2.1.5) CONDUCT OF OPERATIONS Ability to use procedures related to shift staffing, such as minimum crew complement or overtime limitations (reference potential) (CFR: 41.10 / 43.5 / 45.12)**			**3.9**	**94**
	G2.1.37	**(G2.1.37) CONDUCT OF OPERATIONS Knowledge of procedures, guidelines, or limitations associated with reactivity management (CFR: 41.1 / 41.5 / 41.10 / 43.6 / 45.6)**			**4.6**	**95**
		Subtotal	N/A	2	N/A	**2**
2. Equipment Control	G2.2.14	(G2.2.14) EQUIPMENT CONTROL Knowledge of the process for controlling equipment configuration or status (CFR: 41.10 / 43.3 / 45.13)	3.9	66		
	G2.2.38	(G2.2.38) EQUIPMENT CONTROL Knowledge of conditions and limitations in the facility license (CFR: 41.7 / 41.10 / 43.1 / 45.13)	3.6	67		
	G2.2.45	**(G2.2.45) EQUIPMENT CONTROL Ability to determine or interpret technical specifications with action statements of greater than 1 hour (SRO Only) (CFR: 43.2 / 43.5 / 45.3)**			**4.7**	**96**
	G2.2.21	**(G2.2.21) EQUIPMENT CONTROL Knowledge of pre- and post-maintenance operability requirements (CFR: 41.10 / 43.2)**			**4.1**	**97**
		Subtotal	N/A	2	N/A	**2**
3. Radiation Control	G2.3.11	(G2.3.11) RADIATION CONTROL Ability to control radiation releases (CFR: 41.11 / 43.4 / 45.10)	3.8	68		
	G2.3.14	**(G2.3.14) RADIATION CONTROL Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities, such as analysis and interpretation of radiation and activity readings as they pertain to administrative, normal, abnormal, and emergency procedures, or analysis and interpretation of coolant activity, including comparison to emergency plan or regulatory limits (SRO Only) (CFR: 43.4 / 45.10)**			**3.8**	**98**
		Subtotal	N/A	1	N/A	**1**
4. Emergency Procedures/Plan	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)	3.2	69		
	G2.4.20	**(G2.4.20) EMERGENCY PROCEDURES/PLAN Knowledge of the operational implications of emergency and abnormal operating procedures warnings, cautions, and notes (CFR: 41.10 / 43.5 / 45.13)**			**4.3**	**99**
	G2.4.5	**(G2.4.5) EMERGENCY PROCEDURES / PLAN Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions (CFR: 41.10 / 43.5 / 45.13)**			**4.3**	**100**
		Subtotal	N/A	1	N/A	**2**
Tier 3 Point Total			N/A	**6**	N/A	**7**

Theory—Tier 4 (RO)				
Category	K/A #	Topic	RO	
			IR	#
Reactor Theory	292003	(292003K1.09) REACTOR KINETICS AND NEUTRON SOURCES (CFR: 41.1) Define doubling time and calculate it using the power	2.6	70
	292004	(292004K1.05) REACTIVITY COEFFICIENTS (CFR: 41.1) Define the fuel temperature (Doppler) coefficient of reactivity	2.9	71
	292007	(292007K1.01) FUEL DEPLETION AND BURNABLE POISONS (CFR: 41.1) Define burnable poison and state its use in the reactor	3.1	72
			Subtotal	3
Thermodynamics	293005	(293005K1.03) THERMODYNAMIC CYCLES (CFR: 41.14) Describe the steam quality/moisture effects on turbine integrity and efficiency	2.7	73
	293008	(293008K1.26) THERMAL HYDRAULICS (CFR: 41.14) (RECIRCULATION SYSTEM) Explain the jet pump operating principle	3.1	74
	293010	(293010K1.01) BRITTLE FRACTURE AND VESSEL THERMAL STRESS (CFR: 41.14) State the brittle fracture mode of failure	2.8	75
			Subtotal	3
Tier 4 Point Total				6