Facility: **Braidwood Station** Date of Exam: 5/18/20 – 5/29/20

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	3	N/A		3	18	3	3	6
	2	2	1	1				2	2			1	9	2	2	4
	Tier Totals	5	4	4				5	5			4	27	5	5	10
2. Plant Systems	1	2	3	3	3	3	3	3	2	2	2	2	28	3	2	5
	2	1	1	0	1	1	1	1	1	1	1	1	10	1 0	2	3
	Tier Totals	3	4	3	4	4	4	4	3	3	3	3	38	4	4	8
3. Generic Knowledge and Abilities Categories		1			2			3			4			1 2 3 4		
		2			3			2			3		10	2 2 1 2		7

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 shall be selected. 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	PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (**RO**)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000007 (EPE 7; ~~BW E02&E10; CE E02~~) Reactor Trip, Stabilization, Recovery / 1				.01			EA1.01 - Ability to operate and monitor the following as they apply to a Reactor Trip: T/G Controls (CFR 41.5 / 45.5 / 45.6)	3.7	1 (1)
000008 (APE 8) Pressurizer Vapor Space Accident / 3									
000009 (EPE 9) Small Break LOCA / 3									
000011 (EPE 11) Large Break LOCA / 3					.02		EA2.02 – Ability to determine or interpret the following as they apply to a Large Break LOCA: Consequences to RHR of not resetting safety injection (CFR 43.5 / 45.13)	3.3	1 (2)
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4						2.4.4	2.4.4 – Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6)	4.5	1 (3)
000022 (APE 22) Loss of Reactor Coolant Makeup / 2	.02						AK1.02 – Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup: Relationship of charging flow to pressure differential between charging and RCS (CFR 41.8, 10 / 45.3)	2.7	1 (4)
000025 (APE 25) Loss of Residual Heat Removal System / 4		.05					AK2.05 – Knowledge of the interrelations between Loss of Residual Heat Removal System and the following: Reactor building sump (CFR 41.7 / 45.7)	2.6	1 (5)
000026 (APE 26) Loss of Component Cooling Water / 8			.03				AK3.03 – Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: Guidance actions contained in EOP for Loss of CCW (CFR 41.5, 10 / 45.6, 13)	4.0	1 (6)
000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3									
000029 (EPE 29) Anticipated Transient Without Scram / 1				.08			EA1.08 - Ability to operate and monitor the following as they apply to a ATWS: Reactor trip switch pushbutton (CFR 41.5 / 45.5 / 45.6)	4.5	1 (7)
000038 (EPE 38) Steam Generator Tube Rupture / 3					.12		EA2.12 - Ability to determine or interpret the following as they apply to a SGTR: Status of MSIV activating system (CFR 43.5 / 45.13)	3.9	1 (8)
000040 (APE 40; ~~BW E05; CE E05;~~ W E12) Steam Line Rupture—Excessive Heat Transfer / 4						2.2.40	(APE 40) 2.2.40 – Ability to apply Technical Specifications for a system (CFR 41.10 / 45.12, 13)	3.4	1 (9)
000054 (APE 54; ~~CE E06~~) Loss of Main Feedwater /4	.02						AK1.02 - Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): Effects of feedwater introduction on dry S/G (CFR 41.8, 10 / 45.3)	3.6	1 (10)
000055 (EPE 55) Station Blackout / 6			.01				EK3.01 - Knowledge of the reasons for the following responses as they apply to the Station Blackout: Length of time for which battery capacity is designed (CFR 41.5, 10 / 45.6, 13)	2.7	1 (11)
000056 (APE 56) Loss of Offsite Power / 6				.28			AA1.28 - Ability to operate and monitor the following as they apply to the Loss of Offsite Power: SWS flow control valve for the CCW cooler to control CCW outlet temperature (CFR 41.5 / 45.5 / 45.6)	3.1	1 (12)

000057 (APE 57) Loss of Vital AC Instrument Bus / 6					.02		AA2.02 - Ability to determine or interpret the following as they apply to the Loss of Vital AC Instrument Bus: Core flood tank pressure and level indicators (CFR 43.5 / 45.13)	3.7	1 (13)
000058 (APE 58) Loss of DC Power / 6									
000062 (APE 62) Loss of Nuclear Service Water / 4									
000065 (APE 65) Loss of Instrument Air / 8						2.1.20	2.1.20 – Ability to interpret and execute procedure steps (CFR 41.10 / 43.5 / 45.12)	4.6	1 (14)
000077 (APE 77) Generator Voltage and Electric Grid Disturbances / 6		.07					AK2.07 - Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following: Turbine/generator controls (CFR 41.4,5,7,10 / 45.8)	3.6	1 (15)
(W E04) LOCA Outside Containment / 3	.2						EK1.2 – Knowledge of the operational implications of the following concepts as they apply to the LOCA Outside Containment: Normal, abnormal, and emergency operating procedures associated with LOCA Outside Containment (CFR 41.8, 10 / 45.3)	3.5	1 (16)
(W E11) Loss of Emergency Coolant Recirculation / 4		.1					EK2.1 – Knowledge of the interrelations between Loss of Emergency Coolant Recirculation and the following: Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features (CFR 41.7 / 45.7)	3.6	1 (17)
(~~BW E04;~~ W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4			.3				EK3.3 – Knowledge of the reasons for the following responses as they apply to the Loss of Secondary Heat Sink: Manipulation of controls required to obtain desired operating results during abnormal and emergency situations (CFR 41.5, 10 / 45.6, 13)	4.0	1 (18)
K/A Category Totals:	3	3	3	3	3	3	Group Point Total:		**18**

ES-401	PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (**RO**)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000001 (APE 1) Continuous Rod Withdrawal / 1									
000003 (APE 3) Dropped Control Rod / 1				.07			AA1.07 - Ability to operate and monitor the following as they apply to the Dropped Control Rod: In-core and ex-core instrumentation (CFR 41.7 / 45.5, 6)	3.8	1 (19)
000005 (APE 5) Inoperable/Stuck Control Rod / 1									
000024 (APE 24) Emergency Boration / 1									
000028 (APE 28) Pressurizer (PZR) Level Control Malfunction / 2					.10		AA2.10 – Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Whether the automatic mode for PZR level control is functioning improperly, necessity of shift to manual modes (CFR 43.5 / 45.13)	3.3	1 (20)
000032 (APE 32) Loss of Source Range Nuclear Instrumentation / 7						2.4.46	2.4.46 – Ability to verify that the alarms are consistent with the plant conditions (CFR 41.10 / 43.5 / 45.3, 12)	4.2	1 (21)
000033 (APE 33) Loss of Intermediate Range Nuclear Instrumentation / 7	.01						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to Loss of Intermediate Range Nuclear Instrumentation: Effects of voltage changes on performance (CFR 41.8, 10 / 45.3)	2.7	1 (22)
000036 (APE 36; ~~BW/A08~~) Fuel-Handling Incidents / 8									
000037 (APE 37) Steam Generator Tube Leak / 3									
000051 (APE 51) Loss of Condenser Vacuum / 4			.01				AK3.01 - Knowledge of the reasons for the following responses as they apply to the Loss of Condenser Vacuum: Loss of steam dump capability upon loss of condenser (CFR 41.5, 10 / 45.6, 13)	2.8	1 (23)
000059 (APE 59) Accidental Liquid Radwaste Release / 9									
000060 (APE 60) Accidental Gaseous Radwaste Release / 9									
000061 (APE 61) Area Radiation Monitoring System Alarms / 7									
000067 (APE 67) Plant Fire On Site / 8									
000068 (APE 68; ~~BW A06~~) Control Room Evacuation / 8					.04		AA2.04 - Ability to determine and interpret the following as they apply to the Control Room Evacuation: S/G pressure (CFR 43.5 / 45.13)	3.7	1 (24)
000069 (APE 69; W E14) Loss of Containment Integrity / 5									
000074 (EPE 74; W E06 & E07) Inadequate Core Cooling / 4									
000076 (APE 76) High Reactor Coolant Activity / 9				.04			AA1.04 - Ability to operate and monitor the following as they apply to High Reactor Coolant Activity: Failed fuel-monitoring equipment (CFR 41.7 / 45.5, 6)	3.2	1 (25)
000078 (APE 78*) RCS Leak / 3									
(W E01 & E02) Rediagnosis & SI Termination / 3									

(W E13) Steam Generator Overpressure / 4		.1					EK2.1 – Knowledge of the interrelations between Steam Generator Overpressure and the following: Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features (CFR 41.7 / 45.7)	3.0	1 (26)
(W E15) Containment Flooding / 5									
(W E16) High Containment Radiation /9									
(BW A01) Plant Runback / 1									
(BW A02 & A03) Loss of NNI-X/Y/7									
(BW A04) Turbine Trip / 4									
(BW A05) Emergency Diesel Actuation / 6									
(BW A07) Flooding / 8									
(BW E03) Inadequate Subcooling Margin / 4									
(~~BW E08;~~ W E03) LOCA Cooldown—Depressurization / 4									
(~~BW E09; CE A13**;~~ W E09 & E10) Natural Circulation/4	.3						(E10) EK1.3 - Knowledge of the operational implications of the following concepts as they apply to the Natural Circulation with Steam Void in Vessel with/without RVLIS: Annunciators and conditions indicating signals, and remedial actions associated with the Natural Circulation with Steam Void in Vessel with/without RVLIS (CFR 41.8, 10 / 45.3)	3.3	1 (27)
(BW E13 & E14) EOP Rules and Enclosures									
(~~CE A11**;~~ W E08) RCS Overcooling—Pressurized Thermal Shock / 4									
(CE A16) Excess RCS Leakage / 2									
(CE E09) Functional Recovery									
(CE E13*) Loss of Forced Circulation/LOOP/Blackout / 4									
K/A Category Point Totals:	2	1	1	2	2	1	Group Point Total:		**9**

ES-401 PWR Examination Outline Form ES-401-2
Plant Systems—Tier 2/Group 1 (**RO**)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
003 (SF4P RCP) Reactor Coolant Pump		02										K2.02 – Knowledge of the bus power supplies to the following: CCW pumps (CFR 41.7)	2.5	1 (28)
004 (SF1; SF2 CVCS) Chemical and Volume Control			08	03								(SF2) K3.08 – Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: RCP seal injection (CFR 41.7 / 45.6)	3.6	2 (29)
												(SF1) K4.03 – Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following: Protection of ion exchangers (high letdown temperature will isolate ion exchangers) (CFR 41.7)	2.8	(30)
005 (SF4P RHR) Residual Heat Removal				06	02							K4.06 - Knowledge of RHRS design feature(s) and/or interlock(s) which provide for the following: Function of RHR pump miniflow recirculation (CFR 41.7)	2.7	2 (31)
												K5.02 – Knowledge of the operational implications of the following concepts as they apply to the RHRS: Need for adequate subcooling (CFR 41.5 / 45.7)	3.4	(32)
006 (SF2; SF3 ECCS) Emergency Core Cooling					05							K5.05 - Knowledge of the operational implications of the following concepts as they apply to ECCS: Effects of pressure on a solid system (CFR 41.5 / 45.7)	3.4	1 (33)
007 (SF5 PRTS) Pressurizer Relief/Quench Tank							01					A1.01 – Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Maintaining quench tank water level within limits (CFR 41.5 / 45.5)	2.9	1 (34)
008 (SF8 CCW) Component Cooling Water								03				A2.03 – Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High/low CCW temperature (CFR 41.5 / 43.5 / 45.3, 13)	3.0	1 (35)
010 (SF3 PZR PCS) Pressurizer Pressure Control						02						K6.02 – Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: PZR (CFR 41.7 / 45.7)	3.2	1 (36)
012 (SF7 RPS) Reactor Protection						06			05			A3.05 – Ability to monitor automatic operation of the RPS, including: Single and multiple channel trip indicators (CFR 41.7 / 45.5)	3.6	2 (37)
												K6.06 - Knowledge of the effect of a loss or malfunction of the following will have on the RPS: Sensors and detectors (CFR 41.7 / 45.7)	2.7	(38)
013 (SF2 ESFAS) Engineered Safety Features Actuation										02		A4.02 – Ability to manually operate and/or monitor in the control room: Reset of ESFAS channels (CFR 41.7 / 45.5-8)	4.3	1 (39)

022 (SF5 CCS) Containment Cooling							02				2.1.23	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, 6) A1.02 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Containment pressure (CFR 41.5 / 45.5)	4.3 3.6	2 (40) (41)
025 (SF5 ICE) Ice Condenser													
026 (SF5 CSS) Containment Spray	01	~~01~~ 02										K1.01 – Knowledge of the physical connections and/or cause-effect relationships between the CSS and the following systems: ECCS (CFR 41.2-9 / 45.7-8) ~~K2.01 - Knowledge of the bus power supplies to the following: Containment spray pumps~~ K2.02 - Knowledge of the bus power supplies to the following: MOVs (CFR 41.7)	4.2 ~~3.4~~ 2.7	2 (42) (43)
039 (SF4S MSS) Main and Reheat Steam			06									K3.06 - Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: SDS (CFR 41.7 / 45.6)	2.8	1 (44)
059 (SF4S MFW) Main Feedwater				16								K4.16 - Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: Automatic trips for MFW pumps (CFR 41.7)	3.1	1 (45)
061 (SF4S AFW) Auxiliary/Emergency Feedwater					02	02						K5.02 - Knowledge of the operational implications of the following concepts as they apply to the AFW: Decay heat sources and magnitude (CFR 41.5 / 45.7) K6.02 - Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: Pumps (CFR 41.7 / 45.7)	3.2 2.6	2 (46) (47)
062 (SF6 ED AC) AC Electrical Distribution							03					A1.03 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AC distribution system controls including: Effect on instrumentation and controls of switching power supplies (CFR 41.5 / 45.5)	2.5	1 (48)
063 (SF6 ED DC) DC Electrical Distribution								01				A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the DC distribution system, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Grounds (CFR 41.5 / 43.5 / 45.3, 13)	2.5	1 (49)
064 (SF6 EDG) Emergency Diesel Generator									06			A3.06 - Ability to monitor automatic operation of the ED/G, including: Start and stop (CFR 41.7 / 45.5)	3.3	1 (50)
073 (SF7 PRM) Process Radiation Monitoring										02		A4.02 - Ability to manually operate and/or monitor in the control room: Radiation monitoring system control panel (CFR 41.7 / 45.5-8)	3.7	1 (51)

076 (SF4S SW) Service Water		08								2.2.4	2.2.4 – Ability to explain the variations in control board/control room layouts, systems, instrumentation, and procedural actions between units at a facility (CFR 41.6, 7, 10 / 45.3, 13) K2.08 - Knowledge of the bus power supplies to the following: ESF-actuated MOVs (CFR 41.7)	3.6 3.1	2 (52) (53)
078 (SF8 IAS) Instrument Air	04										K1.04 - Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: Cooling water to compressor (CFR 41.2-9 / 45.7-8)	2.6	1 (54)
103 (SF5 CNT) Containment			02								K3.02 – Knowledge of the effect that a loss or malfunction of the containment system will have on the following: Loss of containment integrity under normal operations (CFR 41.7 / 45.6)	3.8	1 (55)
053 (SF1; SF4P ICS*) Integrated Control													
K/A Category Point Totals:	2	3	3	3	3	3	3	2	2	2	2	Group Point Total:	**28**

ES-401	PWR Examination Outline											Form ES-401-2		
	Plant Systems—Tier 2/Group 2 (**RO**)													
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
001 (SF1 CRDS) Control Rod Drive		05										K2.05 - Knowledge of the bus power supplies to the following: M/G sets (CFR 41.7)	3.1	1 (56)
002 (SF2; SF4P RCS) Reactor Coolant				02								K4.02 - Knowledge of RCS design feature(s) and/or interlock(s) which provide for the following: Monitoring reactor vessel level (CFR 41.7)	3.5	1 (57)
011 (SF2 PZR LCS) Pressurizer Level Control					05							K5.05 - Knowledge of the operational implications of the following concepts as they apply to the PZR LCS: Interrelation of indicated charging flow rate with volume of water required to bring PZR level back to programmed level hot/cold (CFR 41.5 / 45.7)	2.8	1 (58)
014 (SF1 RPI) Rod Position Indication														
015 (SF7 NI) Nuclear Instrumentation						04						K6.04 - Knowledge of the effect of a loss or malfunction of the following will have on the NIS: Bistables and logic circuits (CFR 41.7 / 45.7)	3.1	1 (59)
016 (SF7 NNI) Nonnuclear Instrumentation														
017 (SF7 ITM) In-Core Temperature Monitor														
027 (SF5 CIRS) Containment Iodine Removal								~~01~~				~~A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the CIRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High temperature in the filter system (CFR 41.5 / 43.5 / 45.3, 13)~~	~~3.0~~	~~1~~
028 (SF5 HRPS) Hydrogen Recombiner and Purge Control														
029 (SF8 CPS) Containment Purge							03					A1.03 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Containment Purge System controls including: Containment pressure, temperature, and humidity (CFR 41.5 / 45.5)	3.0	1 (60)
033 (SF8 SFPCS) Spent Fuel Pool Cooling									02			A3.02 - Ability to monitor automatic operation of the Spent Fuel Cooling System including: Spent fuel leak or rupture (CFR 41.7 / 45.5)	2.9	1 (61)
034 (SF8 FHS) Fuel-Handling Equipment														
035 (SF 4P SG) Steam Generator														
041 (SF4S SDS) Steam Dump/Turbine Bypass Control										04		A4.04 - Ability to manually operate and/or monitor in the control room: Pressure mode (CFR 41.7 / 45.5-8)	2.7	1 (62)
045 (SF 4S MTG) Main Turbine Generator								17				A2.17 - Ability to (a) predict the impacts of the following malfunctions or operations on the CIRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Malfunction of electrohydraulic control (CFR 41.5 / 43.5 / 45.3, 13)	2.7	1 (63)
055 (SF4S CARS) Condenser Air Removal														
056 (SF4S CDS) Condensate														
068 (SF9 LRS) Liquid Radwaste											2.1.27	2.1.27 – Knowledge of system purpose and/or function (CFR 41.7)	3.9	1 (64)

071 (SF9 WGS) Waste Gas Disposal													
072 (SF7 ARM) Area Radiation Monitoring													
075 (SF8 CW) Circulating Water	08										K1.08 - Knowledge of the physical connections and/or cause-effect relationships between the Circulating Water System and the following systems: Emergency/essential SWS (CFR 41.2-9 / 45.7-8)	3.2	1 (65)
079 (SF8 SAS**) Station Air													
086 Fire Protection													
050 (SF 9 CRV*) Control Room Ventilation													
K/A Category Point Totals:	1	1	0	1	1	1	1	1	1	1	1	Group Point Total:		**10**

ES-401	PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (**SRO**)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000007 (EPE 7; ~~BW E02&E10; CE E02~~) Reactor Trip, Stabilization, Recovery / 1									
000008 (APE 8) Pressurizer Vapor Space Accident / 3					.23		AA2.23 - Ability to determine or interpret the following as they apply to the Pressurizer Vapor Space Accident: Criteria for throttling high-pressure injection after a small LOCA (CFR 43.5 / 45.13)	4.3	1 (76)
000009 (EPE 9) Small Break LOCA / 3						2.4.6	2.4.6 – Knowledge of EOP mitigation strategies (CFR 41.10 / 43.5 / 45.13)	4.7	1 (77)
000011 (EPE 11) Large Break LOCA / 3									
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4									
000022 (APE 22) Loss of Reactor Coolant Makeup / 2									
000025 (APE 25) Loss of Residual Heat Removal System / 4									
000026 (APE 26) Loss of Component Cooling Water / 8									
000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3					.07		AA2.07 - Ability to determine or interpret the following as they apply to the Pressurizer Pressure Control Malfunction: Makeup flow indication (CFR 43.5 / 45.13)	3.1	1 (78)
000029 (EPE 29) Anticipated Transient Without Scram / 1									
000038 (EPE 38) Steam Generator Tube Rupture / 3									
000040 (APE 40; ~~BW E05; CE E05;~~ W E12) Steam Line Rupture—Excessive Heat Transfer / 4						2.4.45	(W E12) 2.4.45 – Ability to prioritize and interpret the significance of each annunciator or alarm (CFR 41.10 / 43.5 / 45.3, 12)	4.3	1 (79)
000054 (APE 54; ~~CE E06~~) Loss of Main Feedwater /4									
000055 (EPE 55) Station Blackout / 6									
000056 (APE 56) Loss of Offsite Power / 6									
000057 (APE 57) Loss of Vital AC Instrument Bus / 6									
000058 (APE 58) Loss of DC Power / 6					.01		AA2.01 - Ability to determine or interpret the following as they apply to the Loss of DC Power: That a loss of DC power has occurred; verifications that substitute power sources have come on line (CFR 43.5 / 45.13)	4.1	1 (80)
000062 (APE 62) Loss of Nuclear Service Water / 4						2.1.28	2.1.28 – Knowledge of the purpose and function of major system components and controls (CFR 41.7)	4.1	1 (81)
000065 (APE 65) Loss of Instrument Air / 8									
000077 (APE 77) Generator Voltage and Electric Grid Disturbances / 6									
(W E04) LOCA Outside Containment / 3									
(W E11) Loss of Emergency Coolant Recirculation / 4									

(~~BW E04;~~ W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4									
K/A Category Totals:					3	3	Group Point Total:		**6**

ES-401	PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (**SRO**)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000001 (APE 1) Continuous Rod Withdrawal / 1									
000003 (APE 3) Dropped Control Rod / 1									
000005 (APE 5) Inoperable/Stuck Control Rod / 1									
000024 (APE 24) Emergency Boration / 1									
000028 (APE 28) Pressurizer (PZR) Level Control Malfunction / 2									
000032 (APE 32) Loss of Source Range Nuclear Instrumentation / 7									
000033 (APE 33) Loss of Intermediate Range Nuclear Instrumentation / 7									
000036 (APE 36; ~~BW/A08~~) Fuel-Handling Incidents / 8									
000037 (APE 37) Steam Generator Tube Leak / 3									
000051 (APE 51) Loss of Condenser Vacuum / 4									
000059 (APE 59) Accidental Liquid Radwaste Release / 9									
000060 (APE 60) Accidental Gaseous Radwaste Release / 9									
000061 (APE 61) Area Radiation Monitoring System Alarms / 7									
000067 (APE 67) Plant Fire On Site / 8									
000068 (APE 68; ~~BW A06~~) Control Room Evacuation / 8									
000069 (APE 69; W E14) Loss of Containment Integrity / 5					.02		(APE 69) AA2.02 - Ability to determine or interpret the following as they apply to the Loss of Containment Integrity: Verification of automatic and manual means of restoring integrity (CFR 43.5 / 45.13)	4.4	1 (82)
000074 (EPE 74; W E06 & E07) Inadequate Core Cooling / 4						2.4.8	(W E06) 2.4.8 – Knowledge of how abnormal operating procedures are used in conjunction with EOPs (CFR 41.10 / 43.5 / 45.13)	4.5	1 (83)
000076 (APE 76) High Reactor Coolant Activity / 9									
000078 (APE 78*) RCS Leak / 3									
(W E01 & E02) Rediagnosis & SI Termination / 3					.2		(W E01) EA2.2 – Ability to determine and interpret the following as they apply to the Reactor Trip or Safety Injection Rediagnosis: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments (CFR 43.5 / 45.13)	3.9	1 (84)
(W E13) Steam Generator Overpressure / 4									
(W E15) Containment Flooding / 5									
(W E16) High Containment Radiation /9						2.4.47	2.4.47 – Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material (CFR 41.10 / 43.5 / 45.12)	4.2	1 (85)
(BW A01) Plant Runback / 1									
(BW A02 & A03) Loss of NNI-X/Y/7									
(BW A04) Turbine Trip / 4									
(BW A05) Emergency Diesel Actuation / 6									
(BW A07) Flooding / 8									

(BW E03) Inadequate Subcooling Margin / 4									
(~~BW E08;~~ W E03) LOCA Cooldown—Depressurization / 4									
(~~BW E09; CE A13**;~~ W E09 & E10) Natural Circulation/4									
(BW E13 & E14) EOP Rules and Enclosures									
(~~CE A11**;~~ W E08) RCS Overcooling—Pressurized Thermal Shock / 4									
(CE A16) Excess RCS Leakage / 2									
(CE E09) Functional Recovery									
(CE E13*) Loss of Forced Circulation/LOOP/Blackout / 4									
K/A Category Point Totals:					2	2	Group Point Total:		**4**

ES-401 PWR Examination Outline Form ES-401-2
Plant Systems—Tier 2/Group 1 (**SRO**)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
003 (SF4P RCP) Reactor Coolant Pump								01				A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Problems with RCP seals, especially rates of seal leak off (CFR 41.5 / 43.5 / 45.3, 13)	3.9	1 (86)
004 (SF1; SF2 CVCS) Chemical and Volume Control														
005 (SF4P RHR) Residual Heat Removal														
006 (SF2; SF3 ECCS) Emergency Core Cooling											2. 1. 19	(SF3) 2.1.19 – Ability to use plant computers to evaluate system or component status (CFR 41.10 / 45.12)	3.8	1 (87)
007 (SF5 PRTS) Pressurizer Relief/Quench Tank														
008 (SF8 CCW) Component Cooling Water								08				A2.08 - Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Effects of shutting (automatically or otherwise) the isolation valves of the letdown cooler (CFR 41.5 / 43.5 / 45.3, 13)	2.7	1 (88)
010 (SF3 PZR PCS) Pressurizer Pressure Control														
012 (SF7 RPS) Reactor Protection														
013 (SF2 ESFAS) Engineered Safety Features Actuation														
022 (SF5 CCS) Containment Cooling														
025 (SF5 ICE) Ice Condenser														
026 (SF5 CSS) Containment Spray														
039 (SF4S MSS) Main and Reheat Steam														
059 (SF4S MFW) Main Feedwater														
061 (SF4S AFW) Auxiliary/Emergency Feedwater														
062 (SF6 ED AC) AC Electrical Distribution														
063 (SF6 ED DC) DC Electrical Distribution														
064 (SF6 EDG) Emergency Diesel Generator								03				A2.03 - Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G System, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Parallel operation of ED/G s (CFR 41.5 / 43.5 / 45.3, 13)	3.1	1 (89)

073 (SF7 PRM) Process Radiation Monitoring										2.4.50	2.4.50 – Ability to verify system alarm setpoints and operate controls identified in the alarm response manual (CFR 41.10 / 43.5 / 45.3)	4.0	1 (90)
076 (SF4S SW) Service Water													
078 (SF8 IAS) Instrument Air													
103 (SF5 CNT) Containment													
053 (SF1; SF4P ICS*) Integrated Control													
K/A Category Point Totals:							3			2	Group Point Total:		**5**

ES-401	PWR Examination Outline Plant Systems—Tier 2/Group 2 (**SRO**)											Form ES-401-2		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
001 (SF1 CRDS) Control Rod Drive														
002 (SF2; SF4P RCS) Reactor Coolant														
011 (SF2 PZR LCS) Pressurizer Level Control														
014 (SF1 RPI) Rod Position Indication														
015 (SF7 NI) Nuclear Instrumentation														
016 (SF7 NNI) Nonnuclear Instrumentation														
017 (SF7 ITM) In-Core Temperature Monitor											2.1.7	2.1.7 – Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation (CFR 41.5 / 43.5 / 45.12, 13)	4.7	1 (91)
027 (SF5 CIRS) Containment Iodine Removal														
028 (SF5 HRPS) Hydrogen Recombiner and Purge Control														
029 (SF8 CPS) Containment Purge														
033 (SF8 SFPCS) Spent Fuel Pool Cooling														
034 (SF8 FHS) Fuel-Handling Equipment														
035 (SF 4P SG) Steam Generator								01				A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the GS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Faulted or ruptured S/Gs (CFR 41.5 / 43.5 / 45.3, 5)	4.6	1 (92)
041 (SF4S SDS) Steam Dump/Turbine Bypass Control														
045 (SF 4S MTG) Main Turbine Generator														
055 (SF4S CARS) Condenser Air Removal														
056 (SF4S CDS) Condensate														
068 (SF9 LRS) Liquid Radwaste														
071 (SF9 WGS) Waste Gas Disposal														
072 (SF7 ARM) Area Radiation Monitoring														
075 (SF8 CW) Circulating Water														
079 (SF8 SAS**) Station Air														
086 Fire Protection											2.2.12	2.2.12 – Knowledge of surveillance procedures (CFR 41.10 / 45.13)	4.1	1 (93)
050 (SF 9 CRV*) Control Room Ventilation														
K/A Category Point Totals:								1			2	Group Point Total:		**3**

Facility: **Braidwood Station** Date of Exam: 5/18/20 – 5/29/20

Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements (CFR 41.10 / 45.13)	3.8	1 (66)		
	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	1 (67)		
	2.1.13	Knowledge of facility requirements for controlling vital/controlled access (CFR 41.10 / 43.5 / 45.9, 10)			3.2	1 (94)
	2.1.42	Knowledge of new and spent fuel movement procedures (CFR: 41.10 / 43.7 / 45.13)			3.4	1 (95)
	Subtotal			2		2
2. Equipment Control	2.2.13	Knowledge of clearance and tagging procedures (CFR 41.10 / 45.13)	4.1	1 (68)		
	2.2.22	Knowledge of limiting conditions for operations and safety limits (CFR 41.5 / 43.2 / 45.2)	4.0	1 (69)		
	2.2.37	Ability to determine operability and/or availability of safety related equipment (CFR 41.7 / 43.5 / 45.12)	3.6	1 (70)		
	2.2.17	Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with transmission system operator (CFR 41.10 / 43.5 / 45.13)			3.8	1 (96)
	2.2.19	Knowledge of maintenance work order requirements (CFR 41.10 / 43.5 / 45.13)			3.4	1 (97)
	Subtotal			3		2
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	1 (71)		
	2.3.7	Ability to comply with radiation work requirements during normal or abnormal conditions (CFR 41.12 / 45.10)	3.5	1 (72)		
	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 / 43.3 / 45.9)			3.1	1 (98)
	Subtotal			2		1
4. Emergency Procedures/Plan	2.4.20	Knowledge of the operational implications of EOP warnings, cautions, and notes (CFR 41.10 / 43.5 / 45.13)	3.8	1 (73)		
	2.4.26	Knowledge of facility protection requirements, including fire brigade and portable firefighting equipment usage (CFR 41.10 / 43.5 / 45.12)	3.1	1 (74)		
	2.4.35	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects (CFR 41.10 / 43.5 / 45.13)	3.8	1 (75)		
	2.4.22	Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations (CFR 41.7, 10 / 43.5 / 45.12)			4.4	1 (99)

	2.4.40	Knowledge of SRO responsibilities in emergency plan implementation (CFR 41.10 / 43.5 / 45.11)			4.5	1 (100)
	Subtotal			3		2
Tier 3 Point Total				10		7