FINAL OUTLINES

FOR THE BRAIDWOOD INITIAL EXAMINATION

DECEMBER 2007

Facility: Braidwood Date of Examination: 12/03/2007

Examination Level: RO ☒ SRO ☐ Operating Test Number: 20070301

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D, S, R	R-103 Perform Shutdown Margin Calculation K/A 2.1.25 Imp Factor 2.8
Conduct of Operations	N, S	R-107 Perform Mode 5 Shiftly and Daily Operating Surveillance K/A 2.1.18 Imp Factor 2.9
Equipment Control	D, S	R-201 Hang Worker Tagout (1A FW Pump) K/A 2.2.13 Imp Factor 3.6
Radiation Control	M, R	R-303 Determine Radiological Conditions and Entry Requirements for 1A RH Hx Room K/A 2.3.10 Imp Factor 2.9
Emergency Plan	N/A	N/A

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

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

Facility: Braidwood Date of Examination: 12/03/2007

Examination Level: RO ☐ SRO ☒ Operating Test Number: 20070301

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D, S, R	S-107 Review Shutdown Margin Calculation K/A 2.1.33 Imp Factor 4.0
Conduct of Operations	N, S	R-107 Perform Mode 5 Shiftly and Daily Operating Surveillance K/A 2.1.18 Imp Factor 3.0
Equipment Control	D, S, R	S-201 Initiate a LCOAR (1A SI Pump) K/A 2.2.23 Imp Factor 3.8
Radiation Control	M, R	R-303 Determine Radiological Conditions and Entry Requirements for 1A RH Hx Room K/A 2.3.10 Imp Factor 3.3
Emergency Plan	N, S	S-400 Prepare and Approve Nuclear Accident Reporting System Form. K/A 2.4.40 Imp Factor 4.0

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

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

Facility: Braidwood Date of Examination: 12/03/2007

Exam Level: RO ☒ SRO-I ☐ SRO-U ☐ Operating Test Number: 20070301

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. SIM-110 Perform Emergency Boration for Inadequate Shutdown Margin K/A 004000A4.07 Imp Factor 3.9	D, S, L, A	1
b. SIM-222 Align Ventilation Systems for Emergency Operations K/A 013000A4.01 Imp Factor 4.5	N, S, L, A	2
c. SIM-206 Lower 1C SI Accumulator Level K/A 006000A1.13 Imp Factor 3.5	D, S	3
d. SIM-400P Secure 1B RH Pump From Shutdown Cooling and Align for Cold Leg Injection K/A 005000A4.01 Imp Factor 3.6	N, S, L	4P
e. SIM-501 Drain the PRT K/A 007000A1.01 Imp Factor 2.9	D, S	5
f. SIM-610 Perform Low Power Electrical Alignment K/A 062000A4.07 Imp Factor 3.1	N ,S	6
g. SIM-800 Swap CC Pumps K/A 008000A4.01 Imp Factor 3.3	D, S, A	8
h. SIM-901 Perform Waste Gas Release Channel Checks K/A 071000A4.25 Imp Factor 3.2	D, P, S	9
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. IP-100 Rod Drive MG Startup and Paralleling with Auto Synchronization Failure K/A 001000G2.1.23 Imp Factor 3.9	D, A	1
j. IP-400S Local Start of 1B AF Pump with Failure of Battery Bank K/A 061000A2.03 Imp Factor 3.1	D, A, E, R	4S
k. IP-704 Align the Fire Hazards Panel K/A 016000G2.1.30 Imp Factor 3.9	M, E, R	7

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: Braidwood Date of Examination: 12/03/2007

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ Operating Test Number: 20070301

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. SIM-110 Perform Emergency Boration for Inadequate Shutdown Margin K/A 004000A4.07 Imp Factor 3.7	D, S, L, A	1
b. SIM-222 Align Ventilation Systems for Emergency Operations K/A 013000A4.01 Imp Factor 4.8	N, S, L, A	2
c. SIM-206 Lower 1C SI Accumulator Level K/A 006000A1.13 Imp Factor 3.7	D, S	3
d. N/A	N/A	N/A
e. SIM-501 Drain the PRT K/A 007000A1.01 Imp Factor 3.1	D, S	5
f. SIM-610 Perform Low Power Electrical Alignment K/A 062000A4.07 Imp Factor 3.1	N ,S	6
g. SIM-800 Swap CC Pumps K/A 008000A4.01 Imp Factor 3.3	D, S, A	8
h. SIM-901 Perform Waste Gas Release Channel Checks K/A 071000A4.25 Imp Factor 3.2	D, P, S	9
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. IP-100 Rod Drive MG Startup and Paralleling with Auto Synchronization Failure K/A 001000G2.1.23 Imp Factor 4.0	D, A	1
j. IP-400S Local Start of 1B AF Pump with Failure of Battery Bank K/A 061000A2.03 Imp Factor 3.4	D, A, E, R	4S
k. IP-704 Align the Fire Hazards Panel K/A 016000G2.1.30 Imp Factor 3.4	M, E, R	7

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility Name:Braidwood Date of Exam:12/03/2007

Tier	Group	RO K/A Category Points												SRO-Only Points						
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A 2		G *		Total		
1. Emergency & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A		3	18	3		3		6		
	2	2	2	1				1	1			2	9	2		2		4		
	Tier Totals	5	5	4				4	4			5	27	5		5		10		
2. Plant Systems	1	3	3	3	3	3	2	2	2	2	3	2	28	2		3		5		
	2	0	1	1	1	1	1	1	1	1	1	1	10	1	1	1		3		
	Tier Totals	3	4	4	4	4	3	3	3	3	4	3	38	4		4		8		
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1		2		3		4	7
		3			2			2			3			2		2		1		2	

Note:
1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
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 associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.
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.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in 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.

ES-401 PWR Examination Outline Form ES-401-2

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
1	000007 Reactor Trip - Stabilization - Recovery / 1	04						Decrease in reactor power following reactor trip (prompt drop and subsequent decay)	3.6	1
2	000008 Pressurizer Vapor Space Accident / 3		02					Sensors and detectors	2.7	1
3	000009 Small Break LOCA / 3						01, 23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	3.9	1
4	000011 Large Break LOCA / 3				04			ESF actuation system in manual	4.4	1
	000015 RCP Malfunctions / 4									1
5	000017 RCP Malfunctions (Loss of RC Flow) / 4						04, 49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4	
6	000022 Loss of Rx Coolant Makeup / 2	01						Consequences of thermal shock to RCP seals	2.8	1
7	000025 Loss of RHR System / 4		02					LPI or Decay Heat Removal/RHR pumps	3.2	1
8	000026 Loss of Component Cooling Water / 8			02				The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS	3.6	1
9	000027 Pressurizer Pressure Control System Malfunction / 3					05		PZR heater setpoints	3.2	1
10	000029 ATWS / 1				10			Rod control function switch	3.6	1
11	000038 Steam Gen. Tube Rupture / 3			09				Criteria for securing/throttling ECCS	4.1	1
12	000040 Steam Line Rupture - Excessive Heat Transfer / 4	05						Reactivity effects of cooldown	4.1	2
13	WE12 Uncontrolled Depreessurization of all Steam Generators / 4		02					Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the	3.6	
	000054 (CE/E06) Loss of Main Feedwater / 4									0
14	000055 Station Blackout / 6					03		Actions necessary to restore power	3.9	1
15	000056 Loss of Off-site Power / 6				21			Reset of the ESF load sequencers	3.3	1
16	000057 Loss of Vital AC Inst. Bus / 6					20		Interlocks in effect on loss of ac vital electrical instrument bus that must be bypassed to restore normal equipment operation	3.6	1
	000058 Loss of DC Power / 6									0
	000062 Loss of Nuclear Svc Water / 4									0
	000065 Loss of Instrument Air / 8									0
	W/E04 LOCA Outside Containment / 3									0
17	W/E11 Loss of Emergency Coolant Recirc. / 4						04, 09	Knowledge symptom based EOP mitigation strategies.	3.1	1
18	BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4			03				Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	4	1
	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)

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000001 Continuous Rod Withdrawal / 1									0
	000003 Dropped Control Rod / 1									0
19	000005 Inoperable/Stuck Control Rod / 1	03						Xenon transient	3.2	1
	000024 Emergency Boration / 1									0
20	000028 Pressurizer Level Malfunction / 2						02 22	Knowledge of limiting conditions for operations and safety limits.	3.4	1
21	000032 Loss of Source Range NI / 7		01					Power supplies, including proper switch positions	2.7	1
	000033 Loss of Intermediate Range NI / 7									0
22	*000036 Fuel Handling Accident / 8*		*02*					*Radiation monitoring equipment (portable and installed)*	3.4	1
23	000037 Steam Generator Tube Leak / 3				10			CVCS makeup tank level indicator	2.9	1
	000051 Loss of Condenser Vacuum / 4									0
	000059 Accidental Liquid RadWaste Rel. / 9									0
	000060 Accidental Gaseous Radwaste Rel. / 9									0
	000061 ARM System Alarms / 7									0
	000067 Plant Fire On-site / 8									0
24	000068 Control Room Evac. / 8						01 30	Ability to locate and operate components, including local controls.	3.9	1
	000069 Loss of CTMT Integrity / 5									0
	W/E14 High Containment Pressure / 5									
25	000074 Inad. Core Cooling / 4	03						Processes for removing decay heat from the core	4.5	1
	W/E06 Degraded Core Cooling / 4									
	W/E07 Saturated Core Cooling / 4									
	000076 High Reactor Coolant Activity / 9									0
26	W/E01 Rediagnosis / 3					02		Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.3	1
	W/E02 SI Termination / 3									
	W/E13 Steam Generator Over-pressure / 4									0
	W/E15 Containment Flooding / 5									0
	W/E16 High Containment Radiation / 9									0
27	W/E03 LOCA Cooldown - Depress. / 4			02				Normal, abnormal and emergency operating procedures associated with LOCA Cooldown and Depressurization	3.4	1
	W/E09 Natural Circulation Operations / 4									0
	W/E10 Natural Circulation with Steam Voide in Vessel with/without RVLIS. / 4									
	W/E08 RCS Overcooling - PTS / 4									0
	K/A Category Totals:	2	2	1	1	1	2	Group Point Total:		9

ES-401 PWR Examination Outline Form ES-401-2

Emergency and Abnormal Plant Evolutions - Tier 2/Group 1 (RO)

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
28	003 Reactor Coolant Pump										07		RCP seal bypass	2.6	1
29, 30	004 Chemical and Volume Control					37					19		Effects of boron saturation on ion exchanger behavior; CVCS letdown orifice isolation valve and valve control switches	2.6; 3.1	2
31	005 Residual Heat Removal				06								Function of RHR pump miniflow recirculation	2.7	1
32, 33	006 Emergency Core Cooling		02			06							*Valve operators for accumulators; Relationship between* ECCS flow and RCS pressure	2.5; 3.5	2
34	007 Pressurizer Relief/Quench Tank				01								Quench tank cooling	2.6	1
35	008 Component Cooling Water											01, 32	Ability to explain and apply all system limits and precautions.	3.4	1
36	010 Pressurizer Pressure Control											01, 02	Knowledge of operator responsibilities during all modes of plant operation.	3	1
37, 38	012 Reactor Protection			04			04						ESFAS; Bypass-block circuits	3.8; 3.3	2
39, 40	013 Engineered Safety Features Actuation		01				01						ESFAS/safeguards equipment control; Sensors and detectors	3.6; 2.7	2
41	022 Containment Cooling									01			Initiation of safeguards mode of operation	4.1	1
	025 Ice Condenser														0
42, 43	026 Containment Spray	01							07				ECCS; Loss of containment spray pump suction when in recirculation mode, possibly caused by clogged sump screen, pump inlet high temperature exceeded cavitation,	4.2; 3.6	2
44, 45	039 Main and Reheat Steam			04		08							MFW pumps; Effect of steam removal on reactivity	2.5; 3.6	2
46	059 Main Feedwater								12				Failure of feedwater regulating valves	3.1	1
47, 48	061 Auxiliary/Emergency Feedwater		03		01								AFW diesel driven pump; Water sources and priority of use	4; 4.1	2
49	062 AC Electrical Distribution							01					Significance of D/G load limits	3.4	1
50	063 DC Electrical Distribution			02									Components using DC control power	3.5	1
51	064 Emergency Diesel Generator	05											Starting air system	3.4	1
52	073 Process Radiation Monitoring							01					Radiation levels	3.2	1
53	076 Service Water										01		SWS pumps	2.9	1
54	078 Instrument Air	01											Sensor air	2.8	1
55	103 Containment									01			Containment isolation	3.9	1
	K/A Category Totals:	3	3	3	3	3	2	2	2	2	3	2	Group Point Total:		28

ES-401 PWR Examination Outline Form ES-401-2

Emergency and Abnormal Plant Evolutions - Tier 2/Group 2 (RO)

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
56	001 Control Rod Drive		05										M/G sets	3.1	1
57	002 Reactor Coolant			02									Fuel	4.2	1
	011 Pressurizer Level Control														0
58	014 Rod Position Indication										01		Rod selection control	3.3	1
	015 Nuclear Instrumentation														0
	016 Non-nuclear Instrumentation														0
	017 In-core Temperature Monitor														0
59	027 Containment Iodine Removal											01 38	*Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.*	3.4	1
	028 Hydrogen Recombiner and Purge Control														0
60	029 Containment Purge									01			CPS isolation	3.8	1
	033 Spent Fuel Pool Cooling														0
	034 Fuel Handling Equipment														0
61	035 Steam Generator						01						MSIVs	3.2	1
62	041 Steam Dump/Turbine Bypass Control							01					T-ave., verification above low/low setpoint	2.9	1
	045 Main Turbine Generator														0
	055 Condenser Air Removal														0
63	056 Condensate								04				Loss of condensate pumps	2.6	1
	068 Liquid Radwaste														0
64	071 Waste Gas Disposal					04							Relationship of hydrogen/oxygen concentrations to flammability	2.5	1
	072 Area Radiation Monitoring														0
	075 Circulating Water														0
	079 Station Air														0
65	086 Fire Protection				05								Halon	3	1
	K/A Category Totals:	0	1	1	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)

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000007 Reactor Trip - Stabilization - Recovery / 1									0
	000008 Pressurizer Vapor Space Accident / 3									0
	000009 Small Break LOCA / 3									0
	000011 Large Break LOCA / 3									0
80	000015 RCP Malfunctions / 4						04 04	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.3	1
	000017 RCP Malfunctions (Loss of RC Flow) / 4									
	000022 Loss of Rx Coolant Makeup / 2									0
	000025 Loss of RHR System / 4									0
	000026 Loss of Component Cooling Water / 8									0
	000027 Pressurizer Pressure Control System Malfunction / 3									0
	000029 ATWS / 1									0
76	000038 Steam Gen. Tube Rupture / 3						04 06	Knowledge symptom based EOP mitigation strategies.	4	1
	000040 Steam Line Rupture - Excessive Heat Transfer / 4									0
	WE12 Unconrtrolled Depreessurization of all Steam Generators / 4									
77	000054 (CE/E06) Loss of Main Feedwater / 4					01		Occurrence of reactor and/or turbine trip	4.4	1
	000055 Station Blackout / 6									0
	000056 Loss of Off-site Power / 6									0
	000057 Loss of Vital AC Inst. Bus / 6									0
78	000058 Loss of DC Power / 6						04 30	Knowledge of which events related to system operations/status should be reported to outside agencies.	3.6	1
79	000062 Loss of Nuclear Svc Water / 4					01		Location of a leak in the SWS	3.5	1
	000065 Loss of Instrument Air / 8									0
81	W/E04 LOCA Outside Containment / 3					02		Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	4.2	1
	W/E11 Loss of Emergency Coolant Recirc. / 4									0
	BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									0
	K/A Category Totals:	0	0	0	0	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)

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000001 Continuous Rod Withdrawal / 1									0
	000003 Dropped Control Rod / 1									0
	000005 Inoperable/Stuck Control Rod / 1									0
	000024 Emergency Boration / 1									0
	000028 Pressurizer Level Malfunction / 2									0
	000032 Loss of Source Range NI / 7									0
	000033 Loss of Intermediate Range NI / 7									0
	000036 Fuel Handling Accident / 8									0
	000037 Steam Generator Tube Leak / 3									0
	000051 Loss of Condenser Vacuum / 4									0
	000059 Accidental Liquid RadWaste Rel. / 9									0
	000060 Accidental Gaseous Radwaste Rel. / 9									0
	000061 ARM System Alarms / 7									0
82	000067 Plant Fire On-site / 8						01 02	Knowledge of operator responsibilities during all modes of plant operation.	4	1
	000068 Control Room Evac. / 8									0
	000069 Loss of CTMT Integrity / 5									1
83	W/E14 High Containment Pressure / 5					04		Facility conditions and selection of appropriate procedures during abnormal and emergency operations	3.8	
	000074 Inad. Core Cooling / 4									0
	W/E06 Degraded Core Cooling / 4									
	W/E07 Saturated Core Cooling / 4									
	000076 High Reactor Coolant Activity / 9									0
	W/E01 Rediagnosis / 3									0
	W/E02 SI Termination / 3									
	W/E13 Steam Generator Over-pressure / 4									0
84	W/E15 Containment Flooding / 5						04 04	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures	4.3	1
	W/E16 High Containment Radiation / 9									0
	W/E03 LOCA Cooldown - Depress. / 4									0
	W/E09 Natural Circulation Operations / 4									1
85	W/E10 Natural Circulation with Steam Voide in Vessel with/without RVLIS. / 4					02		Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.9	
	W/E08 RCS Overcooling - PTS / 4									0
	K/A Category Totals:	0	0	0	0	2	2	Group Point Total:		4

ES-401 PWR Examination Outline Form ES-401-2
Emergency and Abnormal Plant Evolutions - Tier 2/Group 1 (SRO)

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
	003 Reactor Coolant Pump														0
	004 Chemical and Volume Control														0
	005 Residual Heat Removal														0
	006 Emergency Core Cooling														0
	007 Pressurizer Relief/Quench Tank														0
86	008 Component Cooling Water								02				High/low surge tank level	3.5	1
	010 Pressurizer Pressure Control														0
	012 Reactor Protection														0
	013 Engineered Safety Features Actuation														0
	022 Containment Cooling														0
	025 Ice Condenser														0
	026 Containment Spray														0
	039 Main and Reheat Steam														0
	059 Main Feedwater														0
	061 Auxiliary/Emergency Feedwater														0
87	062 AC Electrical Distribution											04, 06	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.3	1
88	063 DC Electrical Distribution											02, 26	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7	1
89	064 Emergency Diesel Generator											02, 22	Knowledge of limiting conditions for operations and safety limits.	4.1	1
90	073 Process Radiation Monitoring								02				Detector failure	3.2	1
	076 Service Water														0
	078 Instrument Air														0
	103 Containment														0
	K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	3	Group Point Total:		5

ES-401 PWR Examination Outline Form ES-401-2

Emergency and Abnormal Plant Evolutions - Tier 2/Group 2 (SRO)

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
	001 Control Rod Drive														0
	002 Reactor Coolant														0
	011 Pressurizer Level Control														0
	014 Rod Position Indication														0
91	015 Nuclear Instrumentation											01 33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4	1
	016 Non-nuclear Instrumentation														0
	017 In-core Temperature Monitor														0
	027 Containment Iodine Removal														0
	028 Hydrogen Recombiner and Purge Control														0
	029 Containment Purge														0
92	033 Spent Fuel Pool Cooling								03				Abnormal spent fuel pool water level or loss of water level	3.5	1
93	034 Fuel Handling Equipment	02											RHRS	3.2	1
	035 Steam Generator														0
	041 Steam Dump/Turbine Bypass Control														0
	045 Main Turbine Generator														0
	055 Condenser Air Removal														0
	056 Condensate														0
	068 Liquid Radwaste														0
	071 Waste Gas Disposal														0
	072 Area Radiation Monitoring														0
	075 Circulating Water														0
	079 Station Air														0
	086 Fire Protection														0
	K/A Category Totals:	1	0	0	0	0	0	0	1	0	0	1	Group Point Total:		3

ES-401	Generic Knowledge and Abilities Outline (Tier 3)	3 2	Form ES-401-3

Facility Name:Braidwood Date of Exam:12/03/2007

Q#	Category	K/A #	Topic	RO IR	RO #	SRO-Only IR	SRO-Only #
66	1. Conduct of Operations	2.1. 01	Knowledge of conduct of operations requirements.	3.7	1		
67		2.1. 22	Ability to determine Mode of Operation.	2.8	1		
68		2.1. 24	Ability to obtain and interpret station electrical and mechanical drawings.	2.8	1		
94		2.1 10	Knowledge of conditions and limitations in the facility license.			3.9	1
95		2.1 20	Ability to execute procedure steps.			4.2	1
		Subtotal			3		2
69	2. Equipment Control	2.2. 04	(multi-unit) Ability to explain the variations in control board layouts, systems, instrumentation and procedural actions between units at a facility.	2.8	1		
70		2.2. 13	Knowledge of tagging and clearance procedures.	3.6	1		
96		2.2. 23	Ability to track limiting conditions for operations.			3.6	1
97		2.2. 27	Knowledge of the refueling process.			3.5	1
		2.2.					
		2.2.					
		Subtotal			2		2
71	3. Radiation Control	2.3. 01	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	2.6	1		
72		2.3. 11	Ability to control radiation releases.	2.7	1		
98		2.3. 06	Knowledge of the requirements for reviewing and approving release permits.			3.1	1
		2.3.					
		2.3.					
		2.3.					
		Subtotal			2		1
73	4. Emergency Procedures / Plan	2.4. 01	Knowledge of EOP entry conditions and immediate action steps	4.3	1		
74		2.4. 03	Ability to identfiy post-accident instrumentation	3.5	1		
75		2.4. 29	Knowledge of the emergency plan	2.6	1		
99		2.4. 38	Ability to take actions called for in the facility emergency plan, including (if required) supporting or acting as emergency coordinator.			4	1
100		2.4. 44	Knowledge of emergency plan protective action recommendations.			4	1
		2.4.					
		Subtotal			3		2
Tier 3 Point Total					10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1	0000652.4.50	Unable to create SRO level question that properly discriminates without ovelap with audit exam. Replaced with ramdomly selected K/A 000015 2.4.4. Updated ES-401-2.
2/1	063000A3.01	Original question submitted for approval was determined to be UNSAT based on low level of difficulty. Unable to create new RO level question that properly discriminates. Replaced with randomly selected K/A 063000K3.02.
2/1	103000A1.01	Original question submitted for approval was determined to be UNSAT based on low level of difficulty. Unable to create new RO level question that properly discriminates. Replaced with randomly selected K/A 103000A3.01.

Simulation Facility Braidwood | Scenario No.: **NRC 07-1** | Operating Test No.: **20070301**

Examiners: _____ Applicant: _____ SRO

_____ _____ RO

_____ _____ BOP

Initial Conditions: IC-18

Turnover: Unit 1 is operating at 75% power, steady state, equilibrium xenon, Boron concentration is 890 ppm. Online risk is green. 1C CD/CB pump is OOS for bearing replacement. The 1C CD/CB pump is expected back in service in four days. Following completion of turnover, the crew is to perform 1BwOS FW-W1, UNIT 1 TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE SURVEILLANCE.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1CD05PC PTL IOR ZDI1CD05PCB PTL IOR ZDI1CB113C CLS		1C CD/CB Pump OOS
1	None	N-BOP, US	Perform 1BwOS FW-W1
2	IMF RX01J 0 30	I-BOP, US	1D SG pressure channel failed low (Tech Spec)
3	IMF TH11B 5 TRGSET 1 "ZLO1RY8000B(2)==0" MRF ED065D (1 10) OPEN	C-RO, US	1RY456 partially opens 1RY8000B block valve breaker trips (Tech Spec)
4	IMF RX18H 650 IMF RX18L 650	I-RO, US	RCS Loop 4 Thot (#2 RTD) failed high (Tech Spec)
5	IMF FW22D	C-BOP R-RO, US	1D CD/CB pump trip.
6	IMF TH03B 450 60	M-ALL	1B Steam Generator Tube Rupture
7	IMF TH11A 0 TRGSET 2 "ZLO1IA066(2)==0" IOR ZDI1IA066 (2 0) CLS IOR ZAO1PIRY018 (2 60) 0 30 IMF PN1555 (2 70) ON	C-RO, US	Loss of RCS pressure control

*(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient

Simulation Facility	Braidwood	Scenario No.: **NRC 07-2**	Operating Test No.: **20070301**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ RO
	_____		_____ BOP

Initial Conditions: IC-16

Turnover: Unit 1 is operating at 53% power, steady state, equilibrium xenon, Boron concentration is 676.0 ppm. Online risk is green. Following completion of turnover, the crew is to perform 1BwOS FW-M2, TURBINE DRIVEN MAIN FEEDWATER PUMP OIL RESERVOIR HI/LO LEVEL ALARM SURVEILLANCE. Power Team has requested Unit 1 prepare to raise power 200 MW at 0.6 MW/min due to grid demand.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF TC03 IMF MS01A 100 IMF MS01B 100 IMF MS01C 100 IMF MS01D 100 IMF SI01B		Turbine auto trip failure MSIVs fail to close 1B SI pump fails to start
1	None	N-BOP, US	1BwOS FW-M2
2	None	R-RO, US	Raise power 200 MW @ 0.6 MW/minute
3	IMF RX13A 100 10	I-RO, US	PZR level channel 1LT-459 fails high (Tech Spec)
4	IMF RX10A 0 30	I-RO, US	Turbine impulse pressure channel 1PT-505 fails low (Tech Spec)
5	IMF ED11A	C-ALL	Loss of instrument bus 111 (Tech Spec)
6	IMF NI09C 120 5	C-ALL	Spiking PR channel/reactor trip
7	Preload	C-BOP	Turbine auto trip failure
8	IMF TH01 0.5 30	M-ALL	PZR vapor space LOCA
9	Preload	C-RO, US	1B SI pump fails to start
10	IMF SW01B	C-BOP, US	1B SX pump trip

*(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient

Simulation Facility	Braidwood	Scenario No.: **NRC 07-3**	Operating Test No.:**20070301**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ RO
	_____		_____ BOP

Initial Conditions: IC-21

Turnover: Unit 1 is operating at 99.5% power, steady state, equilibrium xenon, Boron concentration is 820 ppm. Online risk is green. Following completion of turnover, the shift manager requests the BOP to start the 0B WS pump in accordance with BwOP WS-1, STARTUP AND OPERATION OF THE NON-ESSENTIAL SERVICE WATER SYSTEM, and secure the 0C WS pump in accordance with BwOP WS-3, SHUTDOWN OF A NON-ESSENTIAL SERVICE WATER PUMP, for an upcoming clearance order on the 0C WS pump. Align the 0C WS for standby after it is secured. Operators have been briefed and are standing by at the Lake Screen House to support WS pump swap. Power Team has requested Unit 1 prepare to lower power 200 MW at 3.0 MW/min due to grid demand.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF FW44 IMF FW48A IMF RP02A IMF RP02B		1B AF Pump fails to start 1A AF Pump auto start failure Reactor trip breaker A fails to open Reactor trip breaker B fails to open
1	None	N-BOP, US	Swap WS pumps
2	None	R-RO, US	Lower power 200 MW at 3 MW/min
3	IMF NI09A 120 30	I-RO, US	PR channel N41 fails high (Tech Spec)
4	IMF CV01A	C-RO, US	1A CV pump trip (Tech Spec)
5	IMF TH16C	M-ALL	1C RCP Trip/ATWS
6	IOR ZDIRMIO NEUTRAL IOR ZDIBKSEL MAN	C-RO, US	Control rods will not insert
7	Preload	C-BOP, US	1A AF pump auto start failure/1B AF fail to start

*(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient