

**EXAMINATION OUTLINE SUBMITTAL**

**FOR THE BRAIDWOOD INITIAL EXAMINATION - MAY 2006**

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January 2, 2006  
BW060001

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Braidwood Station, Units 1 and 2  
Facility Operating License Nos. NPF-72 and NPF-77  
NRC Docket Nos. STN 50-456 and STN 50-457

Subject:      Submittal of Initial Operator Licensing Examination Outline

Enclosed are the examination outlines supporting the Initial License Examination scheduled for the week of May 15, 2006 at Braidwood Station.

This submittal includes all appropriate Examination Standards forms and outlines in accordance with NUREG 1021, "Operator Licensing Examination Standards for Power Reactors," Revision 9.

In accordance with NUREG 1021, Revision 9, Section ES-201, "Initial Operator Licensing Examination Process," please ensure that these materials are withheld from public disclosure until after the examinations are complete.

Should you have any questions concerning this letter, please contact Mr. Dale Ambler, Regulatory Assurance Manager, at (815) 417-2800. For questions concerning examination outlines, please contact Mr. Darren Stiles, Training Department, at (815) 458-7829.

Respectfully,



Keith J. Polson  
Site Vice President  
Braidwood Station

Enclosures: (Hand Delivered to Dell McNeil, Chief Examiner, NRC Region III)

Examination Security Agreements (Form ES-201-3)  
Administrative Topics Outline(s) (Form ES-301-1)  
Control Room/In-Plant Systems Outline (Form ES-301-2)  
PWR Examination Outline (Forms ES-401-2)  
Generic Knowledge and Abilities Outline (Tier 3) (Form ES-401-3)  
Scenario Outlines (Form ES-D-1) (3 sets)  
Record of Rejected K/As (Form ES-401-4)  
Completed Checklists:  
    Examination Outline Quality Checklist (Form ES-201-2)  
    Transient and Event Checklist (Form ES-301-5)

cc: (without attachments)  
Chief, NRC Operator Licensing Branch  
NRC Senior Resident Inspector - Braidwood Station

Facility: Braidwood		Date of Examination: 05/15/2006		
Item	Task Description	Initials		
		a	b*	c#
1. W R I T T E N	a. Verify that the outline(s) fit(s) the appropriate model, in accordance with ES-401.	DS	DS	DS
	b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 and whether all K/A categories are appropriately sampled.	DS	DS	DS
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	DS	DS	DS
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.	DS	DS	DS
2. S I M U L A T O R	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, technical specifications, and major transients.	DS	DS	DS
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity, and ensure that each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s), and scenarios will not be repeated on subsequent days.	DS	DS	DS
	c. To the extent possible, assess whether the outline(s) conform(s) with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D.	DS	DS	DS
3. W / T	a. Verify that the systems walk-through outline meets the criteria specified on Form ES-301-2: (1) the outline(s) contain(s) the required number of control room and in-plant tasks distributed among the safety functions as specified on the form (2) task repetition from the last two NRC examinations is within the limits specified on the form (3) no tasks are duplicated from the applicants' audit test(s) (4) the number of new or modified tasks meets or exceeds the minimums specified on the form (5) the number of alternate path, low-power, emergency, and RCA tasks meet the criteria on the form	DS	DS	DS
	b. Verify that the administrative outline meets the criteria specified on Form ES-301-1: (1) the tasks are distributed among the topics as specified on the form (2) at least one task is new or significantly modified (3) no more than one task is repeated from the last two NRC licensing examinations	DS	DS	DS
	c. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on subsequent days.	DS	DS	DS
4. G E N E R A L	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.	DS	DS	DS
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	DS	DS	DS
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	DS	DS	DS
	d. Check for duplication and overlap among exam sections.	DS	DS	DS
	e. Check the entire exam for balance of coverage.	DS	DS	DS
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	DS	DS	DS

  

a. Author	Darren Stiles / <i>[Signature]</i>	Date	12/6/05
b. Facility Reviewer (*)	Dan Ackerman / <i>[Signature]</i>		12-6-03
c. NRC Chief Examiner (#)	Dell McNeil / <i>[Signature]</i>		1/3/06
d. NRC Supervisor	Bruce Valagi / <i>[Signature]</i>		1/4/06

  

NOTE: # Independent NRC Reviewer initial items in Column "c"; chief examiner concurrence required.

Facility: Braidwood U1/U2Date of Examination: 05/15/06Examination Level (circle one): RO/ SROOperating Test Number: 2006301

Administrative Topic (See Note)	Describe activity to be performed
Conduct of Operations	<b>S-103 Call out for Shift Staffing</b> (Modified Simulator JPM) K/A 2.1.5      Imp Factor 3.4
Conduct of Operations	<b>S-105 Supervise Plant Fire Response</b> (LORT Bank Simulator JPM) K/A 2.1.14      Imp Factor 3.3
Equipment Control	<b>S-204 Initiate a LCOAR</b> (New Simulator JPM) K/A 2.2.23      Imp Factor 3.8
Radiation Control	<b>S-303 Review Liquid Release for Approval</b> (New Simulator JPM) K/A 2.3.11      Imp Factor 3.2
Emergency Plan	<b>S-402 Classify and Screen Event for Reportability</b> (LORT Bank Simulator JPM) K/A 2.4.30      Imp Factor 3.6
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.	

Facility: Braidwood U1/U2Date of Examination: 05/15/06Exam Level (circle one): RO SRO(I) SRO(U)Operating Test Number: 2006301

## Control Room Systems (8 for RO, 7 for SRO-I, 2 or 3 for SRO-U)

System / JPM Title	Type Code*	Safety Function
a. <b>Emergency Borate during ATWS from RWST</b> SIM-108 K/A 029EA1.02 Imp Factor 3.3	D, S, A, L	1
b. <b>Establish Automatic Pzr Level Control with Failed 1CV121</b> SIM-219 K/A 011A4.04 Imp Factor 2.9	D, S, A	2
c. <b>Raise SI Accumulator Level with 1A SI pump (RCS press approx 375 psig)</b> SIM-204 K/A 006A1.13 Imp Factor 3.7	D, S, L	3
d. <b>Swap SX Pumps</b> SIM-S403 K/A 076A4.01 Imp Factor 2.9	D, S	4S
e. <b>Synchronize 1A EDG to Bus 141 and Respond to Governor Adjust Failure</b> SIM-608 K/A 064A4.06 Imp Factor 3.9	D, S, A	6
f. <b>Respond to a RCP Thermal Barrier Leak</b> SIM-801 K/A 008A3.05 Imp Factor 3.1	D, S, A, P	8
g. <b>Perform Waste Gas Release Channel Checks</b> SIM-901 K/A 071A4.25 Imp Factor 3.2	N, S	9
h. N/A	N/A	N/A

## In-Plant Systems (3 for RO, 3 for SRO-I, 2 or 3 for SRO-U)

i. <b>Under Voltage Simulated Start of 2A AF Pump Surveillance</b> IP-209 K/A 013A3.02 Imp Factor 4.2	N	2
j. <b>Energize Instrument Bus 211 from the CVT, and Shutdown 211 Inverter</b> IP-604 K/A 057AA1.01 Imp Factor 3.7	M, E, R	6
k. <b>Manual Actuation of the CO2 Suppression Fire Suppression System (2B AF Pump Room)</b> IP-804 K/A 086A2.04 Imp Factor 3.9	N, A, E, R	8

\* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow Power, (R)CA

Facility: Braidwood U1/U2Date of Examination: 05/15/06Exam Level (circle one): RO / SRO(I) **SRO(U)**Operating Test Number: 2006301

## Control Room Systems (8 for RO, 7 for SRO-I, 2 or 3 for SRO-U)

System / JPM Title	Type Code*	Safety Function
a. <b>Emergency Borate during ATWS from RWST</b> SIM-108 K/A 029EK3.12 Imp Factor 4.7	D, S, A, L	1
b. <b>Establish Automatic Pzr Level Control with Failed 1CV121</b> SIM-219 K/A 011A4.04 Imp Factor 2.9	D, S, A	2
c. N/A	N/A	N/A
d. N/A	N/A	N/A
e. N/A	N/A	N/A
f. N/A	N/A	N/A
g. <b>Perform Waste Gas Release Channel Checks</b> SIM-901 K/A 071A4.25 Imp Factor 3.2	N, S	9
h. N/A	N/A	N/A

## In-Plant Systems (3 for RO, 3 for SRO-I, 2 or 3 for SRO-U)

i. N/A	N/A	N/A
j. <b>Energize Instrument Bus 211 from the CVT, and Shutdown 211 Inverter</b> IP-604 K/A 057AA1.01 Imp Factor 3.7	M, E, R	6
k. <b>Manual Actuation of the CO2 Suppression Fire Suppression System (2B AF Pump Room)</b> IP-804 K/A 086A2.04 Imp Factor 3.9	N, A, E, R	8

\* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow Power, (R)CA

Facility: Braidwood		Date of Exam: 05/15/2006		Scenario Numbers: 6-1 / 6-2 / 6-3		Operating Test Number: 2006301	
QUALITATIVE ATTRIBUTES				Initials			
				a	b*	c#	
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	TS	Q	bm			
2.	The scenarios consist mostly of related events.	TS	Q	bm			
3.	Each event description consists of <ul style="list-style-type: none"> <li>the point in the scenario when it is to be initiated</li> <li>the malfunction(s) that are entered to initiate the event</li> <li>the symptoms/cues that will be visible to the crew</li> <li>the expected operator actions (by shift position)</li> <li>the event termination point (if applicable)</li> </ul>	TS	Q	bm			
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	TS	Q	bm			
5.	The events are valid with regard to physics and thermodynamics.	TS	Q	bm			
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	TS	Q	bm			
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	TS	Q	bm			
8.	The simulator modeling is not altered.	TS	Q	bm			
9.	The scenarios have been validated. Pursuant to 10CFR55.46(d), any open simulator performance deficiencies or deviations from the referenced plant have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.	TS	Q	bm			
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.5 of ES-301.	TS	Q	bm			
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	TS	Q	bm			
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).	TS	Q	bm			
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.	TS	Q	bm			
Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes		-	-	-	
1.	Total malfunctions (5-8)	6 / 5 / 6		TS	Q	bm	
2.	Malfunctions after EOP entry (1-2)	2 / 2 / 3		TS	Q	bm	
3.	Abnormal events (2-4)	2 / 2 / 2		TS	Q	bm	
4.	Major transients (1-2)	2 / 1 / 2		TS	Q	bm	
5.	EOPs entered/requiring substantive actions (1-2)	3 / 2 / 1		TS	Q	bm	
6.	EOP contingencies requiring substantive actions (0-2)	1 / 0 / 1		TS	Q	bm	
7.	Critical tasks (2-3)	2 / 2 / 3		TS	Q	bm	



Facility Name:Braidwood										Date of Exam:05/15/2006									
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	1	2				1	1				2	9	2		2	4	
	Tier Totals	5	4	5				4	4				5	27	5		5	10	
2. Plant Systems	1	2	3	3	3	2	2	2	3	2	3	3	28	3		2	5		
	2	1	1	1	1	0	1	1	1	1	1	1	10	1	1	1	3		
	Tier Totals	3	4	4	4	2	3	3	4	3	4	4	38	5		3	8		
3. Generic Knowledge and Categories				Abilities				1	2	3	4	10		1	2	3	4	7	
								3	2	3	2			1	2	2	2		

- Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only 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  $\pm 1$  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	K/A Topic(s)	IR	#	
1	000007 Reactor Trip - Stabilization - Recovery / 1	0 2				Shutdown margin	3.4	1	
2	000008 Pressurizer Vapor Space Accident / 3					Ability to perform specific system and integrated plant procedures during all modes of plant operation.	3.9	1	
3	000009 Small Break LOCA / 3					CCWS high-radiation alarm	3.4	1	
4	000011 Large Break LOCA / 3		0 2			Pumps	2.6	1	
5	000015 RCP Malfunctions / 4					When to jog RCPs during ICC	3.4	1	
	000017 RCP Malfunctions (Loss of RC Flow) / 4								
6	000022 Loss of Rx Coolant Makeup / 2	0 2				Relationship of charging flow to pressure differential between charging and RCS	2.7	1	
7	000025 Loss of RHR System / 4		0 5			Reactor building sump	2.6	1	
8	000026 Loss of Component Cooling Water / 8				0 6	Control of flow rates to components cooled by the CCWS	2.9	1	
	000027 Pressurizer Pressure Control System Malfunction / 3							0	
9	000029 ATWS / 1		0 6			Breakers, relays, and disconnects	2.9	1	
	000038 Steam Gen. Tube Rupture / 3							0	
10	000040 Steam Line Rupture - Excessive Heat Transfer / 4			0 3		Steam line non-return valves	3.2	1	
	WE12 Uncontrolled Depressurization of all Steam Generators / 4								
11	000054 (CE/E06) Loss of Main Feedwater / 4				0 1	AFW controls, including the use of alternate AFW sources	4.5	1	
	000055 Station Blackout / 6							0	
12	000056 Loss of Off-site Power / 6					Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	3.4	1	
13	000057 Loss of Vital AC Inst. Bus / 6					Ability to locate and operate components, including local controls.	3.9	1	
14	000058 Loss of DC Power / 6				0 3	Vital and battery bus components	3.1	1	
15	000062 Loss of Nuclear Svc Water / 4					The length of time after the loss of SWS flow to a component before that component may be damaged	2.8	1	
	000065 Loss of Instrument Air / 8							0	
16	WE04 LOCA Outside Containment / 3			0 3		Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.8	1	
17	WE11 Loss of Emergency Coolant Recirc. / 4			0 3		Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.8	1	
18	BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	0 1				Components, capacity, and function of emergency systems	3.8	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		K/A Topic(s)	IR	#	
	000001 Continuous Rod Withdrawal / 1								0	
19	000003 Dropped Control Rod / 1					01 02	Knowledge of operator responsibilities during all modes of plant operation.	3	1	
	000005 Inoperable/Stuck Control Rod / 1								0	
20	000024 Emergency Boration / 1	01					Relationship between boron addition and change in T-ave	3.4	1	
	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	
21	000059 Accidental Liquid RadWaste Rel. / 9			03			Declaration that a radioactive-liquid monitor is inoperable	3	1	
22	000060 Accidental Gaseous Radwaste Rel. / 9		02				Auxiliary building ventilation system	2.7	1	
	000061 ARM System Alarms / 7								0	
23	000067 Plant Fire On-site / 8						Vital equipment and control systems to be maintained and operated during a fire	3.3	1	
	000068 Control Room Evac. / 8								0	
	000069 Loss of CTMT Integrity / 5								0	
	W/E14 High Containment Pressure / 5									
	000074 Inad. Core Cooling / 4									
24	W/E06 Degraded Core Cooling / 4			01			Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operation limitations and	3.4	1	
	W/E07 Saturated Core Cooling / 4									
	000076 High Reactor Coolant Activity / 9								0	
	W/E01 Rediagnosis / 3								0	
	W/E02 SI Termination / 3								0	
	W/E13 Steam Generator Over-pressure / 4								0	
	W/E15 Containment Flooding / 5								0	
25	W/E16 High Containment Radiation / 9					01 14	Knowledge of system status criteria which require the notification of plant personnel.	2.5	1	
26	W/E03 LOCA Cooldown - Depress. / 4				02		Operating behavior characteristics of the facility	3.4	1	
	W/E09 Natural Circulation Operations / 4									
27	W/E10 Natural Circulation with Steam Void in Vessel with/without RVLIS. / 4	01					Components, capacity, and function of emergency systems	3.3	1	
	W/E08 RCS Overcooling - PTS / 4									
K/A Category Totals:		2	1	2	1	1	2	Group Point Total:		9

ES-401		PWR Examination Outline										Form ES-401-2		
		Plant Systems - 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 3	A 4	C	K/A Topic(s)	IR	#
28 29	003 Reactor Coolant Pump		0 1							0 6		RCPS; RCP parameters	3.1; 2.9	2
30 31	004 Chemical and Volume Control		0 6					3 1				Control instrumentation; Seal injection system and limits on flow range	2.6; 3.1	2
32 33	005 Residual Heat Removal					0 3				0 1		Reactivity effects of RHR fill water; Controls and indication for RHR pumps	2.9; 3.6	2
34	006 Emergency Core Cooling				2 4							Water inventory control	2.6	1
35	007 Pressurizer Relief/Quench Tank							0 2				Maintaining quench tank pressure	2.7	1
36	008 Component Cooling Water			0 3								RCP	4.1	1
37	010 Pressurizer Pressure Control				0 1							Spray valve warm-up	2.7	1
38 39	012 Reactor Protection							1 1			02 25	Trip setpoint calculators; Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	2.9; 2.5	2
40	013 Engineered Safety Features Actuation			0 2								RCS	4.3	1
41 42	022 Containment Cooling								0 1		04 50	Initiation of safeguards mode of operation; Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.1; 3.3	2
	025 Ice Condenser													0
43	026 Containment Spray											Failure of automatic recirculation transfer	4.2	1
44 45	039 Main and Reheat Steam				0 5					0 3		Automatic isolation of steam line; MFW pump turbines	3.7; 2.8	2
46	059 Main Feedwater							0 3				Power level restrictions for operation of MFW pumps and valves	2.7	1
47	061 Auxiliary/Emergency Feedwater					0 1						Relationship between AFW flow and RCS heat transfer	3.6	1
48	062 AC Electrical Distribution											Aligning standby equipment with correct emergency power source (ED/G)	3.7	1
49	063 DC Electrical Distribution		0 1									Major DC loads	2.9	1
50	064 Emergency Diesel Generator	0 2										ED/G cooling water system	3.1	1
51 52	073 Process Radiation Monitoring										04 50	Detector failure; Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	2.7; 3.3	2
53	076 Service Water			0 5								RHR components, controls, sensors, indicators, and alarms, including rad monitors	3	1
54	078 Instrument Air	0 2										Service air	2.7	1
55	103 Containment								0 1			Containment isolation	3.9	1
K/A Category Totals:		2	3	3	3	2	2	2	3	2	3	3	Group Point Total:	28

ES-401		PWR Examination Outline												Form ES-401-2	
Plant Systems - 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 3	A 4	A 5	K/A Topic(s)	IR	#	
	001 Control Rod Drive													0	
	002 Reactor Coolant													0	
56	011 Pressurizer Level Control							0 3				VCT level	2.8	1	
	014 Rod Position Indication													0	
57	015 Nuclear Instrumentation											Core void formation	3.3	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	
58	033 Spent Fuel Pool Cooling				0 3							Anti-siphon devices	2.6	1	
59	034 Fuel Handling Equipment											Radiation monitoring systems	2.6	1	
	035 Steam Generator													0	
60	041 Steam Dump/Turbine Bypass Control								0 5			Main steam pressure	2.9	1	
	045 Main Turbine Generator													0	
61	055 Condenser Air Removal											Ability to locate and operate components, including local controls.	3.9	1	
	056 Condensate													0	
	068 Liquid Radwaste													0	
62	071 Waste Gas Disposal									2 9		Sampling oxygen, hydrogen and nitrogen concentrations in WGDS decay tank; knowledge of limits	3	1	
63	072 Area Radiation Monitoring			0 1								Containment ventilation isolation	3.2	1	
64	075 Circulating Water		0 3									Emergency/essential SWS pumps	2.6	1	
	079 Station Air													0	
65	086 Fire Protection	0 3										Knowledge of the physical connections and/or cause-effect relationships between the Fire Protection System and the following systems: AFW		1	
K/A Category Totals:		1	1	1	1	0	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	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
	000015 RCP Malfunctions / 4							0
	000017 RCP Malfunctions (Loss of RC Flow) / 4							0
	000022 Loss of Rx Coolant Makeup / 2							0
	000025 Loss of RHR System / 4							0
	000026 Loss of Component Cooling Water / 8							0
76	000027 Pressurizer Pressure Control System Malfunction / 3					Actions to be taken if PZR pressure instrument fails high	4	1
	000029 ATWS / 1							0
77	000038 Steam Gen. Tube Rupture / 3					Magnitude of atmospheric radioactive release if cooldown must be completed using steam dumps or if atmospheric reliefs lift	4.6	1
	000040 Steam Line Rupture - Excessive Heat Transfer / 4							1
78	WE12 Uncontrolled Depressurization of all Steam Generators / 4					Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4	
	000054 (CE/E06) Loss of Main Feedwater / 4							0
79	000055 Station Blackout / 6					When battery is approaching fully discharged	3.7	1
	000056 Loss of Off-site Power / 6							0
	000057 Loss of Vital AC Inst. Bus / 6							0
	000058 Loss of DC Power / 6							0
	000062 Loss of Nuclear Svc Water / 4							0
80	000065 Loss of Instrument Air / 8					Knowledge of system status criteria which require the notification of plant personnel.	3.3	1
	WE04 LOCA Outside Containment / 3							0
	WE11 Loss of Emergency Coolant Recirc. / 4							0
81	BW/E04; WE05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4					Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4	1
K/A Category Totals:		0	0	0	0	3	3	6
						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	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	
82	000033 Loss of Intermediate Range NI / 7					Indications of unreliable intermediate-range channel operation	3.6	1	
	000036 Fuel Handling Accident / 8							0	
	000037 Steam Generator Tube Leak / 3							0	
83	000051 Loss of Condenser Vacuum / 4					Knowledge of which events related to system operations/status should be reported to outside agencies.	3.6	1	
	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	
	000068 Control Room Evac. / 8							0	
84	000069 Loss of CTMT Integrity / 5					Knowledge of system status criteria which require the notification of plant personnel.	3.3	1	
	W/E14 High Containment Pressure / 5								
	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	
	W/E15 Containment Flooding / 5							0	
	W/E16 High Containment Radiation / 9							0	
	W/E03 LOCA Cooledown - Depress. / 4							0	
85	W/E09 Natural Circulation Operations / 4					Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.8	1	
	W/E10 Natural Circulation with Steam Voids in Vessel with/without RVLIS. / 4								
	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 Plant Systems - Tier 2/Group 1 (SRO)										Form ES-401-2		
Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 3	A 4	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	
	008 Component Cooling Water												0	
86	010 Pressurizer Pressure Control										Spray valve failures	3.9	1	
	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	
87	059 Main Feedwater										Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4	1	
	061 Auxiliary/Emergency Feedwater												0	
88	062 AC Electrical Distribution										Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7	1	
	063 DC Electrical Distribution												0	
89	064 Emergency Diesel Generator										Identification and analysis of loads not shed during test	2.7	1	
	073 Process Radiation Monitoring												0	
	076 Service Water												0	
90	078 Instrument Air										Air dryer and filter malfunctions	2.9	1	
	103 Containment												0	
K/A Category Totals:		0	0	0	0	0	0	0	3	0	0	2	Group Point Total: 5	



ES-401		PWR Examination Outline												Form ES-401-2	
Plant Systems - 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 3	A 4	K/A Topic(s)	IR	#		
	001 Control Rod Drive												0		
	002 Reactor Coolant												0		
	011 Pressurizer Level Control												0		
	014 Rod Position Indication												0		
	015 Nuclear Instrumentation												0		
	016 Non-nuclear Instrumentation												0		
91	017 In-core Temperature Monitor										Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4	1		
	027 Containment Iodine Removal												0		
	028 Hydrogen Recombiner and Purge Control												0		
	029 Containment Purge												0		
	033 Spent Fuel Pool Cooling												0		
92	034 Fuel Handling Equipment										Shutdown monitor	3.4	1		
	035 Steam Generator												0		
	041 Steam Dump/Turbine Bypass Control												0		
	045 Main Turbine Generator												0		
	055 Condenser Air Removal												0		
93	056 Condensate										Condenser tube leakage	2.5	1		
	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)				Form ES-401-3	
Facility Name: Braidwood		Date of Exam: 05/15/2006					
Q#	Category	K/A #	Topic	RO		SRO-Only	
				IR	#	IR	#
66	1. Conduct of Operations	2.1. 27	Knowledge of system purpose and or function.	2.8	1		
67		2.1. 31	Ability to locate control room switches, controls and indications and to determine that they are correctly reflecting the desired plant lineup.	4.2	1		
68		2.1. 32	Ability to explain and apply all system limits and precautions.	3.4	1		
94		2.1. 25	Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.			3.1	1
		2.1					
		Subtotal			3		1
69	2. Equipment Control	2.2. 03	(multi-unit) Knowledge of the design, procedural, and operational differences between units.	3.1	1		
70		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		
95		2.2. 06	Knowledge of the process for making changes in procedures as described in the safety analysis report.			3.3	1
96		2.2. 17	Knowledge of the process for managing maintenance activities during power operations.			3.5	1
		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. 09	Knowledge of the process for performing a containment purge.	2.5	1		
73		2.3. 11	Ability to control radiation releases.	2.7	1		
97		2.3. 08	Knowledge of the process for performing a planned gaseous radioactive release.			3.2	1
98		2.3. 10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.			3.3	1
		Subtotal			3		2
74	4. Emergency Procedures / Plan	2.4. 31	Knowledge of annunciators alarms and indications, and use of the response instructions.	3.3	1		
75		2.4. 39	Knowledge of the RO's responsibilities in emergency plan implementation.	3.3	1		
99		2.4. 09	Knowledge of low power /shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.			3.9	1
100		2.4. 44	Knowledge of emergency plan protective action recommendations.			4	1
		2.4.					
		Subtotal			2		2
Tier 3 Point Total					10		7

Facility: Braidwood Unit 1 & Unit 2 Scenario No.: 1 Op-Test No.: 2006301

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_

Initial Conditions: IC 18

Turnover: Unit 1 is at 76% power, steady state, equilibrium xenon, MOL. Online risk is green. 1B Heater Drain Pump is OOS for motor replacement for the past 3 days. Expected back in service in 7 days. 0BWIS 3.3.7.3-201, Surveillance Calibration of Control Room Outside Air Intake Rad Monitor 0PR31J, is in progress. Awaiting IMD supervisor package review. LCOAR 3.3.7, Condition A has been entered. 0 CC pump is mechanically and electrically aligned to Unit 2 due to OOS on 2B CC pump. 1CV8149C was returned to service last shift following maintenance to replace its fuse block. Following completion of turnover, the shift manager requests the BOP swap 75 gpm letdown orifices from 1B to 1C per BwOP CV-9 for an upcoming clearance order on 1CV8149B to replace its fuse block while the RO monitors reactor power.

Event No.	Malf. No.	Event Type*	Event Description
	IOR ZDI1HD01PB PTL IRF CC42 RO TRGSET 1 ZLO1FW009A(1) = = 1 IMF MS03A (1 0) 100 0 IMF MS03E (1 0) 100 0 IMF MS03I (1 0) 100 0 IMF CV32B TRGSET 2 ZLO1SI01PA(3) = = 1 IMF CV01A (2 0)	n/a	1B HD pump OOS 0 CC pump aligned to bus 242 1A SG safety valves stuck open  1B CV pump auto start failure 1A CV pump trip
1	None	N-BOP	Swap Letdown orifices
2	IMF PA0253 ON IOR ZDI1MS018A CLS	C-US	SG PORV 1MS018A inoperable (Tech Spec)
3	IMF RX10A 0 15	I-RO	Turbine Impulse Pressure channel 1PT-505 failed low (Tech Spec)
4	IMF RX10A 0 15	R-RO C-BOP	Turbine Impulse Pressure channel 1PT-505 failed low (Tech Spec)
5	TH03A 450 120	M-ALL	1A SGTR (450 gpm)
6	Preload	C-RO	1A CV pump trips/1B CV pump fails to auto start
7	Preload	M-ALL	Faulted (ruptured) 1A SG
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: Braidwood Unit 1 & Unit 2 Scenario No.: 2 Op-Test No.: 2006301

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions: IC 21

Turnover: Unit 1 is at 100% power, steady state, equilibrium xenon, MOL. Online risk is green. 1C CD/CB pump is OOS for an alignment and vibration problem. Expected back in service in one week. The CV Cation demin is scheduled to be placed on line for 30 minutes later in the shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF RH01B IOR ZDI1CD05PC PTL IOR ZDI1CD05PCB PTL IOR ZDI1CB113C CLS	n/a	RHR pump 1B trip 1C CD/CB pump OOS 1C CD/CB AOP OOS 1CB113C OOS
1	None	N-BOP	1PR11J filter change (Tech Spec)
2	None	R-RO N-BOP	Power descension
3	IMF CV03	C-RO	Boric acid transfer pump trip
4	IMF ED11A	C-BOP	Loss of instrument bus 111 (Tech Spec)
5	IMF TH17B	C-RO	1B RCP degraded performance/locked rotor
6	IMF TH06B 540000	M-ALL	Large break RCS LOCA (1B RCS cold leg)
7	Preload	C-BOP	1B RH pump trip
8	Preload	C-BOP	1SI8811A fail to auto open
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: Braidwood Unit 1 & Unit 2 Scenario No.: 3 Op-Test No.: 2006301

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions: IC 18

Turnover: Unit 1 is at 76% power, steady state, equilibrium xenon, MOL. Online risk is green. 1C RCFC is OOS for the past 20 hours for run time meter replacement. LCOAR 3.6.6, Condition C has been initiated. Expected back in service in 12 hours. 1B GC pump is OOS for motor bearing replacement for past 12 hours. Expected back in service in 5 days. 0BwOSR 3.7.10.1-2, Unit Common Control Room Ventilation (VC) Filtration Surveillance (B Train) is scheduled for later in the shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1VP01CCL PTL IOR ZDI1VP01CCH PTL ZDI1GC01PB PTL IMF RP02A IMF RP02B IMF FW48A IMF FW13C 25 0 IMF FW26C 2000 0 IOR ZLO1FW5302 ON IOR ZLO1SLFW530 OFF IOR ZLOMLB6315 OFF IOR ZDI1FW002B OPEN	n/a	1C RCFC OOS  1B GC pump OOS Reactor trip breaker A fails to open Reactor trip breaker B fails to open 1A AF pump fails to start 1FW009C fails 25% open 1FW530 fails partially open  1FW002B failed open
1	None	R-RO C-BOP	Power ascension
2	IOR ZDI1AF01PB PTL IOR ZLOAUXOIL OFF IOR ZLO1AF01PBC OFF	N-BOP	1B AF pump clearance order
3	IMF RX 21A 1700 30	I-RO	Pressurizer pressure channel 1PT-455 fails low (Tech Spec)
4	IMF RX04E 0 120	I-BOP	Feed flow channel 1FT-530 fails low
5	IOR ZDI1FW009C CLS	M-ALL	ATWS
6	IMF RD09 0	I-RO	Auto rod speed failed
7	IMF FW19C 3.5 30	M-ALL	1C FW line break inside containment
8	Preload	C-BOP	1A AF pump fails to auto start
9	Preload	C-BOP	FW isolation failure
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

**The NRC did not make any comments to the facility-prepared Examination Outline for the Braidwood May 2006 Initial Examination.**