Form ES-201-1, "Examination Preparation Checklist"

Form ES-201-2, "Examination Outline Quality Checklist," ***along*** with the ***written examination and operating test outline(s)***

Facility: Braidwood Date of Examination: 10/23-27/00 and 10/30-11/1/00

Examinations Developed by: Facility / NRC (circle one)

Target Date*	Task Description / Reference	Chief Examiner's Initials
-180	1. Examination administration date confirmed (C.1.a; C.2.a & b)	MEB
-120	2. NRC examiners and facility contact assigned (C.1.d; C.2.e)	MEB
-120	3. Facility contact briefed on security & other requirements (C.2.c)	MEB
-120	4. Corporate notification letter sent (C.2.d)	MEB
[-90]	[5. Reference material due (C.1.e; C.3.c)]	N/A
-75	6. Integrated examination outline(s) due (C.1.e & f; C.3.d)	MEB
-70	7. Examination outline(s) reviewed by NRC and feedback provided to facility licensee (C.2.h; C.3.e)	MEB
-45	8. Proposed examinations, supporting documentation, and reference materials due (C.1.e, f, g & h; C.3.d)	MEB
-30	9. Preliminary license applications due (C.1.l; C.2.g; ES-202)	MEB
-14	10. Final license applications due and assignment sheet prepared (C.1.l; C.2.g; ES-202)	MEB
-14	11. Examination approved by NRC supervisor for facility licensee review (C.2.h; C.3.f)	MEB
-14	12. Examinations reviewed with facility licensee (C.1.j; C.2.f & h; C.3.g)	MEB
-7	13. Written examinations and operating tests approved by NRC supervisor (C.2.i; C.3.h)	MEB
-7	14. Final applications reviewed; assignment sheet updated; waiver letters sent (C.2.g, ES-204)	MEB
-7	15. Proctoring/written exam administration guidelines reviewed with facility licensee and authorization granted to give written exams (if applicable) (C.3.k)	MEB
-7	16. Approved scenarios, job performance measures, and questions distributed to NRC examiners (C.3.i)	MEB

* Target dates are keyed to the examination date identified in the corporate notification letter. They are for planning purposes and may be adjusted on a case-by-case basis in coordination with the facility licensee.

[ ] Applies only to examinations prepared by the NRC.

INITIAL SUBMITTAL OF OUTLINES

FOR THE BRAIDWOOD INITIAL EXAMINATION - OCTOBER 2000

Commonwealth Edison Company
Braidwood Generating Station
Route #1, Box 84
Braceville, IL 60407-9619
Tel 815-458-2801

ComEd

April 19, 2000
BW000047

Michael E. Bielby
Lead Examiner
U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, IL 60532-4351

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

Subject: Submittal of Integrated Initial License Training Examination Outline

In accordance with NUREG 1021, Revision 8, "Operating Licensing Examination Standards for Power Reactors," Braidwood Station is submitting the integrated initial licensing training examination outline. This submittal supports the initial license examination scheduled to take place during the week of October 23, 2000.

As required by NUREG 1021, please ensure that the enclosed materials are withheld from public disclosure until after the examination is complete.

If you have any questions concerning this letter, please contact Mr. Terry Simpkin at (815) 458-2801, extension 2980.

Timothy J. Tulon
Site Vice President
Braidwood Station

Enclosures: ES-D-1, Scenario Outlines
ES-201-2, Examination Outline Quality Checklist
ES-201-3, Examination Security Agreements
ES-301-1, Administrative Topics Outline
ES-301-2, Control Room Systems and Facility Walk-Through Test Outline
ES-301-5, Transient and Event Checklist
ES-301-6, Competencies Checklist
ES-401-3, PWR SRO Examination Outline
ES-401-4, PWR RO Examination Outline

cc: Regional Administrator - NRC Region III (without enclosures)
Chief, NRC Operator Licensing Branch (without enclosures)
NRC Senior Resident – Braidwood Station (without enclosures)

Commonwealth Edison Company
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April 19, 2000
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cc: Regional Administrator - NRC Region III (without enclosures)
Chief, NRC Operator Licensing Branch (without enclosures)
NRC Senior Resident – Braidwood Station (without enclosures)

APR 2 1 2000

Facility: Braidwood Units 1 + 2 Date of Examination: 10-23-00

Item	Task Description	Initials a	Initials b*	Initials c
1. WRITTEN	a. Verify that the outline(s) fit(s) the appropriate model per ES-401.	✓	JS	MEB
	b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 and whether all knowledge and ability categories are appropriately sampled.	✓	JS	MEB
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	✓	JS	MEB
	d. Assess whether the repetition from previous examination outlines is excessive.	✓	JS	MEB
2. SIM	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, and major transients.	✓	JS	MEB
	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; ensure 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 over successive days.	✓	JS	MEB
	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.	✓	JS	MEB
3. W/T	a. Verify that: (1) the outline(s) contain(s) the required number of control room and in-plant tasks, ✓ (2) no more than 30% of the test material is repeated from the last NRC examination, ✓ (3)* no tasks are duplicated from the applicants' audit test(s), and ✓ (4) no more than 80% of any operating test is taken directly from the licensee's exam banks. *	✓	JS	MEB
	b. Verify that: (1) the tasks are distributed among the safety function groupings as specified in ES-301, ✓ (2) one task is conducted in a low-power or shutdown condition, ✓ (3) 40% of the tasks require the applicant to implement an alternate path procedure, ✓ (4) one in-plant task tests the applicant's response to an emergency or abnormal condition, and ✓ (5) the in-plant walk-through requires the applicant to enter the RCA. ✓	✓	JS	MEB
	c. Verify that the required administrative topics are covered, with emphasis on performance-based activities.	✓	JS	MEB
	d. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on successive days.	✓	JS	MEB
4. GENERAL	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.	✓	JS	MEB
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	✓	JS	MEB
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	✓	JS	MEB
	d. Check for duplication and overlap among exam sections.	✓	JS	MEB
	e. Check the entire exam for balance of coverage.	✓	JS	MEB
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	✓	JS	MEB

	Printed Name / Signature	Date
a. Author	William J. Spahr	4-11-00
b. Facility Reviewer(*)	John E. Browning	4-11-00
c. Chief Examiner	Michael E. Bielby Sr / Michael E. Bielby Sr	4/23/00
d. NRC Supervisor	David E. Hills / David E. Hills	4/24/

(*) Not applicable for NRC-developed examinations.

* Item 3.a(3) intent is not to use any exam material on audit exam MEB

Facility: Braidwood Units 1 and 2 Form ES-401-4

Exam Date: 10/20/2000 **Exam Level:** RO

Tier	Group	K/A Category Points											Point Total
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	
1. Emergency & Abnormal Plant Evolutions	1	4	4	2				3	2			1	16
	2	3	3	5				4	1			1	17
	3	1	1	0				1	0			0	3
	Totals Tier	8	8	7				8	3			2	36
2. Plant Systems	1	2	2	2	3	2	2	2	2	2	2	2	23
	2	2	2	2	4	1	2	2	1	2	1	1	20
	3	0	1	2	1	1	0	0	2	1	0	0	8
	Tier Totals	4	5	6	8	4	4	4	5	5	3	3	51

3. Generic Knowledge And Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
	3	3	3	4	13

Note:
1. Ensure that at least two topics from every K/A category are sampled within each teir (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. Actual point totals must match those specified in the table.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category /tier.
6. The generic 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.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorites. Enter the tier totals for each category in the table above.

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-4

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
005	Inoperable/Stuck Control Rod / 1		X					AK2.02 - Breakers, relays, disconnects, and control room switches	2.5	1
015	Reactor Coolant Pump (RCP) Malfunctions / 4						X	2.1.20 - Ability to execute procedure steps.	4.3	1
024	Emergency Boration / 1		X					AK2.01 - Valves	2.7	1
024	Emergency Boration / 1					X		AA2.06 - When boron dilution is taking place	3.6	1
027	Pressurizer Pressure Control (PZR PCS) Malfunction / 3				X			AA1.01 - PZR heaters, sprays, and PORVs	4.0	1
051	Loss of Condenser Vacuum / 4				X			AA1.04 - Rod position	2.5*	1
069	Loss of Containment Integrity / 5	X						AK1.01 - Effect of pressure on leak rate	2.6	1
069	Loss of Containment Integrity / 5			X				AK3.01 - Guidance contained in EOP for loss of containment integrity	3.8*	1
074	Inadequate Core Cooling / 4	X						EK1.01 - Methods of calculating subcooling margin	4.3	1
074	Inadequate Core Cooling / 4				X			EA1.13 - Subcooling margin indicators	4.3	1

PWR RO Examination Outline

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-4

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
E06	Degraded Core Cooling / 4		X					EK2.2 - 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 operation of the facility	3.8	1
E09	Natural Circulation Operations / 4	X						EK1.2 - Normal, abnormal and emergency operating procedures associated with Natural Circulation Operations	3.3	1
E09	Natural Circulation Operations / 4		X					EK2.2 - 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 operation of the facility	3.6	1
E10	Natural Circulation with Steam Void in Vessel with/without RVLIS / 4	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the Natural Circulation with Steam Void in Vessel with/without RVLIS	3.3	1
E10	Natural Circulation with Steam Void in Vessel with/without RVLIS / 4			X				EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.4	1
E14	High Containment Pressure / 5					X		EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.3	1

K/A Category Totals: 4 4 2 3 2 1

Group Point Total: 16

PWR RO Examination Outline

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-4

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
007	Reactor Trip / 1			X				EK3.01 - Actions contained in EOP for reactor trip	4.0	1
007	Reactor Trip / 1					X		EA2.05 - Reactor trip first-out indication	3.4	1
008	Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) / 3		X					AK2.02 - Sensors and detectors	2.7*	1
029	Anticipated Transient Without Scram (ATWS) / 1			X				EK3.07 - Using local turbine trip lever	3.1*	1
038	Steam Generator Tube Rupture (SGTR) / 3	X						EK1.01 - Use of steam tables	3.1	1
054	Loss of Main Feedwater (MFW) / 4	X						AK1.01 - MFW line break depressurizes the S/G (similar to a steam line break)	4.1	1
054	Loss of Main Feedwater (MFW) / 4				X			AA1.03 - AFW auxiliaries, including oil cooling water supply	3.5	1
059	Accidental Liquid Radwaste Release / 9			X				AK3.01 - Termination of a release of radioactive liquid	3.5	1
060	Accidental Gaseous Radwaste Release / 9		X					AK2.01 - ARM system, including the normal radiation-level indications and the operability status	2.6	1
060	Accidental Gaseous Radwaste Release / 9				X			AA1.01 - Area radiation monitors	2.8	1

Facility: Braidwood

ES - 401 **Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2** **Form ES-401-4**

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
E01	Rediagnosis / 3				X			EA1.2 - Operating behavior characteristics of the facility	3.3	1
E03	LOCA Cooldown and Depressurization / 4			X				EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.9	1
E03	LOCA Cooldown and Depressurization / 4						X	2.1.20 - Ability to execute procedure steps.	4.3	1
E04	LOCA Outside Containment / 3	X						EK1.1 - Components, capacity, and function of emergency systems	3.5	1
E04	LOCA Outside Containment / 3				X			EA1.2 - Operating behavior characteristics of the facility	3.6	1
E05	Loss of Secondary Heat Sink / 4		X					EK2.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.7	1
E11	Loss of Emergency Coolant Recirculation / 4			X				EK3.2 - Normal, abnormal and emergency operating procedures associated with Loss of Emergency Coolant Recirculation	3.5	1

K/A Category Totals: 3 3 5 4 1 1 **Group Point Total:** 17

PWR RO Examination Outline

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 3

Form ES-401-4

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
036	Fuel Handling Incidents / 8	X						AK1.02 - SDM	3.4	1
036	Fuel Handling Incidents / 8		X					AK2.01 - Fuel handling equipment	2.9	1
E15	Containment Flooding / 5				X			EA1.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	2.9	1

K/A Category Totals: 1 1 0 1 0 0

Group Point Total: 3

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401 | **Plant Systems - Tier 2 / Group 1** | **Form ES-401-4**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
001	Control Rod Drive System / 1					X							K5.54 - Definition and units of reactivity	2.8	1
001	Control Rod Drive System / 1						X						K6.09 - Purpose and operation of neutron flux recorder at high speed concentration	2.9*	1
003	Reactor Coolant Pump System (RCPS) / 4		X										K2.02 - CCW pumps	2.5*	1
003	Reactor Coolant Pump System (RCPS) / 4			X									K3.01 - RCS	3.7	1
004	Chemical and Volume Control System (CVCS) / 1	X											K1.29 - Effect and detection of leaking PORV or relief on PZR level and pressure, including VCT makeup activity in automatic mode	3.4	1
004	Chemical and Volume Control System (CVCS) / 1						X						K6.04 - Pumps	2.8	1
013	Engineered Safety Features Actuation System (ESFAS) / 2				X								K4.03 - Main Steam Isolation System	3.9	1
013	Engineered Safety Features Actuation System (ESFAS) / 2										X		A4.01 - ESFAS-initiated equipment which fails to actuate	4.5	1
015	Nuclear Instrumentation System / 7				X								K4.05 - Reactor trip	4.3	1
015	Nuclear Instrumentation System / 7							X					A1.01 - NIS calibration by heat balance	3.5	1
017	In-Core Temperature Monitor (ITM) System / 7								X				A2.01 - Thermocouple open and short circuits	3.1	1

Facility: Braidwood

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-4**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
017	In-Core Temperature Monitor (ITM) System / 7										X		A4.01 - Actual in-core temperatures	3.8	1
022	Containment Cooling System (CCS) / 5				X								K4.02 - Correlation of fan speed and flowpath changes with containment pressure	3.1*	1
022	Containment Cooling System (CCS) / 5		X										K2.01 - Containment cooling fans	3.0*	1
056	Condensate System / 4	X											K1.03 - MFW	2.6*	1
059	Main Feedwater (MFW) System / 4											X	2.1.12 - Ability to apply technical specifications for a system.	2.9	1
059	Main Feedwater (MFW) System / 4			X									K3.03 - S/Gs	3.5	1
061	Auxiliary / Emergency Feedwater (AFW) System / 4									X			A3.04 - Automatic AFW isolation	4.1	1
061	Auxiliary / Emergency Feedwater (AFW) System / 4									X			A3.02 - RCS cooldown during AFW operations	4.0	1
068	Liquid Radwaste System (LRS) / 9								X				A2.04 - Failure of automatic isolation	3.3	1
071	Waste Gas Disposal System (WGDS) / 9											X	2.1.28 - Knowledge of the purpose and function of major system components and controls.	3.2	1
071	Waste Gas Disposal System (WGDS) / 9							X					A1.06 - Ventilation system	2.5	1

Facility: Braidwood

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-4**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
072	Area Radiation Monitoring (ARM) System / 7					X							K5.01 - Radiation theory, including sources, types, units, and effects	2.7	1

K/A Category Totals: 2 2 2 3 2 2 2 2 2 2 2 **Group Point Total:** 23

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401 | **Plant Systems - Tier 2 / Group 2** | **Form ES-401-4**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
002	Reactor Coolant System (RCS) / 2							X					A1.09 - RCS T-ave	3.7	1
002	Reactor Coolant System (RCS) / 2										X		A4.03 - Indications and controls necessary to recognize and correct saturation conditions	4.3	1
010	Pressurizer Pressure Control System (PZR PCS) / 3											X	2.1.10 - Knowledge of conditions and limitations in the facility license.	2.7	1
010	Pressurizer Pressure Control System (PZR PCS) / 3						X						K6.01 - Pressure detection systems	2.7	1
012	Reactor Protection System / 7					X							K5.01 - DNB	3.3*	1
014	Rod Position Indication System (RPIS) / 1				X								K4.04 - Zone reference lights	2.6*	1
026	Containment Spray System (CSS) / 5								X				A2.09 - Radiation hazard potential of BWST	2.5*	1
033	Spent Fuel Pool Cooling System (SFPCS) / 8									X			A3.01 - Temperature control valves	2.5*	1
035	Steam Generator System (S/GS) / 4				X								K4.01 - S/G level control	3.6	1
039	Main and Reheat Steam System (MRSS) / 4			X									K3.04 - MFW pumps	2.5*	1
039	Main and Reheat Steam System (MRSS) / 4									X			A3.02 - Isolation of the MRSS	3.1	1

Facility: Braidwood

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-4**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
055	Condenser Air Removal System (CARS) / 4			X									K3.01 - Main condenser	2.5	1
062	A.C. Electrical Distribution System / 6	X											K1.04 - Off-site power sources	3.7	1
063	D.C. Electrical Distribution System / 6		X										K2.01 - Major DC loads	2.9*	1
063	D.C. Electrical Distribution System / 6				X								K4.04 - Trips	2.6?	1
064	Emergency Diesel Generator (ED/G) System / 6	X											K1.05 - Starting air system	3.4	1
064	Emergency Diesel Generator (ED/G) System / 6						X						K6.08 - Fuel oil storage tanks	3.2	1
073	Process Radiation Monitoring (PRM) System / 7							X					A1.01 - Radiation levels	3.2	1
075	Circulating Water System / 8		X										K2.03 - Emergency/essential SWS pumps	2.6*	1
079	Station Air System (SAS) / 8				X								K4.01 - Cross-connect with IAS	2.9	1

K/A Category Totals: 2 2 2 4 1 2 2 1 2 1 1 **Group Point Total:** 20

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401 **Plant Systems - Tier 2 / Group 3** **Form ES-401-4**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
005	Residual Heat Removal System (RHRS) / 4		X										K2.01 - RHR pumps	3.0	1
027	Containment Iodine Removal System (CIRS) / 5								X				A2.01 - High temperature in the filter system	3.0*	1
028	Hydrogen Recombiner and Purge Control System (HRPS) / 5			X									K3.01 - Hydrogen concentration in containment	3.3	1
041	Steam Dump System (SDS) and Turbine Bypass Control / 4					X							K5.06 - Effect of power change on fuel cladding	2.5	1
076	Service Water System (SWS) / 4			X									K3.03 - Reactor building closed cooling water	3.5*	1
076	Service Water System (SWS) / 4								X				A2.01 - Loss of SWS	3.5*	1
078	Instrument Air System (IAS) / 8									X			A3.01 - Air pressure	3.1	1
103	Containment System / 5				X								K4.04 - Personnel access hatch and emergency access hatch	2.5	1

K/A Category Totals: 0 1 2 1 1 0 0 2 1 0 0 **Group Point Total:** 8

Generic Knowledge and Abilities Outline (Tier 3)

Printed: 04/17/2000

PWR RO Examination Outline

Form ES-401-5

Facility: Braidwood

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.9	Ability to direct personnel activities inside the control room.	2.5	1
	2.1.22	Ability to determine Mode of Operation.	2.8	1
	2.1.8	Ability to coordinate personnel activities outside the control room.	3.8	1
			Category Total:	**3**
Equipment Control	2.2.30	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.5	1
	2.2.13	Knowledge of tagging and clearance procedures.	3.6	1
	2.2.33	Knowledge of control rod programming.	2.5	1
			Category Total:	**3**
Radiation Control	2.3.11	Ability to control radiation releases.	2.7	1
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5	1
	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	2.6	1
			Category Total:	**3**
Emergency Procedures/Plan	2.4.13	Knowledge of crew roles and responsibilities during EOP flowchart use.	3.3	1
	2.4.17	Knowledge of EOP terms and definitions.	3.1	1
	2.4.26	Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.	2.9	1
	2.4.19	Knowledge of EOP layout, symbols, and icons.	2.7	1
			Category Total:	**4**
			Generic Total:	**13**

Facility: Braidwood Units 1 and 2 Form ES-401-3

Exam Date: 10/20/2000 **Exam Level:** SRO

Tier	Group	K/A Category Points											Point Total
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	
1. Emergency & Abnormal Plant Evolutions	1	4	4	4				4	6			2	24
	2	2	3	3				3	3			2	16
	3	0	1	0				0	1			1	3
	Tier Totals	6	8	7				7	10			5	43
2. Plant Systems	1	2	2	2	2	1	2	2	1	1	2	2	19
	2	2	1	1	2	1	2	2	1	2	1	2	17
	3	0	0	1	0	1	0	0	1	0	0	1	4
	Tier Totals	4	3	4	4	3	4	4	3	3	3	5	40
3. Generic Knowledge And Abilities					Cat 1		Cat 2		Cat 3		Cat 4		
					4		4		4		5		17

Note:
1. Ensure that at least two topics from every K/A category are sampled within each teir (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. Actual point totals must match those specified in the table.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6. The generic 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.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorites. Enter the tier totals for each category in the table above.

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-3

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
005	Inoperable/Stuck Control Rod / 1		X					AK2.02 - Breakers, relays, disconnects, and control room switches	2.6	1
017	Reactor Coolant Pump (RCP) Malfunctions (Loss of RC Flow) / 4					X		AA2.07 - Calculation of expected values of flow in the loop with RCP secured	2.9	1
024	Emergency Boration / 1		X					AK2.01 - Valves	2.7	1
024	Emergency Boration / 1					X		AA2.06 - When boron dilution is taking place	3.7	1
029	Anticipated Transient Without Scram (ATWS) / 1			X				EK3.07 - Using local turbine trip lever	3.4*	1
051	Loss of Condenser Vacuum / 4				X			AA1.04 - Rod position	2.5*	1
059	Accidental Liquid Radwaste Release / 9			X				AK3.01 - Termination of a release of radioactive liquid	3.9	1
067	Plant Fire on Site / 9					X		AA2.13 - Need for emergency plant shutdown	4.4	1
069	Loss of Containment Integrity / 5	X						AK1.01 - Effect of pressure on leak rate	3.1	1
069	Loss of Containment Integrity / 5			X				AK3.01 - Guidance contained in EOP for loss of containment integrity	4.2	1

PWR SRO Examination Outline

Facility: Braidwood

ES - 401 **Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1** **Form ES-401-3**

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
074	Inadequate Core Cooling / 4	X						EK1.01 - Methods of calculating subcooling margin	4.7	1
074	Inadequate Core Cooling / 4				X			EA1.13 - Subcooling margin indicators	4.6	1
E01	Rediagnosis / 3				X			EA1.2 - Operating behavior characteristics of the facility	3.6	1
E01	Rediagnosis / 3						X	2.4.1 - Knowledge of EOP entry conditions and immediate action steps.	4.6	1
E02	SI Termination / 3					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.2	1
E04	LOCA Outside Containment / 3				X			EA1.2 - Operating behavior characteristics of the facility	3.8	1
E06	Degraded Core Cooling / 4		X					EK2.2 - 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 operation of the facility	4.1	1
E07	Saturated Core Cooling / 4					X		EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.9	1
E07	Saturated Core Cooling / 4						X	2.1.20 - Ability to execute procedure steps.	4.2	1

PWR SRO Examination Outline

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-3

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
E09	Natural Circulation Operations / 4	X						EK1.2 - Normal, abnormal and emergency operating procedures associated with Natural Circulation Operations	3.7	1
E09	Natural Circulation Operations / 4		X					EK2.2 - 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 operation of the facility	3.9	1
E10	Natural Circulation with Steam Void in Vessel with/without RVLIS / 4	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the Natural Circulation with Steam Void in Vessel with/without RVLIS	3.6	1
E10	Natural Circulation with Steam Void in Vessel with/without RVLIS / 4			X				EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.6	1
E14	High Containment Pressure / 5					X		EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.8	1

K/A Category Totals: 4 4 4 4 6 2

Group Point Total: 24

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401 **Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2** **Form ES-401-3**

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
007	Reactor Trip / 1			X				EK3.01 - Actions contained in EOP for reactor trip	4.6	1
007	Reactor Trip / 1					X		EA2.05 - Reactor trip first-out indication	3.9	1
008	Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) / 3		X					AK2.02 - Sensors and detectors	2.7	1
008	Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) / 3						X	2.1.20 - Ability to execute procedure steps.	4.2	1
022	Loss of Reactor Coolant Makeup / 2					X		AA2.04 - How long PZR level can be maintained within limits	3.8	1
027	Pressurizer Pressure Control (PZR PCS) Malfunction / 3				X			AA1.01 - PZR heaters, sprays, and PORVs	3.9	1
038	Steam Generator Tube Rupture (SGTR) / 3	X						EK1.01 - Use of steam tables	3.4	1
054	Loss of Main Feedwater (MFW) / 4	X						AK1.01 - MFW line break depressurizes the S/G (similar to a steam line break)	4.3	1
054	Loss of Main Feedwater (MFW) / 4				X			AA1.03 - AFW auxiliaries, including oil cooling water supply	3.7	1
058	Loss of DC Power / 6					X		AA2.01 - That a loss of dc power has occurred; verification that substitute power sources have come on line	4.1	1

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-3

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
060	Accidental Gaseous Radwaste Release / 9		X					AK2.01 - ARM system, including the normal radiation-level indications and the operability status	2.9*	1
060	Accidental Gaseous Radwaste Release / 9				X			AA1.01 - Area radiation monitors	3.0	1
E03	LOCA Cooldown and Depressurization / 4			X				EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.9	1
E03	LOCA Cooldown and Depressurization / 4						X	2.1.20 - Ability to execute procedure steps.	4.2	1
E05	Loss of Secondary Heat Sink / 4		X					EK2.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.9	1
E11	Loss of Emergency Coolant Recirculation / 4			X				EK3.2 - Normal, abnormal and emergency operating procedures associated with Loss of Emergency Coolant Recirculation	4.0	1

K/A Category Totals: 2 3 3 3 3 2

Group Point Total: 16

PWR SRO Examination Outline

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 3

Form ES-401-3

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
028	Pressurizer (PZR) Level Control Malfunction / 2					X		AA2.12 - Cause for PZR level deviation alarm: controller malfunction or other instrumentation malfunction	3.5	1
028	Pressurizer (PZR) Level Control Malfunction / 2						X	2.1.20 - Ability to execute procedure steps.	4.2	1
036	Fuel Handling Incidents / 8		X					AK2.01 - Fuel handling equipment	3.5	1

K/A Category Totals: 0 1 0 0 1 1

Group Point Total: 3

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401 | **Plant Systems - Tier 2 / Group 1** | **Form ES-401-3**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
001	Control Rod Drive System / 1					X							K5.54 - Definition and units of reactivity	3.1	1
001	Control Rod Drive System / 1						X						K6.09 - Purpose and operation of neutron flux recorder at high speed concentration	2.9*	1
003	Reactor Coolant Pump System (RCPS) / 4			X									K3.01 - RCS	4.0	1
004	Chemical and Volume Control System (CVCS) / 1	X											K1.29 - Effect and detection of leaking PORV or relief on PZR level and pressure, including VCT makeup activity in automatic mode	4.0	1
004	Chemical and Volume Control System (CVCS) / 1						X						K6.04 - Pumps	3.1	1
013	Engineered Safety Features Actuation System (ESFAS) / 2										X		A4.01 - ESFAS-initiated equipment which fails to actuate	4.8	1
014	Rod Position Indication System (RPIS) / 1				X								K4.04 - Zone reference lights	2.9*	1
015	Nuclear Instrumentation System / 7											X	2.1.12 - Ability to apply technical specifications for a system.	4.0	1
015	Nuclear Instrumentation System / 7							X					A1.01 - NIS calibration by heat balance	3.8	1
017	In-Core Temperature Monitor (ITM) System / 7										X		A4.01 - Actual in-core temperatures	4.1	1
022	Containment Cooling System (CCS) / 5											X	2.1.10 - Knowledge of conditions and limitations in the facility license.	3.9	1

Facility: Braidwood

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-3**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
022	Containment Cooling System (CCS) / 5		X										K2.01 - Containment cooling fans	3.1	1
026	Containment Spray System (CSS) / 5								X				A2.09 - Radiation hazard potential of BWST	2.9*	1
056	Condensate System / 4	X											K1.03 - MFW	2.6	1
059	Main Feedwater (MFW) System / 4			X									K3.03 - S/Gs	3.7	1
061	Auxiliary / Emergency Feedwater (AFW) System / 4									X			A3.02 - RCS cooldown during AFW operations	4.0	1
063	D.C. Electrical Distribution System / 6		X										K2.01 - Major DC loads	3.1*	1
063	D.C. Electrical Distribution System / 6				X								K4.04 - Trips	2.9?	1
071	Waste Gas Disposal System (WGDS) / 9							X					A1.06 - Ventilation system	2.8	1

K/A Category Totals: 2 2 2 2 1 2 2 1 1 2 2 **Group Point Total:** 19

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-3**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
002	Reactor Coolant System (RCS) / 2							X					A1.09 - RCS T-ave	3.8	1
002	Reactor Coolant System (RCS) / 2										X		A4.03 - Indications and controls necessary to recognize and correct saturation conditions	4.4	1
010	Pressurizer Pressure Control System (PZR PCS) / 3						X						K6.01 - Pressure detection systems	3.1	1
011	Pressurizer Level Control System (PZR LCS) / 2											X	2.1.12 - Ability to apply technical specifications for a system.	4.0	1
012	Reactor Protection System / 7					X							K5.01 - DNB	3.8	1
027	Containment Iodine Removal System (CIRS) / 5								X				A2.01 - High temperature in the filter system	3.3*	1
028	Hydrogen Recombiner and Purge Control System (HRPS) / 5			X									K3.01 - Hydrogen concentration in containment	4.0	1
029	Containment Purge System (CPS) / 8											X	2.1.10 - Knowledge of conditions and limitations in the facility license.	3.9	1
033	Spent Fuel Pool Cooling System (SFPCS) / 8									X			A3.01 - Temperature control valves	2.7*	1
035	Steam Generator System (S/GS) / 4				X								K4.01 - S/G level control	3.8	1

Facility: Braidwood

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-3**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
039	Main and Reheat Steam System (MRSS) / 4									X			A3.02 - Isolation of the MRSS	3.5*	1
062	A.C. Electrical Distribution System / 6	X											K1.04 - Off-site power sources	4.2	1
064	Emergency Diesel Generator (ED/G) System / 6	X											K1.05 - Starting air system	3.9	1
064	Emergency Diesel Generator (ED/G) System / 6						X						K6.08 - Fuel oil storage tanks	3.3	1
073	Process Radiation Monitoring (PRM) System / 7							X					A1.01 - Radiation levels	3.5	1
075	Circulating Water System / 8		X										K2.03 - Emergency/essential SWS pumps	2.7*	1
079	Station Air System (SAS) / 8				X								K4.01 - Cross-connect with IAS	3.2	1

K/A Category Totals: 2 1 1 2 1 2 2 1 2 1 2 **Group Point Total:** 17

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401 **Plant Systems - Tier 2 / Group 3** **Form ES-401-3**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp	Points
008	Component Cooling Water System (CCWS) / 8											X	2.1.12 - Ability to apply technical specifications for a system.	4.0	1
041	Steam Dump System (SDS) and Turbine Bypass Control / 4					X							K5.06 - Effect of power change on fuel cladding	2.8*	1
076	Service Water System (SWS) / 4			X									K3.03 - Reactor building closed cooling water	3.9*	1
076	Service Water System (SWS) / 4								X				A2.01 - Loss of SWS	3.7*	1

K/A Category Totals: 0 0 1 0 1 0 0 1 0 0 1 **Group Point Total:** 4

Generic Knowledge and Abilities Outline (Tier 3)

Printed: 04/17/2000

PWR SRO Examination Outline

Form ES-401-5

Facility: Braidwood

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.22	Ability to determine Mode of Operation.	3.3	1
	2.1.8	Ability to coordinate personnel activities outside the control room.	3.6	1
	2.1.13	Knowledge of facility requirements for controlling vital / controlled access.	2.9	1
	2.1.34	Ability to maintain primary and secondary plant chemistry within allowable limits.	2.9	1
			Category Total:	**4**
Equipment Control	2.2.33	Knowledge of control rod programming.	2.9	1
	2.2.11	Knowledge of the process for controlling temporary changes.	3.4*	1
	2.2.20	Knowledge of the process for managing troubleshooting activities.	3.3	1
	2.2.23	Ability to track limiting conditions for operations.	3.8	1
			Category Total:	**4**
Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	3.0	1
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	3.1	1
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3	1
	2.3.2	Knowledge of facility ALARA program.	2.9	1
			Category Total:	**4**

Generic Knowledge and Abilities Outline (Tier 3)

Printed: 04/17/2000

PWR SRO Examination Outline

Form ES-401-5

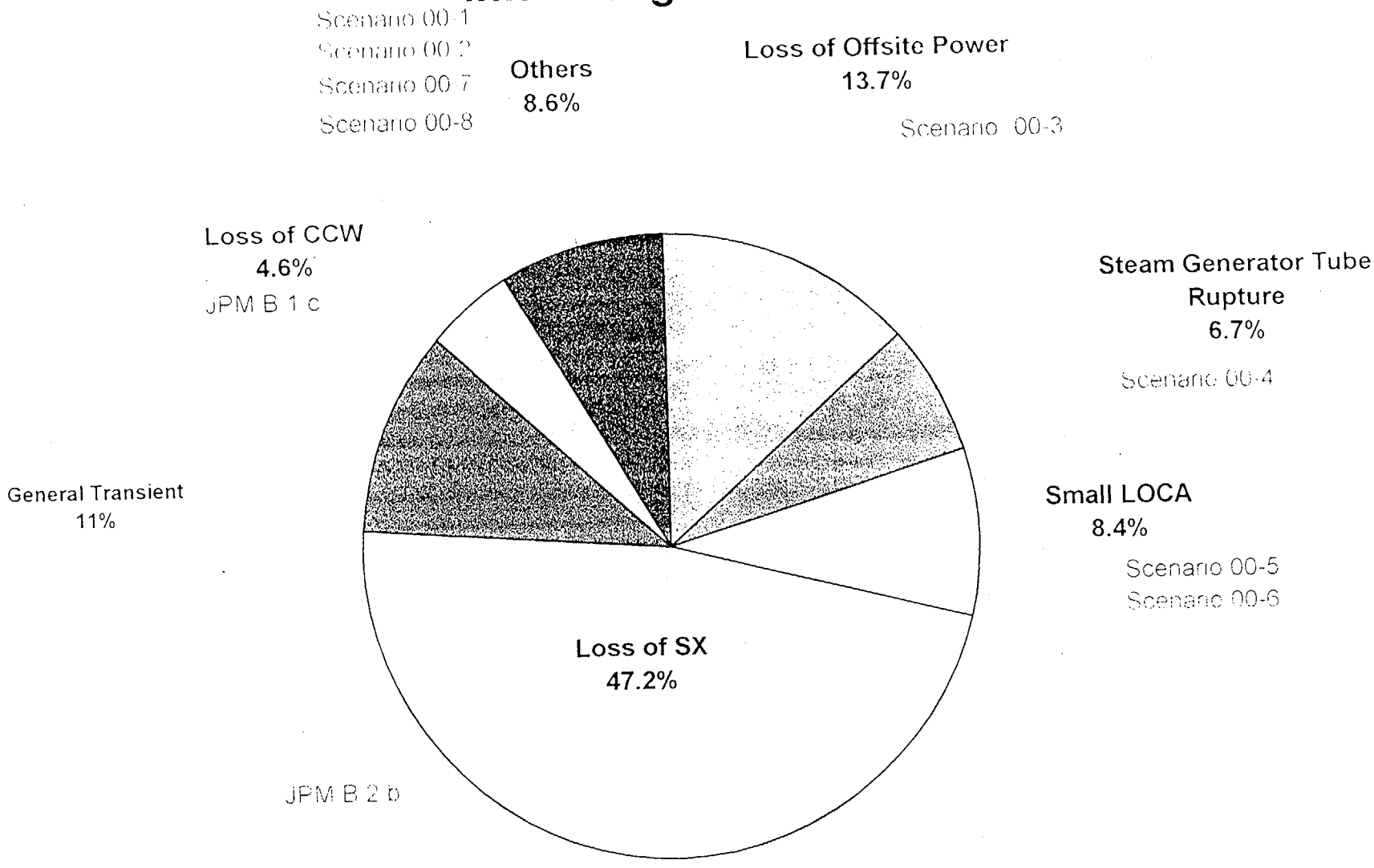
Facility: Braidwood

Generic Category	KA	KA Topic	Imp.	Points
Emergency Procedures/Plan	2.4.19	Knowledge of EOP layout, symbols, and icons.	3.7	1
	2.4.26	Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.	3.3	1
	2.4.22	Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.	4.0	1
	2.4.29	Knowledge of the emergency plan.	4.0	1
	2.4.7	Knowledge of event based EOP mitigation strategies.	3.8	1

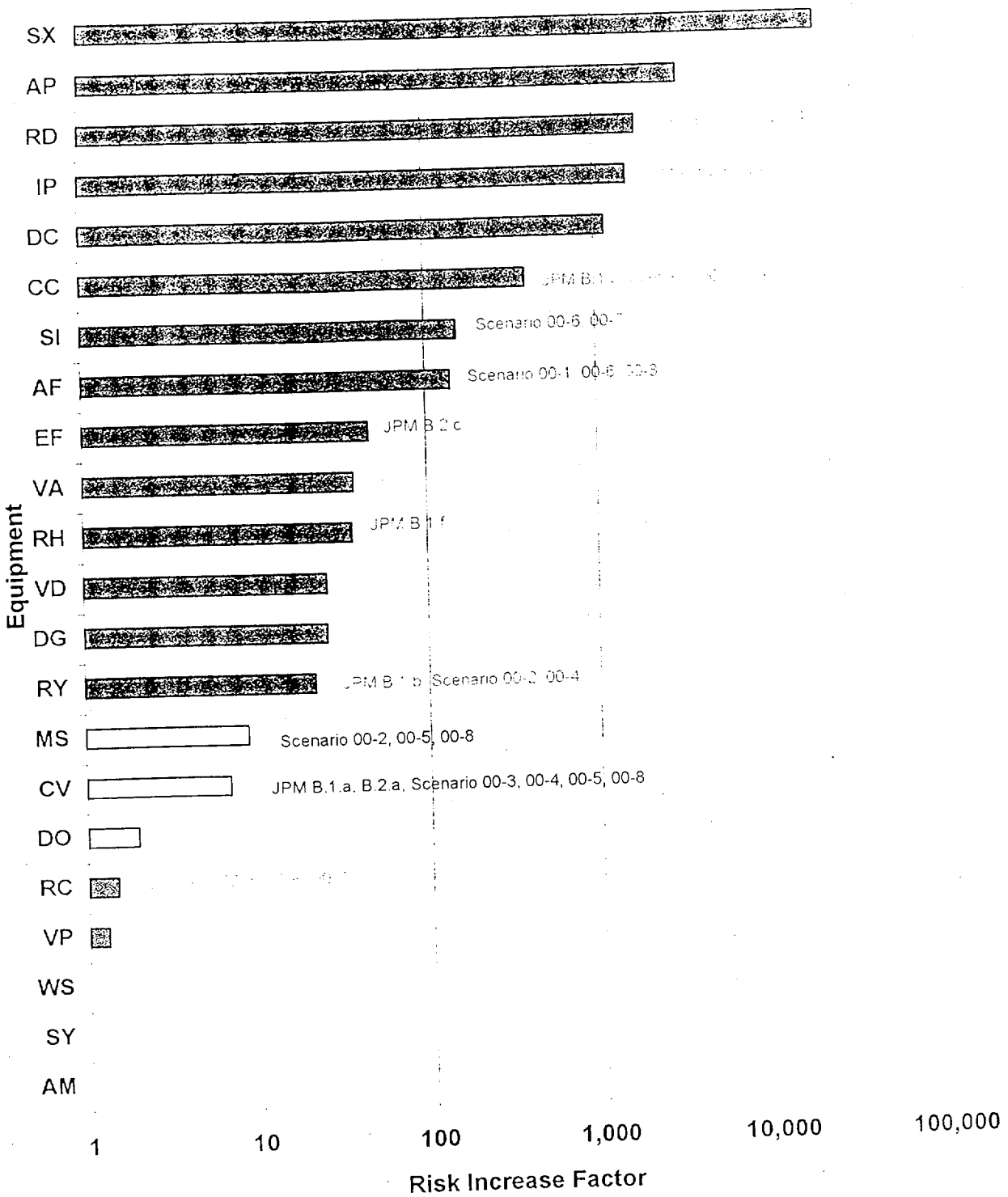
Category Total: 5

Generic Total: 17

Inititiating Events



Potential Risk Increase Factor*
for Key Equipment



Braidwood Suppressed KAs

KA	Sytem/EPE/Generic	KA Statement
AK1.13	000003	Interaction of ICS control stations as well as purpose, function, and modes of operation of ICS
AK3.01	000003	When ICS logic has failed on a dropped rod, the load must be reduced until flux is within specified target bank
AA1.03	000005	Metroscope
AK2.03	000005	Metroscope
AA1.02	000008	HPI pump to control PZR level/pressure
AA1.05	000008	LPI System
EA1.03	000009	Low-pressure SWS activity monitor
EA1.18	000009	Balancing of HPI loop flows
EA2.09	000009	Low-pressure SWS activity monitor
EA2.34	000009	Conditions for throttling or stopping HPI
EA2.35	000009	Conditions for throttling or stopping reflux boiling spray
EK3.27	000009	Manual depressurization or HPI recirculation for sustained high pressure
EA1.09	000011	Core flood tank initiation
EA1.16	000011	Balancing of HPI loop flows
EA2.11	000011	Conditions for throttling or stopping HPI
EA2.12	000011	Conditions for throttling or stopping reflux boiling spray
AA1.19	000015	Power transfer confirm lamp
AA1.19	000017	Power transfer confirm lamp
AA1.03	000025	LPI pumps
AA1.09	000025	LPI pump switches, ammeter, discharge pressure gauge, flow meter, and indicators
AA1.10	000025	LPI pump suction valve and discharge valve indicators
AA1.18	000025	LPI header cross-connect valve controller and indicators
AA1.20	000025	HPI pump control switch, indicators, ammeter running lights, and flow meter
AA1.22	000025	Obtaining of water from BWST for LPI system
AA2.05	000025	Limitations on LPI flow and temperature rates of change
AK2.04	000025	Raw water or sea water pumps
AA1.04	000026	CRDM high-temperature alarm system
EA1.04	000029	BIT inlet valve switches
EA1.05	000029	BIT outlet valve switches
EA2.10	000029	Positive displacement charging pumps
EK3.03	000029	Opening BIT inlet and outlet valves
AA2.05	000033	Nature of abnormality, from rapid survey of control room data
AA1.20	000056	Speed switch room ventilation fan
AA2.02	000057	Core flood tank pressure and level indicators
AA1.04	000062	CRDM high-temperature alarm system
AA1.20	000068	Indicators for operation of startup transformer
AA2.04	000068	S/G pressure
EA1.03	000074	The alternate control station for turbine bypass valve operation
EA1.08	000074	HPI System
EA1.10	000074	Core flood system
EA1.28	000074	Core flood tank isolation valve controls and indicators
EK2.04	000074	HPI pumps
EK2.05	000074	LPI pumps
EK3.05	000074	Activating the HPI system

Braidwood Suppressed KAs

KA	Sytem/EPE/Generic	KA Statement
EK3.09	000074	Opening the cross-connect valve from the LPI to the HPI suction
EK3.10	000074	Isolating core flood tanks to prevent inadvertent discharge
A1.13	001000	"Prepower dependent insertion limit" and power dependent insertion limit, determined with metroscope
A2.05	001000	Fractured split pins
A2.08	001000	Loss of CCW to CRDS
A4.01	001000	Controls for CCWS
A4.04	001000	Part-length rod position
A4.07	001000	Power source transfer check
A4.09	001000	CCWS
K1.01	001000	CCW
K1.06	001000	WGDS
K1.07	001000	Quench tank
K1.09	001000	CCWS must be cut in before energizing CRDS
K3.03	001000	CCW
A4.04	002000	The filling/draining of LPI pumps during refueling
A4.05	002000	The HPI system when it is used to refill the refueling cavity
A4.22	004000	Boronometer chart recorder
K1.09	004000	Relationship between CVCS and RPIS
K1.25	004000	Interface between HPI flow path and excess letdown flow path
K5.33	004000	Use of a boronometer
K5.40	004000	Response of PRT during bubble formation in PZR: increase in quench tank pressure when cycling PORV shows that complete steam bubble does not exist, that significant noncondensable gas is still present
K6.21	004000	Design and purpose of charging pump desurger
K6.23	004000	Capacity of boron recovery tanks: plan not to exceed by inefficient boron movement; interface with boron recovery system
K6.28	004000	Interface between high-activity waste tank and letdown filter drain
K6.33	004000	Principles of boronometer
K4.19	006000	Interlocks to storage tank makeup valve
K4.22	006000	Interlocks between RCP seal flow rate and standby HPI pump
A3.09	008000	Normal CRDM temperatures
K3.02	008000	CRDS
K1.05	011000	Reactor regulating system
K6.07	012000	Core protection calculator
K6.08	012000	COLSS
K6.09	012000	CEAC
K4.14	013000	Upper head injection accumulator isolation
A1.01	014000	Metroscope reed switch display
A2.06	014000	Loss of LVDT
A2.07	014000	Loss of reed switch
K2.01	014000	Reed switches
K2.02	014000	Metroscope
K6.03	014000	Metroscope
K1.05	015000	ICS
K1.06	015000	Reactor regulating system
K3.04	015000	ICS
K3.06	015000	Reactor regulating system

Braidwood Suppressed KAs

KA	Sytem/EPE/Generic	KA Statement
K4.04	015000	Slow response time of SPNDs
K1.03	022000	Auxiliary steam
A1.01	025000	Temperature chart recorders
A1.02	025000	Glycol expansion tank level
A1.03	025000	Glycol flow to ice condenser air handling units
A2.01	025000	Trip of glycol circulation pumps
A2.02	025000	High/low floor cooling temperature
A2.03	025000	Opening of ice condenser doors
A2.04	025000	Containment isolation
A2.05	025000	Abnormal glycol expansion tank level
A2.06	025000	Decreasing ice condenser temperature
A3.01	025000	Refrigerant system
A3.02	025000	Isolation valves
A4.01	025000	Ice condenser isolation valves
A4.02	025000	Containment vent fans
A4.03	025000	Glycol circulation pumps
K1.01	025000	Containment ventilation
K1.02	025000	Refrigerant systems
K1.03	025000	Containment sump system
K2.01	025000	Containment ventilation fans and dampers
K2.02	025000	Refrigerant systems
K2.03	025000	Isolation valves
K3.01	025000	Containment
K4.01	025000	Glycol expansion tank levels and ice condenser system containment isolation valves
K4.02	025000	System control
K5.01	025000	Relationships between pressure and temperature
K5.02	025000	Heat transfer
K5.03	025000	Gas laws
K6.01	025000	Upper and lower doors of the ice condenser
A3.02	035000	MAD valves
A4.01	041000	ICS voltage inverter
A4.07	041000	Remote gagging of stuck open-relief valves
K2.01	041000	ICS, normal and alternate power supply
K2.02	041000	ICS inverter breakers
K4.01	041000	RRG/ICS system
K4.15	041000	"Measured variable" readings on ICS hand-automatic stations and required action if reading is out of the acceptable band
K4.08	045000	The reactor bailey station and reactor diamond station in integrated control circuitry
A3.08	056000	Flow through stator coolant and hydrogen coolers
A4.05	056000	Valve between upper surge tank and hotwell
K1.11	056000	Stator cooling
K5.14	056000	Purpose of valve between upper surge tank and hotwell
A3.07	059000	ICS
A4.10	059000	ICS
K1.06	068000	Boron recovery equipment
A2.04	075000	Effects of extremes in ambient temperature on cooling tower operation

Braidwood Suppressed KAs

KA	Sytem/EPE/Generic	KA Statement
A4.13	075000	Cooling tower operations
A4.14	075000	Lube oil pumps for circulating water pump
K1.06	075000	Cooling towers
K4.04	075000	Automatic pickup of backup lube oil pumps (ac and dc)
K5.05	075000	Principle of operation of the cooling towers
K5.06	075000	Principle of cooling by evaporation
K1.03	076000	Relationship of SWS to raw water filtration (RWF) system and location of SWS supply pump to RWF system
K2.07	076000	Cooling tower fans
K6.08	076000	Cooling towers
A1.02	086000	Fire water storage tank level
A4.04	086000	Fire water storage tank makeup pumps
K1.02	086000	Raw service water
A4.05	103000	PDP speed controller
K1.03	103000	Shield building vent system

4-10-00 Training

4.10.00 Operations
Unit Supervisor

Facility: Braidwood Unit 1 and 2 Date of Examination: 10/23/00
Examination Level (circle one): SRO Operating Test Number: 1

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Conduct of Operations / Verification of Valve Lineup	JPM (N-143 New) KA 2.1.29 3.4/3.3 Utilizing Mock-up
	Conduct of Operations / Manual Entry of a Late Log Entry	JPM (N-142) KA 2.1.18 2.9/3.0
A.2	Equipment Control / Perform a QPTR Surveillance	JPM (N-102 Modified) – KA 2.2.12 3.0/3.4
A.3	Radiation Control / Entry and Exit from a RCA	JPM (N-144) KA 2.3.1 2.6/3.0 Evaluated while performing JPM B.2.a
A.4	Emergency Plan / GSEP Classification	JPM (New) – KA 2.4.41 2.3/4.1

Facility: Braidwood Unit 1 and 2 Date of Examination: 10/23/00
Examination Level (circle one): RO Operating Test Number: 1

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Conduct of Operations / Verification of Valve Lineup	JPM (N-143 New) KA 2.1.29 3.4/3.3 Utilizing Mock-up
	Conduct of Operations / Manual Entry of a Late Log Entry	JPM (N-142) KA 2.1.18 2.9/3.0
A.2	Equipment Control / Perform a QPTR Surveillance	JPM (N-102 Modified) – KA 2.2.12 3.0/3.4
A.3	Radiation Control / Entry and Exit from a RCA	JPM (N-144) KA 2.3.1 2.6/3.0 Evaluated while performing JPM B.2.a
A.4	Emergency Plan / Emergency Plan Directions	2. a. K/A 2.4.39 3.3/3.1 Emergency Exposures
		2. b. K/A 2.4.29 2.6/4.0 Emergency facilities

Facility: Braidwood Unit 1 and 2	Date of Examination: 10/23/00
Exam Level (circle one): RO / SRO(I)	Operating Test No.: 1

B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a. CVCS / Place Excess L/D in Service with Failure of Cooling to 1A L/D Hx. (N-11) KA 004A4.05	M A S	2
b. Pressurizer Relief Tank / Drain PRT with failure of 1B RCDT pump. (N-119) KA 007A1.01	M A S	5
c. Component Cooling Water System / Swap CC pumps with high current on started pump. (N-140) KA 008A3.01	N A S	8
d. Liquid Radwaste System / Perform a Radwaste Liquid Release Radiation Monitor Valve interlock check. (N-32) KA 068A4.02	D S	9
e. A.C. Electrical Distribution / Respond to Loss of 4KV ESF Bus. (N-99) KA 062A2.12	D S	6
f. Residual Heat Removal System / Place RH in recirculation for sampling. (N-139) KA 005K5.09	N S L	4
g. Nuclear Instrumentation System / Source Range Instrument failure in Mode 4. (N-141) KA 015A2.01)	N S L A	7

B.2 Facility Walk-Through

a. CVCS / Local Emergency Boration with Emergency Boration Valve failed closed. (N-89) **Unit 2** (KA APE068AA1.08)	M A R	1
b. Service Water System / Emergency Control of 2A SX Pump. (N-67) High PRA (47.2%) **Unit 2** (KA 013A4.01)	D	4
c. Reactor Protection System / Local Rest of SI. (N-85) **Unit 2** (KA E02EA1.1)	D	7

* 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

OPERATING TEST NO.: 1

Applicant Type	Evolution Type	Minimum Number	Scenario Number 00-1	00-2	00-3	Spare
			1	2	3	4
RO	Reactivity	1	1/	1/	1,4/	1 /
	Normal	1	/1	/ 1	/ 1	/ 1
	Instrument	2	3/ 2	2/ 3	3 / 2	2 / 3
	Component	2	4/ 4	4,5,6,8/ 4,6	5/ 5	4,7 / 8
	Major	1	5,6 / 5,6	7/ 7	5,6 / 5,6	5,6 / 5,6
As RO	Reactivity	1	1	1	1,4	1
	Normal	0				
	Instrument	1	3	2	3	2
	Component	1	4	4,5,6,8	5	4,7
	Major	1	5,6	7	5,6	5,6
SRO-I						
	Reactivity	0				
	Normal	1	1	1	1	1
As SRO	Instrument	1	2,3	3	3	2,3
	Component	1	4	4,5,6,8	5	4,7,8
	Major	1	5,6	7	5,6	5,6
SRO-U	Reactivity	0	N/A	N/A	N/A	N/A
	Normal	1	N/A	N/A	N/A	N/A
	Instrument	1	N/A	N/A	N/A	N/A
	Component	1	N/A	N/A	N/A	N/A
	Major	1	N/A	N/A	N/A	N/A

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations must be significant as defined in Appendix D.

NOTE: Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal.

The "/" in the cells for the "RO'" applicant type represents the position the applicant is expected to fill during the scenario. The events are listed for the identified position: RO / BOP.

Author: _____
Chief Examiner: _____

Operating Test: 1

Competencies	Applicant #1 ~~RO~~/**SRO-I**/~~SRO-U~~				Applicant #2 **RO**/~~SRO-I~~/~~SRO-U~~				Applicant #3 **RO(BOP)**/~~SRO-I~~/~~SRO-U~~			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms	2-6	2-8	2-6	2-8	3-6	2-8	3-6	2,4,5,6,7	2,4,5,6	3,4,6,7	4-6	3,5,6,8
Diagnose Events and Conditions	2-6	2-8	2-6	2-8	1,3-6	2-8	3-6	2-7	1,2,4,5,6	1,3,4,6,7	2,4-6	3,5,6,8
Understand Plant and System Response	1-6	1-8	1-6	1-8	1,3-6	1-8	1-6	1-8	1,2,4,5,6	1,3,4,6,7	1-6	1-8
Comply With and Use Procedures (1)	1-6	1-8	1-6	1-8	1,3-6	1-8	1-6	1,2,4-8	1,2,4,5,6	1,3,4,6,7	1-6	3-8
Operate Control Boards (2)	1-6	1-8	1-6	1-8	1,3-6	1-8	1-6	1,2,4-8	1,2,4,5,6	1-8	1,2,5,6	3-8
Communicate and Interact With the Crew	1-6	1-8	1-6	1-8	1-6	1-8	1-6	1-8	1-6	1-8	1-6	1-8
Demonstrate Supervisory Ability (3)	1-6	1-8	1-6	1-8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Comply With and Use Tech. Specs. (3)	2,3	4	3	2,4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

NOTE: **OPERATING TEST NO.: 1.** Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO and BOP by position.

Author: _____

Chief Examiner: _____

Simulation Facility Braidwood | Scenario No.: 00-1 | Operating Test No.: 1

Examiners: _____ Applicant: _____ SRO

_____ _____ RO

_____ _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a 1A Steam Generator level transmitter failure, a 1D Thot RTD failure requiring rod control to be placed in manual, a Main Feedwater Pump trip coincident with a failure of the main turbine to runback, an ATWS event followed by a loss of heat sink requiring a bleed and feed.

Initial Conditions: IC-21; 100% power BOL, Equil. Xenon

Turnover: The Unit is at 100% power. The 1B AFW pump is OOS to repair a pump motor bearing oil leak. The pump is expected back in approximately 3 to 4 hours. Currently in LCO 3.7.5 Condition A with 12 hours left on the Completion Time.

Event No.	Malf. No.	Event Type*	Event Description
Preload (NOTE 1)	PTL & OOS		1B AFW Pump OOS for oil leak repair
Preload (NOTE 1)	RP01 RP02A RP02B		ATWS Event
Preload (NOTE 1)	FW43 FW01		1A AFW Pump fail to start 1A MFW Pump fail to start
Preload (NOTE 1)	TC04 TC03 IOR ZDI1HSRUNBK OFF IOR ZLO1HSRUNBK OFF IOR ZDI1HSMANUAL OFF IOR ZDI1HSTG010 NORM		Prevent Main Turbine from Runback Prevent Main Turbine Auto Trip
1		R RO N BOP SRO	Perform Load Decrease to 90% at 5MW/min
2	RX06A, 100	I BOP SRO	1A SG Narrow Range Level Transmitter failure high **(NOTE 2)**
3	RX18H, 650	I RO SRO	RCS Loop 1D Thot RTD failure high. **(NOTE 3)**
4	IOR ZDI1HSDEHENTR OFF FW02A	C BOP RO SRO	1B MFW Pump Trip (complicated with failure of Main Turbine to runback)
5	Preloaded	M BOP RO SRO	ATWS
6	Preloaded	M BOP RO SRO	Loss of Heat Sink

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

NOTE 1: Run BATCH FILE for all Preload **BAT RUNBACK**

NOTE 2: RF RP23 (Open/Close) RF RX047 (Trip) RF RX048 (Trip)

NOTE 3: RF RP23 (Open/Close) RF RX026 (Trip) RF RX142 (Trip) RF RX025 (Trip) RF RX141 (Trip) RF RX028 (Trip) RF RX027 (Trip)

SCENARIO 00-1 OVERVIEW

Unit 1 is at 100% power, BOL. The 1B Auxiliary Feedwater Pump is OOS to repair a pump motor bearing oil leak. The pump I expected back in 3 to 4 hours. Currently in LCO 3.7.5 Condition A with 12 hours left on the Completion Time.

Shortly after the crew takes the shift, Electric Generation will call the control room and request Unit 1 reduce load to 90% at 5MW/min.

Following clearly observable plant response from the reactivity changes the 1A steam generator level transmitter LT-517 will fail high. This is not the controlling channel therefore the crew should not take the FRV to manual. The crew will enter BwOA INST-2 Attachment E and trip the required bistables. Technical Specifications will be addressed for bistable tripping.

After the actions of BwOA INST-2 are complete, the 1D Thot RTD will fail high. This will require the crew to re-enter BwOA INST-2 to address the failure. Control rods will have to be placed in manual. The crew will again have to trip bistables and reference Technical Specifications. Control rods may be placed back into Auto after the failed channel is defeated.

Once the crew determines that the bistables can be tripped, the 1B MFW pump will trip. The crew should attempt to ramp down the main turbine by performing a turbine runback (unsuccessful) while attempting to fast start the 1A Main Feedwater pump. The crew will determine that the Main Turbine will not run back and that a reactor trip is required due to lowering SG water levels.

When the crew attempts to trip the reactor, an ATWS event will initiate. The crew will enter BwFR-S.1. The turbine will fail to trip and the crew will shut the MSIVs by initiating a Main Steamline Isolation signal. When the 1A Auxiliary Feedwater Pump receives a start signal, it will immediately trip. This is an entry condition into BwFR-H.1 but the crew will have to complete FR-S.1 first.

Once the crew is complete with BwFR-S.1, the crew will transition to BwFR-H.1 due to the loss of heat sink. The crew will secure RCPs and initiate an RCS bleed and feed. Once the bleed and feed is initiated, the 1A AFW pump will be returned to operation. The crew must remain in BwFR-H.1 due to bleed and feed initiated.

Critical Tasks

1. FR-S.1--A: Isolate the main turbine from the SGs within 1 minute of the Reactor Trip signal.

2. FR-S.1--C: Insert negative reactivity into the core by at least one of the following methods before completing the immediate action steps of FR-S.1:
   - De-energize the control rod drive MG sets
   - Insert RCCAs
   - Establish emergency boration flow to the RCS

3. FR-H.1--B Establish RCS bleed and feed before PORVs open automatically.

Simulation Facility Braidwood | Scenario No.: 00-2 | Operating Test No.: 1

Examiners: _____ Applicant: _____ SRO

_____ _____ RO

_____ _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a VCT level channel failure, a failure of a radiation monitor, letdown system leak to the Component Cooling water system, uncontrolled outward rod motion requiring a manual reactor trip, an instrument air leak inside containment, a steam break inside containment with a failure to auto isolate the faulted steam generator and a failed open PORV requiring manual isolation.

Initial Conditions: IC-16; 48% power MOL, Steady State, Equil. Xe

Turnover: The unit is at 48% power. Currently in BwGP 100-3 step 58. The crew will continue ramping the unit up in power after turnover.

Event No.	Malf. No.	Event Type*	Event Description
Preload	FW13D, 100		1D Feedwater Isolation Valve failed open
1		N BOP SRO R RO	Ramp the unit up in power at 5MW/min
2	CV16, 0	I RO SRO	VCT Level Channel (LT-112) failure
3	RM01T, 5	I BOP SRO	Drumming Station Radiation Alarm failure high (Delete malfunction in 5 minutes)
4	CV23A, 50	C BOP RO SRO	Letdown Heat Exchanger leak to the Component Cooling Water System
5	BAT rodsout	C RO SRO	Uncontrolled Rod Withdrawal requiring a Reactor Trip
6	IA03, 1000 Ramp over 8 minutes	C BOP RO SRO	Instrument Air Leak inside containment
7	BAT PORVFAIL	M BOP RO SRO	Steam line break inside containment on the 1D Main Steam Line with a failed open Feedwater Isolation valve
8	BAT PORVFAIL	C RO SRO	PORV 455C fail open

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

SCENARIO 00-2 OVERVIEW

Initially Unit 1 is at 48% power in BwGP 100-3 step 58 holding for turnover. The crew will continue with the ramp up in power after he turnover. After the crew has taken the shift, the crew will continue with the ramp up in power.

Following clearly observable plant response from the reactivity changes, VCT level transmitter LT-112 will fail low. The crew should respond to the alarm, reference the annunciator response and secure auto makeup.

After the actions for the failed VCT transmitter are complete, the Drumming Station Radiation Alarm will fail high. The crew should reference BwAR 4-OAR059J to determine automatic and subsequent operator actions for the failed radiation monitor.

After the actions are complete for the failed radiation monitor, a letdown heat exchanger to Component Cooing Water System leak will occur. The crew should enter BwOA PRI-6 to isolate letdown, determine the location of the leak and place the standby letdown heat exchanger in service.

Once the crew has placed the standby letdown heat exchanger in service, an uncontrolled rod motion casualty will occur. The crew will attempt to stop the rod motion by placing the rods in manual. When the crew notes that this does not stop the withdrawl, the crew will trip the reactor and enter BwEP E-0.

From E-0, the crew will transition to BwEP ES-0.1. While in ES-0.1, an instrument air leak will occur inside of containment. The crew should enter BwOA SEC-4 to address the failure. When Instrument Air is isolated to containment, the leak will be isolated. NOTE: Instrument Air to containment may auto isolate.

After Instrument Air is isolated to containment, a steam break will occur inside containment on the 1D Main Steam Line. The crew will initiate a Safety Injection and transition back to BwEP E-0. From BwEP E-0, the crew will transition to BwEP E-2. The crew should note that the 1D FW isolation MOV did not automatically close and take actions to close the valve.

From BwEP E-2, the crew will transition t BwEP E-1 and then to BwEP ES-1.1 to terminate SI. After the 1D SG has completely blown down, RCS pressure will rapidly increase to the PORV setpoint. When PORV 455C opens it will fail open requiring the crew to manually isolate the PORV.

Critical Tasks

1. E-2 --A: Isolate the faulted SG before transition out of E-2.

2. E-0--M: Close the block MOV upstream of the stuck-open Pzr PORV by completion of the first step in the ERG network that directs the crew to close the block MOV.

Simulation Facility Braidwood	Scenario No.: 00-3	Operating Test No.: 1
Examiners: _____	Applicant: _____	SRO
_____	_____	RO
_____	_____	BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a PT-508 high failure, a Power Range NI failure, an inadvertent dilution, a reactor trip due to a failed open RTB, and a Loss of All AC.

Initial Conditions: IC-21; 100% power BOL, Equilibrium Xenon

Turnover: Unit 1 is at 100% power. Unit 2 is in MODE 5. The 1A DG is OOS to replace a leaking fuel injection line on the 2R cylinder. The 1A DG is expected back in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the Completion Time.

Event No.	Malf. No.	Event Type*	Event Description
Preload	MRF EG03 MAINT_0 IOR ZDI1HSAP079 NAT		Place the 1A DG & output breaker in PTL and tag OOS Prevents ESF Bus 142 cross tie to U-2
Preload	MRF FW160 STOP	C BOP RO SRO	Prevent the 1B AFW pump from starting
Preload	CAE! 1BDGAUTO Link MRF EG09 REMOTE to TRG 6	C BOP SRO	Failure of the 1B DG to Auto Start
1		N BOP SRO R RO	Ramp the unit down in power to 90% at 5Mw/min
2	FW16, 1500	I BOP SRO	PT-508 (Feedwater Header Pressure Transmitter) fails high
3	NI08A, 500	I RO SRO	NI-41 Power Range Upper Detector Failure High **(NOTE 1)**
4	MRF CV13, 100	R RO SRO	Inadvertent Dilution Event
5	MRF RP01 TRIP	M BOP RO SRO	Reactor Trip **(NOTE 2)**
6	ED04A EG09B	M BOP RO SRO	Loss of All AC DG 1B Seizure (insert after crew manually starts)

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

NOTE 1: RP20 (Open/Close) RX013 (Trip) RX135 (Trip)
NOTE 2: If the crew trips the reactor due to the inadvertent dilution, this event does not need to be initiated.
NOTE 3: When directed as local operator to attempt to start the 1B AFW pump **MRF FW160 START**

SCENARIO 00-3 OVERVIEW

Unit 1 is at 100% power, BOL. Unit 2 is in MODE 5. The 1A Diesel Generator is OOS to replace a leaking fuel injection line on the 2R cylinder. Currently in LCO 3.8.1 Condition B with 12 hours left on the Completion Time.

After the crew takes the shift, Electric Generation will request the Unit be reduced to 90% power at 5Mw/min.

Following clearly observable plant response from the reactivity changes, feedwater header pressure instrument, PT-508 will fail high. The operator is expected to recognize this condition, take manual control of the Master FW Pumps Speed Controller and restore FW discharge pressure to within its normal band.

After the actions for the failed PT-508 instrument are complete, N-41 Power Range Upper Detector will fail high. The crew will enter BwOA INST-1 Attachment A and take actions to stabilize the plant. After the crew has defeated the failed N-41, the crew will place rods back into Auto and trip bistables associated with the failed Power Range NI.

After the actions of BwOA INST-1 are complete, an inadvertent dilution will occur. The crew should enter BwOA PRI-12 to attempt to determine and correct the cause of the inadvertent dilution. The crew may enter BwOA PRI-2 to commence emergency boration. The crew may trip the reactor due to the inadvertent dilution. If the crew does not trip the reactor, an inadvertent reactor trip will occur due to the opening of the 1A reactor trip breaker.

Once the immediate actions of BwEP E-0 are complete a Loss of All AC will occur. The 1B DG will not auto-start. When the crew attempts to manually start the 1B DG, it will seize and trip. Re-powering the ESF Buses from U-2 will also be unsuccessful. The crew will transition from E-0 to BwCA-0.0 and then transition to BWCA-0.1. While in ECA-0.0 the 1A DG will become available to restore power to Bus 141.

NOTE: The crew may transition to BwCA-0.2 based on Pzr level if they performed a large SG depressurization.

During the crews actions in BwCA-0.0 the crew will recognize the failure of the 1B AFW pump to auto start. The crew will have to manually start (locally) the 1B AFW pump to restore AFW to the steam generators.

Critical Tasks

1. ECA-0.0--B: Establish the minimum required AFW flow rate (500 gpm) to the SGs before dryout occurs.

2. ECA-0.0--H: Isolate RCP seal injection before a charging pump starts or is started.

Simulation Facility Braidwood | Scenario No.: Spare

Examiners: _____ | Operators: _____ SRO

_____ _____ RO

_____ _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a normal power increase, a pressurizer level channel failure, HDT level controller failure, a leak in the letdown heat exchanger, a leak in the main turbine EHC system and a Large LOCA with failure of RH pumps to start and failure of automatic transfer to sump suction for operating train of RH.

Initial Conditions: IC-16. Unit at 49% power

Turnover: 1CC9437A OOS for MOV surveillance. Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time.

Event No.	Malf. No.	Event Type*		Event Description
Preload	RH01A	C	RO SRO	1A RH Pump fails to start/trip
Preload	MRF RP85 open RP15F	C	RO SRO	1B RH Pump fails to start on SI with manual start available
Preload	RH04B	C	BOP SRO	Failure of 1SI8811B (RH CNMT Sump) auto transfer
1		N	BOP SRO	Ramp up turbine power to 75% at 5 MW/min
		R	RO	Raise reactor power using rods and/or dilution
2	RX13A, 0, 10	I	RO SRO	Pressurizer level channel fails low (LT-459) **(NOTE 1)**
3	FW17, 0	I	BOP SRO	Heater Drain Tank level controller fails low
4	CV23A, 100	C	RO SRO	Letdown Heat Exchanger tube leak
5	TC15, 34	M	BOP RO SRO	EHC System leak of 34 gpm results in turbine trip **(NOTE 2)**
6	TH06A, 450000	M	BOP RO SRO	Large Break LOCA upon reactor trip
7	Preload	C	RO SRO	1A and 1B RH Pump fail to start with 1B RH pump manual start capable.
8	Preload	C	BOP SRO	Failure of Auto transfer to cold leg recirc for "B" Train

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

NOTE 1: MRF RP20 OPEN/CLOSE
MRF RX029 TRIP

NOTE 2: If asked as local operator, the EH fluid leak is greater than makeup capacity and leak is located at combined discharge of EH pumps.

SCENARIO Spare OVERVIEW

Unit 1 is at 50% power. Following turnover power increase is initiated to 75% power.

Following clearly observable plant response from the reactivity changes, the controlling pressurizer level channel will fail low. Pressurizer level will be placed in manual, an operable channel selected and level returned to normal. The SRO should contact I&C to assist in repair and the tripping of bistables. Technical Specifications should be consulted for applicability.

After the bistables for pressurizer level have been tripped, Heater Drain Tank level controller will fail causing heater drain tank level to rise. The overflow valve will open and level alarms will actuate. The operator is expected to take manual control of the level controller and reopen the valve.

After HDT tank level is restored to normal band, a leak will develop in the letdown heat exchanger. The operator should notice VCT level changing, and radiation levels in the CCW system increasing. Operators should troubleshoot and identify the failed letdown HX. The crew should establish letdown using the 1B HX.

After the 1B Letdown HX is in service, an EHC leak will develop on the EHC reservoir. EHC level will drop bringing in several alarms. When level is sufficiently low to result in a trip of the EHC pumps, the main turbine also gets a trip signal. E-0 will be entered when the reactor trips.

At the time of the reactor trip, a large break LOCA occurs on the RCS. Both RH pumps fail to start. The 1A RH pump trips if a manual start is attempted, but the 1B RH pump will start on a manual start. When RWST level drops to the LO-2 level for automatic transfer to the CNMT sump suction, the "B" Train valve SI8811B will fail to automatically open. Operator action is required to stop the RH and CS pumps and manually open the sump suction valves. The scenario is terminated following completion of the alignment of ECCS for cold leg recirculation.

Critical Tasks

1. E-0 — H: Manually start at least one low-head ECCS pump before transition out of E-0.

2. ES-1.3 — A: Transfer to cold leg recirculation and establish ECCS recirculation flow that at least meets the assumptions of the plant-specific LOCA analysis.

OPERATING TEST NO.: 2

Applicant Type	Evolution Type	Minimum Number	Scenario Number 00-4	00-5	00-6	Spare
			1	2	3	4
RO	Reactivity	1	1 /	1,3 /	1 /	1 /
	Normal	1	/ 1	/ 1,3	/ 1	/ 1
	Instrument	2	3 / 4	5 / 4	3 / 4	2 / 3
	Component	2	2,8 / 5	2,6 / 6	2,5,9 / 8	4,7 / 8
	Major	1	6 / 6,7	7,8 / 7,8	6,7 / 6,7	5,6 / 5,6
As RO	Reactivity	1	1	1,3	1	1
	Normal	0				
	Instrument	1	3	5	3	2
	Component	1	2,8	2,6	2,5,9	4,7
	Major	1	6	7,8	6,7	5,6
SRO-I						
As SRO	Reactivity	0				
	Normal	1	1	1,3	1	1
	Instrument	1	3,4	4,5	3,4	2,3
	Component	1	2,5,8	2,6	2,5,8,9	4,7,8
	Major	1	6,7	7,8	6,7	5,6
SRO-U	Reactivity	0	N/A	N/A	N/A	N/A
	Normal	1	N/A	N/A	N/A	N/A
	Instrument	1	N/A	N/A	N/A	N/A
	Component	1	N/A	N/A	N/A	N/A
	Major	1	N/A	N/A	N/A	N/A

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations must be significant as defined in Appendix D.

NOTE: Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal.

The "/" in the cells for the "RO"' applicant type represents the position the applicant is expected to fill during the scenario. The events are listed for the identified position: RO / BOP.

Author: _____
Chief Examiner: _____

Operating Test: 2

Competencies	Applicant #1 ~~RO~~/**SRO-I**/~~SRO-U~~				Applicant #2 **RO**/~~SRO-I~~/~~SRO-U~~				Applicant #3 **RO(BOP)**/~~SRO-I~~/~~SRO-U~~			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms	2-8	2-8	2-9	2-8	2-8	2,4,5,6,7,8	2-9	2,4,5,6,7	2-8	2,4,5,6,7,8	2-9	3,5,6,8
Diagnose Events and Conditions	2-8	2-8	2-9	2-8	2,3,6,8	2,5,6,7,8	2,3,5,6,7,9	2-7	4-7	4,6,7,8	4,6,7,8	3,5,6,8
Understand Plant and System Response	1-8	1-8	1-9	1-8	1,2,3,6,8	1-3,4-8	1,2,3,5,6,7,9	1-8	1,4-7	1,3,4,6-8	1,4,6,7,8	1-8
Comply With and Use Procedures (1)	1-8	1-8	1-9	1-8	1,2,3,6,8	1-3,4-8	1,2,3,5,6,7,9	1,2,4-8	1,4-7	1,3,4,6-8	1,4,6,7,8	3-8
Operate Control Boards (2)	1-8	1-8	1-9	1-8	1,2,3,6,8	1-3,4-8	1,2,3,5,6,7,9	1,2,4-8	1,4-7	1,3,4,6-8	1,4,6,7,8	3-8
Communicate and Interact With the Crew	1-8	1-8	1-9	1-8	1-8	1-8	1-9	1-8	1-8	1-8	1-9	1-8
Demonstrate Supervisory Ability (3)	1-8	1-8	1-9	1-8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Comply With and Use Tech. Specs. (3)	1,4,5	2,4,5	3,4,5	2,4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

NOTE: **OPERATING TEST NO.: 2.** Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO and BOP by position.

Author: _____

Chief Examiner: _____

Simulation Facility Braidwood Scenario No.: 00-4 Operating Test No.: 2

Examiners: _____ Operators: _____ SRO

_____ _____ RO

_____ _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to pre-loaded SGTL, a power decrease, an auto rod speed controller failure, a VCT level transmitter failure, a SG level transmitter failure, actuation of deluge to the in service Control Room Vent Charcoal Filter, a SGTR with a pressurizer safety valve failing open.

Initial Conditions: IC-16, 49% power. Xenon is increasing

Turnover: Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time. Chemistry has just confirmed the 1B SG has a tube leak of 15 gpm.

Event No.	Malf. No.	Event Type*	Event Description
Preload	TH03B, 15	RO SRO	SG B Tube leak – 15 gpm small enough to give alarms. Large enough to cause a power reduction
Preload	1B DG in PTL 1423 in PTL MRF EG09 MAINT_0		1B DG OOS
1		N BOP SRO	Ramp down turbine power at directed MW/min
		R RO	Lower reactor power using rods and/or boration
2	RD09, 72	C RO SRO	Auto Rod Speed controller failure – 72 steps/min when rod motion is initiated
3	CV17, 100	I RO SRO	VCT level transmitter LT-185 fails high on a 180 sec ramp.
4	RX06G, 0	I BOP SRO	SG B level transmitter (controlling) fails low on a 180 sec ramp (LT-529) **(NOTE 1)**
5	FP01D	C BOP SRO	Inadvertent deluge of MCR VC Charcoal filter(trips running supply & exhaust fans)
6	TC02	BOP RO SRO	Turbine trip on sensed low load
7	TH03B, 900	BOP SRO	SG B tube rupture – (100% 300 sec ramp)
8	TH12A, 95	C RO SRO	Pressurizer safety valve fails partially open

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

NOTE 1 RP20 (OPEN/CLOSE) RX057 (TRIP) RX058 (TRIP)

SCENARIO 00-4 OVERVIEW

Unit 1 is at 50% power. It will be discussed in the turnover that the SGTL has been discovered. Power decrease should be directed following turnover.

Following clearly observable plant response from the reactivity changes, an auto rod speed failure will cause rods to insert at 72 steps/min when demanded. It is expected that the RO will recognize improper rod motion for this condition and place rod control in manual. BwOA ROD-1 may be entered, but is NOT required, in response to the rod control problem. I&C will not be able to repair the rod speed problem and manual rod control will be the only way to move control rods at proper speed.

After actions for the rod failure are complete, a VCT level transmitter LT-185 will fail high. VCT level will have to be controlled manually to allow letdown flow to the VCT or divert as necessary. LT-112 indication will be available.

After control of VCT level is regained, a SG level channel will fail low. SG level control will be placed in manual and normal level restored. Entry is made into BwOA INST-2 (Attachment E); the level control is transferred to an operable channel and the FRV control returned to auto. The SRO will address ITS for applicability and actions for the failed SG level instrument. The SRO will contact I&C for assistance in repair and the tripping of bistables.

After the SG level channel bistables have been tripped, the deluge valve to the Control Room Vent Charcoal Filter opens when inadvertently kicked by a painter. The actuation of the deluge results in trip of the running "B" Train Control Room Ventilation Supply and Return fans and the "B" Train Chiller. The operator will be required to start the "A" Train equipment and direct local actions to isolate the deluge.

After Control Room Ventilation is restored, the main turbine will trip 60 seconds following failure of the load sensor. Coincident with the turbine trip the SGTR will occur on SG B, and a pressurizer safety valve will fail 95% open. E-0 will be entered with procedures E-3 and CA-3.1 utilized. The scenario terminates after determination that no additional cooldown is required at step 10 of ECA-3.1.

Critical Tasks

E-3--A: Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.

E-3--B: Establish/maintain RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either of the following conditions:

- Too high to maintain minimum required subcooling (per ICONICS or Att. A)

OR

- Below the RCS temperature that causes an extreme or severe challenge to the subcriticality and/or the integrity CSF (240°F).

E-3--C: Depressurize RCS to meet SI termination criteria before water enters the steamlines.

Simulation Facility	Braidwood	Scenario No.: 00-5	Operating Test No.: 2
Examiners:	_____	Operators: _____	SRO
	_____	_____	RO
	_____	_____	BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a power maneuver, RCP seal failure, 1C Steam Generator feed flow transmitter failure, Pzr pressure channel failure, loss of an ESF bus, reactor trip with component failures.

Initial Conditions: IC-31 90% power. All systems are in automatic and operating properly.

Turnover: Unit 1 is currently at 90% power. All systems are in automatic and operating properly. Electrical Generation has requested a load increase to full power as soon as possible.

Event No.	Malf. No.	Event Type*		Event Description
Preload	RP01	M	RO BOP SRO	Failure of automatic reactor trip
Preload	RP15B	C	RO BOP SRO	Failure of the 1B Charging pump to Auto Start
Preload	RP15R	C	RO BOP SRO	Failure of the 1B SX pump to Auto Start
1		N	BOP SRO	Ramp up turbine power to 100% at 5 MW/min
		R	RO	Raise reactor power using rods and/or dilution
2	CV27A, 3.1	C	RO SRO	1A RCP #1 seal failure. (3.1 gpm at 240 sec.)
3		N	BOP SRO	Ramp down turbine power at directed MW/min due to shutdown requirements
		R	RO	Lower reactor power using rods and/or boration
4	RX04E, 0	I	BOP SRO	SG C feed flow (controlling) fails low. 180 sec ramp.
5	RX21B, 2500	I	RO SRO	Pressurizer Pressure channel PT-456 fails high. **(NOTE 1)**
6	ED07A	C	RO BOP SRO	Loss of 4KV ESF Bus 141
7	RF RP61 IN (RP01)	M	RO BOP SRO	Closure of all MSIVs with failure of reactor to auto trip
8	TH06A, 2500	M	RO BOP SRO	LOCA 2500 gpm. 5 minute ramp

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

NOTE 1: MRF RP21 (OPEN/CLOSE) MRF RX036 (TRIP) MRF RX038 (TRIP) MRF RX039 (TRIP)

MRF RX037 (TRIP) MRF RX017 (TRIP) MRF RX137 (TRIP)

SCENARIO 00-5 OVERVIEW

Unit 1 is at 90% power. Electric Generation has requested load increase to full power as soon as possible due to expected electrical loads.

Following clearly observable plant response from the reactivity changes, a 1A RCP #1 seal will fail and leak at the rate of 3.1 gpm over a 240-sec. period. The seal should be isolated. The procedure will direct the removal of the RCP from service. A ramp down in power should be started.
[NOTE to Simulator Operator: When asked, report 1A RCP # 2 seal leakoff flow reads 0.3 gpm]

Following the decision to ramp down power, a SG feed flow channel will fail low. The operator should place the associated FWRV in manual and restore SG level. Entry is made into BwOA INST-2 (Attachment G) and the feedwater flow control is transferred to an operable channel and the FRV control returned to auto. The SRO should call I&C for assistance in repair of the failed channel.

After I&C has been notified of the feed flow channel failure, a pressurizer pressure channel will fail high. A PORV will go open. The operator must diagnose the failed channel, close the PORV. Entry is made into BwOA Inst-2 (Attachment B) and an operable pressurizer pressure channel selected. Pressurizer pressure is verified restoring to normal. The SRO will review ITS for applicability and actions. The SRO will notify I&C of the failure, request assistance in repair and the tripping of bistables.

When the bistables have been tripped, power will be lost to the 4KV ESF Bus 141. Just following the loss of power to the bus, all MSIVs will close resulting in a primary transient that will generate a reactor trip (OTΔT). The reactor will fail to trip requiring the crew to recognize failure and initiate a manual trip. Following entry into E-0, a LOCA will occur on the 1A Cold Leg requiring a SI. The crew should manually initiate a SI. The crew will recognize the DG 1A started but does NOT tie to bus due to the fault. Repairs are required for Bus 141. Transition will be made to E-1. The crew will be required to manually start the 1B SX Pump to provide cooling to various plant components. Manual start of the 1B CV Pump is also required.

Critical Tasks

E-0--A: Manually trip the reactor from the control room when safety limits are exceeded (failure of auto trip)

E-0--L: Manually start at least one ESW pump in an operating safeguards train (1B) before cooled components overheat.

Simulation Facility Braidwood Scenario No.: 00-6 Operating Test No.: 2

Examiners: _____ Operators: _____ SRO

_____ _____ RO

_____ _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to normal power reduction, a plugged boric acid filter, a Tcold RTD failing high, a steam flow detector failure, a RCP thermal barrier leak, a steam break causing a reactor trip, a RCS Small Break LOCA with a failure of automatic start of both Auxiliary Feedwater (AF) pump but manual start available for the 1A AF Pump, and failure of the High Head SI discharge valves to auto open.

Initial Conditions: IC-54; 100% power BOL. Equilibrium. Xenon

Turnover: Unit is at 100% power. Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time.

Event No.	Malf. No.	Event Type*	Event Description
Preload (NOTE 1)	FW44 MRF EG09 MAINT_O	C BOP SRO	1B AF Pump fails to start 1B DG OOS
Preload (NOTE 1)	IMF RP15B MRF RP90 OPEN RF RP91 TEST IORs SE:PN0470 OFF SE:PN0468 OFF	C BOP SRO	1A AF Pump fails to auto start
Preload (NOTE 1)	MRF RP75 OUT IOR ZDI1SI8801A CLS	C RO SRO	SI8801A fails close and SI8801B fails to auto open
1		N BOP SRO	Ramp down turbine power to 60% at 5 MW/min
		R RO	Lower reactor power using rods and/or boration
2	RF CV33, 0	C RO SRO	Boric Acid filter plugged. (Insert after boration has started) **(NOTE 2)**
3	RX18D, 630	I RO SRO	Loop D Tcold fails high **(NOTE 3)**
4	RX03E, 0	I BOP SRO	Steam Flow C (control) detector fails low. (360 sec ramp) FT-532A
5	CC07C, 25	C RO SRO	Loop C RCP thermal barrier leak. (25 gpm)
6	MS08	M BOP RO SRO	Main Steam Line Break Outside Containment (Results in reactor trip)
7	TH06C, 200 -900	M BOP RO SRO	RCS leak on Loop C at 200 gpm (increase to 900 gpm after 5 min.)
8	Preload	C BOP SRO	AF pumps fail to auto start with 1A manual start capable
9	Preload	C RO SRO	High Head SI discharge valves to RCS fail to open automatically with 1SI8801A

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

NOTE 1: Run BATCH FILE for all Preload **BAT ES1.2**

NOTE 2: MRF CV34, 100 when directed to bypass filter.

NOTE 3: MRF RP23 (OPEN/CLOSE) MRF RX026 (TRIP) MRF RX142 (TRIP) MRF RX025 (TRIP) MRF RX141 (TRIP) MRF RX028 (TRIP) MRF RX027 (TRIP)

SCENARIO 00-6 OVERVIEW

Unit 1 is at 100 % power BOL. Following turnover, the crew is to maintain power steady for flux mapping.

The system operator will call the control room and request a reduction of reactor power to 75%.

Following clearly observable plant response from the reactivity changes, the boric acid filter will become plugged causing a complete loss of boric acid flow. The operators will troubleshoot the lack of boric acid flow and will eventually open the filter bypass valve.

After the boric acid filter bypass is opened, Loop D Tcold RTD will fail high. BwOA INST-2 (Attachment A) will be entered to address the failed Tcold RTD. The SRO will address ITS for actions for the failed Tcold instrument.

When I&C has tripped the bistables, a steam flow detector will fail low. This will cause the BOP to go to manual on the FWRV and control the feed pump speed manually. Entry into BwOA INST-2 (Attachment H) is required. The failed channel will be selected out and after control of SG level is attained, control will be switched back to auto. The turbine ramp should be slowed or stopped during troubleshooting and plant stabilized.

Two minutes following return of the SG level control to auto, a RCP will develop a thermal barrier leak. Automatic isolation of the leak is not desired. Entry into BwOA PRI-1 may occur and entry into PRI-6 will occur. The operators must diagnose the leak and expected radiation alarms, and manually isolate the leak.

After the RCP thermal barrier leak is isolated, a main steam break outside of containment will occur. This will result in a reactor trip and main steam isolation. The crew will enter BwEP E-0 and transition to BwEP ES-0.1. While the crew is in ES-0.1, an RCS leak of 200 gpm occurs. This leak will increase to 900 gpm after approx. 5 min. The crew will transition back to BwEP-E-0. Upon AFW actuation, the 1A motor driven AF pump and the 1B diesel driven AF pump will fail to start. The operator will manually start the 1A AF pump (the 1B AFW pump will not be able to be started). The high head SI discharge valve SI8801A & B will fail to open with the SI8801B capable of being manually open. The operator will manually open SI8801B for high head injection flow. Transition is made to E-1 based on RCS and containment conditions. Cooldown will be required and transition is made to ES-1.2. The scenario is terminated when at step 6 when determination of cooldown is required.

Critical Tasks

E-0--F: Establish the minimum required AFW flow rate to the SGs before transition out of E-0.

E-0--I: Establish flow from at least one high-head ECCS pump before transition out of E-0.

Simulation Facility Braidwood | Scenario No.: Spare

Examiners: _____ | Operators: _____ SRO

_____ _____ RO

_____ _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a normal power increase, a pressurizer level channel failure, HDT level controller failure, a leak in the letdown heat exchanger, a leak in the main turbine EHC system and a Large LOCA with failure of RH pumps to start and failure of automatic transfer to sump suction for operating train of RH.

Initial Conditions: IC-16. Unit at 49% power

Turnover: 1CC9437A OOS for MOV surveillance. Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time.

Event No.	Malf. No.	Event Type*		Event Description
Preload	RH01A	C	RO SRO	1A RH Pump fails to start/trip
Preload	MRF RP85 open RP15F	C	RO SRO	1B RH Pump fails to start on SI with manual start available
Preload	RH04B	C	BOP SRO	Failure of 1SI8811B (RH CNMT Sump) auto transfer
1		N	BOP SRO	Ramp up turbine power to 75% at 5 MW/min
		R	RO	Raise reactor power using rods and/or dilution
2	RX13A, 0, 10	I	RO SRO	Pressurizer level channel fails low (LT-459) **(NOTE 1)**
3	FW17, 0	I	BOP SRO	Heater Drain Tank level controller fails low
4	CV23A, 100	C	RO SRO	Letdown Heat Exchanger tube leak
5	TC15, 34	M	BOP RO SRO	EHC System leak of 34 gpm results in turbine trip **(NOTE 2)**
6	TH06A, 450000	M	BOP RO SRO	Large Break LOCA upon reactor trip
7	Preload	C	RO SRO	1A and 1B RH Pump fail to start with 1B RH pump manual start capable.
8	Preload	C	BOP SRO	Failure of Auto transfer to cold leg recirc for "B" Train

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

NOTE 1: MRF RP20 OPEN/CLOSE MRF RX029 TRIP

NOTE 2: If asked as local operator, the EH fluid leak is greater than makeup capacity and leak is located at combined discharge of EH pumps.

SCENARIO Spare OVERVIEW

Unit 1 is at 50% power. Following turnover power increase is initiated to 75% power.

Following clearly observable plant response from the reactivity changes, the controlling pressurizer level channel will fail low. Pressurizer level will be placed in manual, an operable channel selected and level returned to normal. The SRO should contact I&C to assist in repair and the tripping of bistables. Technical Specifications should be consulted for applicability.

After the bistables for pressurizer level have been tripped, Heater Drain Tank level controller will fail causing heater drain tank level to rise. The overflow valve will open and level alarms will actuate. The operator is expected to take manual control of the level controller and reopen the valve.

After HDT tank level is restored to normal band, a leak will develop in the letdown heat exchanger. The operator should notice VCT level changing, and radiation levels in the CCW system increasing. Operators should troubleshoot and identify the failed letdown HX. The crew should establish letdown using the 1B HX.

After the 1B Letdown HX is in service, an EHC leak will develop on the EHC reservoir. EHC level will drop bringing in several alarms. When level is sufficiently low to result in a trip of the EHC pumps, the main turbine also gets a trip signal. E-0 will be entered when the reactor trips.

At the time of the reactor trip, a large break LOCA occurs on the RCS. Both RH pumps fail to start. The 1A RH pump trips if a manual start is attempted, but the 1B RH pump will start on a manual start. When RWST level drops to the LO-2 level for automatic transfer to the CNMT sump suction, the "B" Train valve SI8811B will fail to automatically open. Operator action is required to stop the RH and CS pumps and manually open the sump suction valves. The scenario is terminated following completion of the alignment of ECCS for cold leg recirculation.

Critical Tasks

1. E-0 — H: Manually start at least one low-head ECCS pump before transition out of E-0.

2. ES-1.3 — A: Transfer to cold leg recirculation and establish ECCS recirculation flow that at least meets the assumptions of the plant-specific LOCA analysis.

OPERATING TEST NO.: 3

Applicant Type	Evolution Type	Minimum Number	Scenario Number 00-7	00-8	00-9	Spare
			1	2	3	4
RO	Reactivity	1	4 /	1 /	1 /	1 /
	Normal	1	/ 4	/ 1	/ 1	/ 1
	Instrument	2	1,2 / 1	3 / 4	4 / 2,3	2 / 3
	Component	2	3,5 / 5	2,5 / 5	5,7 / 5,7	4,7 / 8
	Major	1	6 / 6	6,7 / 6,7	6,8 / 6,8	5,6 / 5,6
As RO	Reactivity	1	4	1	1	1
	Normal	0				
	Instrument	1	1,2	3	4	2
	Component	1	3,5	2,5	5,7	4,7
	Major	1	6	6,7	6,8	5,6
SRO-I						
As SRO	Reactivity	0				
	Normal	1	4	1	1	1
	Instrument	1	1,2	3,4	2,3,4	2,3
	Component	1	3,5	2,5	5,7	4,7,8
	Major	1	6	6,7	6,8	5,6
SRO-U	Reactivity	0	N/A	N/A	N/A	N/A
	Normal	1	N/A	N/A	N/A	N/A
	Instrument	1	N/A	N/A	N/A	N/A
	Component	1	N/A	N/A	N/A	N/A
	Major	1	N/A	N/A	N/A	N/A

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations must be significant as defined in Appendix D.

NOTE: Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal.

The "/" in the cells for the "RO'" applicant type represents the position the applicant is expected to fill during the scenario. The events are listed for the identified position: RO / BOP.

Author: _____
Chief Examiner: _____

Operating Test: 3

Competencies	Applicant #1 ~~RO~~/**SRO-I**/~~SRO-U~~				Applicant #2 **RO**/~~SRO-I~~/~~SRO-U~~				Applicant #3 **RO(BOP)**/~~SRO-I~~/~~SRO-U~~			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms	1,2,3,5,6	2-7	2-8	2-8	1,2,3,5,6	2,3,5,6,7	4-8	2,4,5,6,7	1,5,6	4,5,6,7	2,3,5,6,7,8	3,5,6,8
Diagnose Events and Conditions	1,2,3,5,6	2-7	2-8	2-8	1,2,3,5,6	2,3,5,6,7	4-8	2-7	1,5,6	4,5,6,7	2,3,5,6,7,8	3,5,6,8
Understand Plant and System Response	1-6	1-7	1-8	1-8	1-6	1,2,3,5,6,7	1,4-8	1-8	1,4,5,6	1,4,5,6,7	1,2,3,5,6,7,8	1-8
Comply With and Use Procedures (1)	1-6	1-7	1-8	1-8	1-6	1,2,3,5,6,7	1,4-8	1,2,4-8	1,4,5,6	1,4,5,6,7	1,2,3,5,6,7,8	3-8
Operate Control Boards (2)	1-6	1-7	1-8	1-8	1-6	1,2,3,5,6,7	1,4-8	1,2,4-8	1,4,5,6	1,4,5,6,7	1,2,3,5,6,7,8	3-8
Communicate and Interact With the Crew	1-6	1-7	1-8	1-8	1-6	1-7	1-8	1-8	1-6	1-7	1-8	1-8
Demonstrate Supervisory Ability (3)	1-6	1-7	1-8	1-8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Comply With and Use Tech. Specs. (3)	1,3	2,3,4	3,4,5	2,4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

NOTE: **OPERATING TEST NO.: 2.** Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO and BOP by position.

Author: _____

Chief Examiner: _____

Simulation Facility Braidwood	Scenario No.: 00-7	Operating Test No.: 3	
Examiners: _____		Operators: _____	SRO
_____		_____	RO
_____		_____	BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to an impulse pressure transmitter failure, Pzr Master Controller failing low, 1C RCP #1 seal failing open requiring a unit S/D, loss of ESF Bus, RCP shaft seizure resulting in a LOCA with various components failing to align (start/open) during the Reactor Trip and Safety Injection.

Initial Conditions: IC- 21, 100% power, Steady State operations. All equipment in automatic and operating properly.

Turnover: 100% power, Steady State operations. All equipment in automatic and operating properly.

Event No.	Malf. No.	Event Type*		Event Description
Preload (NOTE 1)	RP01 IOR ZDIRT2 NORMAL	C	BOP RO SRO	Automatic reactor trip failure. Failure of the reactor trip switch from the RO panel.
Preload (NOTE 1)	RP02A	C	RO SRO	Failure of the "A" RTB to open.
Preload (NOTE 1)	RP15C MRF FW160 STOP MRF RP90 OPPEN IMF RP155	C	BOP RO SRO	Failure of the 1A SI Pump to Auto start. Failure of the 1B AFW Pump to Auto start. Failure of the 1A AFW Pump to Auto Start
1	RX10A, 0	I	BOP RO SRO	PT-505 failure low **(NOTE 2)**
2	RX15, 2355	I	RO SRO	Failure of the Pzr Master Pressure Controller
3	CV27C, 4	C	RO SRO	Failure of the 1C RCP #1 seal
4		N	BOP SRO	Ramp down turbine power at directed MW/min due to RCP seal failure
		R	RO	Lower reactor power using rods and/or boration due to RCP seal failure
5	ED07B	C	BOP RO SRO	Loss of ESF Bus 142 (overcurrent)
6	TH17C TH06C, 2000 IOR ZDI1HSAP041	M	BOP RO SRO	1C RCP shaft seizure 1C RCS cold leg LOCA (1 minute delay) Trip Bkr 1412 after E-0 to manually start the 1A SI Pump

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

NOTE 1: Run BATCH FILE for all Preload **BAT 1AFWPMP**

NOTE 2: RP20 (OPEN/CLOSE) RX143 (Trip)

SCENARIO 00-7 OVERVIEW

The scenario starts with the Unit 1 at 100% steady state power. There are no Out of Services and all equipment is operating properly.

After the crew has taken the shift, PT-505, Main Turbine First Stage Impulse Pressure Channel will fail low causing the crew to perform the actions of BwOA INST-2 Attachment D. These actions include manual rod control, going to the steam pressure mode on the steam dumps, defeating the failed channel, tripping bistables and referencing Tech Specs.

After the actions of BwOA INST-2 Attachment D are complete, the Pressurizer Master Pressure Controller will fail high. The crew should take manual control of the controller and restore RCS pressure to normal. The crew may reference BwOA INST-2 Attachment B for guidance.

Once Pzr Pressure has been restored to normal, the 1C RCP #1 seal will fail open resulting in the Unit required to be shutdown and the 1C RCP secured within 8 hours. The crew should enter BwOA RCP-1 to address the seal failure. The crew will commence a unit shutdown per BwGP 100-4 ensuring that the 1C RCP will be secured in 8 hours. Tech. Specs should also be referenced to determine if the RCS leak rate is acceptable.

Following clearly observable plant response from the reactivity changes resulting from the unit shutdown, an overcurrent condition will occur on Bus 142 resulting in the loss of Bus 142. The crew should enter BwOA ELEC-3 to take actions for the loss of Bus 142. The crew should also determine that Attachment D of BwOA ELEC-3 is not applicable due to the fire being in Bus 142. The crew will reference tech Specs.

After the actions for the loss of Bus 142 are complete, the 1C RCP shaft will seize resulting in a RCS Cold Leg LOCA. The crew will have to manually trip the reactor from the safeguards panel due to both an automatic reactor trip failure and the failure of the manual reactor trip switch from the RO panel. The crew will perform the actions of BwEP E-0. During the Immediate Actions of E-0, the crew should recognize that the "A" reactor trip breaker failed open and dispatch a local operator to open it. The crew will have to manually start the 1A SI pump due to an auto start failure. Auxiliary Feedwater will also have to be manually initiated due to the Loss of Bus 142 (1A AFW pump) and the failure of the 1B AFW pump to auto start.

From BwEP E-0 the crew will transition to BwEP E-1 and then to BwEP ES-1.2 to cooldown the primary plant.

Critical Tasks

E-0--A: Manually trip the reactor from the control room to prevent a transition to BWFR-S.1.

E-0--F: Establish the minimum required AFW flow rate to the SGs before transition out of E-0.

E-0--J: Establish flow from at least one intermediate-head ECCS pump before transition out of E-0.

Simulation Facility	Braidwood	Scenario No.: 00-8	Operating Test No.: 3

Examiners: _____ Operators: _____ SRO

_____ _____ RO

_____ _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a

Initial Conditions: IC-31, 90% power, Steady State, 1A Charging pump and 1B AFW pump OOS.

Turnover: Unit 1 is currently at 90% power. 1A Charging pump is OOS for pump bearing replacement and is expected back next shift. Currently in Tech Spec 3.5.2 Condition A. There are 5 days left on the Completion Time. The 1B AFW Pump is OOS for a modification to the starting circuit and is expected back in 3 to 4 hours. Currently in Tech Spec 3.7.5 Condition A. There are 60 hours left on the Completion Time. Electrical Generation has requested a load increase to full power as soon as possible at 5Mw/min. Unit 2 is in a Refueling outage and they are making preps to lift the head.

Event No.	Malf. No.	Event Type*	Event Description
Preload (NOTE 1)	RP01 RP02A RP02B	M BOP RO SRO	Failure of the reactor to trip (Auto and Manual)
Preload (NOTE 1)	RD09, 18	C RO SRO	Auto rod speed failure at 18 steps/min.
Preload (NOTE 1)	MS03A 100 Trg 3 MS03B 100 Trg 3 MS03C 100 Trg 3 MS03D 100 Trg 3	C BOP RO SRO	SG Safety failure (4 SGs)
Preload (NOTE 1)	1A CV Pump PTL & OOS 1B AFW Pump PTL & OOS		1A CV Pump OOS 1B AFW Pump OOS
Preload (NOTE 1)	Imbedded Batch File	C BOP RO SRO	1A AFW pump fail to Auto start
1		N BOP SRO	Ramp up turbine power to 100% at 5 MW/min
		R RO	Raise reactor power using rods and/or dilution
2	CV01B	C RO SRO	1B Charging Pump trip
3	RX18E, 650	I RO SRO	A Loop Hot Leg RTD failure high **(NOTE 2)**
4	RX03A, 4.8mlbm/hr	I BOP SRO	1B SG Steam Flow Channel Failure (controlling channel)
5	EG05A	C BOP RO SRO	1E Main Power Transformer Failure
6	Preloaded	M BOP RO SRO	ATWS
7	TRG! 3	M BOP RO SRO	4 Faulted SGs

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

NOTE 1: Run BATCH FILE for all Preload **BAT ATWS**

NOTE 1: RP20 (OPEN/CLOSE) RX014 (Trip) RX136 (Trip) RX013 (Trip) RX135 (Trip) RX016 (Trip) RX015 (Trip)

SCENARIO 00-8 OVERVIEW

Unit 1 is at 90% power. Electric Generation has requested load increase to full power as soon as possible. The 1A Charging Pump is OOS for bearing replacement and the 1B AFW Pump is OOS for a modification installation. Unit 2 is in a refueling outage and they are making preps to lift the head.

Once the crew starts the power increase, a failed auto rod speed failure may become evident. If this is the case, the crew will put the Control Rods into manual.

Following clearly observable plant response from the reactivity changes due to the power increase, the 1B Charging pump will trip for no apparent reason. The crew should isolate letdown and reference the applicable Annunciator Response manuals and dispatch a local operator to investigate. The crew should also reference Tech Specs due to no charging pumps available. The local operator will report back that a maintenance worker hit the breaker trip with a bar that he was using to erect scaffolding. There is nothing wrong with the breaker or the pump. The crew should re-start the pump and re-establish letdown.

Once letdown is restored, the "A" Loop Hot Leg RTD will fail high. This will require the crew to enter BwOA INST-2 Attachment A and take the appropriate actions which include placing control rods in manual, defeating the failed channel, tripping bistables and referencing Tech Specs.

After the actions of BwOA INST-2 are complete, the controlling steam flow channel for the 1B SG will fail low. This will require the crew to take manual control of the 1B SG FRV and enter BwOA INST-2 Attachment H. The crew will select an operable channel for the 1B SG steam flow and return the FRV back to automatic control.

Shortly after the crew gains control of the 1B SG level, a catastrophic failure of the 1E Main Power Transformer will occur resulting in a trip of the Main Generator. The reactor will fail to trip resulting in the crew transitioning to BwFR-S.1. Compounding the problem, Auto rod speed will fail to 18 steps/min (rods may be in manual due to rod speed failure previously detected) requiring the crew to take manual control of rods. As steam generator pressure increases due to the ATWS, a safety valve on each of the SGs will fail open resulting in an uncontrolled depressurization of all SGs. The crew will transition from BwFR-S.1 to E-0. From E-0 the crew will transition to E-2 and then to BwCA-2.1

Critical Tasks

FR-S.1--B: Start AFW pumps within 60 seconds of the ATWS condition.

FR-S.1--C: Insert negative reactivity into the core by at least one of the following methods before completing the immediate-action steps of FR-S.1:

- De-energize the control rod drive MG sets
- Insert RCCAs
- Establish emergency boration flow to the RCS

Simulation Facility Braidwood	Scenario No.: 00-9	Operating Test No.: 3	
Examiners: _____		Operators: _____	SRO
_____		_____	RO
_____		_____	BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a request to raise power, radiation monitor failure, SG Narrow range level failure, Pzr level failure, a SG tube leak which degrades to a SGTR, and a main steam line break.

Initial Conditions: IC-31; 90% Power, Equilibrium. Xenon, Steady State. 1A AFW pump OOS

Turnover: Unit 1 is at 90% power, Steady State. The 1A AFW pump is OOS for motor bearing replacement. Currently in Tech Spec 3.7.5 Condition A. The pump is expected back in 3 to 4 hours. There are 60 hours left on the Completion Time.

Event No.	Malf. No.	Event Type*		Event Description
Preload	1A AFW Pump in PTL & OOS			1A AFW pump OOS
1		N	BOP SRO	Raise turbine power to 100% at 5 MW/min
		R	RO	Raise reactor power using rods and/or boration
2	RM01AU	I	BOP SRO	1D Main Steam Line radiation monitor failure
3	RX06C, 0	I	BOP SRO	1A SG Narrow Range level channel failure (LT-519) **(NOTE 1)**
4	RX13A, 0	I	RO SRO	Pressurizer Level Channel LT-460 fail low **(NOTE 2)**
5	TH03D, 20	C	BOP RO SRO	1D SG Tube Leak
6	TH03D, 450	M	BOP RO SRO	1D SGTR (after crew determines shutdown required)
7	MS04D, 100	C	BOP RO SRO	1D SG atmospheric relief fail open
8	MS07A, .5	M	BOP RO SRO	1A Main Steam Line steam break (once C/D commenced in E-3)

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

NOTE 1: RP21 (OPEN/CLOSE) RX051 (Trip) RX052 (Trip)

NOTE 2: RP21 (OPEN/CLOSE) RX030 (Trip)

SCENARIO 00-9 OVERVIEW

Unit 1 is at 90% power, Steady State. The 1A AFW pump is OOS for motor bearing replacement. Currently in Tech Spec 3.7.5 Condition A. The pump is expected back in 3 to 4 hours. There are 60 hours left on the Completion Time. Electric Generation has requested an increase in power to 100% at 5MW/min.

Following clearly observable plant response from the reactivity changes, the 1D Main Steam Line radiation monitor will fail. The crew will enter the RM-11 annunciator responses and determine that the Rad Monitor has failed.

After the crew has taken the actions for the failed rad monitor, the 1A SG Narrow Range Level Channel (LT-519) will fail low. The crew will enter BwOA INST-2 Attachment E. The crew will take manual control of the 1A FRV, restore SG level, trip applicable bistables and reference Tech Specs. The crew will also switch controlling channels and return the 1A SG FRV to Auto.

Once the actions for the failed SG level channel are complete, Pzr level channel 460 will fail low. The crew will enter BwOA INST-2 Attachment C to select an operable channel, restore Pzr level to normal and restore letdown. The crew will also trip bistables and reference Tech Specs.

When the crew is determines that the tripping of the Pzr level bistables will not generate a reactor trip or SI, the 1D Steam Generator will develop a 20 gpm leak. The crew will enter BwOA SEC-8 and determine that a unit S/D is required. The crew will initiate a S/D to MODE 3 within 6 hours and reference Tech Specs.

After the crew determines that a Unit shutdown is required per SEC-8, the SGTL on the 1D SG will increase to 450 gpm. At the same time, the 1D SG atmospheric relief valve will fail open. The crew will trip the reactor, manually initiate a Safety Injection and transition to BwEP E-0.

From E-0 the crew will transition to BwEP E-3. After the crew has commenced a cooldown in E-3, the 1B main steam line will develop a large steam break. The crew will transition to BwEP E-2 per the foldout page. When the crew completes BwEP E-2 and transitions back to E-3 the scenario will be complete.

Critical Tasks

E-2--A: Isolate the faulted SG before transition out of E-2.

E-3--A: Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.

Simulation Facility Braidwood | Scenario No.: Spare

Examiners: _____ | Operators: _____ SRO

_____ _____ RO

_____ _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a normal power increase, a pressurizer level channel failure, HDT level controller failure, a leak in the letdown heat exchanger, a leak in the main turbine EHC system and a Large LOCA with failure of RH pumps to start and failure of automatic transfer to sump suction for operating train of RH.

Initial Conditions: IC-16. Unit at 49% power

Turnover: 1CC9437A OOS for MOV surveillance. Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time.

Event No.	Malf. No.	Event Type*		Event Description
Preload	RH01A	C	RO SRO	1A RH Pump fails to start/trip
Preload	MRF RP85 open RP15F	C	RO SRO	1B RH Pump fails to start on SI with manual start available
Preload	RH04B	C	BOP SRO	Failure of 1SI8811B (RH CNMT Sump) auto transfer
1		N	BOP SRO	Ramp up turbine power to 75% at 5 MW/min
		R	RO	Raise reactor power using rods and/or dilution
2	RX13A, 0, 10	I	RO SRO	Pressurizer level channel fails low (LT-459) **(NOTE 1)**
3	FW17, 0	I	BOP SRO	Heater Drain Tank level controller fails low
4	CV23A, 100	C	RO SRO	Letdown Heat Exchanger tube leak
5	TC15, 34	M	BOP RO SRO	EHC System leak of 34 gpm results in turbine trip **(NOTE 2)**
6	TH06A, 450000	M	BOP RO SRO	Large Break LOCA upon reactor trip
7	Preload	C	RO SRO	1A and 1B RH Pump fail to start with 1B RH pump manual start capable.
8	Preload	C	BOP SRO	Failure of Auto transfer to cold leg recirc for "B" Train

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

NOTE 1: MRF RP20 OPEN/CLOSE
MRF RX029 TRIP

NOTE 2: If asked as local operator, the EH fluid leak is greater than makeup capacity and leak is located at combined discharge of EH pumps.

SCENARIO Spare OVERVIEW

Unit 1 is at 50% power. Following turnover power increase is initiated to 75% power.

Following clearly observable plant response from the reactivity changes, the controlling pressurizer level channel will fail low. Pressurizer level will be placed in manual, an operable channel selected and level returned to normal. The SRO should contact I&C to assist in repair and the tripping of bistables. Technical Specifications should be consulted for applicability.

After the bistables for pressurizer level have been tripped, Heater Drain Tank level controller will fail causing heater drain tank level to rise. The overflow valve will open and level alarms will actuate. The operator is expected to take manual control of the level controller and reopen the valve.

After HDT tank level is restored to normal band, a leak will develop in the letdown heat exchanger. The operator should notice VCT level changing, and radiation levels in the CCW system increasing. Operators should troubleshoot and identify the failed letdown HX. The crew should establish letdown using the 1B HX.

After the 1B Letdown HX is in service, an EHC leak will develop on the EHC reservoir. EHC level will drop bringing in several alarms. When level is sufficiently low to result in a trip of the EHC pumps, the main turbine also gets a trip signal. E-0 will be entered when the reactor trips.

At the time of the reactor trip, a large break LOCA occurs on the RCS. Both RH pumps fail to start. The 1A RH pump trips if a manual start is attempted, but the 1B RH pump will start on a manual start. When RWST level drops to the LO-2 level for automatic transfer to the CNMT sump suction, the "B" Train valve SI8811B will fail to automatically open. Operator action is required to stop the RH and CS pumps and manually open the sump suction valves. The scenario is terminated following completion of the alignment of ECCS for cold leg recirculation.

Critical Tasks

1. E-0 — H: Manually start at least one low-head ECCS pump before transition out of E-0.

2. ES-1.3 — A: Transfer to cold leg recirculation and establish ECCS recirculation flow that at least meets the assumptions of the plant-specific LOCA analysis.