2011 BRAIDWOOD STATION

INITIAL EXAMINATION

OUTLINE SUBMITTAL

Exelon Generation Company, LLC
Braidwood Station
35100 South Route 53, Suite 84
Braceville, IL 60407-9619

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Exelon Nuclear

March 14, 2011
BW110028

10 CFR 55.40(b)

U. S. Nuclear Regulatory Commission
Regional Administrator, Region III
2443 Warrenville Road, Suite 210
Lisle, IL 60532-4352

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

Subject: Submittal of Initial Operator Licensing Examination Outline

Enclosed are the examination outlines supporting the Initial License Examination scheduled for the weeks of June 20 and 27, 2011 at Braidwood Station.

This submittal includes all appropriate examination standard forms and outlines in accordance with NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 9, Supplement 1.

In accordance with NUREG 1021, Revision 9, Supplement 1, Section ES-201, "Initial Operator Licensing Examination Process," please ensure that these materials are withheld from public disclosure until after the examinations are complete.

Should you have any questions concerning this letter, please contact Mr. Chris VanDenburgh, Regulatory Assurance Manager, at (815) 417-2800. For questions concerning examination materials, please contact Brian Kempen at (815) 458-7860.

Respectfully,

Daniel J. Enright
Site Vice President
Braidwood Station

Enclosures: (Hand delivered to Bruce Palagi, Chief Examiner, Region III)

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

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

bcc: (without attachments)
Director, Licensing
Regulatory Assurance Manager – Braidwood Station
Manager, Licensing – Braidwood, Byron and LaSalle County Stations
Braidwood Nuclear Licensing Administrator
Exelon Document Control Desk Licensing
Human Resources – Braidwood Station
Director Site Training – Braidwood Station
B. Kempen – Braidwood Training Department

Facility: BRAIDWOOD Date of Examination: 6/20/2011

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

	Printed Name / Signature	Date
a. Author	BRIAN KEMPEN / [signature]	3/1/11
b. Facility Reviewer (*)	James Smith [signature]	3-7-11
c. NRC Chief Examiner (#)	BRUCE PALAGI / [signature]	3-18-11
d. NRC Supervisor	RAYMOND K WALTON / [signature]	3/10/2011

NOTE: # Independent NRC Reviewer initial items in Column "c"; chief examiner concurrence required.
* Not applicable for NRC-prepared examination outlines.

Facility: Braidwood Date of Examination: 06/20/2011

Examination Level: RO ☒ SRO ☐ Operating Test Number: 2011 NRC

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	S or R, D, P	R-104 Determine SDM is inadequate K/A 2.1.25 Imp Factor 3.9
Conduct of Operations	S, M	R-110 Perform Offsite AC Power Availability Surveillance with ACB 1424 control power lost. K/A 2.1.31 Imp Factor 4.6
Equipment Control	S or R,N	R-204 Identify leak isolation point from station mechanical drawings. K/A 2.2.41 Imp Factor 3.5
Radiation Control	D, S	R-300 Perform Liquid Release Channel Check. K/A 2.3.11 Imp Factor 3.8
Emergency Plan	N/A	N/A

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

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

Facility: Braidwood Date of Examination: 06/20/2011

Examination Level: RO ☐ SRO ☒ Operating Test Number: 2011 NRC

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	S or R, D, P	R-104 Determine SDM is inadequate K/A 2.1.25 Imp Factor 4.2
Conduct of Operations	S, M	R-110 Perform Offsite AC Power Availability Surveillance with ACB 1424 control power lost. K/A 2.1.31 Imp Factor 4.3
Equipment Control	S or R, D	S-204 Review battery surveillance and determine LCOAR requirements. K/A 2.2.40 Imp Factor 4.7
Radiation Control	D, S	S-302 Prepare/Perform Liquid Release K/A 2.3.6 Imp Factor 4.3 3.8
Emergency Plan	S or R, N	S-412 Make Contigency Action Plan For Fire In The Plant. K/A 2.4.25 Imp Factor 3.7

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

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

Facility: Braidwood Date of Examination: 06/20/2011

Exam Level: RO ☒ SRO-I ☐ SRO-U ☐ Operating Test Number: 2011 NRC

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

System / JPM Title	Type Code*	Safety Function
a. SIM-112 Establish Excess Letdown to the VCT K/A 004000A4.06 Imp Factor 3.6	M, A, S	1
b. SIM-215 Place VC Makeup Filter Train and Recirculation Charcoal Adsorber in Operation K/A 0130002.1.23 Imp Factor 4.3	D, S	2
c. SIM-301 Align RHR for Cold Leg Injection K/A 006000A4.04 Imp Factor 3.7	D, S, L	3
d. SIM-409S Perform RV/IV Cycling Surveillance K/A 045000A4.01 Imp Factor 3.1	N, A, S	4S
e. SIM-504 Perform 1A CS Pump Post Maintenance Run K/A 026000A4.01 Imp Factor 4.5	D, A, S	5
f. SIM-601 Synchronize a SAT to a bus being fed by a Diesel K/A 064000A4.07 Imp Factor 3.4	D, S,	6
g. SIM-707 Operate a Rad Monitor (Disable Incore Seal Table Monitor Audible Alarm) K/A 073000A4.02 Imp Factor 3.7	D, S	7
h. SIM-800 Swap CC Pumps K/A 008000A4.01 Imp Factor 3.3 Sim 11-5 event 4	D, A, S, P	8
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. IP-211 ESF Slave Relay Surv. (K616) K/A 013000A3.02 Imp Factor 4.1	N	2
j. IP-606 Perform Local Actions for Loss of DC Bus (add FW pp local trip) K/A 000058AA1.03 Imp Factor 3.1	M, A, E	6
k. IP-708 Local start of CC Hx outlet rad monitor (2PR09J) K/A 0730002.1.30 Imp Factor 4.4	D, R	7

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

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

Facility: Braidwood Date of Examination: 06/20/2011

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ Operating Test Number: 2011 NRC

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

System / JPM Title	Type Code*	Safety Function
a. SIM-112 Establish Excess Letdown to the VCT K/A 004000A4.06 Imp Factor 3.6	M, A, S	1
b. SIM-215 Place VC Makeup Filter Train and Recirculation Charcoal Adsorber in Operation K/A 0130002.1.23 Imp Factor 4.4	D, S	2
c. SIM-301 Align RHR for Cold Leg Injection K/A 006000A4.04 Imp Factor 3.6	D, S, L	3
d. SIM-409S Perform RV/IV Cycling Surveillance K/A 045000A4.01 Imp Factor 2.9	N, A, S	4S
e. SIM-504 Perform 1A CS Pump Post Maintenance Run K/A 026000A4.01 Imp Factor 4.3	D, A, S	5
f.		
g. SIM-707 Operate a Rad Monitor (Disable Incore Seal Table Monitor Audible Alarm) K/A 073000A4.02 Imp Factor 3.7	D, S	7
h. SIM-800 Swap CC Pumps K/A 008000A4.01 Imp Factor 3.1	D, A, S, P	8

In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. IP-211 ESF Slave Relay Surv. (K616) K/A 013000A3.02 Imp Factor 4.2	N	2
j. IP-606 Perform Local Actions for Loss of DC Bus (add FW pp local trip) K/A 000058AA1.03 Imp Factor 3.3	M, A, E	6
k. IP-708 Local start of CC Hx outlet rad monitor (2PR09J) K/A 0730002.1.30 Imp Factor 4.0	D, R	7

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

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

Facility: Braidwood Date of Examination: 06/20/2011

Exam Level: RO ☐ SRO-I ☐ SRO-U ☒ Operating Test Number: 2011 NRC

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

System / JPM Title	Type Code*	Safety Function
a.		
b.		
c. SIM-301 Align RHR for Cold Leg Injection (S/D) K/A 006000A4.04 Imp Factor 3.6	D, S, L, EN	3
d. SIM-409S Perform RV/IV Cycling Surveillance (At Power #2) K/A 045000A4.01 Imp Factor 2.9	N, A, S	4S
e.		
f.		
g.		
h.		

In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. IP-211 ESF Slave Relay Surv. (K616) (Actuation relay fails to unlatch) K/A 013000A3.02 Imp Factor 4.2	N	2
j. IP-606 Perform Local Actions for Loss of DC Bus (add FW pp local trip) K/A 000058AA1.03 Imp Factor 3.3	M, A, E	6
k. IP-708 Local start of CC Hx outlet rad monitor (2PR09J) K/A 0730002.1.30 Imp Factor 4.0	D, R	7

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

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

Facility: Braidwood Date of Exam: 6/20/11 Operating Test No.: 2011 NRC

APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1 (11-1)			2 (11-3)			3 (11-5)			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO ☐ SRO-I ☒ SRO-U ☐	RX	2												1		1	
	NOR	1					1							2		1	
	I/C	3,4					3,5		2					5		4	
	MAJ	7					6		5					3		2	
	TS	4,5												2		2	
RO ☐ SRO-I ☒ SRO-U ☐	RX		2		2									2		1	
	NOR				1			1						2		1	
	I/C		4		3,4,5			2,3,4						7		4	
	MAJ		7		6			5						3		2	
	TS				4, 5			3,4						4		2	
RO ☒ SRO-I ☐ SRO-U ☐	RX					2								1	1		
	NOR			1						1				2	1		
	I/C			3		4,5				3,4				5	4		
	MAJ			7		6				5				3	2		
	TS														0		

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

Group 1:
Group 2:
Group 3:

Facility: Braidwood Date of Exam: 6/20/11 Operating Test No.: 2011 NRC

APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1 (11-2)			2 (11-3)			3 N/A			4 N/A						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO ☐ SRO-I ☒ SRO-U ☐	RX	2				2								2		1	
	NOR	1												1		1	
	I/C	3,4,5, 6				4,5								6		4	
	MAJ	7				6								2		2	
	TS	3,4												2		2	
RO ☐ SRO-I ☒ SRO-U ☐	RX		2		2									2		1	
	NOR				1									1		1	
	I/C		3,4		3,4,5									5		4	
	MAJ		7		6									2		2	
	TS				4, 5									2		2	
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

Group 4:

Facility: Braidwood | Date of Exam: 6/20/11 | Operating Test No.: 2011 NRC

APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1 (11-2)			2 (11-4)			3 N/A			4 N/A						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO ☐ SRO-I ☒ SRO-U ☐	RX	2				6								2		1	
	NOR	1												1		1	
	I/C	3,4,5,6				3,5								6		4	
	MAJ	7				7								2		2	
	TS	3,4												2		2	
RO ☒ SRO-I ☐ SRO-U ☐	RX		2											1	1		
	NOR						1							1	1		
	I/C		3,4				2,4							4	4		
	MAJ		7				7							2	2		
	TS													0	0		
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

Group 5:

Facility: Braidwood | Date of Exam: 6/20/11 | Operating Test No.: 2011 NRC

APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1 (11-2)			2 (11-4)			3 N/A			4 N/A						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO ☐ SRO-I ☐ SRO-U ☒	RX	2			6									2			0
	NOR	1			1									2			1
	I/C	3,4,5,6			3,4,5									7			2
	MAJ	7			7									2			1
	TS	3,4			4,5									4			2
RO ☒ SRO-I ☐ SRO-U ☐	RX		2											1	1		
	NOR						1							1	1		
	I/C		3,4				2,4							4	4		
	MAJ		7				7							2	2		
	TS													0	0		
RO ☒ SRO-I ☐ SRO-U ☐	RX					6								1	1		
	NOR			1										1	1		
	I/C			5,6		3,5								4	4		
	MAJ			7		7								2	2		
	TS													0	0		

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

Group 6:
Group 7

Facility Name:Braidwood Date of Exam:6/20/11

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

Note:
1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

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

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

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
1	000007 Reactor Trip - Stabilization - Recovery / 1				07			MT/G trip; verification that the MT/G has been tripped	4.3	1
	000008 Pressurizer Vapor Space Accident / 3									0
2	000009 Small Break LOCA / 3						02.12	Knowledge of surveillance procedures.	3.7	1
3	000011 Large Break LOCA / 3		02					Pumps	2.6	1
4	000015 RCP Malfunctions / 4						01.32	Ability to explain and apply system limits and precautions.	3.8	1
	000017 RCP Malfunctions (Loss of RC Flow) / 4									
5	000022 Loss of Rx Coolant Makeup / 2					02		Charging pump problems	3.2	1
	000025 Loss of RHR System / 4									0
6	000026 Loss of Component Cooling Water / 8					01		Location of a leak in the CCWS	2.9	1
7	000027 Pressurizer Pressure Control System Malfunction / 3			01				Isolation of PZR spray following loss of PZR heaters	3.5	1
8	000029 ATWS / 1		06					Breakers, relays, and disconnects	2.9	1
9	000038 Steam Gen. Tube Rupture / 3	02						Leak rate vs. pressure drop	3.2	1
	000040 Steam Line Rupture - Excessive Heat Transfer / 4									1
18	WE12 Uncontrolled Depressurization of all Steam Generators / 4	01						Components:, capacity, and function of emergency systems	3.4	
10	000054 (CE/E06) Loss of Main Feedwater / 4					04		Proper operation of AFW pumps and regulating valves	4.2	1
11	000055 Station Blackout / 6			01				Length of time for which battery capacity is designed	2.7	1
12	000056 Loss of Off-site Power / 6			02				Actions contained in EOP for loss of offsite power	4.4	1
	000057 Loss of Vital AC Inst. Bus / 6									0
13	000058 Loss of DC Power / 6	01						Battery charger equipment and instrumentation	2.8	1
14	000062 Loss of Nuclear Svc Water / 4				05			The CCWS surge tank, including level control and level alarms, and radiation alarm	3.1	1
	000065 Loss of Instrument Air / 8									0
16	W/E04 LOCA Outside Containment / 3		01					Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.5	1
	W/E11 Loss of Emergency Coolant Recirc. / 4									0
17	BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4						02.22	Knowledge of limiting conditions for operations and safety limits.	4	1
15	000077 Generator Voltage and Electric Grid Disturbances / 6				01			Grid frequency and voltage	3.6	1
	K/A Category Totals:	3	3	3	3	3	3	Group Point Total:		18

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

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

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000001 Continuous Rod Withdrawal / 1									0
	000003 Dropped Control Rod / 1									0
	000005 Inoperable/Stuck Control Rod / 1									0
19	000024 Emergency Boration / 1						01, 31	Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup	4.6	1
	000028 Pressurizer Level Malfunction / 2									0
20	000032 Loss of Source Range NI / 7					07		Maximum allowable channel disagreement	2.8	1
	000033 Loss of Intermediate Range NI / 7									0
	000036 Fuel Handling Accident / 8									0
	000037 Steam Generator Tube Leak / 3									0
	000051 Loss of Condenser Vacuum / 4									0
	000059 Accidental Liquid RadWaste Rel. / 9									0
	000060 Accidental Gaseous Radwaste Rel. / 9									0
	000061 ARM System Alarms / 7									0
21	000067 Plant Fire On-site / 8	01						Fire classifications, by type	2.9	1
	000068 Control Room Evac. / 8									0
22	000069 Loss of CTMT Integrity / 5		03					Personnel access hatch and emergency access hatch	2.8	1
	W/E14 High Containment Pressure / 5									
	000074 Inad. Core Cooling / 4									1
	W/E06 Degraded Core Cooling / 4									
25	W/E07 Saturated Core Cooling / 4			04				RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and	3.3	
	000076 High Reactor Coolant Activity / 9									0
	W/E01 Rediagnosis / 3									1
23	W/E02 SI Termination / 3		02					Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the	3.5	
	W/E13 Steam Generator Over-pressure / 4									0
	W/E15 Containment Flooding / 5									0
27	W/E16 High Containment Radiation / 9				02			Operating behavior characteristics of the facility	2.9	1
24	W/E03 LOCA Cooldown - Depress. / 4				01			Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	4	1
	W/E09 Natural Circulation Operations / 4									0
	W/E10 Natural Circulation with Steam Voide in Vessel with/without RVLIS. / 4									
26	W/E08 RCS Overcooling - PTS / 4	03						Annunciators and conditions indicating signals, and remedial actions associated with the Pressurized Thermal Shock	3.5	1
	K/A Category Totals:	2	2	1	2	1	1	Group Point Total:		9

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

Plant Systems - Tier 2/Group 1 (RO)

Q#	System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
28,29	003 Reactor Coolant Pump				03				03				Adequate lubrication of the RCP; Problems associated with RCP motors, including faulty motors and current, and winding and bearing temperature problems	2.5; 2.7	2
30	004 Chemical and Volume Control							03					RCS pressure	3.8	1
31,32	005 Residual Heat Removal						03					04, 36	RHR heat exchanger; Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	2.5; 3.8	2
33,34	006 Emergency Core Cooling						10				11		Valves; Overpressure protection system	2.6; 4.2	2
35	007 Pressurizer Relief/Quench Tank			01									Containment	3.3	1
36	008 Component Cooling Water				01								Automatic start of standby pump	3.1	1
37	010 Pressurizer Pressure Control	08											PZR LCS	3.2	1
39,38	012 Reactor Protection					02				04			Power density; Circuit breaker	3.1; 2.8	2
40	013 Engineered Safety Features Actuation					02							Safety system logic and reliability	2.9	1
41	022 Containment Cooling		01										Containment cooling fans	3	1
	025 Ice Condenser														0
42	026 Containment Spray							06					Containment spray pump cooling	2.7	1
43,44	039 Main and Reheat Steam	05										02, 12	T/G; Knowledge of surveillance procedures.	2.5; 3.7	2
46,45	059 Main Feedwater								03			04, 50	Overfeeding event; Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	2.7; 4.2	2
47	061 Auxiliary/Emergency Feedwater			01									RCS	4.4	1
48	062 AC Electrical Distribution								11				Aligning standby equipment with correct emergency power source (ED/G)	3.7	1
49	063 DC Electrical Distribution			02									Components using DC control power	3.5	1
50	064 Emergency Diesel Generator		03										Control power	3.2	1
51	073 Process Radiation Monitoring				01								Release termination when radiation exceeds setpoint	4	1
52	076 Service Water	05											ED/G	3.8	1
53	078 Instrument Air									01			Air pressure	3.1	1
55,54	103 Containment							01			03		Containment pressure, temperature, and humidity; ESF slave relays	3.7; 2.7	2
															0
	K/A Category Totals:	3	2	3	3	2	2	3	3	2	2	3	Group Point Total:		28

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

Plant Systems - Tier 2/Group 2 (RO)

Q#	System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
56	001 Control Rod Drive			01									CVCS	2.9	1
	002 Reactor Coolant														0
57	011 Pressurizer Level Control					15							PZR level indication when RCS is saturated	3.6	1
58	014 Rod Position Indication							02					Control rod position indication on control room panels	3.2	1
59	015 Nuclear Instrumentation											02.40	Ability to apply Technical Specifications for a system.	3.4	1
	016 Non-nuclear Instrumentation														0
60	017 In-core Temperature Monitor										02		Temperature values used to determine RCS/RCP operation during inadequate core cooling (i.e., if applicable, average of five highest values)	3.8	1
	027 Containment Iodine Removal														0
	028 Hydrogen Recombiner and Purge Control														0
	029 Containment Purge														0
	033 Spent Fuel Pool Cooling														0
61	034 Fuel Handling Equipment						02						Radiation monitoring systems	2.6	1
	035 Steam Generator														0
62	041 Steam Dump/Turbine Bypass Control				14								Operation of loss-of-load bistable taps upon turbine load loss	2.5	1
	045 Main Turbine Generator														0
	055 Condenser Air Removal														0
	056 Condensate														0
	068 Liquid Radwaste														0
63	071 Waste Gas Disposal									03			Radiation monitoring system alarm and actuating signals	3.6	1
	072 Area Radiation Monitoring														0
64	075 Circulating Water		03										Emergency/essential SWS pumps	2.6	1
65	079 Station Air	01											IAS	3	1
	086 Fire Protection														0
	K/A Category Totals:	1	1	1	1	1	1	1	0	1	1	1	Group Point Total:		10

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

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

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000007 Reactor Trip - Stabilization - Recovery / 1									0
76	000008 Pressurizer Vapor Space Accident / 3						04.35	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	4	1
	000009 Small Break LOCA / 3									0
79	000011 Large Break LOCA / 3					08		Conditions necessary for recovery when accident reaches stable phase	3.9	1
	000015 RCP Malfunctions / 4									0
	000017 RCP Malfunctions (Loss of RC Flow) / 4									
	000022 Loss of Rx Coolant Makeup / 2									0
77	000025 Loss of RHR System / 4						04.30	Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	4.1	1
	000026 Loss of Component Cooling Water / 8									0
	000027 Pressurizer Pressure Control System Malfunction / 3									0
	000029 ATWS / 1									0
	000038 Steam Gen. Tube Rupture / 3									0
78	000040 Steam Line Rupture - Excessive Heat Transfer / 4					04		Conditions requiring ESFAS initiation	4.7	1
	WE12 Uncontrolled Depressurization of all Steam Generators / 4									
	000054 (CE/E06) Loss of Main Feedwater / 4									0
	000055 Station Blackout / 6									0
	000056 Loss of Off-site Power / 6									0
	000057 Loss of Vital AC Inst. Bus / 6									0
	000058 Loss of DC Power / 6									0
	000062 Loss of Nuclear Svc Water / 4									0
80	000065 Loss of Instrument Air / 8						04.08	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	4.5	1
	W/E04 LOCA Outside Containment / 3									0
81	W/E11 Loss of Emergency Coolant Recirc. / 4					01		Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.2	1
	BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									0
	000077 Generator Voltage and Electric Grid Disturbances / 6									0
	K/A Category Totals:	0	0	0	0	3	3	Group Point Total:		6

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

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

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000001 Continuous Rod Withdrawal / 1									0
	000003 Dropped Control Rod / 1									0
	000005 Inoperable/Stuck Control Rod / 1									0
	000024 Emergency Boration / 1									0
	000028 Pressurizer Level Malfunction / 2									0
	000032 Loss of Source Range NI / 7									0
	000033 Loss of Intermediate Range NI / 7									0
	000036 Fuel Handling Accident / 8									0
	000037 Steam Generator Tube Leak / 3									0
	000051 Loss of Condenser Vacuum / 4									0
	000059 Accidental Liquid RadWaste Rel. / 9									0
82	000060 Accidental Gaseous Radwaste Rel. / 9						01.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.4	1
83	000061 ARM System Alarms / 7						04.04	Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.7	1
	000067 Plant Fire On-site / 8									0
	000068 Control Room Evac. / 8									0
	000069 Loss of CTMT Integrity / 5									0
	W/E14 High Containment Pressure / 5									
84	000074 Inad. Core Cooling / 4					07		The difference between a LOCA and inadequate core cooling, from trends and indicators	4.7	1
	W/E06 Degraded Core Cooling / 4									
	W/E07 Saturated Core Cooling / 4									
85	000076 High Reactor Coolant Activity / 9					02		Corrective actions required for high fission product activity in RCS	3.4	1
	W/E01 Rediagnosis / 3									0
	W/E02 SI Termination / 3									
	W/E13 Steam Generator Over-pressure / 4									0
	W/E15 Containment Flooding / 5									0
	W/E16 High Containment Radiation / 9									0
	W/E03 LOCA Cooldown - Depress. / 4									0
	W/E09 Natural Circulation Operations / 4									0
	W/E10 Natural Circulation with Steam Voide in Vessel with/without RVLIS. / 4									
	W/E08 RCS Overcooling - PTS / 4									0
	K/A Category Totals:	0	0	0	0	2	2	Group Point Total:		4

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

Plant Systems - Tier 2/Group 1 (SRO)

Q#	System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
	003 Reactor Coolant Pump														0
	004 Chemical and Volume Control														0
	005 Residual Heat Removal														0
	006 Emergency Core Cooling														0
86	007 Pressurizer Relief/Quench Tank								04				Overpressurization of the waste gas vent header	2.9	1
	008 Component Cooling Water														0
87	010 Pressurizer Pressure Control								02				Spray valve failures	3.9	1
88	012 Reactor Protection											04.34	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.1	1
	013 Engineered Safety Features Actuation														0
	022 Containment Cooling														0
	025 Ice Condenser														0
	026 Containment Spray														0
	039 Main and Reheat Steam														0
89	059 Main Feedwater											02.44	Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system	4.4	1
90	061 Auxiliary/Emergency Feedwater								06				Back leakage of MFW	3	1
	062 AC Electrical Distribution														0
	063 DC Electrical Distribution														0
	064 Emergency Diesel Generator														0
	073 Process Radiation Monitoring														0
	076 Service Water														0
	078 Instrument Air														0
	103 Containment														0
															0
	K/A Category Totals:	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:		5

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

Plant Systems - Tier 2/Group 2 (SRO)

Q#	System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
	001 Control Rod Drive														0
	002 Reactor Coolant														0
	011 Pressurizer Level Control														0
	014 Rod Position Indication														0
	015 Nuclear Instrumentation														0
	016 Non-nuclear Instrumentation														0
	017 In-core Temperature Monitor														0
	027 Containment Iodine Removal														0
	028 Hydrogen Recombiner and Purge Control														0
91	029 Containment Purge											01 32	Ability to explain and apply system limits and precautions.	4	1
	033 Spent Fuel Pool Cooling														0
	034 Fuel Handling Equipment														0
	035 Steam Generator														0
	041 Steam Dump/Turbine Bypass Control														0
92	045 Main Turbine Generator								1 2				Control rod insertion limits exceeded (stabilize secondary)	2.8	1
	055 Condenser Air Removal														0
	056 Condensate														0
	068 Liquid Radwaste														0
	071 Waste Gas Disposal														0
93	072 Area Radiation Monitoring											04 11	Knowledge of abnormal condition procedures.	4.2	1
	075 Circulating Water														0
	079 Station Air														0
	086 Fire Protection														0
	K/A Category Totals:	0	0	0	0	0	0	0	1	0	0	2	Group Point Total:		3

Facility Name:Braidwood Date of Exam:6/20/11

Q#	Category	K/A #	Topic	RO IR	RO #	SRO-Only IR	SRO-Only #
66	1. Conduct of Operations	2.1. 06	Ability to manage the control room crew during plant transients.	3.8	1		
67		2.1. 23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	1		
		2.1.					
94		2.1. 20	Ability to interpret and execute procedure steps.			4.6	1
95		2.1. 32	Ability to explain and apply system limits and precautions.			4	1
		2.1.					
		Subtotal			2		2
68	2. Equipment Control	2.2. 02	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.	4.6	1		
69		2.2. 38	Knowledge of conditions and limitations in the facility license.	3.6	1		
70		2.2. 41	Ability to obtain and interpret station electrical and mechanical drawings.	3.9	1		
96		2.2. 05	Knowledge of the process for making design or operating changes to the facility.			3.2	1
97		2.2. 25	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.			4.2	1
		2.2.					
		Subtotal			3		2
71	3. Radiation Control	2.3. 05	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	1		
72		2.3. 07	Ability to comply with radiation work permit requirements during normal or abnormal conditions.	3.5	1		
73		2.3. 12	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.2	1		
98		2.3. 13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.			3.8	1
		2.3.					
		2.3.					
		Subtotal			3		1
74	4. Emergency Procedures / Plan	2.4. 16	Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, and severe accident management guidelines.	3.5	1		
75		2.4. 34	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	1		
		2.4.					
99		2.4. 16	Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating p			4.4	1
100		2.4. 26	Knowledge of facility protection requirements, including fire brigade and portable fire fighting equipment usage.			3.6	1
		2.4.					
		Subtotal			2		2
Tier 3 Point Total					10		7

The Braidwood 2011-1 NRC written exam outline was generated in accordance with NUREG 1021, Revision 9, Supp 1, OPERATOR LICENSING EXAMINATION STANDARDS FOR POWER REACTORS, and TQ-AA-151, ILT CERTIFICATION AND NRC EXAM DEVELOPMENT AND ADMINISTRATION. The written exam outline was generated using commercially available, previously NRC approved, outline development software (Westinghouse NRC K/A Exam Generator, version 1.1) to systematically and randomly select K/A statements from NUREG-1122 to complete each of the three tiers of the written exam outline.

Simulation Facility	Braidwood	Scenario No.: **NRC 11-1**	Operating Test No.: **NRC 2011 Exam**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ ATC
	_____		_____ BOP

Initial Conditions: IC-18

Turnover: Unit 1 is at 75% power, steady state, equilibrium xenon, MOL. Online risk is green. 1C CW PP is OOS for intake bay inspection. Following completion of turnover, the shift manager requests the BOP to swap GC pumps per BwOP GC-5, in preparation for an OOS on 1GC01PA next shift. TSO has requested Unit 1 prepare to raise turbine load to full power at 0.6 MW/min due to grid demand.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1CW01PB PTL MRF ED093B OPEN IMF RP02A IMF RP02B IMF RD09 IRF RP49 OUT TRGSET 1 "THPPRZR .GT. 2315" IMF TH11B (1 0) 100 IOR ZDI1RY8000B AUTO		1B CW PP OOS 1CW001B OOS Reactor trip breaker A fails to open Reactor trip breaker B fails to open Auto Rod Speed Failure (8 steps/min) prevents 1A CV train valves from auto positioning on SI signal PZR PORV 1RY456 fails open 1RY8000B fails open
1	None	N-BOP, US	Swap stator cooling pumps.
2	None	R-ATC, US	Raise power at 0.6 Mw/Min
3	IMF FW16 1500 30	I-BOP, US	1PT-508 FW Htr Dsch Press fails high
4	IMF TH11A 5 TRGSET 2 "ZLO 1RY8000A(2)==0" MRF ED058C (2 5) OPEN	C-ATC, TS-US	1RY455A partially opens 1RY8000A block valve breaker trips
5	IMF ED11D DMF TH11A 5 IRF ED019 OPEN	TS-US	Loss of instrument bus 114 (Tech Spec)
6	IMF ED07C		Bus 143 Deenergized
7	Preload	M-All	ATWS
8	Preload		PZR PORV 1RY456 fails open

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

SCENARIO OVERVIEW

Unit 1 is at 75% power, steady state, equilibrium xenon, MOL. Online risk is green. 1B CW PP is OOS for intake bay inspection. Following completion of turnover, the shift manager requests the BOP to swap GC pumps per BwOP GC-5, in preparation for an OOS on 1GC01PA next shift. TSO has requested Unit 1 prepare to raise turbine load to full power at 0.6 MW/min due to grid demand.

After completing shift turnover and relief, the BOP will swap stator cooling pumps per BwOP GC-5.

After swapping stator cooling pumps, Power Team will request Unit raise turbine load to full power at 0.6 MW/min due to grid demand. The crew will commence a power ascension at 0.6 mw/min.

After a measurable change in power, feedwater line pressure detector 1PT-508 will fail high over a 30 second period. Both main feedwater pumps speed will lower, reducing feedwater flow and causing all steam generator levels to begin lowering. The crew will take actions to stabilize the plant by taking manual control of the main feedwater pumps. 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment J, will be implemented. 1PT-508 will remain unavailable for the remainder of the scenario.

After the 1PT-508 failure is addressed, PZR PORV 1RY455A will open to the intermediate position, resulting in a slow RCS pressure drop. The ATC will isolate the PZR PORV by closing 1RY8000A, PORV block valve. Once 1RY8000A is closed, its breaker will trip open, removing power from 1RY8000A. 1RY455A will remain unavailable for the remainder of the scenario. Tech spec 3.4.11, conditions B and C apply.

After the PZR PORV failure is addressed, a loss of instrument bus 114 will occur. The crew will enter 1BwOA ELEC-2, LOSS OF INSTRUMENT BUS, and determine that instrument bus 114 is damaged and cannot be energized from the CVT.

After the instrument bus 114 failure is addressed, bus 143 is lost causing the loss of 1A and 1C CW pumps. Condenser vacuum is lost and a manual reactor trip or an automatic turbine trip - reactor trip signal is generated. The turbine trips but the reactor does not trip, placing the plant in an ATWS condition. 1BwEP-0 is entered with a transition to 1BwFR S-1. A failure of rod control to automatically insert rods at $\geq$ 48 steps/minute forces the Unit NSO to manually insert control rods. The RWST will be used as the borated water source since the BA transfer pump has lost power. RCS pressure rises and PZR PORV 1RY456 opens to reduce pressure.
Although RCS pressure starts dropping, PZR PORV 1RY456 remains open creating a loss of reactor coolant. 1BwFR-S.1 is completed and 1BwEP-0 is reentered with a failure of high head injection valves (1SI8801A/B) and charging line Cnmt isolation valves (1CV8105/6) to automatically reposition. The crew will take action to manually open 1SI8801A/B and close 1CV8105/6.

Completion criteria is transition to 1BwEP ES-1.2.

Comments:_____

Critical Tasks

1. Insert negative reactivity into the core by initiating RCCA insertion at greater than or equal to 48 steps per minute prior to completion of step 1 of 1BwFR-S.1.
   (ERG Critical Task number - FR-S.1--C) (K/A number – 000029EA1.09 importance – 4.0/3.6)
2. Establish high head injection flow before transition out of 1BwEP-0.
   (ERG Critical Task number - E-0--I) (K/A number - APE008AA2.10, importance - 3.6/3.6)

NOTE:
No normal, reactivity, I/C, Tech Spec or Major events in this scenario are repeated on the 2011 Audit Exam nor other sections of the 2011 NRC exam.
A similar major event (ATWS) is included on the **11-spare** Audit Exam scenario, however this event is different because it contains an auto rod speed failure that is not included on the Audit exam spare. Also, this scenario combines the ATWS with a fails open PZR PORV that is not included on the Audit Exam.

Comments: _____

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Simulation Facility	Braidwood	Scenario No.: **NRC 11-2**	Operating Test No.:**2011 NRC Exam**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ ATC
	_____		_____ BOP

Initial Conditions: IC-21

Turnover: Unit 1 is operating at 100% power, steady state, equilibrium xenon. Online risk is yellow. 1B SX pump is OOS for change out of the aux lube oil pump for the past 24 hours. LCOAR 1BwOL 3.7.8 has been initiated. Expected back in service next shift. Following completion of turnover, the crew is to perform 1BwOS FW-W1, UNIT 1 TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE SURVEILLANCE. Power Team has requested Unit 1 lower power to 1125 MW at 3 MW/min due to grid demand following completion of 1BwOS FW-W1. Heavy rains have been experienced at the Braidwood site over the past few days and are forecasted to continue.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1SX01PB PTL IOR ZLO1SX01PBC OFF IMF MS01C 100 trgset 1 "ZDI1MS001C(1) == 1" trg 1 "DMF MS01C"		1B SX pump OOS 1B SX aux lube oil pump OOS 1MS001C fails to close from MSI switches
1	None	N-BOP, US	1BwOS FW-W1
2	None	R-ATC, US	Lower power at 3 Mw/Min
3	IMF CV01B	C-ATC, US TS, US	1B CV pump trip (Tech Spec)
4	IMF RX10A 0 15	I-ATC, US TS-US	Turbine impulse pressure channel 1PT-505 fails Low (Tech Spec)
5	IMF FW35C	C-BOP, US	1C HD Pump Trip
6	IMF RX05 0 30	I-BOP, US	Steam line pressure detector 1PT-507 fails low
7	MRF ED042D OPEN MRF ED042E OPEN MRF ED042H OPEN IOR ZLO1HSDG0201 OFF IMF ED15C IMF ED15G IMF EG08A	M-ALL	Dual unit loss of Offsite AC power (unit 1 loss of all AC power)
8	Preload		1C MSIV Fails to Close From MSI Switches

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

SCENARIO OVERVIEW

Unit 1 is operating at 100% power, steady state, equilibrium xenon. 1B SX pump is OOS for change out of the aux lube oil pump for the past 24 hours. LCOAR 1BwOL 3.7.8 has been initiated. Expected back in service next shift. Following completion of turnover, the crew is to perform 1BwOS FW-W1, UNIT 1 TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE SURVEILLANCE. Power Team has requested Unit 1 lower power 125 MW at 3 MW/min due to grid demand following completion of 1BwOS FW-W1. Heavy rains have been experienced at the Braidwood site over the past few days and are forecasted to continue.

After completing shift turnover and relief, the crew will perform 1BwOS FW-W1, UNIT 1 TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE SURVEILLANCE.

After completing 1BwOS FW-W1, the crew will lower power to 1125 MW at 3 MW/min due to grid demand. The crew will commence a power reduction at 3 MW/min.

After a measurable change in power, 1B CV pump will trip. The crew will implement 1BwOA PRI-15, LOSS OF NORMAL CHARGING. The crew will start the 1A CV pump to restore normal charging. Technical Specifications 3.5.2 condition A and TRM 3.1.d, condition A apply.

After the 1B CV pump trip is addressed, First Stage Turbine Impulse Pressure channel 1PT-505 will fail low. The ATC will diagnose the failure of 1PT-505 and take manual control of rods after verifying turbine load stable. 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment D, will be entered. TS 3.3.1 conditions A and P will be entered. The ATC will return rod control to automatic after verifying Tave and Tref are within 1°F.

After the 1PT-505 failure is addressed, the 1C Heater Drain pump will trip due to overcurrent. The crew will implement 1BwOA SEC-1, SECONDARY PUMP TRIP, and start the 1B Heater Drain pump. Technical Specifications do not apply. On-line risk remains yellow. The 1C Heater Drain pump will remain unavailable for the rest of the scenario.

After the 1C Heater Drain pump has been addressed, steam line pressure detector 1PT-507 will fail low over a 30 second period. Both main feedwater pumps speed will lower, reducing feedwater flow and causing all steam generator levels to begin lowering. The crew will take actions to stabilize the plant by taking manual control of the main feedwater pumps. 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment J, will be implemented. 1PT-507 will remain unavailable for the remainder of the scenario. On-line risk remains yellow.

After the 1PT-507 failure is addressed, a loss of all offsite power will occur for both Units. When the 1A DG engine attempts to start, the engine will seize. A loss of DC control power to the 1B DG will prevent it from starting, resulting in a loss of all AC power to Unit 1. Transition will be made to 1BwCA-0.0, LOSS OF ALL AC POWER. The 1C MSIV will fail to close from either MSI switch and will have to be closed from the C/S. A limited crosstie to Unit 2 will be required due to the failure of 2B DG to energize bus 142. The crew must restore power to Unit 1 within 10 minutes. After power is restored to Bus 141, SX will be cross-tied between units per 1BwCA-0.0, Attachment C.
The scenario is complete when the crew has restored CV pump flow in 1BwCA-0.0, step 23e.

Critical Tasks

1. Restore power to Bus 141 within 10 minutes of loss of all AC power.
   (UFSAR 15.0.8/Table 15.0-7) (K/A number – 000055EA2.03 importance 3.9/4.7)
2. Isolate RCP seal injection before a CV pump is started in 1BwCA-0.0.
   (ERG Critical Task number - ECA-0.0--H) (K/A number - 003000A4.01 importance - 3.3/3.2)

NOTE:
No normal, reactivity, I/C, Tech Spec or Major events in this scenario are repeated on the 2011 Audit Exam nor other sections of the 2011 NRC exam.
A similar I/C event (1PT505 failure) is included on the **11-3** Audit Exam scenario, however this event is different because the instrument fails in the opposite direction causing a different plant response to the failure.

Comments: _____

Simulation Facility	Braidwood	Scenario No.: **NRC 11-3**	Operating Test No.: **2011 NRC Exam**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ ATC
	_____		_____ BOP

Initial Conditions: IC-21

Turnover: Unit 1 is operating at 100% power, steady state, equilibrium xenon. Online risk is yellow. Control rods are in manual for troubleshooting by Instrument Maintenance. Auto rod control is not available.

Event No.	Malf. No.	Event Type	Event Description
Preload	IMF FW44 IMF RP15D MRF RP84 OPEN trgset 1 "ZLO52BRKA(2) == 1" IMF CV01B (1 0) trg 1 "IMF FW19C 3.5 0 10" IMF RX17 0		1B AF pump fails to start 1B SI pump fails to automatically start 1B CV pump trips when Rx trips Feed line break inside containment when Rx trips Rod control failure requiring rods in manual.
1	None	N-BOP, US	Lower reactive load 1 KV.
2	IMF ED15A IMF ED015I	R-ATC, US	Grid disturbance requiring turbine load reduction
3	IOR ZDI1CV110B CLS IOR ZDO1CV110B(1) OFF IOR ZDO1CV110B(2) OFF	C-ATC, US	1CV110B valve fails closed requiring ramp with rods only
4	IMF FW17 100	I-BOP, US	HDT Level Controller Failure in Auto
5	IRF ED025 OPEN	TS-US	Loss of DC to inverter 113
6	IMF ED07A	C-ATC, BOP TS-US	Loss of bus 141
7	IMF RP09A Preload	M (ALL)	Inadvertent FWI Feed line break inside containment
8	Preload		1B CV pump trip when Rx trips
9	Preload		Loss of heat sink (1B AF pp)

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

SCENARIO OVERVIEW

Unit 1 is operating at 100% power, steady state, equilibrium xenon, Boron concentration is 800 ppm. Online risk is green.

After completing shift turnover and relief, the BOP will lower Unit 1 reactive load 1 KV in accordance with BwOP MP-23.

After lowering reactive load, a grid disturbance will cause 345 KV lines 0103 and 0104 to be lost. One minute later, the Transmission System Operations Reliability Coordinator will contact the main control room and direct Unit 1 to initiate an emergency load reduction of 100 MW within 20 minutes to alleviate an overload condition on grid transmission lines. The state estimator alarm is not present.

During the initial boric acid addition, 1CV110B valve will fail closed (blown fuse), forcing the crew to complete the load ramp with control rods only.

After the load ramp is complete, HDT Level Controller, 1LK-HD009A, will fail to 100% demand. The 1HD046A/B valves will full open and HDT level will drop. The BOP will take actions to stabilize the plant by taking manual control of the 1LK-HD009A.

After the HDT Level Controller failure is addressed, a loss of DC to instrument inverter 113 will occur. The crew will follow the annunciator response BwAR 1-4-C5. The crew will determine from field report that the instrument inverter DC input has failed. Technical Specification 3.8.7, condition A applies. On line risk becomes yellow.

Following completion of inverter 113 actions,, a ground fault will occur on bus 141. 1BwOA ELEC-3 will be entered and the operators will start redundant equipment on bus 142 and investigate the status of bus 141. Tech Spec 3.8.9 applies. On-line risk becomes yellow.

Following completion of 1BwOA ELEC-3 actions, an inadvertent FWI occurs. When the crew manually trips the reactor, a feed line break on the 1C SG inside containment will occur. SI will actuate. The crew will enter 1BwEP-0 to stabilize the plant. The 1B SI pump fails to auto start and must be manually started due to a failure of its actuation relay. The 1B AF pump will not start (engine will seize) resulting in a transition to 1BwFR-H.1 at step 15 of 1BwEP-0. The 1B CV pump trips when the reactor trips. Bleed and feed will be required due to the status of the CV pumps.

Completion criteria is establishing startup feedwater pump flow to the non-faulted SGs.

Critical Tasks

Comments: _____

1. Manually start the 1B SI pump before transition out of 1BwEP-0
   (ERG Critical Task number - E-0—J) (K/A number 006000A4.01 4.1/3.9)
2. Initiate RCS bleed and feed before attempting to establish main feedwater flow or condensate flow to any SG (ERG Critical Task number - FR-H.1--F) (K/A number 000E05EA1.1 importance 4.1/4.0)

NOTE:
No normal, reactivity, I/C, Tech Spec or Major events in this scenario are repeated on the 2011 Audit Exam nor other sections of the 2011 NRC exam.
A similar Reactivity event (Emergency load reduction) is included on the **11-spare** Audit Exam scenario, however this event is different because the boration flow path is isolated by a valve failure forcing the crew to perform this load ramp with control rods only.

Comments: _____

Simulation Facility	Braidwood	Scenario No.: **NRC 11-4**	Operating Test No.: **2011 NRC EXAM**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ ATC
	_____		_____ BOP

Initial Conditions: IC-21

Turnover: Unit 1 is operating at 100% power, steady state, equilibrium xenon. Online risk is green. 1C CD/CB pump is OOS for bearing replacement. The 1C CD/CB pump is expected back in service in four days. . Following completion of turnover, the crew is to perform 1BwOS MS-Q1, UNIT 1 MAIN STEAM DUMP VALVE STROKE SURVEILLANCE.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1CD05PC PTL IOR ZDI1CD05PCB PTL IOR ZDI1CB113C CLS		1C CD/CB Pump OOS
1	None	N-BOP, US	Steam Dump Valve Stroke Surv.
2	IMF RX29D 100 30	I-BOP, US	1FW540 controller fails high in auto
3	IMF RX17 –4.25	C-ATC, US	Rod control failure
4	IMF SW01A	C-BOP, US TS-US	1A SX Pump Trip
5	IMF RX21A 2500 30	I-ATC, US TS-US	1PT-455 fails high
6	IMF TC14D 0	R-ATC, US	#4 Governor valve servo failure closed
7	IMF TH03B 450 60	M-ALL	1B Steam Generator Tube Rupture
8	IMF TH11A 0 IMF TH03B 450 60 TRGSET 1 "ZLO1IA066(2)==0" IOR ZDI1IA066 (1 0) CLS IOR ZAO1PIRY018 (1 60) 0 30 IMF PN1555 (1 70) ON IMF TH11B 0		Loss of RCS pressure control

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

SCENARIO OVERVIEW

Unit 1 is operating at 100% power, steady state, equilibrium xenon. Online risk is green. 1C CD/CB pump is OOS for bearing replacement. The 1C CD/CB pump is expected back in service in four days. Following completion of turnover, the crew is to perform 1BwOS MS-Q1, UNIT 1 MAIN STEAM DUMP VALVE STROKE SURVEILLANCE.

After completing shift turnover and relief, the BOP will perform 1BwOS MS-Q1, UNIT 1 MAIN STEAM DUMP VALVE STROKE SURVEILLANCE.

After completing 1BwOS MS-Q1, 1FW540 Feed Reg Valve Controller 1FK-540 will fail to 100% demand. The 1FW540 valve will full open and 1D SG level will rise. The crew will take actions to stabilize the plant by taking manual control of the 1FK-540.

After the 1FK-540 failure is addressed, the rod control summing amplifier will malfunction, resulting in uncontrolled inward rod motion. After checking turbine power stable, the RO will place rod control in Manual to stop the inward rod motion. 1BwOA ROD-1, UNCONTROLLED ROD MOTION, will be implemented. Rods will remain in Manual control for the remainder of the scenario.

After the rod control failure has been addressed, the 1A Essential Service Water pump will trip due to overcurrent. The crew will implement 1BwOA PRI-8, ESSENTIAL SERVICE WATER MALFUNCTION, and start the 1B Essential Service Water pump. Technical Specifications 3.7.8, condition A applies. On-line risk remains yellow. The 1A SX pump will remain unavailable for the rest of the scenario.

After the Essential Service Water malfunction has been addressed, the controlling pressurizer pressure channel will fail high. The ATC will identify the failure and take manual control to restore pressurizer pressure. The US will enter 1BwOA INST 2, OPERATION WITH A FAILED INSTRUMENT CHANNEL-Attachment B. Tech Specs 3.3.1 conditions A, E, and K, 3.3.2 conditions A and D, and 3.3.4 condition A will be entered.

After the pressurizer pressure channel failure has been addressed, the #4 turbine governor valve servo will fail, causing the #4 governor valve to close. Turbine load will lower approximately 70 Mw. The ATC will borate the RCS as necessary and/or move rods in to stabilize RCS temperature. On-line risk remains yellow.

After the governor valve malfunction has been addressed, a 450 gpm Steam Generator Tube Rupture will occur on the 1B SG. The crew will implement 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION. When SI actuates, a solenoid failure will cause 1IA066 to fail closed, resulting a loss of Instrument Air to containment. IA to containment will remain unavailable for the remainder of the scenario. The crew will transition to 1BwEP-3, STEAM GENERATOR TUBE RUPTURE, based on secondary radiation trends on the 1B SG. After determining RCS pressure control is unavailable, the crew will transition to 1BwCA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

The scenario is complete when the crew has terminated high head SI in 1BwCA-3.3.

Critical Tasks

1. Isolate feedwater flow into and steam flow from the ruptured SG prior to completing step 4 of 1BwEP-3. (ERG Critical Task number - E-3--A) (K/A number – 000038EA2.01 importance – 4.1/4.7)
2. Cool down to establish RCS subcooling margin, but prevent entry into 1BwFR-P.1. (ERG Critical Task number - E-3--B) (K/A number - 000038EA1.36 importance - 4.3/4.5)
3. Terminate high head SI prior to completing step 9 of 1BwCA-3.3. (ERG Critical Task number – CA-3.3--A) (K/A number – 000038EA1.30 importance – 4.0/3.8)

NOTE:
No normal, reactivity, I/C, Tech Spec or Major events in this scenario are repeated on the 2011 Audit Exam nor other sections of the 2011 NRC exam.
A similar I/C event (SGTR) is included on the **11-3** Audit Exam scenario, however this event is different because this event is a SGTR combined with a loss of RCS pressure control while the **11-3** Audit Exam scenario contains a SGTR that is also faulted.

Comments: _____

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Simulation Facility	Braidwood	Scenario No.: **NRC 11-5**	Operating Test No.: **2011 NRC EXAM**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ ATC
	_____		_____ BOP

Initial Conditions: IC-13

Turnover: The unit is at 17% power, xenon building in, BOL, at 1BwGP 100-3 step 22. The main Turbine is at 1775 rpm ready for turbine trip test. Online risk is green. Following completion of turnover, the Shift Manager directs the crew to perform 1BwGP 100-3, step F.22.a through F.22.p, turbine trip test. 1BwOS TRM 3.3.g.3 and 3.3.g.4 will be performed concurrently by another operator who has also been briefed to take over at step F.22.q. for the turbine synchronization.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1WO056A OPEN IRF RP29 OUT IRF RP37 OUT IMF MS01A 100 IMF MS01B 100 IMF MS01C 100 IMF MS01D 100 IMF CC02B 200 IMF CS01B		Fail 1WO056A open Slave relay for train A Phase A valves Slave relay for train A CS valves MSIVs fail to close 1B CC pump pressure switch failed high 1B CS pump trip
1	None	N-BOP, US	Turbine Overspeed trip test
2	IMF CV05 600 5	I-ATC, US	Letdown line pressure controller 1PK-CV131 output fails high
3	IMF RX06K 0 15	I-BOP, US TS-US	1C SG NR level transmitter 1LT-539 fails low
4	IMF CC01B	C-BOP, TS-US	1A component cooling pump trip with 1B component cooling pump discharge pressure switch failure
5	IMF MS07D 4.0 30	M-ALL	Uncontrolled depressurization of all steam generators
6	Preload		CS system failure to actuate

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

SCENARIO OVERVIEW

The unit is at 17% power, xenon building in, BOL, at 1BwGP 100-3 step 22. The main Turbine is at 1775 rpm ready for turbine trip test. Online risk is green. Following completion of turnover, the Shift Manager directs the crew to perform 1BwGP 100-3, step F.22.a through F.22.p, turbine trip test. 1BwOS TRM 3.3.g.3 and 3.3.g.4 will be performed concurrently by another operator who has also been briefed to take over at step F.22 q. for the turbine synchronization.

After completing shift turnover and relief, the BOP will perform the turbine trip test per 1BwGP 100-3, step F.22.a thru F.22.p.

After the turbine trip test is complete, letdown pressure controller 1PK-131 output will fail high. The letdown PCV will close and letdown pressure will rise lifting the letdown line relief valve. The ATC will take manual control of letdown pressure controller and restore letdown pressure. The crew may isolate letdown due to the lifting letdown relief valve. If letdown is isolated, it will be restored per BwOP CV-17. US may choose to enter tech spec 3.4.13 and then exit when relief resets, or remain in tech spec until a RCS leakrate can verify no leakage.

After the 1PK-131 failure is addressed, 1C SG NR level transmitter 1LT-539 will fail low. 1FW530A, Feedwater Regulating Bypass Valve, will open fully and 1C SG level will rise. The BOP will take manual control of 1C SG level and stabilize 1C SG level. 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment E, will be implemented. The BOP will restore 1C SG level control to automatic after 1C SG level is restored to normal and an operable 1C SG NR level controlling channel is selected. Technical specifications 3.3.1, conditions A and E and 3.3.2, conditions A and D are applicable.

After the 1LT-539 failure is addressed, the 1A component cooling water pump will trip. When the 1A CC pump trips, the 1B and 0 CC pumps will not automatically start on low system discharge pressure due the 1B CC pump discharge pressure switch being failed high. The crew will manually start a standby CC pump, either the 1B or 0 CC pump, to restore system flow and dispatch operators to investigate the malfunctions. If the 1A CC pump control switch is placed in PTL prior to manually starting a standby pump, the U-0 CC pump will automatically start. Technical specification 3.7.7, condition B applies until the 1A CC pump is placed in PTL (U-0 CC pump then becomes operable).

After the 1A CC pump trip is addressed, the 1D MS line ruptures inside containment. While performing the actions of 1BwEP-0, the crew should note the failure of a Phase A slave relay and manually align valves to close the WO containment penetrations. When containment pressure reaches 20 psig, Phase B actuates but the CS pumps do not start. The crew should manually realign the train A CS valves, which will start the 1A CS pump. Operators should transition to 1BwEP-2 and recognize that the MSIVs have failed to close and that an uncontrolled depressurization of all SGs is in progress. The crew should transition to 1BwCA-2.1 where they will throttle AF flow to the SGs, terminate SI and restore normal charging and letdown. An entry into 1BwFR-P.1 may be required as directed by the status trees.

Completion criteria is checking RCS subcooling per step 21 in 1BwCA-2.1 or completion of 1BwFR-P.1, step 21.

Critical Tasks

1. Manually actuate one train of containment spray prior to transition out of 1BwEP-0.
   (ERG Critical Task number - E-0--E) (K/A number - 013000A4.01, importance - 4.5/4.8)
2. Manually lower AF flow to 45 gpm for each SG prior to completion of step 2 of 1BwCA-2.1.
   (ERG Critical Task number - ECA-2.1--A) (K/A number – 0WE12EA1.3 importance – 3.4/3.9)

NOTE:
No normal, reactivity, I/C, Tech Spec or Major events in this scenario are repeated on the 2011 Audit Exam nor other sections of the 2011 NRC exam.

Comments:

Simulation Facility	Braidwood	Scenario No.: **NRC 11-spare**	Operating Test No.: **2011 NRC Exam**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ ATC
	_____		_____ BOP

Initial Conditions: IC-18

Turnover: Unit 1 is at 75% power, steady state, equilibrium xenon, MOL. RCS boron concentration is 645 ppm. Online risk is green. 1B HD pump has been OOS for breaker contact work for the past 10 hours. 1A CW pump is OOS for impeller work. Expected back in service in one week. 1PR11J filter change planned early in shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1RH01PB PTL IOR ZDI1CW01PA PTL IRF ED051C OPEN IRF ED075C OPEN IMF RP14A IMF RP14B IMF TC03		1B RHR pump OOS 1A CW PP OOS 1CW001A OOS SI auto actuation failure (Train A) SI auto actuation failure (Train B) Turbine auto trip failure
1	None	N-BOP TS-US	1PR11J filter change
2	IMF FW35A	C-BOP, US R-ATC, US	1A Heater Drain Pump trip requiring turbine runback
3	IMF RX13A 100 10	I-ATC, US TS-US	PZR level channel 1LT-459 fails high (Tech Spec)
4	IMF CV23A 80 180	C-ATC (or BOP), US	1A letdown HX tube leak
5	IMF EG03 100 10	C-BOP, US	Generator voltage regulator failure
6	IMF TH01 0.5 30	M-ALL	PZR vapor space LOCA
7	preload		Turbine auto trip failure SI auto actuation failure

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

SCENARIO OVERVIEW

Unit 1 is at 75% power, steady state, equilibrium xenon, MOL. RCS boron concentration is 645 ppm. Online risk is green. 1B HD pump has been OOS for breaker contact work for the past 10 hours. 1A CW pump is OOS for impeller work. Expected back in service in one week. 1PR11J filter change planned early in shift.

After completing shift turnover and relief, a Radiation Protection Technician will contact the main control room and request the crew shutdown 1PR11J sample pump to support daily filter replacement. The Unit Supervisor will enter Tech Spec 3.4.15, condition B. Approximately two minutes later, the RP Technician will request restart of the 1PR11J skid. 1PR11J will be restarted. LCO 3.4.15 may be exited after filter change completion and monitor is operating normally for 15 minutes.

After changing the 1PR11J filter, 1A Heater Drain Pump will trip. 1BwOA SEC-1, SECONDARY PUMP TRIP, Attachment C, will be entered. The BOP will initiate a turbine load reduction to 780 MW at 20 MW/minute. The ATC will borate the RCS as necessary to stabilize RCS temperature.

After the 1A HD pump trip has been addressed, PZR level channel 1LT-459 will fail high. 1CV121, charging header flow control valve, will lower charging flow and pressurizer level will lower. The ATC will take manual control of PZR level and stabilize PZR level. 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment C, will be implemented. The ATC will restore PZR level control to automatic after PZR level is restored to normal and an operable PZR level control channel is selected. Technical Specifications 3.3.1, conditions A and K apply.

After the 1LT-459 failure is addressed, the 1A letdown heat exchanger will develop a tube leak. Letdown flow and VCT level will lower and CC surge tank level and radiation will rise. The crew will implement 1BwOA PRI-6, COMPONENT COOLING SYSTEM MALFUNCTION, and locate and isolate the leakage. The crew will align the 1B letdown heat exchanger in accordance with BwOP CV-22, OPERATION OF LETDOWN AND REGEN HEAT EXCHANGERS.

After the letdown heat exchanger tube is addressed, the generator voltage regulator output will fail high, causing the main generator to be overexcited. The BOP will turn the voltage regulator to off/test and manually lower main generator excitation using the base adjuster.

After the voltage regulator failure is addressed, a weld breaks on the PZR causing a PZR vapor space LOCA. When the reactor trips, the turbine will not automatically trip. The crew will manually trip the turbine. The crew will take actions in accordance with 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION. While performing the actions of 1BwEP-0, the crew should note the failure of SI to automatically actuate. The crew should manually actuate SI. The crew will transition to 1BwEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, after determining that the RCS is not intact.

The scenario is complete when the crew has determined RCS subcooling in 1BwEP-1.

Comments: _____

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Critical Tasks

1. Manually trip the main turbine prior to completion of step 2 of 1BwEP-0.
(ERG Critical Task number - E-0--Q) (K/A number - 045000A4.01 importance – 3.1/2.9)
2. Manually actuate Safety Injection prior to transition to 1BwEP-1.
(ERG Critical Task number - E-0--D) (K/A number - 000040AA1.01 importance - 4.6/4.6)

NOTE:
No normal, reactivity, I/C, Tech Spec or Major events in this scenario are repeated on the 2011 Audit Exam nor other sections of the 2011 NRC exam.
A similar I/C event (HD pump trip) is included on the **11-2** NRC Exam scenario, however this event is different because this event requires a turbine runback due to a lack of a standby pump, whereas scenario 11-2 required starting of a standby pump.

Comments: _____

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