

OUTLINE SUBMITTAL

FOR THE BRAIDWOOD INITIAL EXAMINATION - OCTOBER 2001

Outline Submittal

Contains the following:

Outline Submittal Letter from Licensee

ES-201-1	Examination Preparation Checklist
ES-201-2	Examination Outline Quality Checklist
ES-301-1	Administrative Topics Outline (RO)
ES-301-1	Administrative Topics Outline (SRO)
ES-301-2	Control Room and Facility Walk-Through Test Outline (RO)
ES-301-2	Control Room and Facility Walk-Through Test Outline (SRO)
ES-301-5	Transient and Event Checklist
ES-301-6	Competencies Checklist
D-1	Dynamic Simulator Scenario Outline for 4 scenarios
ES-401-3	PWR SRO Examination Outline
ES-401-4	PWR RO Examination Outline
ES-401-10	Record of Rejected K/As
Admin	NRC Comments and Resolution on licensee submitted test outlines

Exelon Generation Company, LLC
Braidwood Station
35100 South Rt 53, Suite 84
Braceville, IL 60407-9619
Tel. 815-458-2801

www.exeloncorp.com

July 6, 2001
BW010068

James E. Dyer
Regional Administrator
Region III
U.S. Nuclear Regulatory Commission
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. STN 50-456 and STN 50-457

Subject: Submittal of Integrated Initial License Training Examination Outline

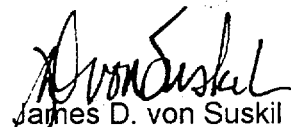
Enclosed are the examination outlines, supporting the Initial License Examination scheduled for the weeks of October 15, 2001, through October 29, 2001, at Braidwood Station.

This submittal includes all appropriate Examination Standard forms and outlines in accordance with NUREG-1021, "Operator Licensing Examination Standards," Revision 8, Supplement 1.

In accordance with NUREG 1021, Revision 8, 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 Amy Ferko, Regulatory Assurance Manager at (815) 417-2699. For questions concerning examination outlines, please contact Scott M. Deprest at (815) 458-7829.

Respectfully,



James D. von Suskil
Site Vice President
Braidwood Station

Enclosures: (Hand delivered to Del McNeil, Chief Examiner, NRC Region III)

Examination Security Agreements (Form ES-201-3)
Administrative Walk-Through Job Performance Measures Sample Plan (Form ES-301-1)
Control Room Systems and Facility Walk-Through Test Outline (Form ES-301-2)
SRO Written Exam Sample Plan (Forms ES-401-1 or ES-401-3 and ES-401-5)
RO Written Exam Sample Plan (Forms ES-401-2 or ES-401-4 and ES-401-5)
Operational Scenarios Sample Plan (Form ES-D-1)
Record of Rejected K/As (Form ES-401-10)
Completed Checklists:
 Examination Outline Quality Checklist (Form ES-201-2)
 Transient and Event Checklist (Form ES-301-5)
 Competencies Checklist (Form ES-301-6)

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

Facility: <u>Braidwood Nuclear Station</u>		Date of Examination: <u>10/15/01</u>
Examinations Developed by: <input checked="" type="checkbox"/> 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)	drm
-120	2. NRC examiners and facility contact assigned (C.1.d; C.2.e)	drm
-120	3. Facility contact briefed on security & other requirements (C.2.c)	drm
-120	4. Corporate notification letter sent (C.2.d)	drm
[-90]	[5. Reference material due (C.1.e; C.3.c)] <i>(N/A Facility dev.)</i>	drm
-75	6. Integrated examination outline(s) due (C.1.e & f; C.3.d)	drm
-70	7. Examination outline(s) reviewed by NRC and feedback provided to facility licensee (C.2.h; C.3.e)	drm
-45	8. Proposed examinations, supporting documentation, and reference materials due (C.1.e, f, g & h; C.3.d)	drm
-30	9. Preliminary license applications due (C.1.i; C.2.g; ES-202)	drm
-14	10. Final license applications due and assignment sheet prepared (C.1.i; C.2.g; ES-202)	drm
-14	11. Examination approved by NRC supervisor for facility licensee review (C.2.h; C.3.f)	drm
-14	12. Examinations reviewed with facility licensee (C.1.j; C.2.f & h; C.3.g)	drm
-7	13. Written examinations and operating tests approved by NRC supervisor (C.2.i; C.3.h)	drm
-7	14. Final applications reviewed; assignment sheet updated; waiver letters sent (C.2.g, ES-204)	drm
-7	15. Proctoring/written exam administration guidelines reviewed with facility licensee and authorization granted to give written exams (if applicable) (C.3.k)	drm
-7	16. Approved scenarios, job performance measures, and questions distributed to NRC examiners (C.3.i)	drm
<p>* 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.</p> <p>[] Applies only to examinations prepared by the NRC.</p>		

Facility: BRAIDWOOD		Date of Examination: 10/15/29/01		
Item	Task Description	Initials		
		a	b*	c#
1. W R I T T E N	a. Verify that the outline(s) fit(s) the appropriate model per ES-401.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 and whether all KA categories are appropriately sampled.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	d. Assess whether the justification for deselected or rejected K/A statements are appropriate.	<i>D</i>	<i>JFS</i>	<i>sn</i>
2. S I M	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.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	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.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	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.	<i>D</i>	<i>JFS</i>	<i>sn</i>
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.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	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.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	c. Verify that the required administrative topics are covered, with emphasis on performance-based activities.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	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.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	e. Verify that the required administrative topics are covered, with emphasis on performance-based activities.	<i>D</i>	<i>JFS</i>	<i>sn</i>
4. G E N E R A L	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	d. Check for duplication and overlap among exam sections.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	e. Check the entire exam for balance of coverage.	<i>D</i>	<i>JFS</i>	<i>sn</i>
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	<i>D</i>	<i>JFS</i>	<i>sn</i>
a. Author		Printed Name / Signature		Date
b. Facility Reviewer (*)		SCOTT M. DEPREST / <i>Scott M. Deprest</i>		6/28/01
c. NRC Chief Examiner (#)		JOHN E. BROWNING / <i>John E. Browning</i>		6/28/01
d. NRC Supervisor		DELL R. MCNEIL / <i>Dell R. McNeil</i>		7/13/01
		DAVID E. HILS / <i>David E. Hils</i>		7/13/01
NOTE: * Not applicable for NRC-developed examinations. # Independent NRC Reviewer initial items in Column "c" chief examiner concurrence required.				

Facility: **Braidwood Units 1 and 2**Date of Examination: **10/15-29/01**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- Perform Calorimetric	N-08 (Simulator JPM) K/A015A1.01	Imp Factor 3.5
	Conduct of Operations- Determine SDM Inadequate from Calculation	N-125 (Simulator JPM) K/A001A4.11	Imp Factor 3.5
A.2	Equipment Control- Perform AC Offsite Sources Weekly Surveillance	N-75 (Simulator JPM) K/A062K1.04	Imp Factor 3.7
A.3	Radiation Control- Local Start of CC Hx Outlet Radiation Monitor	N-133 (In Plant JPM) K/A2.3.10	Imp Factor 2.9
A.4	Emergency Plan- Activate Emergency Response Data System (ERDS)	N-160 (New Simulator JPM) K/A2.4.29	Imp Factor 2.6

Facility: **Braidwood Units 1 and 2**Date of Examination: **10/15-29/01**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- Review Calorimetric	S-42 (New Simulator JPM) K/A015A1.01 Imp Factor 3.8
	Conduct of Operations- Determine SDM Incorrectly Calculated and Inadequate.	S-43 (New Simulator JPM) K/A001A4.11 Imp Factor 4.1
A.2	Equipment Control- Review AC Offsite Sources Weekly Surveillance	N-75a (Modified Simulator JPM) K/A062K1.04 Imp Factor 4.2
A.3	Radiation Control- Review a Release Package	S-41 (New Simulator JPM) K/A 2.3.6 Imp Factor 3.1
A.4	Emergency Plan- Transfer Command and Control to the TSC	S-40 (New Simulator JPM) K/A 2.4.38 Imp Factor 4.0

Facility: **Braidwood Units 1 and 2**Date of Examination: **10/15-29/01**Exam Level (circle one): **RO**Operating Test Number: **1****B.1 Control Room Systems**

System / JPM Title	Type Code*	Safety Function
a. CVCS/ Perform Dilution with Failure of 1CV111A. N-26 K/A004A4.07 3.9/3.7	L, D A, S	1
b. PZR Level Control System/ Establish Automatic PZR Level Control with Failed Master Controller. N-77 K/A011A4.04 3.2/2.9	D, A, S	2
c. ECCS/ Decrease SI Accumulator Pressure. N-04 K/A006A4.02 4.0/3.8	L, D S	3
d. Containment Spray System/ Perform Start of 1A CS Pump for Surveillance Test. N-123A K/A026A4.01 4.5/4.3	M, S	5
e. PRM System/ Operate Rad Monitor- Disable Incore Seal Table Monitor Audible Alarm. N-69C K/A073A4.02 3.7/3.7	D, S	7
f. Containment Purge System/ Use Containment Mini-Purge system to Reduce Containment Pressure. N-161 K/A029A1.03 3.0/3.3	L, N S	8
g. Liquid Rad Waste System/ Respond to Increasing Level in RCDT. N-162 K/A068A2.04 3.3/3.3	N, A, S	9

B.2 Facility Walk-Through

a. Steam Dump and Turbine Bypass Control System/ Local Operation of A SG PORV. N-83 K/A041A4.06 2.9/3.1	D	4
b. Loss of DC Power/ Determine Status of DC Bus. N-31 K/A058AA1.03 3.1/3.3	D	6
c. Control Room Evacuation/ Local Emergency start of the 2B AFW Pump from 2AF03J. N-56A K/A068AA1.02 4.3/4.5	M, R, A	4

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

Facility: **Braidwood Units 1 and 2**Date of Examination: **10/15-29/01**Exam Level (circle one): **SRO(I)**Operating Test Number: **1****B.1 Control Room Systems**

System / JPM Title	Type Code*	Safety Function
a. CVCS/ Perform Dilution with Failure of 1CV111A. N-26 K/A004A4.07 3.9/3.7	L, D A, S	1
b. PZR Level Control System/ Establish Automatic PZR Level Control with Failed Master Controller. N-77 K/A011A4.04 3.2/2.9	D, A, S	2
c. ECCS/ Decrease SI Accumulator Pressure. N-04 K/A006A4.02 4.0/3.8	L, D S	3
d. Containment Spray System/ Perform Start of 1A CS Pump for Surveillance Test. N-123A K/A026A4.01 4.5/4.3	M, S	5
e. PRM System/ Operate Rad Monitor- Disable Incore Seal Table Monitor Audible Alarm. N-69C K/A073A4.02 3.7/3.7	D, S	7
f. Containment Purge System/ Use Containment Mini-Purge system to Reduce Containment Pressure. N-161 K/A029A1.03 3.0/3.3	L, N S	8
g. Liquid Rad Waste System/ Respond to Increasing Level in RCDT. N-162 K/A068A2.04 3.3/3.3	N, A, S	9

B.2 Facility Walk-Through

a. Steam Dump and Turbine Bypass Control System/ Local Operation of A SG PORV. N-83 K/A041A4.06 2.9/3.1	D	4
b. Loss of DC Power/ Determine Status of DC Bus. N-31 K/A058AA1.03 3.1/3.3	D	6
c. Control Room Evacuation/ Local Emergency start of the 2B AFW Pump from 2AF03J. N-56A K/A068AA1.02 4.3/4.5 K/A013A 4.01 4.5/4.8	M, R, A	4.5

* 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: Bwd 2001-01

Applicant Type	Evolution Type	Minimum Number	Scenario Number			
			1	2	3	4
RO/BOP	Reactivity	1	1/	1/	1/	2/
	Normal	1	/1	/1	/1	/2
	Instrument / Component	4	3, 4/ 2, 5, 6	2, 5, / 3, 4	3, 4, / 5,	3, 4/ 5, 6
	Major	1	7	6	7, 9	7, 8

As RO	Reactivity	1	1	1	1	2
	Normal	0				
	Instrument / Component	2	3, 4	2, 5,	3, 4,	3, 4
	Major	1	7	6	7, 9	7, 8
SRO-I						
As SRO	Reactivity	0				
	Normal	1	1	1	1	2
	Instrument / Component	2	2-6	2-5,	2-6,	3-6
	Major	1	7	6	7, 9	7, 8

SRO-U	Reactivity	0	N/A	N/A	N/A	N/A
	Normal	1	N/A	N/A	N/A	N/A
	Instrument / Component	2	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 may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
 - (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 requirement.

NOTE: Scenario #3 is a "spare" scenario and is presented 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:

Scott Depert

NRC Reviewer:

Bill R. McNeil

OPERATING TEST: Bwd 2001-01

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

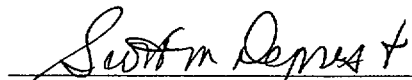
Notes:
 (1) Includes Technical Specification compliance for an RO.
 (2) Optional for an SRO-U.
 (3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

NOTE: Scenario #3 is a "spare" scenario and is presented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO, and BOP by position.

Author:



NRC Reviewer:



Simulation Facility BraidwoodScenario No.: 01-1

Operating Test No.: 1

Examiners: _____

Applicant: _____

SROROBOP

Initial Conditions: IC-18, 75% power, steady state, MOC.

Turnover: Ramp to full power requested by Electric Operations. MESACs were completed on 1D SGWLC instrumentation on the previous shift. 1A MFP is out of service due to breaker cubicle work.

Event No.	Malf. No.	Event Type*	Event Description
Preload	CH11A and CH11C FW48B FW43 MS01A-D, 100 FW45E, 100 Override ZDI1AF013E AUTO	C BOP C BOP C BOP C RO BOP SRO C BOP C BOP SRO	1A and 1C RCFCs fail to auto shift from hi to low speed on SI. 1B AFW pump fails to auto start, can be manually started. 1A AFW pump fails to auto or manually start. All MSIVs fail at 100% open, no closure available. 1AF005E potentiometer fails to 100% demand. 1AF013E stuck open.
1		R RO SRO N BOP	Raise Reactor Power using rods and dilution Ramp up turbine power from 75% to full power.
	RX06O, 0	I BOP SRO	1LT549, 1D SG Controlling Water Level Channel fails low.
3	RX13, 0	I RO SRO	1LT-459, Controlling PZR Level Channel fails low.
4	CV09, 50	C RO SRO	TCV-130A modulates closed
5	MS04D, 100	C BOP SRO	1MS018D, 1D SG PORV fails open.
6	FW09A, 100	C BOP SRO	1FW510, 1A SG Feed reg valve fails open.
7	FW19A, 2.0	M BOP RO SRO	1A SG Feed line break (2 MLB/HR) inside containment. 4 faulted steam generators.

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

SCENARIO 01-1 OVERVIEW

The scenario begins with the plant at 75% power and a ramp up to full power is requested via the turnover. The turnover includes information that MESACs were completed for 1D SGWLC instrumentation on the previous shift and 1A MFP is out of service for breaker cubicle work.

After clearly observable plant response to the requested reactivity change, the controlling channel of S/G Water Level instrumentation for 1D S/G will fail low causing a demand for more feed flow to the 1D S/G. The BOP will diagnose the failure and take manual control of the 1D S/G feed regulating valve. The crew will enter and perform actions of 1BwOA INST-2 Attachment E, "OPERATION WITH A FAILED INSTRUMENT – NARROW RANGE S/G LEVEL CHANNEL FAILURE", to stabilize the plant and trip the bistables for the failed channel. The SRO will investigate Tech Specs. LCO 3.3.1 condition E and LCO 3.3.2 condition D will apply. Maintenance will investigate as requested.

After the bistables are tripped for the failed S/G water level control channel, a failure of the controlling channel of Pzr Level will occur causing letdown to isolate. The crew will respond by diagnosing the failure of the level channel and entering and performing the actions of 1BwOA INST-2 Attachment C, "OPERATION WITH A FAILED INSTRUMENT – PRESSURIZER LEVEL CHANNEL FAILURE". An alternate controlling level channel will be selected, letdown will be restored, and the crew will take actions to restore pressurizer level to the program value. Bistables will be tripped for the failed channel, and Tech Specs will be investigated. LCO 3.3.1 condition K will apply. Maintenance will investigate as requested.

Following the restoration of letdown and bistable tripping, the letdown temperature control valve for the on line letdown heat exchanger will close. Letdown temperature will increase causing a high temperature diversion around the mixed bed demineralizers. Manual control of the temperature controller is available and will be necessary to restore letdown temperature to normal. Annunciator response procedures will be referenced to respond to the failure.

When manual control of the letdown temperature control valve is selected, the 1D S/G PORV controller will cause the 1D S/G PORV to open. RCS Tave will decrease causing control rod motion in the outward direction. The crew will investigate the cause of the temperature decrease and diagnose the inadvertent PORV failure. Emergency closure of the PORV will be available from the control room and the PORV will be locally isolated if directed by the crew. The SRO will determine Tech Spec 3.7.4 applies.

A failure open of the 1A Feed Regulating Valve will cause a High-2 SG Level Turbine Trip if the crew does not manually trip the reactor first. A 1A S/G feed line break inside of containment will occur when the 1A FWIV closes requiring a safety injection. 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION" will be entered. Containment pressure will exceed the Containment Spray actuation setpoint. Manual action will be required to start 1 train of RCFCs and the 1B AFW pump. The 1A AFW pump will fail to start. A diagnosis of a Faulted S/G will cause transition to 1BwEP-2, "FAULTED SG ISOLATION". Further diagnosis will determine 4 faulted S/Gs exist due to failure of all MSIVs to close and a transition to 1BwCA-2.1, "UNCONTROLLED DEPRESSURIZATION OF ALL S/Gs" will be made. Depending on the timing, a transition to 1BwFR Z.1, "RESPONSE TO CONTAINMENT HIGH PRESSURE," will occur after exiting the Reactor Trip/Safety Injection procedure. Manual operator action will be required to throttle

Comments: _____

AFW flow to a minimum to the SGs. Local operator action will be required to throttle B Train AFW flow to the faulted 1A S/G due to a failure of the potentiometer and a stuck open isolation valve. Containment Spray may be terminated (depending on the amount of secondary water inventory remaining in the SGs and the RCS temperature) before reaching the LO-2 RWST setpoint for auto swap over to the containment sump and an unnecessary injection of sump water into the RCS. NaOH addition to the CS water will be stopped due to the break being on a secondary system. If the LO-2 RWST level is reached, then the crew will transition to 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION and then back to the procedure and step in effect. The crew will proceed to terminate the safety injection in 1BwCA 2.1. Scenario termination is after stopping high head injection flow and re-establishing charging flow.

Critical Tasks

- E-0—F Establish the minimum required AFW flow rate to the SGs before transition out of E-0, unless the transition is to FR-H.1, in which case the task must be initiated before RCPs are manually tripped per FR-H.1.
- ECA-2.1---A Control the AFW flow rate to not less than 45 gpm per SG in order to minimize the RCS Cooldown rate before a severe (orange path) challenge develops to the integrity CSF.

Comments: _____

Simulation Facility BraidwoodScenario No.: 01-2

Operating Test No.: 1

Examiners: _____

_____Applicant: _____

_____SROROBOP

Initial Conditions: IC-22, 100% Power, Steady state, MOC.

Turnover: 1A MFP is unavailable due to breaker cubicle work. MESACs were completed for 1D SGWLC instrumentation last shift. Ramp down to 90% power in preparation for TV-GV Surveillance due next shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload	FW01 ED06H RP01 RP02A and B TC03 Override: ZDI1HSTG010, AS IS RF RP 34 and 35 OUT RF RP60 and 61 OUT FW44	C BOP C BOP C RO C BOP C BOP C BOP	MFP 1A fails to start/ OOS. 6.9KV Breaker 1591 fails to ABT. Reactor fails to auto Trip/ATWS Reactor Trip breakers fail to open from control room/ATWS Turbine fails to Auto Trip Turbine fails to Manually Trip. MSIVs fail to Isolate on Auto Isolation signal. 1B AFW pump fails to start.
1		R RO SRO N BOP	Lower Reactor power with boration and control rods. Ramp down turbine power from 100% to 90%.
2	RX18B, 590, 1 min ramp	I RO SRO	RCS Loop 1B Tcold RTD fails to mid-span over 1 minute.
3	RF RP38 IN FW43 (Trigger)	C BOP SRO	Inadvertent Auto start of 1A AFW pump. 1A AFW pump fails to start after C/S taken to Pull Out.
4	RX05, 0, 5 min ramp	I BOP SRO	Main steam Header Pressure Controller (1PT-507) fails low over 5 minutes.
5	CV08, 600	C RO SRO	Letdown Pressure Control valve (1PT-131) fails closed.
6	ED05D	M BOP RO SRO	SAT feed breaker to bus 159 trips opens, no ABT. Loss of RCS flow (Loop 1D) ATWS and turbine fails to trip. Loss of Heat Sink.
7	RD06 RF ED073B OPEN (Trigger)	C RO C RO SRO	Control rods fail to move. Emergency boration valve stuck closed.

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

SCENARIO 01-2 OVERVIEW

The scenario begins with the plant at 100% power and a ramp down to 90% in preparation for the TV-GV surveillance due next shift. The turnover includes information that 1A MFP is unavailable due to breaker cubicle work, and MESACs were completed for 1D SGWLC instrumentation on the previous shift.

After clearly observable plant response to the requested reactivity change, the Tcold RTD on Loop 1B will drift high causing inward rod motion. The RO will diagnose the instrument failure and place rod control in manual. The power change may be suspended. The SRO will enter 1BwOA INST-2 Attachment A, "OPERATION WITH A FAILED INSTRUMENT CHANNEL – RCS NARROW RANGE RTD CHANNEL FAILURE", and direct crew actions to defeat the failed channel, restore Tave and automatic rod control, investigate Tech Specs, and trip bistables. LCO 3.3.1 condition E will apply. Maintenance will investigate as requested. When the recovery is complete, the load ramp will recommence if previously suspended.

After the bistables are tripped for the failed RTD, an inadvertent automatic start of the 1A AFW pump will occur due to a slave relay actuation. The addition of colder feedwater to the SGs will cause Tave to decrease and outward rod motion to occur. The BOP will respond by referencing the annunciator response procedures. When the control switch for the 1A AFW pump is placed in PULL OUT to stop the unwanted addition of AFW, the pump will no longer start for the remainder of the scenario. (This failure to start may not be discovered until the major transient.) The SRO will investigate Tech Specs for AFW. LCO 3.7.5 will apply. Maintenance will investigate as requested.

Shortly after the inadvertent start of the 1A AFW pump, the main steam header pressure controller will slowly fail low. This will cause the main feed pumps to slow down, the feed regulating valves to open, and a decrease in all SG water levels. The BOP will diagnose the failure, place main feed pump speed control in manual and increase feed pump speed to restore SG levels and main feed header pressure to the program value. The steam dump controller will no longer respond correctly in the steam pressure mode of operations, but this is inconsequential at power.

After SG levels are stable, the letdown pressure control valve will fail closed causing the letdown relief valve to lift to the PRT. The RO will diagnose this from cycling letdown pressure and manually isolate letdown. The pressure control valve will be locally isolated and bypassed and letdown flow restored.

After letdown restoration, breaker 1592 trips causing a loss of 6.9KV Bus 159. No ABT to the UAT will occur, resulting in a loss of the 1D RCP. The Reactor Protection System will sense the loss of RCS flow and generate a reactor trip signal. The Reactor will fail to trip (ATWS), requiring emergency boration because rods will fail to move. The Turbine will fail to trip, necessitating a manual runback of the turbine. This delay in getting the turbine tripped will most likely result in the generation of Safety Injection and MSIV Isolation signals. The MSIVs will NOT automatically close, but can be manually closed. The SRO will implement 1BwFR S.1, "RESPONSE TO NUCLEAR POWER GENERATION/ ATWS", and the crew will perform Immediate Actions. The 1A AFW pump will NOT start if taken out of PULL OUT. The 1B AFW pump will fail to start. The emergency boration valve will be stuck closed, necessitating an alternate emergency boration source and flow path. The reactor will trip when the steam dumps are taken off.

Comments: _____

A transition from the ATWS procedure to 1BwFR H.1, "LOSS OF SECONDARY HEAT SINK," will be made if the SRO has directed the STA to monitor Critical Safety Function Status Trees and narrow range steam generator levels are all less than 10%. Otherwise, the SRO will transition to 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION", and diagnose the need to transition the 1BwFR H.1 when AFW flow is unable to be verified.

Upon entering 1BwFR H.1, the loss of SG water levels will require the initiation of Bleed and Feed. The SRO will direct tripping of all RCPs and the initiation of Bleed and Feed. After Bleed and Feed is initiated, the SRO will direct attempts to restore feed flow. Main feed and AFW are not available. When Condensate flow is established, the scenario ends.

Critical Tasks

- FR-S.1—A: Isolate main steam from the main turbine before exceeding 3107 psig RCS pressure.
- FR-S.1—C Insert negative reactivity into the core by emergency boration prior to dispatching operators to locally trip the reactor or turbine.
- FR-H.1—B Initiate RCS Bleed and Feed before PZR PORVS open automatically.

Comments: _____

Simulation Facility BraidwoodScenario No.: 01-3

Operating Test No.: 1

Examiners: _____

_____Applicant: _____ SRO
_____ RO
_____ BOP

Initial Conditions: IC-__, 25% power, following a restart from a trip from full power 12 hours ago.

Turnover: Ramp to full power. 1A RH and 1A MFP pumps are unavailable. MESACs were completed for 1D SGWLC instrumentation on the previous shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload	CS01A RF RP__ OUT RH04B Override	C BOP SRO C BOP SRO	1A Containment Spray pump fails to start Auto or Manually. 1B Containment Spray pump fails to start Auto (Manual Avail) 1B Containment Sump Recirc Isol valve stuck closed.
1		R RO SRO N BOP	Raise Reactor power with dilution and control rods. Ramp up turbine power from 25% to full power.
2	CH08D, 60	I BOP SRO	Containment Pressure Transmitter IPT-937 fails high.
3	NI09B, 120	I RO SRO	Power Range Channel N42 fails high.
4	CV27C, 3.1, 1 min ramp	C RO SRO	1C RCP #1 Seal Leakage (degradation).
5	CV15, 50	C BOP SRO	50 gpm Seal water heat exchanger leak, CCW into seal return.
6	CV27C, 10, 5 min ramp	C RO SRO	1C RCP #1 Seal Leakage worsens, requiring reactor trip.
7	TH06C, 540K (Trigger)	M RO SRO BOP	Large break LOCA at time of Reactor Trip.
8	Preload	C BOP SRO	Containment Spray failure, only one train available.
9	Preload	M RO SRO BOP	Loss of Emergency Coolant Recirculation.

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

SCENARIO 01-3 OVERVIEW

The scenario begins with the plant at approximately 25% power with orders to ramp up to full power. The turnover includes information that the 1A RH pump is unavailable due to a scheduled work window, 1A MFP is unavailable due to breaker cubicle work, and MESACS were completed for 1D SGWLC instrumentation on the previous shift.

After clearly observable plant response to the requested reactivity change, a Containment Pressure channel will fail high. The BOP and RO will diagnose the failure from annunciators, instrumentation indications, and the bistable light. The SRO will enter 1BwOA INST-2 Attachment J, "OPERATION WITH A FAILED CHANNEL – CONTAINMENT PRESSURE CHANNEL FAILURE," and direct actions to trip the bistable and investigate Tech Specs. LCO 3.3.2 condition E applies. Maintenance will investigate as requested.

After the bistable is tripped for the containment pressure channel, a Power Range Channel will fail high causing inward rod motion. The RO will diagnose the failure from control board indications and alarms and place rod control in manual. The ramp up may be suspended. The SRO will enter 1BwOA INST-1 Attachment A, "NUCLEAR INSTRUMENTATION MALFUNCTION – PR CHANNEL FAILURE," and direct actions to defeat the channel, restore Tave and automatic rod control, trip bistables, and investigate Tech Specs. LCO 3.3.1 conditions D and E apply. Maintenance will investigate as requested. The ramp up may be restarted if suspended earlier.

After the bistables are tripped for the failed NI, 1C RCP seal will begin to leak abnormally. The RO will diagnose the failure from RCP parameters, and the SRO will enter 1BwOA RCP-1, "REACTOR COOLANT PUMP SEAL FAILURE". The crew will determine the seal problem is real, not an instrumentation problem, and commence a shutdown.

While preparations are being made to shutdown the unit, a seal water heat exchanger tube leak will occur, causing a decreasing Surge Tank level, and a dilution of the RCS from Component Cooling water entering the flowpath to the CV pumps. The problem will be diagnosed by the BOP from makeup occurring to the CCW surge tank. The SRO will enter 1BwOA PRI-12, "UNCONTROLLED DILUTION" and direct actions to isolate and bypass the seal water heat exchanger. Control rods will be verified to be above the RIL to satisfy Tech Specs.

After the seal water heat exchanger is bypassed, the 1C RCP seal leak gets worse and exceeds the limit requiring a trip. At the time of the reactor trip, a large break LOCA occurs. The SRO will enter and direct actions of 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION". Containment pressure will exceed the actuation setpoint. One train of CS will not start, the other train must be manually started due to a slave relay failure. An RCS LOCA will be diagnosed and a transition to 1BwEP-1, "LOSS OF REACTOR OR SECONDARY COOLANT" will be made. If containment pressure remains above the CS actuation setpoint, a transition to 1BwFR-Z.1, "RESPONSE TO HIGH CONTAINMENT PRESSURE" will be made. When the LO-2 RWST level is reached, the crew will transition to 1BwEP ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION". A failure of the B Train sump recirculation valve will occur, requiring a transition to 1BwCA-1.1, "LOSS OF EMERGENCY COOLANT RECIRCULATION". The SRO will direct one operator to add make up to the RWST, and direct the other operator to stop the running CS pump. Minimum ECCS flow will be established to the RCS. The scenario is terminated after make-up is established to the RWST.

Comments: _____

Critical Tasks

- E-0—E: Manually actuate at least the minimum required compliment of containment cooling equipment before an extreme (red path) challenge develops to the containment critical safety function.
- ECA-1.1—A: Stop ECCS pumps with suctions aligned to the RWST before they cavitate and trip. (applicable when RWST < 7%).
- ECA-1.1—B: Makeup to the RWST and minimize outflow.

Comments: _____

Simulation Facility BraidwoodScenario No.: 01-4Operating Test No.: 1

Examiners: _____

Applicant: _____

SROROBOP

Initial Conditions: IC-16, 50% power, equilibrium xenon, steady state.

Turnover: A 60 gpd tube leak in 1D SG has been ongoing for 48 hrs. Steps 1-9 of 1BwOA SEC-8 are complete. Ongoing sample reports are due shortly after shift turnover. 1B SI pump and 1A MFP are unavailable. 1D SG PORV is isolated due to leakby. MESACs on 1A SGWLC instrumentation were completed last shift. The unit has been requested to ramp to full power.

Event No.	Malf. No.	Event Type*	Event Description
Preload	TH03D, .042 gpm SI12A MS01B, 50 Override	C RO SRO BOP C BOP C BOP C BOP	60 gpd tube leak 1D SG. 1A SI pump fails to Auto start, can be manually started. 1B MSIV sticks at 50% OPEN when demanded to be closed. 1D MSIV fails to manually close, can Auto close.
1	TH03D, .08 gpm	C SRO	Leak in 1D SG increases to > procedural limit requiring shutdown.
2		R RO SRO N BOP	Lower reactor power with boration and control rods. Ramp down turbine power form 50% to off line.
	RX21A, 2500 TH11A, 100	I RO SRO C RO SRO	1PT-455 Controlling pressure Channel fails high, causing 1RY455 PZR PORV open and stick open.
4	CV01A	C RO SRO	1A CV pump trip.
5	FW16, 1500, 3 min ramp	I BOP SRO	Main Feed Header Pressure controller fails high, 3 min ramp.
6	EG03, 100	C BOP SRO	Main Generator Field Force – Auto Voltage Regulator Failure.
7	TH03D, 500, 5 min ramp	M BOP RO SRO	1D SG Tube leak increases to 500 gpm over 5 minutes.
8	MS03D, 100	M BOP SRO RO	Main steam safety valve on 1D SG fails open resulting in faulted ruptured SG.

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

SCENARIO 01-4 OVERVIEW

The scenario begins with the unit at 50% power steady state. A report just after turnover confirms 100 gpd tube leakage in 1D S/G. This is an increase from 60 gpd at the beginning of last shift. Steps 1-9 of 1BwOA SEC-8, "STEAM GENERATOR TUBE LEAK" are complete. 1B SI pump is not available due to scheduled work window. 1A MFP is unavailable due to breaker cubicle work, and 1D S/G PORV is isolated due to leakby. MESACs on 1A SGWLC instrumentation were completed last shift.

The SRO will determine the unit must be shutdown within 2 hrs due to exceeding the procedural limit for tube leakage per 1BwOA SEC-8 SGTL, step 10. After clearly observable plant response to the reactivity change for shutting down, the controlling pressurizer pressure channel will fail high causing a PZR PORV to open and stick. The RO will diagnose the pressure channel failure and the PORV sticking open from alarms, meter indications, and decreasing PZR pressure. The RO will attempt to close the failed open PZR PORV, and then close its block valve to stop the pressure decrease. Manual action will also be required to close the PZR spray valves. The SRO will enter and direct actions from 1BwOA INST-2 Attachment B, "PRESSURIZER PRESSURE CHANNEL FAILURE," to select an operable channel, restore pressure, trip bistables and investigate Tech Specs. LCO 3.3.1 conditions E and K, LCO 3.3.2 condition D, LCO 3.3.4 condition A, and LCO 3.4.1 condition A apply for the failed instrument. Tech spec 3.4.11 applies for the Pzr PORV and power will be removed from the block valve. Maintenance will investigate as requested.

After the bistables are tripped for the failed pressure channel, the operating CV pump will trip. The RO will diagnose this failure from the annunciators, pump tripped indications, and a loss of charging flow. The SRO will enter and direct actions from 1BwOA PRI-15, "LOSS NORMAL CHARGING" to verify the tripped pump was not gas bound, start the standby charging pump, and investigate Tech Specs. LCO 3.5.2 condition A and TLCO 3.1.d apply. Maintenance will investigate as requested.

After swapping charging pumps, the Main Feed Header Pressure instrument will drift high causing the SG levels to decrease due to decreasing feed pump speed. The BOP will diagnose the failure from level deviation alarms for each SG, and restore main feed pump speed via manual control. The SRO will direct the actions based on the annunciator response procedure. Maintenance will investigate as requested.

After stabilizing feed flows, the automatic voltage regulator (AVR) will increase its output, overexciting the main generator. The BOP will diagnose this failure from main control board indications and alarms. The SRO will direct the BOP to take the regulator to OFF or TEST and reduce voltage to within acceptable limits per the annunciator response procedures. Maintenance will investigate as requested.

Shortly after the generator is stabilized, the tube leak on 1D SG will increase in severity to 500 gpm over 5 minutes. The RO will report decreasing pressurizer level, the BOP will report decreasing feed flow on 1D SG and water level stable or increasing. The MSL rad monitors will indicate increases. The SRO will determine PZR level can NOT be maintained, order a Reactor Trip and SI, and enter and direct response from 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION". The crew will perform Immediate and subsequent actions, diagnosing a SGTR in 1D S/G, and transition to 1BwEP-3 SGTR. The 1A SI pump will fail to start automatically but can be manually started. When an attempt is

Comments: _____

made to close the 1D MSIV, it will not close. The use of the MSIV Isolation switch will close 1A, 1C and 1D MSIVs. The 1B MSIV will only partially close before it becomes mechanically bound. When the RH pumps are stopped, a Main Steam Safety valve on 1D SG will fail open. The crew will diagnose the faulted ruptured steam generator by the decrease in steam generator pressure and transition to 1BwCA-3.1, "SGTR WITH LOSS OF REACTOR COLLANT - SUBCOOLED RECOVERY DESIRED." Initiation of further RCS cooldown will depend on the previous cooldown rate not exceeding 100 degrees F in any 1 hr. The scenario ends after the crew determines if a subcooled recovery is appropriate.

Critical Tasks

- E-0—J: Establish flow from at least one intermediate head (SI) ECCS pump before transition out of E-0.
- E-3—A: Isolate feed water flow into and steam flow out from the ruptured steam generator before a transition to ECA-3.1 occurs.
- ECA-3.1—B: Cooldown the RCS to cold shutdown conditions at the highest rate achievable but less than 100 degrees F per hour in all RCS cold legs.

Comments: _____

Facility: Braidwood/Byron Units 1 and 2

Form ES-401-3

Exam Date: 10/29/2001

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	4			4	24
	2	3	3	2				3	3			2	16
	3	0	1	0				0	2			0	3
	Tier Totals	7	8	6				7	9			6	43
2. Plant Systems	1	1	1	2	2	1	2	2	2	2	1	3	19
	2	1	2	2	2	2	1	1	2	2	1	1	17
	3	0	0	1	0	1	0	0	1	0	0	1	4
	Tier Totals	2	3	5	4	4	3	3	5	4	2	5	40
3. Generic Knowledge And Abilities					Cat 1		Cat 2		Cat 3		Cat 4		
					4		5		4		4		17

- Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier (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 priorities. Enter the tier totals for each category in the table above.

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
001	Continuous Rod Withdrawal / 1						X	2.2.19 - Knowledge of maintenance work order requirements.	3.1	1
001	Continuous Rod Withdrawal / 1	X						AK1.06 - Relationship of reactivity and reactor power to rod movement	4.2	1
003	Dropped Control Rod / 1					X		AA2.05 - Interpretation of computer in-core TC map for dropped rod location	3.2*	1
003	Dropped Control Rod / 1	X						AK1.01 - Reason for turbine following reactor on dropped rod event	3.7	1
005	Inoperable/Stuck Control Rod / 1				X			AA1.01 - CRDS	3.4	1
011	Large Break LOCA / 3					X		EA2.04 - Significance of PZR readings	3.9	1
015	Reactor Coolant Pump (RCP) Malfunctions / 4		X					AK2.10 - RCP indicators and controls	2.8	1
017	Reactor Coolant Pump (RCP) Malfunctions (Loss of RC Flow) / 4		X					AK2.07 - RCP seals	2.9	1
017	Reactor Coolant Pump (RCP) Malfunctions (Loss of RC Flow) / 4				X			AA1.12 - Reactor coolant loop flow meters	3.1	1
040	Steam Line Rupture / 4	X						AK1.03 - RCS shrink and consequent depressurization	4.2	1

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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
051	Loss of Condenser Vacuum / 4					X		AA2.01 - Cause for low vacuum condition	2.7*	1
059	Accidental Liquid Radwaste Release / 9						X	2.1.14 - Knowledge of system status criteria which require the notification of plant personnel.	3.3	1
059	Accidental Liquid Radwaste Release / 9	X						AK1.02 - Biological effects on humans of various types of radiation, exposure levels that are acceptable for nuclear power plant personnel, and the units used for radiation-intensity measurements and for radiation exposure levels	3.2*	1
062	Loss of Nuclear Service Water / 4						X	2.2.17 - Knowledge of the process for managing maintenance activities during power operations.	3.5	1
062	Loss of Nuclear Service Water / 4			X				AK3.03 - Guidance actions contained in EOP for Loss of nuclear service water	4.2	1
074	Inadequate Core Cooling / 4				X			EA1.12 - RCS temperature and pressure indicators	4.4	1
E01	Radiagnosis / 3		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
E01	Radiagnosis / 3			X				EK3.1 - Facility operating characteristics during transient conditions, including coolant chemistry and	3.3	1

the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics

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
E08	Pressurized Thermal Shock / 4			X				EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.8	1
E09	Natural Circulation Operations / 4				X			EA1.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.5	1
E10	Natural Circulation with Steam Void in Vessel with/without RVLIS / 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
E12	Uncontrolled Depressurization of all Steam Generators / 4			X				EK3.4 - 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 amendments are not violated	3.8	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
E14	High Containment Pressure / 5						X	2.2.14 - Knowledge of the process for making configuration changes.	3.0	1

K/A Category Totals: 4 4 4 4 4 4

Group Point Total: 24

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		EA2.02 - Proper actions to be taken if the automatic safety functions have not taken place	4.6	1
007	Reactor Trip / 1						X	2.2.17 - Knowledge of the process for managing maintenance activities during power operations.	3.5	1
009	Small Break LOCA / 3		X					EK2.03 - S/Gs	3.3*	1
025	Loss of Residual Heat Removal System (RHRS) / 4	X						AK1.01 - Loss of RHRS during all modes of operation	4.3	1
025	Loss of Residual Heat Removal System (RHRS) / 4				X			AA1.10 - LPI pump suction valve and discharge valve indicators	2.9	1
027	Pressurizer Pressure Control (PZR PCS) Malfunction / 3	X						AK1.02 - Expansion of liquids as temperature increases	3.1	1
027	Pressurizer Pressure Control (PZR PCS) Malfunction / 3		X					AK2.03 - Controllers and positioners	2.8	1
037	Steam Generator (S/G) Tube Leak / 3			X				AK3.09 - Maximum load change capability of facility	3.1*	1
038	Steam Generator Tube Rupture (SGTR) / 3				X			EA1.45 - Safely parameter display system	4.0*	1
038	Steam Generator Tube Rupture (SGTR) / 3					X		EA2.13 - Magnitude of rupture	3.7	1

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	2.3.2 - Knowledge of facility ALARA program.	2.9	1
060	Accidental Gaseous Radwaste Release / 9		X					AK2.01 - ARM system, including the normal radiation-level indications and the operability status	2.9*	1
061	Area Radiation Monitoring (ARM) System Alarms / 7			X				AK3.02 - Guidance contained in alarm response for ARM system	3.6	1
065	Loss of Instrument Air / 8					X		AA2.05 - When to commence plant shutdown if instrument air pressure is decreasing	4.1	1
E11	Loss of Emergency Coolant Recirculation / 4				X			EA1.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	4.0	1
E16	High Containment Radiation / 9	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the High Containment Radiation	3.3	1

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

Group Point Total: 16

Facility: ()idwood/Byron Units 1 and 2

PWR ST examination Outline

Printed: 06 () 01

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					AK2.02 - Sensors and detectors	2.7	1
028	Pressurizer (PZR) Level Control Malfunction / 2					X		AA2.04 - Ammeters and running indicators for CVCS charging pumps	3.1	1
E15	Containment Flooding / 5					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	3.2	1

K/A Category Totals: 0 1 0 0 2 0

Group Point Total: 3

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				A2.07 - Effect of reactor trip on primary and secondary parameters and systems	4.4	1
001	Control Rod Drive System / 1									X			A3.04 - Radial imbalance	3.8	1
004	Chemical and Volume Control System (CVCS) / 1						X						K6.10 - Boric acid storage tank/boron injection tank recirculation flow path	3.1	1
013	Engineered Safety Features Actuation System (ESFAS) / 2				X								K4.02 - Containment integrity system reset	4.2	1
013	Engineered Safety Features Actuation System (ESFAS) / 2						X						K6.01 - Sensors and detectors	3.1*	1
014	Rod Position Indication System (RPIS) / 1										X		A4.02 - Control rod mode-select switch	3.2	1
015	Nuclear Instrumentation System / 7	X											K1.02 - Vital ac systems	3.6	1
015	Nuclear Instrumentation System / 7							X					A1.03 - NIS power indication	3.7	1
017	In-Core Temperature Monitor (ITM) System / 7											X	2.1.25 - Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.	3.1	1
017	In-Core Temperature Monitor (ITM) System / 7			X									K3.01 - Natural circulation indications	3.7*	1

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								K4.04 - Cooling of control rod drive motors	3.1	1
022	Containment Cooling System (CCS) / 5									X			A3.01 - Initiation of safeguards mode of operation	4.3	1
056	Condensate System / 4								X				A2.04 - Loss of condensate pumps	2.8*	1
059	Main Feedwater (MFW) System / 4			X									K3.04 - RCS	3.8	1
059	Main Feedwater (MFW) System / 4							X					A1.07 - Feed Pump speed, including normal control speed for ICS	2.6*	1
061	Auxiliary / Emergency Feedwater (AFW) System / 4		X										K2.03 - AFW diesel driven pump	3.8*	1
071	Waste Gas Disposal System (WGDS) / 9					X							K5.04 - Relationship of hydrogen/oxygen concentrations to flammability	3.1	1
071	Waste Gas Disposal System (WGDS) / 9											X	2.1.20 - Ability to execute procedure steps.	4.2	1
072	Area Radiation Monitoring (ARM) System / 7											X	2.2.8 - Knowledge of the process for determining if the proposed change, test, or experiment involves an unreviewed safety question.	3.3	1

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

Group Point Total: 19

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							K5.09 - Relationship of pressure and temperature for water at saturation and subcooling conditions	4.2	1
010	Pressurizer Pressure Control System (PZR PCS) / 3			X									K3.02 - RPS	4.1	1
010	Pressurizer Pressure Control System (PZR PCS) / 3				X								K4.02 - Prevention of uncovering PZR heaters	3.4	1
011	Pressurizer Level Control System (PZR LCS) / 2						X						K6.01 - Reasons for starting charging pump while increasing letdown flow rate	3.2*	1
011	Pressurizer Level Control System (PZR LCS) / 2								X				A2.01 - Excessive letdown	3.1	1
028	Hydrogen Recombiner and Purge Control System (HRPS) / 5	X											K1.01 - Containment annulus ventilation system (including pressure limits)	2.5	1
028	Hydrogen Recombiner and Purge Control System (HRPS) / 5		X										K2.01 - Hydrogen recombiners	2.8*	1
029	Containment Purge System (CPS) / 8								X				A2.01 - Maintenance or other activity taking place inside containment	3.6	1
033	Spent Fuel Pool Cooling System (SFPCS) / 8			X									K3.03 - Spent fuel temperature	3.3	1
039	Main and Reheat Steam System (MRSS) / 4					X							K5.08 - Effect of steam removal on reactivity	3.6	1
062	A.C. Electrical Distribution System / 6		X										K2.01 - Major system loads	3.4	1

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
064	Emergency Diesel Generator (ED/G) System / 6											X	2.2.5 - Knowledge of the process for making changes in the facility as described in the safety analysis report.	2.7	1
064	Emergency Diesel Generator (ED/G) System / 6									X			A3.12 - Purpose of automatic load sequencer	3.5	1
073	Process Radiation Monitoring (PRM) System / 7							X					A1.01 - Radiation levels	3.5	1
073	Process Radiation Monitoring (PRM) System / 7										X		A4.01 - Effluent release	3.9	1
086	Fire Protection System (FPS) / 8				X								K4.03 - Detection and location of fires	3.7	1
103	Containment System / 5									X			A3.01 - Containment isolation	4.2	1

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

Group Point Total: 17

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
005	Residual Heat Removal System (RHRS) / 4											X	2.2.27 - Knowledge of the refueling process.	3.5	1
005	Residual Heat Removal System (RHRS) / 4								X				A2.02 - Pressure transient protection during cold shutdown	3.7	1
007	Pressurizer Relief Tank/Quench Tank System (PRTS) / 5					X							K5.02 - Method of forming a steam bubble in the PZR	3.4	1
045	Main Turbine Generator (MT/G) System / 4			X									K3.01 - Remainder of the plant	3.2	1

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

Group Point Total: 4

PWR SRO Examination Outline

Facility: Braidwood/Byron Units 1 and 2

Form ES-401-5

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.4	Knowledge of shift staffing requirements.	3.4	1
	2.1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	1
	2.1.11	Knowledge of less than one hour technical specification action statements for systems.	3.8	1
	2.1.12	Ability to apply technical specifications for a system.	4.0	1
Category Total:			4	
Equipment Control	2.2.1	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	3.6	1
	2.2.10	Knowledge of the process for determining if the margin of safety, as defined in the basis of any technical specification is reduced by a proposed change, test or experiment.	3.3	1
	2.2.21	Knowledge of pre- and post-maintenance operability requirements.	3.5	1
	2.2.22	Knowledge of limiting conditions for operations and safety limits.	4.1	1
	2.2.27	Knowledge of the refueling process.	3.5	1
Category Total:			5	
Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	3.0	1
	2.3.2	Knowledge of facility ALARA program.	2.9	1
	2.3.3	Knowledge of SRO responsibilities for auxiliary systems that are outside the control room (e.g., waste disposal and handling systems).	2.9	1
	2.3.6	Knowledge of the requirements for reviewing and approving release permits.	3.1	1
Category Total:			4	

Generic Knowledge and Abilities Outline (Tier 3)

PWR SRO Examination Outline

Printed: 06/15/2

Facility: Braidwood/Byron Units 1 and 2

Form ES-401-5

Generic Category	KA	KA Topic	Imp.	Points
Emergency Procedures/Plan	2.4.11	Knowledge of abnormal condition procedures.	3.6	1
	2.4.26	Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.	3.3	1
	2.4.34	Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications.	3.6	1
	2.4.48	Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions.	3.8	1

Category Total: 4

Generic Total: 17

Facility: Braidwood/Byron Units 1 and 2

Form ES-401-4

Exam Date: 10/29/2001

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	3	4	3				4	1			1	16
	2	5	3	3				3	2			1	17
	3	0	1	0				0	1			1	3
	Totals Tier	8	8	6				7	4			3	36
2. Plant Systems	1	2	2	2	3	1	2	2	2	3	2	2	23
	2	2	2	2	2	2	2	2	2	1	3	0	20
	3	1	1	1	1	1	0	0	1	2	0	0	8
	Tier Totals	5	5	5	6	4	4	4	5	6	5	2	51
3. Generic Knowledge And Abilities					Cat 1		Cat 2		Cat 3		Cat 4		
					3		3		4		3		13

- Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (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 priorities. Enter the tier totals for each category in the table above.

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			AA1.01 - CRDS	3.6	1
015	Reactor Coolant Pump (RCP) Malfunctions / 4		X					AK2.10 - RCP indicators and controls	2.8*	1
017	Reactor Coolant Pump (RCP) Malfunctions (Loss of RC Flow) / 4		X					AK2.07 - RCP seals	2.9	1
017	Reactor Coolant Pump (RCP) Malfunctions (Loss of RC Flow) / 4				X			AA1.12 - Reactor coolant loop flow meters	2.8*	1
027	Pressurizer Pressure Control (PZR PCS) Malfunction / 3	X						AK1.02 - Expansion of liquids as temperature increases	2.8	1
027	Pressurizer Pressure Control (PZR PCS) Malfunction / 3		X					AK2.03 - Controllers and positioners	2.6	1
040	Steam Line Rupture / 4	X						AK1.03 - RCS shrink and consequent depressurization	3.8	1
051	Loss of Condenser Vacuum / 4					X		AA2.02 - Conditions requiring reactor and/or turbine trip	3.9	1
062	Loss of Nuclear Service Water / 4			X				AK3.03 - Guidance actions contained in EOP for Loss of nuclear service water	4.0	1
069	Loss of Containment Integrity / 5						X	2.1.25 - Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.	2.8	1

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
074	Inadequate Core Cooling / 4				X			EA1.12 - RCS temperature and pressure indicators	4.1	1
E08	Pressurized Thermal Shock / 4			X				EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.7	1
E08	Pressurized Thermal Shock / 4	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the Pressurized Thermal Shock	3.5	1
E09	Natural Circulation Operations / 4				X			EA1.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.5	1
E10	Natural Circulation with Steam Void in Vessel with/without RVLIS / 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
E12	Uncontrolled Depressurization of all Steam Generators / 4			X				EK3.4 - 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 amendments are not violated	3.5	1

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

Group Point Total: 16

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
001	Continuous Rod Withdrawal / 1	X						AK1.06 - Relationship of reactivity and reactor power to rod movement	4.0	1
003	Dropped Control Rod / 1	X						AK1.01 - Reason for turbine following reactor on dropped rod event	3.2	1
009	Small Break LOCA / 3		X					EK2.03 - S/Gs	3.0	1
022	Loss of Reactor Coolant Makeup / 2						X	2.2.12 - Knowledge of surveillance procedures.	3.0	1
025	Loss of Residual Heat Removal System (RHRS) / 4	X						AK1.01 - Loss of RHRS during all modes of operation	3.9	1
025	Loss of Residual Heat Removal System (RHRS) / 4				X			AA1.10 - LPI pump suction valve and discharge valve indicators	3.1*	1
037	Steam Generator (S/G) Tube Leak / 3			X				AK3.09 - Maximum load change capability of facility	2.7*	1
038	Steam Generator Tube Rupture (SGTR) / 3				X			EA1.45 - Safely parameter display system	3.9*	1
038	Steam Generator Tube Rupture (SGTR) / 3					X		EA2.13 - Magnitude of rupture	3.1*	1

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
059	Accidental Liquid Radwaste Release / 9	X						AK1.02 - Biological effects on humans of various types of radiation, exposure levels that are acceptable for nuclear power plant personnel, and the units used for radiation-intensity measurements and for radiation exposure levels	2.6	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
061	Area Radiation Monitoring (ARM) System Alarms / 7			X				AK3.02 - Guidance contained in alarm response for ARM system	3.4	1
E01	Radiagnosis / 3		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	3.5	1
E01	Radiagnosis / 3			X				EK3.1 - Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics	3.0	1
E02	SI Termination / 3					X		EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.5	1
E11	Loss of Emergency Coolant Recirculation / 4				X			EA1.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.9	1

Facility: () idwood/Byron Units 1 and 2

PWR Examination Outline

Printed: 06/01

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
E16	High Containment Radiation / 9	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the High Containment Radiation	3.0	1

K/A Category Totals: 5 3 3 3 2 1

Group Point Total: 17

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
028	Pressurizer (PZR) Level Control Malfunction / 2		X					AK2.02 - Sensors and detectors	2.6	1
036	Fuel Handling Incidents / 8					X		AA2.03 - Magnitude of potential radioactive release	3.1*	1
E15	Containment Flooding / 5						X	2.1.16 - Ability to operate plant phone, paging system, and two-way radio.	2.9	1

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

Group Point Total: 3

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				A2.07 - Effect of reactor trip on primary and secondary parameters and systems	4.1	1
001	Control Rod Drive System / 1									X			A3.04 - Radial imbalance	3.5	1
003	Reactor Coolant Pump System (RCPS) / 4		X										K2.02 - CCW pumps	2.5*	1
004	Chemical and Volume Control System (CVCS) / 1						X						K6.10 - Boric acid storage tank/boron injection tank recirculation flow path	2.7	1
004	Chemical and Volume Control System (CVCS) / 1											X	2.3.10 - Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	1
013	Engineered Safety Features Actuation System (ESFAS) / 2				X								K4.02 - Containment integrity system reset	3.9	1
013	Engineered Safety Features Actuation System (ESFAS) / 2						X						K6.01 - Sensors and detectors	2.7*	1
015	Nuclear Instrumentation System / 7	X											K1.02 - Vital ac systems	3.4	1
015	Nuclear Instrumentation System / 7							X					A1.03 - NIS power indication	3.7	1
017	In-Core Temperature Monitor (ITM) System / 7			X									K3.01 - Natural circulation indications	3.5*	1
017	In-Core Temperature Monitor (ITM) System / 7										X		A4.01 - Actual in-core temperatures	3.8	1

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
022	Containment Cooling System (CCS) / 5				X								K4.04 - Cooling of control rod drive motors	2.8	1
022	Containment Cooling System (CCS) / 5									X			A3.01 - Initiation of safeguards mode of operation	4.1	1
056	Condensate System / 4								X				A2.04 - Loss of condensate pumps	2.6	1
059	Main Feedwater (MFW) System / 4			X									K3.04 - RCS	3.6	1
059	Main Feedwater (MFW) System / 4							X					A1.07 - Feed Pump speed, including normal control speed for ICS	2.5*	1
061	Auxiliary / Emergency Feedwater (AFW) System / 4		X										K2.03 - AFW diesel driven pump	4.0*	1
068	Liquid Radwaste System (LRS) / 9	X											K1.02 - Waste gas vent header	2.5	1
068	Liquid Radwaste System (LRS) / 9				X								K4.01 - Safety and environmental precautions for handling hot, acidic, and radioactive liquids	3.4	1
071	Waste Gas Disposal System (WGDS) / 9					X							K5.04 - Relationship of hydrogen/oxygen concentrations to flammability	2.5	1
071	Waste Gas Disposal System (WGDS) / 9											X	2.1.22 - Ability to determine Mode of Operation.	2.8	1
072	Area Radiation Monitoring (ARM) System / 7									X			A3.01 - Changes in ventilation alignment	2.9*	1

Facility: () Maidwood/Byron Units 1 and 2

PWR RO mination Outline

Printed: () 2001

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		A4.01 - Alarm and interlock setpoint checks and adjustments	3.0*	1

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

Group Point Total: 23

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							K5.09 - Relationship of pressure and temperature for water at saturation and subcooling conditions	3.7	1
006	Emergency Core Cooling System (ECCS) / 2						X						K6.13 - Pumps	2.8	1
006	Emergency Core Cooling System (ECCS) / 2							X					A1.09 - Pump amperage, including start, normal and locked	2.8	1
010	Pressurizer Pressure Control System (PZR PCS) / 3			X									K3.02 - RPS	4.0	1
010	Pressurizer Pressure Control System (PZR PCS) / 3				X								K4.02 - Prevention of uncovering PZR heaters	3.0	1
011	Pressurizer Level Control System (PZR LCS) / 2						X						K6.01 - Reasons for starting charging pump while increasing letdown flow rate	2.8*	1
011	Pressurizer Level Control System (PZR LCS) / 2								X				A2.01 - Excessive letdown	3.2	1
012	Reactor Protection System / 7										X		A4.04 - Bistable, trips, reset and test switches	3.3*	1
012	Reactor Protection System / 7		X										K2.01 - RPS channels, components, and interconnections	3.3	1
014	Rod Position Indication System (RPIS) / 1										X		A4.02 - Control rod mode-select switch	3.4	1
029	Containment Purge System (CPS) / 8								X				A2.01 - Maintenance or other activity taking place inside containment	2.9	1

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
029	Containment Purge System (CPS) / 8	X											K1.02 - Containment radiation monitor	3.3	1
033	Spent Fuel Pool Cooling System (SFPCS) / 8			X									K3.03 - Spent fuel temperature	3.0	1
039	Main and Reheat Steam System (MRSS) / 4					X							K5.08 - Effect of steam removal on reactivity	3.6	1
062	A.C. Electrical Distribution System / 6		X										K2.01 - Major system loads	3.3	1
064	Emergency Diesel Generator (ED/G) System / 6									X			A3.12 - Purpose of automatic load sequencer	3.3*	1
073	Process Radiation Monitoring (PRM) System / 7							X					A1.01 - Radiation levels	3.2	1
073	Process Radiation Monitoring (PRM) System / 7										X		A4.01 - Effluent release	3.9	1
079	Station Air System (SAS) / 8	X											K1.01 - IAS	3.0	1
086	Fire Protection System (FPS) / 8				X								K4.03 - Detection and location of fires	3.1	1

K/A Category Totals: 2 2 2 2 2 2 2 2 1 3 0

Group Point Total: 20

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				A2.02 - Pressure transient protection during cold shutdown	3.5	1
007	Pressurizer Relief Tank/Quench Tank System (PRTS) / 5					X							K5.02 - Method of forming a steam bubble in the PZR	3.1	1
007	Pressurizer Relief Tank/Quench Tank System (PRTS) / 5									X			A3.01 - Components which discharge to the PRT	2.7*	1
008	Component Cooling Water System (CCWS) / 8				X								K4.02 - Operation of the surge tank, including the associated valves and controls	2.9	1
028	Hydrogen Recombiner and Purge Control System (HRPS) / 5	X											K1.01 - Containment annulus ventilation system (including pressure limits)	2.5*	1
028	Hydrogen Recombiner and Purge Control System (HRPS) / 5		X										K2.01 - Hydrogen recombiners	2.5*	1
045	Main Turbine Generator (MT/G) System / 4			X									K3.01 - Remainder of the plant	2.9	1
103	Containment System / 5									X			A3.01 - Containment isolation	3.9	1

K/A Category Totals: 1 1 1 1 1 0 0 1 2 0 0

Group Point Total: 8

Generic Knowledge and Abilities Outline (Tier 3)

Printed: 06/15/20

PWR RO Examination Outline

Facility: Braidwood/Byron Units 1 and 2

Form ES-401-5

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.11	Knowledge of less than one hour technical specification action statements for systems.	3.0	1
	2.1.30	Ability to locate and operate components, including local controls.	3.9	1
	2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	3.4	1
Category Total:				3
Equipment Control	2.2.1	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	3.7	1
	2.2.22	Knowledge of limiting conditions for operations and safety limits.	3.4	1
	2.2.27	Knowledge of the refueling process.	2.6	1
Category Total:				3
Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	2.6	1
	2.3.9	Knowledge of the process for performing a containment purge.	2.5	1
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	1
	2.3.11	Ability to control radiation releases.	2.7	1
Category Total:				4
Emergency Procedures/Plan	2.4.26	Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.	2.9	1
	2.4.34	Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications.	3.8	1
	2.4.39	Knowledge of the RO's responsibilities in emergency plan implementation.	3.3	1
Category Total:				3
Generic Total:				13

Tier/Group	Exam Outline	Randomly selected KA	Reason for Rejection
2 / 2	RO	026000K1.02	By/Bw CS systems use no cooling water, therefore this K/A is not applicable to By/Bw.
2 / 1	SRO	026000K1.02	By/Bw CS systems use no cooling water, therefore this K/A is not applicable to By/Bw.
2 / 2	RO	039000K3.03	By/Bw do not have turbine driven AFW pumps, therefore this K/A is not applicable to By/Bw.
2 / 2	SRO	039000K3.03	By/Bw do not have turbine driven AFW pumps, therefore this K/A is not applicable to By/Bw.
1 / 1	RO	000015AA2.09	By/Bw have no procedural direction to stop RCPs based on high motor stator temperatures, therefore this K/A is not applicable to By/Bw.
2 / 2	RO	055000 2.2.25	By/Bw tech specs do not include requirements for the Condenser Air Removal System, therefore this K/A is not applicable to By/Bw.
2 / 1	RO	061000 2.4.14	By/Bw do not utilize flowcharts while in EOPs, therefore this K/A is not applicable to By/Bw.
2 / 1	RO	068000K5.04	Appears to be double jeopardy with 000059AK1.02. Replaced K/A with randomly selected K/A 068000K4.01.
2 / 1	RO	071000A4.16	By/Bw Control Rooms have no controls or indications relative to Gas Decay Tank shifts, therefore this K/A is not applicable to By/Bw.
1 / 3	SRO	00WE15 2.2.3	There are no applicable differences applicable to containment flooding for either unit, therefore this K/A is not applicable to By/Bw.
2 / 2	SRO	075000 2.2.8	Appears to be double jeopardy with K/A 072000 2.2.8. Replaced with randomly selected K/A 079000K1.01.

The following was the only comment on the provided outline:

There were two Safety Function 4 JPMs in the Facility Walk-Through Test (Category B). NUREG 1021 does not require all of the JPMs to be from different categories, however, it is implied that they should be. The facility agreed to change JPM B.2.a to a different Safety Function Group.