

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

June 23, 1998



Mr. Hironori Peterson  
U. S. Nuclear Regulatory Commission  
Region III  
801 Warrenville Road  
Lisle, IL 60532-4351

Dear Mr. Peterson:

Enclosed is the reactor operator written examination outline which Braidwood Generating Station is submitting for review, comment, and approval for the Initial License Examination scheduled for the week of September 14, 1998, at Byron Generating Station.

This outline has been developed in accordance with Interim Revision 8 of NUREG-1021 ("Operator Licensing Examiner Standards").

Please ensure that these materials are withheld from public disclosure until after the examinations are complete.

If you have any questions or concerns regarding this outline, please contact Scott Deprest at (815) 458-3411 extension 2250 or Paul Hippely at (815) 458-3411 extension 2235.

Sincerely,

A handwritten signature in dark ink, appearing to read "T. Tulon".

Timothy J. Tulon  
Site Vice President  
Braidwood Nuclear Generating Station

cc w/o enclosures:  
Regulatory Assurance  
B. Wegner  
J. Walker  
L. Weber  
C. Cerovac  
P. Hippely  
T. Berton  
S. Deprest  
P. DiGiovanna  
Class File  
nrc...98037tjt.doc

981106020 981102  
PDR ADOC# 05000456  
V PDR

**Turnbull, Michelle A.**

---

**From:** Bash, Faye A.  
**Sent:** Tuesday, June 23, 1998 8:17 AM  
**To:** Turnbull, Michelle A.  
**Subject:** FW: NRC ILT Sample Plan Submittal Cover Letter

This is for Tim's signature.

-----Original Message-----

**From:** Hippely, Paul J.  
**Sent:** Monday, June 22, 1998 11:03 AM  
**To:** Bash, Faye A.  
**Subject:** NRC ILT Sample Plan Submittal Cover Letter

Faye,

Attached is the sample plan cover letter that will be attached to the sample plan material when submitted to the NRC. The cover letter requires Site VP/Station manager signature as directed by Terry Simpkin. Please re-format and place on Braidwood letterhead for signature approval. Dave Hoots will pick up the letter tomorrow, Tuesday, after it has been signed.

Thank you,  
Paul Hippely



SAMPSUB.doc

Facility: Braidwood Units 1 and 2		Date of Examination: September 14, 1998		
Item	Task Description	Initials		
		a	b	c
WRITEN	1. a. Verify that the outline(s) fit(s) the appropriate model per ES-401.	SD	dt	HP
	b. Assess whether all six knowledge and four ability categories are appropriately sampled.	SD	dt	HP
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	SD	dt	HP
	d. Assess whether the repetition from previous examination outlines is excessive.	SD	dt	HP
SIM	2. 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.			
	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 scenario and scenarios will not be repeated over successive days.			
	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.		N	
WIT	3. a. Verify that the outline(s) contain(s) the required number of control room and in-plant tasks and verify that no more than 30% of the test material is repeated from the last NRC examination.			A
	b. Verify that the tasks are distributed among the safety function groupings as specified in ES-301; one task shall require a low-power or shutdown condition, one or two shall require the applicant to implement an alternate path procedure, and one should require entry to the RCA.			
	c. Verify that the required administrative topics are covered, with emphasis on performance-based activities.			
	d. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no more than 30% of the items are duplicated on successive days.			
GENERAL	4. a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.	SD	dt	HP
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	SD	dt	HP
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	SD	dt	HP
	d. Check for duplication and overlap among exam sections.			A
	e. Check the entire exam for balance of coverage.	SD	dt	HP
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	SD	dt	HP
a. Author	Printed Name / Signature		Date	
b. Facility Reviewer(*)	SCOTT M. DEPEST / <i>Scott M. Depest</i>		6/22/98	
c. Chief Examiner	DAVID M. HOOTS / <i>David M. Hoots</i>		6/22/98	
d. NRC Supervisor	HURONKI PETERSON / <i>Huronki Peterson</i>		7/14/98	
	MELVIN LEACIT / <i>Melvin Leacit</i>		8/7/98	
(*) Not applicable for NRC-developed examinations				

Facility: Braidwood 1 & 2		Date of Exam: September 14, 1998					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	2	2	2				4	6				16
	2	3	2	3				6	2			1	17
	3			1				1	1				3
	Tier Totals	5	4	6				11	9			1	36
2. Plant Systems	1	3	2	1	2	2	1	1	2	3	4	2	23
	2	2		2	2	2	1	2	2	3	2	2	20
	3	2		1	1				1	1	1	1	8
	Tier Totals	7	2	4	5	4	2	3	5	7	7	5	51
3. Generic Knowledge and Abilities					Cat 1		Cat 2		Cat 3		Cat 4		13
					5		3		2		3		
<p>Note:</p> <ul style="list-style-type: none"> <li>• Attempt to distribute topics among all K/A categories; select at least one topic from every K/A category within each tier.</li> <li>• Actual point totals must match those specified in the table.</li> <li>• 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.</li> <li>• Systems/evolutions within each group are identified on the associated outline.</li> <li>• The shaded areas are not applicable to the category/tier.</li> </ul>													

**PWR RO Examination Outline**

Facility: Braidwood

Exam Date: 9/14/98

Examination Level: RO

Section Title Generic Knowledge and Abilities

RO Group 1

System/Evolution	K/A	RO KA Statement	Level	Question Topic
Conduct of Operations	2.1.1	3.7 Knowledge of conduct of operations requirements.	B	Evaluation of requirement for "active" license
	2.1.1	3.7 Knowledge of conduct of operations requirements.	B	Direction of NLO personnel
	2.1.2	3.0 Knowledge of operator responsibilities during all modes of plant operation.	B	Operating Daily Orders
	2.1.14	2.5 Knowledge of system status criteria which require the notification of plant personnel.	B	MOV Stroke Time actions
	2.1.23	3.9 Ability to perform specific system and integrated plant procedures during all modes of plant operation.	B	Procedure required usage
Equipment Control	2.2.13	3.6 Knowledge of tagging and clearance procedures.	B	MSIV OOS Hang to prevent opening
	2.2.26	2.5 Knowledge of refueling administrative requirements.	B	RCS level discrepancy during refueling
	2.2.32	3.5 Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	B	RO duties in Control Room during refueling
Radiation Control	2.3.1	2.6 Knowledge of 10 CFR: 20 and related facility radiation control requirements.	B	Radiation exposure determination
	2.3.10	2.9 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	R	Fuel Handling Accident Response
Emergency Procedures / Plan	2.4.16	3.0 Knowledge of EOP implementation hierarchy and coordination with other support procedures.	B	Performance of Status Trees/Function Restoration
	2.4.20	3.3 Knowledge of operational implications of EOP warnings, cautions, and notes.	B	Applicability of EOP Operator Action Summary Page
	2.4.31	3.3 Knowledge of annunciators alarms and indications, and use of the response instructions.	B	Identification of inoperable CR annunciators

**PWR RO Examination Outline**

Facility: Braidwood  
 Section Title Plant Systems  
 RO Group 1

Exam Date: 9/14/98

Examination Level: RO

System/Evolution	K/A	RO KA Statement	Level	Question Topic
Control Rod Drive System	001 A2.06	3.4 Effects of transient xenon on reactivity	B	Effect of Xenon Transient & compensation
	001 K1.03	3.4 CRDM	B	Application of DC Hold
Reactor Coolant Pump System	003 A1.06	2.9 PZR spray flow	B	RCP and Pzr spray operations
	003 K2.01	3.1 RCPS	R	RCP Breaker & interlocks
Chemical and Volume Control System	004 A3.11	3.6 Charging/letdown	R	Charging & letdown flows (including seal injection)
	004 A4.07	3.9 Boration/dilution	B	Calculation of RCS Boron dilution
	004 K6.01	3.1 Spray/heater combination in PZR to assure uniform boron concentration	R	Boron mixing
Engineered Safety Features Actuation System	013 A3.01	3.7* Input channels and logic	B	CNMT Spray/Phase B
	013 K4.13	3.7 MFW isolation/reset	R	FW Isolation - P14
Nuclear Instrumentation System	015 A2.02	3.1 Faulty or erratic operation of detectors or compensating components	B	SR NIS discriminator failure
	015 K2.01	3.3 NIS channels, components, and interconnections	B	SR NIS - loss of control power
	015 K5.06	3.4 Subcritical multiplications and NIS indications	R	Eval for 1/M - Eightfold increase
In-Core Temperature Monitor System	017 K4.01	3.4 Input to subcooling monitors	R	CETC failure effect on Subcooling Monitor/Iconic Display
Containment Cooling System	2.1.32	3.4 Ability to explain and apply all system limits and precautions.	R	RCFC operations requirements
Main Feedwater System	2.1.7	3.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	B	SG Level program - low power
	059 K1.04	3.4 S/GS water level control system	R	Effect of failure of SG steam pressure channel
Auxiliary / Emergency Feedwater System	061 A3.01	4.1 AFW startup and flows	B	AFW Startup

**PWR RO Examination Outline**

Facility: Braidwood

Exam Date:

9/14/98

Examination Level: RO

Section Title Plant Systems

RO Group 1

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Auxiliary / Emergency Feedwater System	061 K5.02	3.2	Decay heat sources and magnitude	B	AFW flow requirements for cooldown
Liquid Radwaste System	068 A4.04	3.8	Automatic isolation	B	RCDT operation - effect of CNMT Isolation
	068 K1.07	2.7	Sources of liquid wastes for LRS	R	CNMT Sump sources of input during normal operations
Waste Gas Disposal System	071 A4.05	2.6*	Gas decay tanks, including valves, indicators, and sample line	R	Waste Gas Decay Tank Operations
Area Radiation Monitoring System	072 A4.03	3.1	Check source for operability demonstration	R	Check Source operation
	072 K3.02	3.1	Fuel handling operations	B	Loss of FHB Overhead Crane rad monitor

**PWR RO Examination Outline**

Facility: Braidwood  
 Section Title Plant Systems  
 RO Group 2

Exam Date: 9/14/98

Examination Level: RO

System/Evolution	K/A	RO KA Statement	Level	Question Topic
Reactor Coolant System	002 A1.11	2.7 Relative level indications in the RWST, the refueling cavity, the PZR and the reactor vessel during preparation for refueling	B	Relationship of levels during refueling operations
	002 A3.01	3.7 Reactor coolant leak detection system	R	RCS leak Detection Systems
	002 K4.09	3.2 Operation of loop isolation valves.	R	Use of Loop Isolation Valves
Emergency Core Cooling System	006 A2.13	3.9 Inadvertent SIS actuation	B	Systems response to SI/Actions
	006 K3.02	4.3 Fuel	B	10CFR50.46 Design Criteria
	006 K6.03	3.6 Safety Injection Pumps	B	Evaluation of flow ECCS pumps
Pressurizer Pressure Control System	010 A1.08	3.2 Spray nozzle DT	B	Spray using Normal and Aux Spray
	010 K5.01	3.5 Determination of condition of fluid in PZR, using steam tables	B	Evaluation of Pzr conditions
Pressurizer Level Control System	011 K1.04	3.8 RPS	B	Pzr Level Reactor Trip
Reactor Protection System	012 A3.07	4.0 Trip breakers	R	Operation of BOTH Bypass Trip Breakers
	012 A4.03	3.6 Channel blocks and bypasses	B	Input that can be bypassed & plant conditions
	012 K5.01	3.3* DNB	R	OTdT inputs & effect of changes
Rod Position Indication System	2.4.31	3.3 Knowledge of annunciators alarms and indications, and use of the response instructions.	R	ROD BOTTOM Alarm operation
Non-Nuclear Instrumentation System	016 K3.02	3.4* PZR LCS	B	NR RTD Failure effects
Containment Spray System	026 A2.08	3.2 Safe securing of containment spray when it can be done)	B	Sequence for securing CNMT Spray
	026 A4.01	4.5 CSS controls	R	Pump operation interlocks
Spent Fuel Pool Cooling System	033 K1.05	2.7* RWST	R	RWST Purification Loops



**PWR RO Examination Outline**

Facility: Braidwood

Exam Date: 9/14/98

Examination Level: RO

Section Title Plant Systems

RO Group 2

System/Evolution	K/A	RO KA Statement	Level	Question Topic
D.C. Electrical Distribution	2.1.30	3.9 Ability to locate and operate components, including local controls.	B	DC bus battery charger
Emergency Diesel Generators	064 A3.07	3.6* Load sequencing	B	Sequencing of CNMT Spray pumps - SI & SI w LOP
Fire Protection System	086 K4.06	3.0 CO2	B	Effect of loss of DC - CO2 actuation

**PWR RO Examination Outline**

Facility: Braidwood  
 Section Title Plant Systems  
 RO Group 3

Exam Date: 9/14/98

Examination Level: RO

System/Evolution	K/A	RO KA Statement	Level	Question Topic
Residual Heat Removal System	005 K1.12	3.1 Safeguard pumps	B	Recirc interties to SI Pumps & CV Pumps
	005 K4.10	3.1 Control of RHR heat exchanger outlet flow	R	Failure of Hx Outlet Valve
Pressurizer Relief Tank/Quench Tank System	2.4.50	3.3 Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	R	ERT conditions causing alarm/response
Component Cooling Water System	008 A2.05	3.3* Effect of loss of instrument and control air on the position of the CCW valves that are air operated	R	Determination of effect of valve positioning
Containment Iodine Removal System	027 A4.03	3.3* CIRS fans	R	Charcoal Filters response to deluge
Steam Dump System and Turbine Bypass Control	041 A3.02	3.3 RCS pressure, RCS temperature, and reactor power	B	Steam Dump input malfunction
Main Turbine Generator System	045 K1.20	3.4 Protection system	R	Turbine Control response to Failed Impulse Channel
Instrument Air System	078 K3.02	3.4 Systems having pneumatic valves and controls	B	Evaluation of eqpt affected for slow loss of IA

# PWR RO Examination Outline

Facility: Braidwood

Exam Date: 9/14/98

Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 1

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Reactor Coolant Pump Malfunctions	015 AA2.10	3.7	When to secure RCPs on loss of cooling or seal injection	B	Eval loss of cooling flow (CCW)
	015 AK2.07	2.9	RCP seals	B	Eval of RCP seal failure
Emergency Boration	024 AA2.05	3.3	Amount of boron to add to achieve required SDM	B	Time/amount E-boration for condition
Loss of Component Cooling Water	026 AA1.05	3.1	The CCWS surge tank, including level control and level alarms, and radiation alarm	B	Evaluation of CCW leak
Pressurizer Pressure Control Malfunction	027 AA1.01	4.0	PZR heaters, sprays, and PORVs	B	Pressure controller step change
	027 AA2.15	3.7	Actions to be taken if PZR pressure instrument fails high	B	Non-Controlling channel failure
Steam Line Rupture	040 AA1.01	4.6	Manual and automatic ESFAS initiation	B	Steamline isolation
	040 AK1.06	3.7	High-energy steam line break considerations	B	Eval of Leak
Loss of Condenser Vacuum	051 AA2.02	3.9	Conditions requiring reactor and/or turbine trip	B	Eval of conditions
Station Blackout	055 EK3.02	4.3	Actions contained in EOP for loss of offsite and onsite power	B	Identification of RCP seal LOCA/cooldown
Loss of Vital AC Instrument Bus	057 AA2.19	4.0	The plant automatic actions that will occur on the loss of a vital ac electrical instrument bus	B	Eqpt affected on bus loss
Control Room Evacuation	068 AA1.21	3.9	Transfer of controls from control room to shutdown panel or local control	B	Operations required for transfer
Inadequate Core Cooling	074 EK1.03	4.5	Processes for removing decay heat from the core	B	Major action categories
High Reactor Coolant Activity	076 AA2.02	2.8	Corrective actions required for high fission product activity in RCS	B	Actions for reducing activity
Pressurized Thermal Shock	E08 EK2.2	3.6	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.	B	Identification of heat removal process

**PWR RO Examination Outline**

Facility: Braidwood

Exam Date: 9/14/98

Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 1

System/Evolution	K/A	RO KA Statement	Level	Question Topic
Natural Circulation Operations	E09 EK3.1	3.3 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.	B	Natural Circ conditions and limits

**PWR RO Examination Outline**

Facility: Braidwood

Exam Date: 9/14/98

Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 2

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Continuous Rod Withdrawal	001 AA2.05	4.4	Uncontrolled rod withdrawal, from available indications	B	Evaluate conditions - unwarranted rod withdrawal
Dropped Control Rod	003 AK3.10	3.2?	RIL and PDIL	B	P/A vs. Group Step Counters
Reactor Trip	007 EA1.03	4.2	RCS pressure and temperature	B	Stabilized RCS temperature with failure of Steam Dumps
	007 EK2.03	3.5	Reactor trip status panel	R	Reactor Trip requirements
Pressurizer Vapor Space Accident	008 AK1.01	3.2	Thermodynamics and flow characteristics of open or leaking valves	R	Tail-Pipe conditions
Small Break LOCA	009 EA1.10	3.8*	Safety parameter display system	B	Calculation of subcooled margin on Iconic Display
Large Break LOCA	011 EA1.03	4.0	Securing of RCPs	B	RCP trip criteria evaluation
Loss of Reactor Coolant Makeup	022 AA1.08	3.4	VCT level	B	VCT level transmitter malfunction
Loss of Residual Heat Removal System	025 AK1.01	3.9	Loss of RHRS during all modes of operation	B	Calc of time to saturation/core boiling
	025 AK3.01	3.1	Shift to alternate flowpath	B	Alternate RCS cooling
Anticipated Transient Without Scram	2.4.48	3.5	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.	B	AMS conditions
Loss of Source Range Nuclear Instrumentation	032 AK1.01	2.5	Effects of voltage changes on performance	B	Evaluation of SR NIS voltage failure
Loss of Intermediate Range Nuclear Instrumentation	033 AA2.04	3.2	Satisfactory overlap between source-range, intermediate-range and power-range instrumentation	B	Effect of failed IR channel on SU
Steam Generator Tube Leak	037 AA1.02	3.1*	Condensate exhaust system	R	Monitors for SG Tube leakage
Steam Generator Tube Rupture	038 EK3.06	4.2	Actions contained in EOP for RCS water inventory balance, S/G tube rupture, and plant shutdown procedures	B	Loss of subcooling

## PWR RO Examination Outline

Facility: Braidwood

Exam Date: 9/14/98

Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 2

System/Evolution	K/A	RO	KA Statement	Level	Question Topic
Loss of Secondary Heat Sink	E05 EK2.1	3.7	Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	B	Interlocks affecting reestablishment of feed
Loss of Emergency Coolant Recirculation	E11 EA1.1	3.9	Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	B	Reason for rapid SG depressurization

**PWR RO Examination Outline**

Facility: Braidwood

Exam Date: 9/14/98

Examination Level: RO

Section Title Emergency and Abnormal Plant Evolutions

RO Group 3

System/Evolution	K/A	RO KA Statement	Level	Question Topic
Pressurizer Level Control Malfunction	028 AK3.05	3.7 Actions contained in EOP for PZR level malfunction	B	Failed level channel low.
Loss of Off-Site Power	056 AA1.21	3.3* Reset of the ESF load sequencers	B	Reset of sequencer
	056 AA2.45	4.2 That the ED/Gs have started automatically and that the bus tie breakers are closed	B	Eval of electric bus status