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March 15, 2002

U.S. NRC Region I Administrator  
475 Allendale Road  
King of Prussia, PA 19406

Subject: Submittal of Limited Senior Reactor Operator Examination Outline  
Limerick Generating Station, Units 1 and 2 (Docket # 50-352 and 50-353)  
Peach Bottom Atomic Power Station, Units 2 and 3 (Docket # 50-277 and 50-278)

In accordance with NUREG 1021, Revision 8, "Operating Licensing Examination Standards for Power Reactors", Exelon is submitting the Limited Senior Reactor Operator examination outlines for Limerick Generating Station and Peach Bottom Atomic Power Station. This submittal supports the initial license examination scheduled for the week of June 3, 2002.

In accordance with NUREG 1021, Revision 8, Section ES-201, please ensure that these materials are withheld from public disclosure until after the examinations are complete.

Should you have any questions concerning this letter or the examination outlines, please contact Jeff Stevens at (610) 718-4011.

Respectfully,



Brandon K. Shultz  
Facility Representative/Senior Reactor Operator  
Limerick Generating Station

Enclosure: (Hand delivered to Allen Blamey, Chief Examiner, NRC Region I)  
Examination Outline Quality Checklist  
ES-201-3, Examination Security Agreements  
ES-301-1, Administrative Topics Outline  
ES-301-3, Facility Walk-Through Test Outline  
ES-701, LSRO Written Examination Outline  
ES-D-1, Scenario Outlines

**2002 INITIAL LIMITED SENIOR REACTOR OPERATOR LICENSE  
EXAMINATION SAMPLE PLAN**

EXAM DATE: 06/03/02

FACILITIES: LIMERICK GENERATING STATION 1 & 2, and PEACH BOTTOM ATOMIC  
POWER STATION 2 & 3**I. WRITTEN EXAM****A. OUTLINE: (ES-701)**

Group (Sample %)	Subject area	Number of Questions
1 (15%)	Reactor and fuel characteristics and physical aspects of core construction important to fuel handling or shutdown activities	8
2 (30%)	System equipment and instruments that are important to plant safety and are located near or used during fuel handling activities or during alternate shutdown procedures	15
3 (40%)	Normal, abnormal, emergency operating and administrative procedures related to fuel handling activities	21
4 (15%)	Health physics and radiation protection for fuel handling activities and general employee responsibilities	6
100%	Totals	50

Notes:

Question sequence on completed exam may differ from sequence in the outline

Unit Codes: LG-Limerick 1 and 2, PB-Peach Bottom 2 and 3, C-Common to Limerick and Peach Bottom

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**B. CONTENT:**

Group 1 – 15%

8 Questions

Subject Area: Reactor and fuel characteristics and physical aspects of core construction important to fuel handling or shutdown activities

	System #	System Name	K/A #	K/A Topic(s)	Imp.	Unit
1-1	291002	Sensors and Detectors	K1.19	Operation of fission chamber	3.1	C
1-2	291006	HX and Cond.	K1.04	Flow effects on heat transfer	2.8	C
1-3	292001	Neutrons	K1.03	Define thermal neutrons	2.7	C
1-4	292002	Neutron Life Cycle	K1.14	Changes to shutdown margin	2.9	C
1-5	292003	Rx Kinetics	K1.06	Effect of delayed neutrons on reactor period	3.7	C
1-6	292005	Control Rods	K1.01	Rod and notch position	3.3	C
1-7	292008	Rx Operational Physics	K1.30	Decay heat and time since S/D	3.5	C
1-8	293008	Thermal Hydraulics	K1.31	Core orificing	3.0	C

Notes:

Question sequence on completed exam may differ from sequence in the outline

Unit Codes: LG-Limerick 1 and 2, PB-Peach Bottom 2 and 3, C-Common to Limerick and Peach Bottom

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Group 2 - 30%

15 Questions

Subject Area: System equipment and instruments that are important to plant safety and are located near or used during fuel handling activities or during alternate shutdown procedures

Knowledge and use of radiation monitors, spent fuel pool cooling and residual heat removal (RHR) systems and the Technical Specifications associated with those systems.

Question #	System #	System Name	K/A #	K/A Topic(s)	Imp	Unit
2-1	201002	Rx Man Control	A1.01	CRD drive water flow	2.8	PB
2-2	201003	CRD Mech	K4.06	CRD uncoupling	2.6	C
2-3	202001	Recirculation	K1.18	Shutdown cooling mode	3.3	LG
2-4	205000	RHR SDC	K2.01	Pump motors	3.1	PB
2-5	290002	RPV Internals	2.2.32	Effects of alterations on core configuration	3.3	C
2-6	290001	Secondary Containment	K3.01	Offsite release rates	4.4	LG
2-7	215003	IRM (WRNM)	2.1.12	Apply Tech Specs for a system	4.0	PB
2-8	215004	SRM	A4.06	Alarms and lights	3.1	LG
2-9	234000	Fuel Handling Equipment.	A3.01	Crane/refuel bridge movement	3.6	PB
2-10	233000	Fuel Pool Cooling	K4.06	Maintenance of adequate pool level	3.2	LG
2-11	234000	Fuel Handling Equip	K6.04	Refueling platform air system	3.7	PB
2-12	288000	Plant Ventilation	K4.02	Secondary Containment isolation	3.8	LG

Notes:

Question sequence on completed exam may differ from sequence in the outline

Unit Codes: LG-Limerick 1 and 2, PB-Peach Bottom 2 and 3, C-Common to Limerick and Peach Bottom

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**EXELON NUCLEAR**

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Group 2 - 30%

15 Questions

Subject Area: System equipment and instruments that are important to plant safety and are located near or used during fuel handling activities or during alternate shutdown procedures

Knowledge and use of radiation monitors, spent fuel pool cooling and residual heat removal (RHR) systems and the Technical Specifications associated with those systems.

Question #	System #	System Name	K/A #	K/A Topic(s)	Imp	Unit
2-13	272000	Radiation Monitoring	2.2.26	Refueling administrative requirements	3.7	LG
2-14	234000	Fuel Handling Equipment	K5.02	Fuel handling equipment interlocks	3.7	PB
2-15	215004	SRM	K3.01	RPS	3.4	LG

Unit Codes: LG-Limerick 1 and 2, PB-Peach Bottom 2 and 3, C-Common to Limerick and Peach Bottom

Notes:

Question sequence on completed exam may differ from sequence in the outline

Unit Codes: LG-Limerick 1 and 2, PB-Peach Bottom 2 and 3, C-Common to Limerick and Peach Bottom

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Group 3 - 40%

21 Questions

Subject Area: Normal, abnormal, emergency operating and administrative procedures related to fuel handling activities, core safety, and accident mitigation, including general facility events.

Control room operator's response to events only as it relates to fuel handling activities and the general response expected of employees.

Question #	System #	System Name	K/A #	K/A Topic(s)	Imp	Unit
3-1	295031	Low RPV/Cavity Level	EK2.05	Low Pressure Coolant Injection (RHR)	4.3	PB
3-2	295034	Sec. Cont. Vent High Rad	EK2.01	Process rad monitoring system	4.2	LG
3-3	295023	Refueling Accidents	AK1.03	Inadvertent criticality	4.0	PB
3-4	295023	Refueling Accidents	AK3.01	Refueling floor evacuation	4.3	PB
3-5	2.2	Equipment control	2.2.26	Knowledge of refueling administrative requirements	3.7	LG
3-6	2.1	Conduct of operations	2.1.12	Ability to apply technical specifications for a system	4.0	PB
3-7	2.2	Equipment control	2.2.27	Knowledge of the refueling process	3.5	LG
3-8	2.2	Equipment control	2.2.20	Knowledge of the process for managing troubleshooting activities	3.3	C
3-9	2.4	Emergency Plan	2.4.38	Ability to take actions called for in the facility emergency plan	4.0	C
3-10	2.1	Conduct of operations	2.1.20	Ability to execute procedure steps	4.2	C
3-11	234000	Fuel handling equipment	K5.05	Fuel orientation	3.7	PB

Notes:

Question sequence on completed exam may differ from sequence in the outline

Unit Codes: LG-Limerick 1 and 2, PB-Peach Bottom 2 and 3, C-Common to Limerick and Peach Bottom

EXELON NUCLEAR

Group 3 - 40%

21 Questions

Subject Area: Normal, abnormal, emergency operating and administrative procedures related to fuel handling activities, core safety, and accident mitigation, including general facility events.

Control room operator's response to events only as it relates to fuel handling activities and the general response expected of employees.

Question #	System #	System Name	K/A #	K/A Topic(s)	Imp	Unit
3-12	234000	Fuel handling equipment	K4.03	Protection against lifting radioactive components out of the water	4.2	(PB) - Com LG
3-13	234000	Fuel handling equipment	A2.03	Loss of electrical power	3.1	PB
3-14	234000	Fuel handling equipment	A3.02	Interlock operation	3.7	PB
3-15	2.2	Equipment control	2.2.27	Knowledge of the refueling process	3.5	LG
3-16	2.2	Equipment control	2.2.6	Knowledge of the process for making changes to procedures	3.3	(LG) - Com C
3-17	2.2	Equipment control	2.2.22	Knowledge of LCOs and safety limits	4.1	LG
3-18	2.2	Equipment control	2.2.22	Knowledge of LCOs and safety limits	4.1	PB
3-19	2.1	Conduct of operations	2.1.3	Knowledge of shift turnover practices	3.4	C
3-20	2.1	Conduct of operations	2.1.18	Ability to make accurate, clear, and concise logs and records	3.0	C
3-21	2.4	Emergency Procedures	2.4.10	Knowledge of annunciator response procedures	3.1	LG

Notes:

Question sequence on completed exam may differ from sequence in the outline

Unit Codes: LG-Limerick 1 and 2, PB-Peach Bottom 2 and 3, C-Common to Limerick and Peach Bottom

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**EXELON NUCLEAR**

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Group 4 - 15%

6 Questions

Subject Area: Health physics and radiation protection for fuel handling activities and general employee responsibilities.

Administrative procedures associated with radiation protection.

Question #	System #	System Name	K/A #	K/A Topic(s)	Imp	Unit
4-1	2.3	Radiation Control	2.3.1	10CFR20 and related facility controls	3.0	C
4-2	2.3	Radiation Control	2.3.2	Knowledge of facility ALARA program (Dose extension)	2.9	C
4-3	2.3	Radiation Control	2.3.2	Knowledge of facility ALARA program (Postings and controls)	2.9	C
4-4	2.3	Radiation Control	2.3.4	Knowledge of exposure limits and controls	3.1	C
4-5	2.3	Radiation Control	2.3.5	Knowledge of the use and function of personal monitoring equipment	2.5	C
4-6	2.3	Radiation Control	2.3.7	Knowledge of the process for preparing a radiation work permit	3.3	C

Notes:

Question sequence on completed exam may differ from sequence in the outline

Unit Codes: LG-Limerick 1 and 2, PB-Peach Bottom 2 and 3, C-Common to Limerick and Peach Bottom



Facilities: <u>LGS Units 1 &amp; 2</u> <u>PBAPS Units 2 &amp; 3</u>		Date of Examination: <u>6/3/02-6/7/02</u>
Examination Level: <u>LSRO</u>		Operating Test Number: _____
Administrative Topic / Subject Description	Method of Evaluation: 1. ONE Administrative JPM, or 2. TWO Administrative Questions	
A.1	Working Hour Limits  PBAPS JPM	2.1.5 Ability to locate and use procedures and directives related to shift staffing and activities  JPM: Apply working hour limitations for LSRO and platform operator
	Station Reference Material Interpretation LGS JPM	2.1.25 Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data  JPM: Evaluate loss of cooling conditions and determine time to cavity boiling from chart
A.2	Core Location Differences LGS/PBAPS JPM	2.2.3 Knowledge of design, procedural, and operational differences between units  JPM: Conduct core counting to identify IRM location at LGS and WRNM at PBAPS from above-core pictures
A.3	Electronic Dosimeter PBAPS JPM	2.3.5 Knowledge of the use and function of personnel monitoring equipment  JPM: Verify setting of electronic dosimeter for the fuel floor RWP
A.4	Refueling Accident Emergency Action Level (EAL) LGS JPM	2.4.41 Knowledge of the emergency action level thresholds and classifications
		JPM: Determine EAL for refueling accident conditions

*changed to focus difference*

*changed*

*Changed to agree with ROI 02-04*

*Proposed common LGS/PBAPS  
Adm. Exam.*

Facility: <u>PBAPS Units 2 &amp; 3</u>		Date of Examination: <u>6/3/02-6/7/02</u>
Examination Level: <u>LSRO</u>		Operating Test Number: _____
Administrative Topic / Subject Description		Method of Evaluation: 1. ONE Administrative JPM, or 2. TWO Administrative Questions
A.1	Working Hour Limits  JPM	2.1.5 Ability to locate and use procedures and directives related to shift staffing and activities  JPM: Apply working hour limitations for LSRO and platform operator  3.4
	Shift Turnover JPM	2.1.3 Knowledge of shift turnover practices  JPM: Assess turnover conditions  3.4
A.2	Secondary Containment Requirements JPM	2.2.26 Knowledge of refueling administrative requirements  JPM: Determine the requirement for secondary containment while moving loads over spent fuel  3.7
A.3	Radiation Control  Questions	2.3.2 Knowledge of facility ALARA program  Question: Response to personal contamination  2.9
		2.3.10 Ability to perform procedures to reduce excessive radiation levels and guard against personnel exposure  Question: Drywell access restrictions during fuel handling  3.3
A.4	Refueling Accident Emergency Action Level JPM	2.4.41 Knowledge of the emergency action level thresholds and classifications  JPM: Determine EAL for refueling accident conditions  4.1

*Not used  
ROI 2002-004  
4/17/02*

II. OPERATING EXAM

A. CATEGORY A - ADMINISTRATIVE TOPICS OUTLINES

ES-301

ADMINISTRATIVE TOPICS OUTLINE

Form ES-301-1

Facility: <u>LGS Units 1 and 2</u>		Date of Examination: <u>6/3/02-6/7/02</u>
Examination Level: <u>LSRO</u>		Operating Test Number: _____
Administrative Topic / Subject Description	Method of Evaluation: 1. ONE Administrative JPM, or 2. TWO Administrative Questions	
A.1	Print Reading JPM	2.1.24 Ability to obtain and interpret station electrical and mechanical drawings  JPM: Demonstrate the Shutdown Cooling Alternate Decay Heat Removal flow path on a P&ID. <span style="float: right;">3.1</span>
	Station Reference Material Interpretation JPM	2.1.25 Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data  JPM: Evaluate loss of cooling conditions and determine time to cavity boiling from chart <span style="float: right;">3.1</span>
A.2	Core Location Differences JPM	2.2.3 Knowledge of design, procedural, and operational differences between units  JPM: Conduct core counting to identify IRM location at LGS and WRNM at PBAPS from above-core pictures <span style="float: right;">3.3</span>
A.3	Electronic Dosimeter JPM	2.3.5 Knowledge of the use and function of personnel monitoring equipment  JPM: Verify setting of electronic dosimeter for the fuel floor RWP <span style="float: right;">2.5</span>
A.4	Emergency Plan Questions	2.4.42 Knowledge of emergency response facilities Question: Activation levels for response facilities <span style="float: right;">3.7</span>
		2.4.29 Knowledge of the emergency plan Question: Evacuation facilities <span style="float: right;">4.0</span>

*Not used  
ROI 2002-004  
Alt/loz*

B. CATEGORY B - SYSTEMS EXAMINATION OUTLINES

ES-301

INDIVIDUAL WALK-THROUGH TEST OUTLINE

Form ES-301-2

Facility: <u>LGS Units 1 and 2</u>	Date of Examination: <u>6/3/02 – 6/7/02</u>	
Examination Level: <u>LSRO</u>	Operating Test Number: _____	
<b>System / JPM Title</b>		
	<b>Type Code*</b>	<b>Safety Function</b>
a. Fuel Handling Equipment / Movement of dummy bundle in the spent fuel pool (actual movement) – alt path due to debris obstructing target location	ANPR	FHE
b. Fuel Handling Equipment / LPRM removal	NPR	FHE
c. Fuel Handling Equipment / Movement of fuel from fuel prep machine to spent fuel pool – alt path due to slack cable warning	ANPR	FHE
d. Aux Systems / Response to loss of air to cavity seals	NPR	AUX
e. Radiation Monitoring / Defeat Unit 1 and Unit 2 HVAC rad isolation signals to support irradiated component movement	NPR	IC
f.		
g.		
<b>B.2 Facility Walk-Through</b>		
a.		
b.		
c.		
<p>* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (P)lant, (R)CA</p> <p>Safety Function: FHE: Fuel Handling Equipment, AUX: Auxiliary Systems, IC: Instrumentation and Control; DHR: Decay Heat Removal, RM: Radiation Monitoring</p>		

Facility: Peach Bottom 2 and 3 Date of Examination: 6/3/02 -6/7/02  
 Examination Level: LSRO Operating Test Number: \_\_\_\_\_

System / JPM Title	Type Code*	Safety Function
a. Fuel Handling Equipment / Log on to refuel platform and set up for semi-automatic motion	DRP	FHE
b. Fuel Handling Equipment / Automatic dummy bundle transfer in the spent fuel pool (actual movement)	DRP	FHE
c. Fuel Handling Equipment / Control rod removal using combined grapple – alternate path due to rod indicating still coupled	NARP	FHE
d. Aux Equipment / Storage of the Tri-Nuclear Underwater Vacuum Unit	NRP	AUX
e. Nuclear Instruments / Abnormal WRNM response (inadvertent criticality) during core alterations	NARP	IC
f.		
g.		
<b>B.2 Facility Walk-Through</b>		
a.		
b.		
c.		
<p>* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (P)lant, (R)CA</p> <p>Safety Function: FHE: Fuel Handling Equipment, AUX: Auxiliary Systems, IC: Instrumentation and Control; DHR: Decay Heat Removal, RM: Radiation Monitoring</p>		

C. CATEGORY C - INTEGRATED PLANT (REFUELING EQUIPMENT) EXAMINATION OUTLINE

Appendix D

SCENARIO OUTLINE

Form ES-D-1

Facility: <u>LGS 1 and 2</u> Scenario No. <u>1</u> Op-Test Number: _____			
Examiners: _____		Operators: _____	
Initial Conditions: Shuffle Part 1 is in progress on Unit 1			
Turnover: A fuel bundle is in transit from the core to the spent fuel pool			
Event No.	Malf No.	Event Type*	Event Description
1.	N/A	C	Minor leakage reported from drywell upper seal plate into the drywell requires temporary suspension of fuel movement to allow access to upper drywell area for inspection.
2.	N/A	M	A fuel bundle is dropped onto spent fuel pool with significant fuel damage.

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

Facility: LGS 1 and 2 Scenario No. 2 Op-Test Number: \_\_\_\_\_  
 Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions: In-vessel maintenance is in progress on Unit 2

Turnover: The bridge is over the core and moving toward the fuel pool with a double blade guide hanging from the main hoist and a control rod/fuel support piece on the combined grapple hanging from the monorail aux hoist.

Event No.	Malf No.	Event Type*	Event Description
1.	N/A	I	Receipt of unexpected rod block over core due to load cell failure
2.	N/A	M	Significant leakage from CRD Mechanism Housing requires installation of the Emergency Guide Tube Seal

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

Facility: PBAPS 2 and 3 Scenario No. 1 Op-Test Number: \_\_\_\_\_

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

Initial Conditions: Core alterations are in progress on Unit 3

Turnover: A bundle is being raised from the core.

Event No.	Malf No.	Event Type*	Event Description
1.	N/A	C	Hoist jam condition while moving fuel
2.	N/A	M	Unexpected fuel floor area radiation monitor alarm

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



Facility: PBAPS 2 and 3 Scenario No. 2 Op-Test Number: \_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

Initial Conditions: Core shuffle part 2 is in progress.

Turnover: A bundle is in transit from the fuel pool to the core.

Event No.	Malf No.	Event Type*	Event Description
1.	N/A	I	Wide Range Nuclear Monitoring (WRNM) Instrument failure requires suspension of core alterations
2.	N/A	M	Loss of cavity level and emergency makeup

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