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HOPE CREEK LIMITED SRO LICENSE EXAMINATION OUTLINE

Enclosed is our proposed outline for the LSRO license examination to be conducted for Hope Creek candidates during the week of March 10 and 17, 2003. Included are:

- Form ES-201-2, Examination Outline Quality Checklist: Form ES-201 was pen and ink changed to reflect LSRO Exam requirements of ES-701.
- Proposed Schedule: Currently there are 4 LSRO candidates. The operating exam is estimated to take 2 - 3 days. The written examination will be given the day after completion of the operating exam.
- LSRO Written Examination Outline: The 50 question Written Exam outline for the LSRO exam was randomly generated using the "token method". K/A's that were not consistent with ES-701 Attachment 1 were reselected using the random process.
- LSRO Administrative Topics Outlines: There are 3 Admin JPMs and 2 sets of 2 questions outlined on Form ES-301-1.
- Discussion Scenario Outlines: There are 2 scenarios, each outlined on Form ES-D-1 IAW ES-701.
- Facility Walk-Through Test Outlines: There are 5 Plant JPMs outlined on Form ES-301-2 IAW ES-701.

The examination team is currently developing the written and operating examination. If you have any questions or comments, please call me at 856-339-3966. For major issues, the Operations Training Manager, Jim Reid, can be reached at 856-339-3896. Jim is on the Examination Security Agreement.

Sincerely,
Archie E. Faulkner

Archie E. Faulkner
Training Supervisor /Exam Development

Facility: Hope Creek		Date of Exam: 3/10/2003						Exam Level: LSRO				
Tier	Group	K/A Category Points										Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1	0	1	0				1	2			2	6
	2	2	0	5				4	2			1	14
	Tier Totals	2	1	5				5	4			3	20
2. Plant Systems	1	0	0	0	0	0	1	0	0	0	0	1	2
	2	1	1	0	2	2	1	0	2	0	0	0	9
	3	1	0	0	0	0	2	0	1	0	0	0	4
	Tier Totals	3	1	0	1	2	4	0	3	0	0	1	15
3. Reactor and fuel characteristics and physical aspects of core construction important to fuel handling or shutdown activities											8		8
4. Health Physics and Radiation Protection for fuel handling activities and general employee responsibilities											7		7

Note:

1. The point total for each ***tier*** in the proposed outline must match that specified in the table. The final point total for each ***tier*** may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total ***50*** points.
2. 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.
3. Systems/evolutions within each group are identified on the associated outline.
4. The shaded areas are not applicable to the category/tier.
5. * 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.
6. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO 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.

Emergency and Abnormal Evolutions - Tier 1/Group 1

System #	Name	K1	K2	K3	A1	A2	G	KA Topic(s)	Imp.	Pts.
295003	Partial or Complete Loss of A.C. Power				X			AA1.01 A.C. electrical distribution system	3.8	1
295003	Partial or Complete Loss of A.C. Power						X	2.4.32 Knowledge of operator response to loss of all annunciators.	3.5	1
295006	SCRAM									
295007	High Reactor Pressure									
295009	Low Reactor Water Level									
295010	High Drywell Pressure									
295013	High Suppression Pool Temperature									
295014	Inadvertent Reactivity Addition		X					AK2.05 Neutron monitoring system	4.1	1
295014	Inadvertent Reactivity Addition					X		AA2.01 Reactor power	4.2	1
295015	Incomplete SCRAM									
295016	Control Room Abandonment									
295017	High Off-Site Release Rate									
295023	Refueling Accidents					X		AA2.04 Occurrence of fuel handling accident	4.1	1
295023	Refueling Accidents						X	2.1.20 Ability to execute procedure steps.	4.2	1
295024	High Drywell Pressure									
295025	High Reactor Pressure									
295026	Suppression Pool High Water Temperature									
295027	High Containment Temperature (Mark III Containment Only)									
295030	Low Suppression Pool Water Level									

Emergency and Abnormal Evolutions - Tier 1/Group 1

System #	Name	K1	K2	K3	A1	A2	G	KA Topic(s)	Imp.	Pts.
295031	Reactor Low Water Level									
295037	SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown									
295038	High Off-Site Release Rate									
500000	High Containment Hydrogen Concentration									

Emergency and Abnormal Evolutions - Tier 1/Group 2

System #	Name	K1	K2	K3	A1	A2	G	KA Topic(s)	Imp.	Pts.
295001	Partial or Complete Loss of Forced Core Flow Circulation					X		AA2.04 Individual jet pump flows: Not-BWR-1&2	3.1	1
295001	Partial or Complete Loss of Forced Core Flow Circulation				X			AA1.01 Recirculation system	3.6	1
295002	Loss of Main Condenser Vacuum									
295004	Partial or Complete Loss of D.C. Power									
295005	Main Turbine Generator Trip									
295008	High Reactor Water Level									
295011	High Containment Temperature (Mark III Containment Only)									
295012	High Drywell Temperature									
295018	Partial or Complete Loss of Component Cooling Water	X						AK1.01 Effects on component/system operations	3.6	1
295018	Partial or Complete Loss of Component Cooling Water					X		AA2.01 Component temperatures	3.4	1
295019	Partial or Complete Loss of Instrument Air									
295020	Inadvertent Containment Isolation									
295021	Loss of Shutdown Cooling			X				AK3.02 Feeding and bleeding reactor vessel	3.4	1
295021	Loss of Shutdown Cooling				X			AA1.04 Alternate heat removal methods	3.7	1
295021	Loss of Shutdown Cooling						X	2.4.35 Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications.	3.5	1
295022	Loss of CRD Pumps			X				AK3.02 CRDM high temperature	3.1	1
295022	Loss of CRD Pumps	X						AK1.02 Reactivity control	3.7	1
295028	High Drywell Temperature									
295029	High Suppression Pool Water Level									

Emergency and Abnormal Evolutions - Tier 1/Group 2

System #	Name	K1	K2	K3	A1	A2	G	KA Topic(s)	Imp.	Pts.
295032	High Secondary Containment Area Temperature									
295033	High Secondary Containment Area Radiation Levels			X				EK3.04 Personnel evacuation	4.4	1
295033	High Secondary Containment Area Radiation Levels				X			EA1.01 Area radiation monitoring system	4.0	1
295034	Secondary Containment Ventilation High Radiation			X				EK3.01 Isolating secondary containment ventilation	4.1	1
295034	Secondary Containment Ventilation High Radiation				X			EA1.02 Process radiation monitoring system	4.0	1
295035	Secondary Containment High Differential Pressure									
295036	Secondary Containment High Sump/Area Water Level									
600000	Plant Fire On Site			X				EK3.04 Actions contained in the abnormal procedure for plant fire on site	3.4	1

Plant Systems - Tier 2/Group 1

System	Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic(s)	Imp.	Pts.
201005	Rod Control and Information System (RCIS)														
202002	Recirculation Flow Control System														
203000	RHR/LPCI: Injection Mode (Plant Specific)														
206000	High Pressure Coolant Injection System														
207000	Isolation (Emergency) Condenser														
209001	Low Pressure Core Spray System														
209002	High Pressure Core Spray System (HPCS)														
211000	Standby Liquid Control System														
212000	Reactor Protection System														
215004	Source Range Monitor (SRM) System											X	2.2.32 Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.3	1
215005	Average Power Range Monitor/Local Power Range Monitor System														
216000	Nuclear Boiler Instrumentation														
217000	Reactor Core Isolation Cooling System (RCIC)														
218000	Automatic Depressurization System														
223001	Primary Containment System and Auxiliaries														
223002	Primary Containment Isolation System/Nuclear Steam Supply Shut-Off														
226001	RHR/LPCI: Containment Spray System Mode														
239002	Relief/Safety Valves														
241000	Reactor/Turbine Pressure Regulating System														

Plant Systems - Tier 2/Group 1

System	Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic(s)	Imp.	Pts.
259002	Reactor Water Level Control System														
261000	Standby Gas Treatment System														
262001	A.C. Electrical Distribution														
264000	Emergency Generators (Diesel/Jet)						X						K6.09 D.C. power	3.5	1
290001	Secondary Containment														

Plant Systems - Tier 2/Group 2

System	Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic(s)	Imp.	Pts.
201001	Control Rod Drive Hydraulic System					X							K5.03 Pressure indication	2.7	1
201002	Reactor Manual Control System														
201004	Rod Sequence Control System (Plant Specific)														
201006	Rod Worth Minimizer System (RWM) (Plant Specific)														
202001	Recirculation System				X								K4.01 2/3 core coverage: Plant-Specific	3.9	1
204000	Reactor Water Cleanup System					X							K5.04 Heat exchanger operation	2.7	1
205000	Shutdown Cooling System (RHR Shutdown Cooling Mode)						X						K6.03 Recirculation system	3.2	1
205000	Shutdown Cooling System (RHR Shutdown Cooling Mode)								X				A2.05 System isolation	3.7	1
214000	Rod Position Information System														
215002	Rod Block Monitor System														
215003	Intermediate Range Monitor (IRM) System		X										K2.01 IRM channels/detectors	2.7	1
219000	RHR/LPCI: Torus/Suppression Pool Cooling Mode														
230000	RHR/LPCI: Torus/Suppression Pool Spray Mode														
234000	Fuel Handling Equipment	X											K1.05 Reactor vessel components: Plant-Specific	3.3	1
239003	MSIV Leakage Control System														
245000	Main Turbine Generator and Auxiliary Systems														
259001	Reactor Feedwater System														
262002	Uninterruptable Power Supply (A.C./D.C.)														
263000	D.C. Electrical Distribution														
271000	Offgas System														

Plant Systems - Tier 2/Group 2

System	Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic(s)	Imp.	Pts.
272000	Radiation Monitoring System								X				A2.01 Fuel element failure	4.1	1
286000	Fire Protection System														
290003	Control Room HVAC														
300000	Instrument Air System (IAS)														
400000	Component Cooling Water System (CCWS)				X								K4.01 Automatic start of standby pump	3.9	1

Plant Systems - Tier 2/Group 3

System	Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic(s)	Imp.	Pts.
201003	Control Rod and Drive Mechanism	X											K1.01 Control rod drive hydraulic system	3.3	1
215001	Traversing In-Core Probe						X						K6.04 Primary containment isolation system: Mark-I&II(Not- BWR1)	3.4	1
233000	Fuel Pool Cooling and Clean-up								X				A2.02 Low pool level	3.3	1
239001	Main and Reheat Steam System														
256000	Reactor Condensate System														
268000	Radwaste														
288000	Plant Ventilation Systems														
290002	Reactor Vessel Internals						X						K6.02 CRD mechanism	2.9	1

Facility: Hope Creek	Date of Exam: 3/10/03		Exam Level: LSRO	
Category	K/A#	Topic	Imp.	Points
3. Reactor and fuel characteristics and physical aspects of core construction important to fuel handling or shutdown activities	292001 K1.02	Reactor Theory – Neutrons – Define prompt and delayed neutrons.	3.1	1
	292003 K1.07	Reactor Theory – Reactor Kinetics and Neutron Sources – Explain prompt critical, prompt jump, and prompt drop.	3.3	1
	292004 K1.05	Reactor Theory – Reactivity Coefficients – Define the Doppler coefficient of reactivity.	2.9	1
	292005 K1.01	Reactor Theory – Reactor Control Rods – Relate notch and rod position.	3.3	1
	293008 K1.30	Reactor Theory – Reactor Operational Physics – Explain the relationship between decay heat generation and: a) power level history, b) power production, and c) time since reactor shutdown.	3.5	1
	293006 K1.13	Thermodynamics Theory – Fluid Statics – Explain the results of putting centrifugal pumps in parallel or series combinations	2.7	1
	293008 K1.06	Thermodynamics Theory – Thermal Hydraulics – Define natural convection heat transfer.	2.6	1
	293010 K1.01	Thermodynamics Theory – Brittle Fracture and Vessel Thermal Stress – State the brittle fracture mode of failure.	2.8	1
	Total			8
4. Health Physics and Radiation Protection for fuel handling activities and general employee responsibilities	G 2.3.1	Knowledge of 10CFR20 and related facility radiation control requirements.	3.0	1
	G 2.3.2	Knowledge of facility ALARA program.	2.9	1
	G 2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	3.1	1
	G 2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3	1
	G 2.1.4	Knowledge of shift staffing requirements.	3.4	1
	G 2.1.10	Knowledge of conditions and limitations of the facility license.	3.9	1
	G 2.4.30	Knowledge of which events related to system operations/status should be reported to outside agencies	3.6	1
	Total			7

Facility: Hope Creek
Examination Level: SRO(L)

Date of Examination: 3/17/03
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 JPM	2.1.5 (3.4) – Ability to locate and use procedures and directives related to shift staffing and activities JPM: Apply working hour limitations for LSRO and platform operator
	Conduct of Operations JPM	2.1.24 (3.1) – Ability to obtain and interpret station electrical and mechanical drawings JPM: Demonstrate flowpath for Alternate Decay Heat Removal using D RHR Loop using P+ID's
A.2	Equipment Control JPM	2.2.26 (3.7) – Knowledge of refueling administrative requirements JPM: Verify HC.OP-DL.ZZ-0026 log requirements for resuming Core Alterations
A.3	Radiation Control Questions	2.3. 5 (2.5) – Knowledge of use of personnel monitoring equipment QUESTION: Personnel contamination response
		2.3. 10 (3.3) – Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure QUESTION: Requirements for removal of tools or equipment from the Spent Fuel Pool
A.4	Emergency Plan Questions	2.4.40 (4.0) – Knowledge of SRO responsibilities in emergency plan implementation QUESTION: EP Event requiring Accountability of plant personnel
		2.4.41 (4.1) – Knowledge of emergency action level thresholds and classifications QUESTION: EP Event classification for fuel handling event

Facility: Hope Creek **Date of Examination**: 3/17/03

Exam Level: SRO(L) **Operating Test No.:** 1

B.1: Control Room Systems

	System	JPM Description	Type Code*	Safety Function
S.1	205000 Shutdown Cooling System (RHR Shutdown Cooling Mode)	Restoration of NSSSS Isolation Capability to SDC Valves IAW HC.OP-GP.SM-0001	M	IC/ DHR
S.2	204000 RWCU	Align RWCU for Alternate Heat Removal	N, R, A	AUX/ DHR
S.3	234000 Fuel Handling Systems	Perform Main Fuel Hoist checks IAW HC.OP-ST.KE-0001 5.4.4.F through 5.4.4. I	D, R, A	FHE
S.4	234000 Fuel Handling Systems	Perform Monorail Aux Hoist Controls Functional Test HC.OP-FT.KE-0001 Section 5.4.1 through 5.4.15	N, R	FHE
S.5	234000 Fuel Handling Systems	Perform Fuel Grapple Interlocks Test IAW HC.OP-ST.KE-0001 5.1 through 5.1.10	D, R	FHE

B.2: Facility Walk-Through (Same as RO In-Plant Walkthrough)

P.1	NA	NA	NA	NA
P.2	NA	NA	NA	NA
P.3	NA	NA	NA	NA

* **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, (**E**)OP/AB

Facility: Hope Creek **Scenario No.:** 2 **Op Test No.:** 1

Examiners: ____________________ **Candidates:** ____________________ LSRO

____________________ ____________________ LSRO

____________________ LSRO

____________________ LSRO

Objectives: To evaluate the applicants' ability to recognize and address problems with refueling bridge interlocks. Recognize HC.OP-AB.CONT-0005 IRRADIATED FUEL DAMAGE entry and take required actions.

Initial Conditions: Core Alterations are in progress. A fuel bundle is in the Fuel Prep Machine, being re-assembled.

Turnover: You are the Refueling SRO. Double blade guide 31-28/29-26 is about to be removed from the core.

Event No.	Malf. No.	Event Type*	Event Description	Evaluator Guide
1	N/A	N	Double blade guide removed IAW HC.OP-SO.KE-0001	Grapple is open with proper bail alignment. Grapple is centered over bail handle. Grapple is lowered, Slack Cable light comes on. Hoist position indication is consistent with seated blade guide. Verifies proper location and orientation then engages grapple. Grapple Engaged light is lit. Raises double blade guide.
2	1	C	Hoist Jam light comes on. Hoist movement stops.	Lowers hoist until Hoist Jam light clears. Stops refueling operation until problem is resolved.
3	N/A	M	A fuel bundle in the fuel prep machine is being re-assembled. Several pins that were removed fall into the spent fuel storage rack and rupture.	Notify Control Room. Implement actions of HC.OP-AB.CONT-0005 IRRADIATED FUEL DAMAGE. Suspends all refueling operations.

4	N/A	M	Refuel Floor Exhaust Hi-Hi Radiation alarms	Evacuate the refuel floor. Recognizes FRVS auto start and Reactor Building Ventilation isolation setpoints.

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

Facility: Hope Creek **Scenario No.:** 1 **Op Test No.: 1**

Examiners: ____________________ **Candidates:** ____________________ LSRO

____________________ ____________________ LSRO

____________________ LSRO

____________________ LSRO

Objectives: Evaluate applicants' response to a CRD Mechanism leak. Discuss the effects of lowering fuel pool level. Demonstrate knowledge of method to stop CRDM leak from above with CRB

Initial Conditions: Operational Condition 5, core alterations in progress. All Control Rods are inserted except rod 30-31. The CRDM for 14-23 has been replaced after rebuild. The Reactor Mode Switch is Operable and locked in Refuel position. All SRMs are operable. Shutdown Margin requirements are met.

Turnover: You are the Refueling SRO. Control Rod Blade 14-23 needs to be removed and replaced from the reactor core using the Frame Mounted Aux Hoist. All fuel has been removed from the cell. A double blade guide is installed. The Control Rod Blade 14-23 is full out with the CRDM uncoupled from under-vessel.

Event No.	Malf. No.	Event Type*	Event Description	Evaluator Guide
1	1	I	SRM A fails to zero (0) cps	Reviews Tech Spec 3.9.2 for SRM Operability. Determines core alterations may continue for 14-23.
2	N/A	N	Removal of the Control Rod Blade.	Meets Tech Spec 3.9.10.1 requirements for a single control rod removal. Discusses Restricted Core Operations Form (RCOF) to continue. - Remove double blade guide. - Remove fuel support piece. - Uses CRB Grapple on Frame Mounted Aux Hoist to remove CRB.

3	NA	M	Under vessel crew reports water pouring out 14-23 CRDM flange. They are unable to stop the leak.	Recognizes cavity level would be lowering and takes actions of HC.OP-AB.COOL-0004 Fuel Pool Cooling. -Evacuates the Refuel Floor - Notifies Control Room. - Notifies Reactor Engineer. - Notifies Radiation Protection. Recognizes that the CRB needs to be placed back into the guide tube to bottom in order to stop leak. (Not required for full credit)
4	N/A	M	Reactor Engineer and OS concurs with placing CRB back into guide tube.	Puts CRB back into guide tube and lowers to the bottom to stop the leak.

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