

**ST. LUCIE EXAM 2002-301  
50-335 & 50-389/2002-301**

**APRIL 22, 2002**

**Draft Submittal**

1. Senior Reactor Operator Written Exam  
Sample Outlines

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

- 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. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate  $\pm 1$  from that specified in the table based on NRC revisions. The final exam must total 100 points.
  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.

E/APE # / Name / Safety Function	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	A <sub>1</sub>	A <sub>2</sub>	G	K/A Topic(s)	Imp.	Exam
000001 Continuous Rod Withdrawal / I	X						AK1.17 Knowledge of operational implications of MTC	3.7	SRO
000003 Dropped Control Rod / I			X				AK3.06 Knowledge of the reason for the following as they apply to the dropped CEA: Reset of demand position counter to zero.	3.0	SRO
000005 Inoperable/Stuck Control Rod / I						X	G2.2.22 Knowledge of LCO's and safety limits	4.1	SRO
000011 Large Break LOCA / III		X					EK2.02 Knowledge of interrelations between pumps and large break LOCA's	2.7	SRO
000015/17 RCP Malfunctions / IV					X		AA2.10 Ability to determine when to secure RCP's on loss of cooling or seal injection.	3.7	SRO
<b>CE/A13</b> Natural Circ. / IV		X					AK2.2 Knowledge of interrelations between NC and heat removal systems and relations between the proper operation of these systems.	3.6	SRO
000024 Emergency Boration / I	X						AK1.02 Knowledge of operational implications of emergency boration and relationship between boron addition and reactor power.	3.9	SRO
000026 Loss of Component Cooling Water / VIII			X			X	AK3.02 Knowledge of the reasons for the automatic actions (alignment) within the CCWS resulting from actuation of ESFAS. G2.1.33 Tech Spec entry level conditions	3.9 4.0	SRO SRO
000029 Anticipated Transient w/o Scram / I			X				EK2.06 Knowledge of interrelations between breakers relays and disconnects following an ATWAS	3.1	SRO
000040 ( <b>CE/E05</b> ) Steam Line Rupture - Excessive Heat Transfer / IV				X	X		EA1.3 Ability to operate and/or monitor desired operating results during abnormal and emergency situations. EA2.1 Ability to determine and interpret facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.0 4.0	SRO SRO
<b>CE/A11</b> RCS Overcooling - PTS / IV	X						AK1.2 Knowledge of operational implications of normal, abnormal and EOP's associated with RCS overcooling.	3.3	SRO
000051 Loss of Condenser Vacuum / IV					X		AA2.02 Ability to determine and interpret conditions requiring reactor/turbine trip on loss of condenser vacuum.	4.1	SRO
000055 Station Blackout / VI	X			X			EK1.02 Knowledge of operational implications of natural circulation cooling as they apply to station blackout. EA1.06 Ability to operate and monitor restoration of power with one EDG	4.4 4.5	SRO SRO
000057 Loss of Vital AC Elec. Inst. Bus / VI				X			AA1.05 Ability to operate and/or monitor backup inst. Indications	3.4	SRO
000059 Accidental Liquid Release						X	G2.3.10 Ability to perform procedures to reduce levels of radiation and guard against personnel exposure.	3.3	SRO
000062 Loss of Nuclear Service Water / IV			X				AK3.02 Knowledge of the reasons for automatic actions (alignments) within the nuclear service water resulting from actuation of the ESFAS	3.9	SRO
000067 Plant Fire On-site / IX						X	G2.4.26 Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.	3.3	SRO
000068 (BW/A06) Control Room Evac. / VIII			X				AK3.13 Knowledge of the reasons for performing a SDM calculation, including boron needed and boration time.	3.9	SRO
000069 (W/E14) Loss of CTMT Integrity / V					X		AA2.01 Ability to determine and interpret loss of containment integrity.	4.3	SRO
000074 (W/E06&E07) Inad. Core Cooling / IV				X			EA1.05 Ability to operate and monitor PORV as applied to inadequate core cooling.	4.1	SRO
000076 High Reactor Coolant Activity / IX					X		AA2.02 Ability to determine and interpret correct actions required for high fission product activity in RCS	3.4	SRO
K/A Category Totals:	4	2	5	4	5	4	Group Point Total:		24

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Exam
000007 CE/E02 Reactor Trip - Stabilization - Recovery /	X						EK1.2 Knowledge of normal, abnormal and EOP's associated with reactor trip recovery.	3.4	SRO
000008 Pressurizer Vapor Space Accident / III	X						AK1.01 Knowledge of operational implications of thermodynamics and flow characteristics of open or leaking valves	3.7	SRO
000009 Small Break LOCA / III			X				EK3.10 Knowledge of the reasons for PZR level as applied to small break LOCA.	3.6	SRO
000022 Loss of Reactor Coolant Makeup / II				X			AA1.01 Ability to operate/monitor CVCS letdown and charging as applied to loss of reactor coolant makeup	3.3	SRO
000025 Loss of RHR System / IV		X				X	AK2.03 Knowledge of interrelations between loss of RHR and service water or closed cooling water pumps. G2.2.3 Knowledge of design, procedural and operational differences between units	2.7 3.3	SRO SRO
000027 Pressurizer Pressure Control System Malfunction / III					X		AA2.10 Ability to determine and interpret PZR heater energized/de-energized condition.	3.6	SRO
000032 Loss of Source Range NI / VII						X	G2.1.27 Knowledge of system purpose and or function	2.9	SRO
000033 Loss of Intermediate Range NI / VII							Not chosen due to PSL does not have intermediate range NI's.	N/A	N/A
000037 Steam Generator Tube Leak / III					X		AA2.16 Ability to determine and interpret pressure at which to maintain RCS during S/G cooldown.	4.3	SRO
000038 Steam Generator Tube Rupture / III		X					EK2.02 Knowledge of the interrelations between sensors and detectors and a SGTR	2.5	SRO
000054 (CE/E06) Loss of Main Feedwater / IV				X			AA1.02 Ability to operate and/or monitor manual startup of electric and steam driven AFW pumps as applied to loss of main feedwater.	4.4	SRO
000058 Loss of DC Power / VI				X			AA1.01 Ability to operate and/or monitor cross-tie of affected dc bus with the alternate supply.	3.5	SRO
000060 Accidental Gaseous Radwaste Rel. / IX					X		AA2.05 Ability to determine and interpret that automatic safety actions have occurred as a result of high ARM system signal.	4.2	SRO
000061 ARM System Alarms / VII			X				AK3.02 Knowledge of reason for guidance contained in alarm response for ARM system	3.6	SRO
000065 Loss of Instrument Air / VIII					X		AA2.06 Ability to determine when to trip reactor if instrument air pressure is decreasing.	4.2	SRO
CE/E09 Functional Recovery				X			EA1.3 Ability to operate and/or monitor desired operating results during abnormal and emergency situations.	3.8	SRO
K/A Category Point Totals:	2	2	2	4	4	2	Group Point Total:		16

E/APE # / Name / Safety Function	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	A <sub>1</sub>	A <sub>2</sub>	G	K/A Topic(s)	Imp.	Exam
000028 Pressurizer Level Malfunction / II		X					AK2.02 Knowledge of interrelations between malfunctions of sensors and detectors and pressurizer level control.	2.7	SRO
000036 (BW/A08) Fuel Handling Accident / VIII									
000056 Loss of Off-site Power / VI			X				AK3.02 Knowledge of the reasons for actions contained in EOP for loss of offsite power.	4.7	SRO
CE/A16 Excess RCS Leakage / II						X	G2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry level conditions for ONP's and EOP's	4.3	SRO
K/A Category Point Totals:		1	1			1	Group Point Total:		3

System # / Name	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	K <sub>4</sub>	K <sub>5</sub>	K <sub>6</sub>	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	G	K/A Topic(s)	Imp.	Exam
001 Control Rod Drive	X											K1.05 Knowledge of physical connections and/or cause effect relationship between CRDS and NIS and RPS.	4.4	SRO
003 Reactor Coolant Pump								X				A2.01 Ability to predict the impacts of problems with RCP seals, especially rates of seal leak-off and use procedures to correct, control or mitigate.	3.9	SRO
004 Chemical and Volume Control		X										K2.05 Knowledge of bus power supplies to MOV's.	2.9	SRO
013 Engineered Safety Features Actuation	X											K1.15 Knowledge of physical connections and/or cause effect relationship between ESFAS and MFW system.	3.8	SRO
014 Rod Position Indication							X					A1.03 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with RPIS and PDIL, PPDIL.	3.8	SRO
015 Nuclear Instrumentation				X						X		K4.07 Knowledge of NIS design features and/or interlocks for permissives A4.03 Ability to manually operate and/or monitor in the control room trip bypasses.	3.8 3.9	SRO SRO
017 In-core Temperature Monitor								X				A2.02 Ability to predict the impact of core damage on ITM, use procedures to correct, control or mitigate the consequences of those malfunctions or operations	4.1	SRO
022 Containment Cooling			X						X			K3.02 Knowledge of the effect that a loss or malfunction will have on containment instrumentation readings. A3.01 Ability to monitor automatic operation of the CCS, including initiation of safeguards mode of ops.	3.3 4.3	SRO SRO
026 Containment Spray				X								K4.07 Knowledge of CSS design features and/or interlock which provide adequate level in containment sump for suction (interlock)	4.1	SRO
056 Condensate							X					A1.08 Ability to predict and/or monitor changes in parameters associated with MFW suction pressure.	2.5	SRO
059 Main Feedwater						X						K6.12 Knowledge of the effect of a loss or malfunction of S/G controller logic for MFW reg. Valve will have on the MFW components.	2.5	SRO
061 Auxiliary/Emergency Feedwater		X									X	K2.01 Knowledge of bus power supplies to AFW system MOV's G2.4.11 Knowledge of abnormal condition procedures.	3.3 3.6	SRO SRO
063 DC Electrical Distribution			X									K3.02 Knowledge of the effect that a loss or malfunction of the DC elec. System will have on components using DC control power.	3.7	SRO
068 Liquid Radwaste	X											K1.01 Knowledge of physical connections between LRS and RCS and CVCS	2.6	SRO
071 Waste Gas Disposal					X							K5.04 Knowledge of the operational implications of the relationships of hydrogen/oxygen concentrations to flammability.	3.1	SRO
072 Area Radiation Monitoring									X			A3.01 Ability to monitor automatic operation of the ARM system to changes in ventilation alignment	3.1	SRO
K/A Category Point Totals:	3	2	2	2	1	1	2	2	2	1	1			19

System # / Name	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	K <sub>4</sub>	K <sub>5</sub>	K <sub>6</sub>	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	G	K/A Topic(s)	Imp.	Exam
002 Reactor Coolant										X		A4.03 Ability to manually operate and/or monitor in the control room indications and controls necessary to recognize and correct saturation conditions	4.4	SRO
006 Emergency Core Cooling	X											K1.04 Knowledge of the physical connections and/or cause/effect relationship between ECCS and Aux. Spray system.	2.8	SRO
010 Pressurizer Pressure Control									X			A3.02 Ability to monitor automatic operation of the PZR PCS including PZR pressure.	3.5	SRO
011 Pressurizer Level Control						X						K6.03 Knowledge of the effect of a loss or malfunction between PZR level and PZR heater control circuit.	3.3	SRO
012 Reactor Protection							X					A1.01 Ability to predict and/or monitor changes in parameters associated with operating the RPS including trip setpoint adjustment.	3.4	SRO
027 Containment Iodine Removal											X	G2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions including containment systems.	4.3	SRO
028 Hydrogen Recombiner and Purge Control					X							K5.03 Knowledge of the operational implications of sources of hydrogen within containment.	3.6	SRO
029 Containment Purge				X								K4.03 Knowledge of design features and/or interlocks which provide automatic purge isolation	3.5	SRO
033 Spent Fuel Pool Cooling				X								K4.01 Knowledge of design features and/or interlocks which provide for maintenance of spent fuel pool level.	3.2	SRO
035 Steam Generator										X		A4.05 Ability to manually operate and/or monitor in the control room level control to enhance natural circulation.	4.0	SRO
039 Main and Reheat Steam			X									K3.05 Knowledge that a loss or malfunction of the MRSS will have on the RCS.	3.7	SRO
055 Condenser Air Removal														
062 AC Electrical Distribution			X									K3.02 Knowledge of loss or malfunction of A.C. distribution will have on EDG.	4.4	SRO
064 Emergency Diesel Generator	X											K1.03 Knowledge of the physical connections and/or cause-effect relationship between the EDG and the EDG fuel oil supply system.	4.0	SRO
073 Process Radiation Monitoring					X							K5.01 Knowledge of the operational implications as they apply to concepts to the PRM related to radiation theory, including sources, types, units and effects.	3.0	SRO
075 Circulating Water														
079 Station Air								X				A2.01 Ability to predict the impacts of cross connection with IAS. Use procedures to correct, control or mitigate.	3.2	SRO
086 Fire Protection									X			A3.01 Ability to monitor automatic operation of the FPS including starting mechanisms of fire water pumps.	3.3	SRO
103 Containment			X									K3.03 Knowledge of the effect that a loss or malfunction of containment system will have on containment integrity under refueling conditions.	4.1	SRO
K/A Category Point Totals:	2		3	2	2	1	1	1	2	2	1			17

System # / Name	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	K <sub>4</sub>	K <sub>5</sub>	K <sub>6</sub>	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	G	K/A Topic(s)	Imp.	Exam
005 Residual Heat Removal								X				A2.02 Ability to predict the impacts of pressure transient protection during cold shutdown and based on predictions correct, control or mitigate.	3.7	SRO
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water				X								K4.02 Knowledge of CCWS design feature and/or interlocks which provide for operation of the surge tank, associated valves and controls.	2.7	SRO
041 Steam Dump/Turbine Bypass Control						X						K6.03 Knowledge of the effect of a loss or malfunction of controllers, positioners including ICS, S/G, CRDS will have on the SDS.	2.9	SRO
045 Main Turbine Generator														
076 Service Water														
078 Instrument Air	X											K1.05 Knowledge of the physical connections and/or cause effect relationship between IAS and MSIV air.	3.5	SRO
K/A Category Point Totals:	1			1		1		1				Group Point Total:		4



ES-401 Facility: St. Lucie (02-301)		Generic Knowledge and Abilities Outline (Tier 3) Date of Exam: 4/22/02		Form ES-401-5 Exam Level: SRO	
Category	K/A #	Topic	Imp.	Exam	
Conduct of Operations	2.1.11	Knowledge of one hour technical specification action statements for systems.	3.8	SRO	
	2.1.32	Ability to explain and apply all systems limits and precautions	3.8	SRO	
	2.1.22	Ability to determine Mode of Operation	3.3	SRO	
	2.1.29	Knowledge of how to conduct and verify valve lineups	3.3	SRO	
	Total				4
Equipment Control	2.2.3	Knowledge of the design, procedural and operational differences between units.	3.3	SRO	
	2.2.22	Knowledge of limiting conditions for operations and safety limits	4.1	SRO	
	2.2.12	Knowledge of surveillance procedures	3.4	SRO	
	2.2.27	Knowledge of the refueling process	3.5	SRO	
	Total				4
Radiation Control	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure	3.3	SRO	
	2.3.9	Knowledge of the process for performing a containment purge	3.4	SRO	
	2.3.11	Ability to control radiation releases	3.2	SRO	
	2.3.6	Knowledge of the requirements for reviewing and approving release permits.	3.1	SRO	
	Total				4
Emergency Procedures and Plan	2.4.7	Knowledge of event based EOP mitigation strategies	3.8	SRO	
	2.4.49	Ability to perform without reference actions that require immediate operation of system components and controls	4.0	SRO	
	2.4.12	Knowledge of abnormal condition procedures.	3.6	SRO	
	2.4.41	Knowledge of EAL thresholds and classifications	4.1	SRO	
	2.4.40	Knowledge of SRO's responsibilities in E-Plan implementation	4.0	SRO	
	Total				5
Tier 3 Target Point Total SRO					17