ES-401 **PWR Examination Outline** **Form ES-401-2**

Facility: ST LUCIE Date of Exam: MARCH 2015

Tier	Group	RO K/A Category Points											SRO-Only Points		
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total
1. Emergency & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A		3	18	3	3	6
	2	1	2	1				1	2			2	9	2	2	4
	Tier Totals	4	5	4				4	5			5	27	5	5	10
2. Plant Systems	1	2	2	3	3	2	2	3	3	2	3	3	28	3	2	5
	2	1	1	1	1	1	1	1	1	1	1	0	10	0 1	2	3
	Tier Totals	3	3	4	4	3	3	4	4	3	4	3	38	4	4	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7
		2			3			2			3			2	2	1	2	

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, 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 by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7.* The generic (G) 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. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
008AK2.02	Pressurizer Vapor Space Accident / 3	2.7	2.7	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Sensors and detectors
009EG2.4.50	Small Break LOCA / 3	4.2	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.
011EA1.09	Large Break LOCA / 3	4.3	4.3	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Core flood tank initiation
015AA2.01	RCP Malfunctions / 4	3	3.5	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Cause of RCP failure
022AK3.07	Loss of Rx Coolant Makeup / 2	3	3.2	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Isolating charging
025AK1.01	Loss of RHR System / 4	3.9	4.3	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Loss of RHRS during all modes of operation
026AK3.02	Loss of Component Cooling Water / 8	3.6	3.9	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS
027AA2.15	Pressurizer Pressure Control System Malfunction / 3	3.7	4	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Actions to be taken if PZR pressure instrument fails high
029EK1.01	ATWS / 1	2.8	3.1	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Reactor nucleonics and thermo-hydraulics behavior
038EG2.4.20	Steam Gen. Tube Rupture / 3	3.8	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of operational implications of EOP warnings, cautions and notes.
054AK3.03	Loss of Main Feedwater / 4	3.8	4.1	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Manual control of AFW flow control valves

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
055EK1.02	Station Blackout / 6	4.1	4.4	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Natural circulation cooling
056AA1.18	Loss of Off-site Power / 6	3.2	3.2	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Control room normal ventilation supply fan
057AA2.05	Loss of Vital AC Inst. Bus / 6	3.5	3.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	S/G pressure and level meters
058AA1.01	Loss of DC Power / 6	3.4	3.5	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Cross-tie of the affected dc bus with the alternate supply
062AG2.1.23	Loss of Nuclear Svc Water / 4	4.3	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to perform specific system and integrated plant procedures during all modes of plant operation.
CE02EK2.1	Reactor Trip - Stabilization - Recovery / 1	3.3	3.7	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
CE05EK2.2	Steam Line Rupture - Excessive Heat Transfer / 4	3.7	4.2	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	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.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
005AG2.4.45	Inoperable/Stuck Control Rod / 1	4.1	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to prioritize and interpret the significance of each annunciator or alarm.
024AK2.04	Emergency Boration / 1	2.6	2.5	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Pumps
028AA1.01	Pressurizer Level Malfunction / 2	3.8	3.9	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	PZR level reactor protection bistables
036AK1.03	Fuel Handling Accident / 8	4	4.3	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Indications of approaching criticality
059AG2.4.35	Accidental Liquid RadWaste Rel. / 9	3.8	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects
067AA2.08	Plant Fire On-site / 9 8	2.9	3.6	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Limits of affected area
069AA2.02	Loss of CTMT Integrity / 5	3.9	4.4	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Verification of automatic and manual means of restoring integrity
076AK3.06	High Reactor Coolant Activity / 9	3.2	3.8	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Actions contained in EOP for high reactor coolant activity
CA16AK2.1	Excessive RCS Leakage / 2	3.2	3.5	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
003K1.10	Reactor Coolant Pump	3.0	3.2	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	RCS
004K5.30	Chemical and Volume Control	3.8	4.2	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Relationship between temperature and pressure in CVCS components during solid plant operation
005K2.01	Residual Heat Removal	3.0	3.2	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	RHR pumps
005K3.06	Residual Heat Removal	3.1	3.2	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	CSS
006A2.12	Emergency Core Cooling	4.5	4.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Conditions requiring actuation of ECCS
007K5.02	Pressurizer Relief/Quench Tank	3.1	3.4	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Method of forming a steam bubble in the PZR
008K3.01	Component Cooling Water	3.4	3.5	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Loads cooled by CCWS
010K4.03	Pressurizer Pressure Control	3.8	4.1	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Over pressure control
012A1.01	Reactor Protection	2.9	3.4	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Trip setpoint adjustment
012A2.03	Reactor Protection	3.4	3.7	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Incorrect channel bypassing
013A2.01	Engineered Safety Features Actuation	4.6	4.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	LOCA

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
013A4.01	Engineered Safety Features Actuation	4.5	4.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	ESFAS-initiated equipment which fails to actuate
022K4.03	Containment Cooling	3.6	4.0	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Automatic containment isolation
026A3.01	Containment Spray	4.3	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Pump starts and correct MOV positioning
026G2.2.42	Containment Spray	3.9	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to recognize system parameters that are entry-level conditions for Technical Specifications
039G2.1.28	Main and Reheat Steam	4.1	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the purpose and function of major system components and controls.
059K3.04	Main Feedwater	3.6	3.8	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	RCS
061K2.01	Auxiliary/Emergency Feedwater	3.2	3.3	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	AFW system MOVs
062A1.03	AC Electrical Distribution	2.5	2.8	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Effect on instrumentation and controls of switching power supplies
062K4.03	AC Electrical Distribution	2.8	3.1	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Interlocks between automatic bus transfer and breakers
063A3.01	DC Electrical Distribution	2.7	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Meters, annunciators, dials, recorders and indicating lights
064K6.07	Emergency Diesel Generator	2.7	2.9	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Air receivers

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
064K6.08	Emergency Diesel Generator	3.2	3.3	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Fuel oil storage tanks
073A1.01	Process Radiation Monitoring	3.2	3.5	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Radiation levels
076K1.07	Service Water	2.5	2.3	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Secondary closed cooling water
078A4.01	Instrument Air	3.1	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Pressure gauges
078G2.4.8	Instrument Air	3.8	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.
103A4.06	Containment	2.7	2.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Operation of the containment personnel airlock door

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
001K3.02	Control Rod Drive	3.4	3.5	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	RCS
017K6.01	In-core Temperature Monitor	2.7	3.0	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Sensors and detectors
027A2.01	Containment Iodine Removal	3.0	3.3	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	High temperature in the filter system
028A4.03	Hydrogen Recombiner and Purge Control	3.1	3.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Location and operation of hydrogen sampling and analysis of containment atmosphere, including alarms and indications
034A3.01	Fuel Handling Equipment	2.5	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Travel limits
035K1.12	Steam Generator	3.7	3.9	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	RPS
041K5.01	Steam Dump/Turbine Bypass Control	2.9	3.2	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Relationship of no-load T-ave. to saturation pressure relief setting on valves
071K4.06	Waste Gas Disposal	2.7	3.5	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Sampling and monitoring of waste gas release tanks
072A1.01	Area Radiation Monitoring	3.4	3.6	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Radiation levels
075K2.03	Circulating Water	2.6	2.7	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Emergency/essential SWS pumps

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.42	Conduct of operations	2.5	3.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of new and spent fuel movement procedures
G2.1.45	Conduct of operations	4.3	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to identify and interpret diverse indications to validate the response of another indication
G2.2.1	Equipment Control	4.5	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.
G2.2.13	Equipment Control	4.1	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of tagging and clearance procedures.
G2.2.23	Equipment Control	3.1	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to track Technical Specification limiting conditions for operations.
G2.3.12	Radiation Control	3.2	3.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiological safety principles pertaining to licensed operator duties
G2.3.5	Radiation Control	2.9	2.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to use radiation monitoring systems
G2.4.17	Emergency Procedures/Plans	3.9	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of EOP terms and definitions.
G2.4.47	Emergency Procedures/Plans	4.2	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.
G2.4.6	Emergency Procedures/Plans	3.7	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge symptom based EOP mitigation strategies.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
008AA2.25	Pressurizer Vapor Space Accident / 3	2.8	3.4	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Expected leak rate from open PORV or code safety
025AG2.2.40	Loss of RHR System / 4	3.4	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to apply technical specifications for a system.
026AA2.05	Loss of Component Cooling Water / 8	2.4	2.5	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	The normal values for CCW-header flow rate and the flow rates to the components cooled by the CCWS
055EA2.02	Station Blackout / 6	4.4	4.6	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	RCS core cooling through natural circulation cooling to S/G cooling
056AG2.4.30	Loss of Off-site Power / 6	2.7	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of events related to system operations/status that must be reported to internal orginizations or outside agencies.
077AG2.2.37	Generator Voltage and Electric Grid Disturbances / 6	3.6	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to determine operability and/or availability of safety related equipment

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
001AG2.1.32	Continuous Rod Withdrawal / 1	3.8	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to explain and apply all system limits and precautions.
068AA2.08	Control Room Evac. / 8	3.9	4.1	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	S/G pressure
076AG2.2.25	High Reactor Coolant Activity / 9	3.2	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.
CA13AA2.2	Natural Circ. / 4	2.9	3.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Adherence to appropriate procedures and operation within the limitations in the facility s license and amendments.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
008A2.07	Component Cooling Water	2.5	2.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Consequences of high or low CCW flow rate and tempera- ture; the flow rate at which the CCW standby pump will start
010G2.1.19	Pressurizer Pressure Control	3.9	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to use plant computer to evaluate system or component status.
013G2.2.22	Engineered Safety Features Actuation	4.0	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of limiting conditions for operations and safety limits.
022A2.04	Containment Cooling	2.9	3.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Loss of service water
039A2.03	Main and Reheat Steam	3.4	3.7	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Indications and alarms for main steam and area radiation monitors (during SGTR)

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
015G2.1.7	Nuclear Instrumentation	4.4	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior and instrument interpretation.
016G2.1.20	Non-nuclear Instrumentation	4.6	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to execute procedure steps.
072A2.03	Area Radiation Monitoring	2.7	2.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Blown power-supply fuses

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.37	Conduct of operations	4.3	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of procedures, guidelines or limitations associated with reactivity management
G2.1.40	Conduct of operations	2.8	3.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of refueling administrative requirements
G2.2.17	Equipment Control	2.6	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the process for managing maintenance activities during power operations.
G2.2.38	Equipment Control	3.6	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of conditions and limitations in the facility license.
G2.3.6	Radiation Control	2.0	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to aprove release permits
G2.4.16	Emergency Procedures/Plans	3.5	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines.
G2.4.44	Emergency Procedures/Plans	2.4	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of emergency plan protective action recommendations.

ES-401, Rev. 9 **Generic Knowledge and Abilities Outline (Tier 3)** **Form ES-401-3**

Facility: St. Lucie		Date of Exam:				March 2015
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.37	G2.1.37, Knowledge of procedures reactivity management	4.3		4.6	
	2.1.40	G2.1.40, Knowledge of refueling Admin Requirements	2.8		3.9	
	2.1.42	G2.1.42, Knowledge of new and spent fuel movement requirements	2.5		3.4	
	2.1.45	G2.1.45, Interpretation of diverse indications to validate the response of another indication.	4.3		4.3	
	2.1.					
	2.1.					
	Subtotal		2		2	
2. Equipment Control	2.2.1	G2.2.1, Perform pre-startup procedures for facility, including those controls associated with plant equipment that could affect reactivity.	4.5		4.4	
	2.2.13	G2.2.13, Knowledge of tagging and clearance procedures	4.1		4.3	
	2.2.17	G2.2.17, Knowledge of the process for managing maintenance activities during power operations.	2.6		3.8	
	2.2.23	Ability to track Technical Specification limiting conditions for operations.	3.1		4.6	
	2.2.38	G2.2.38, Knowledge of conditions and limitations in the facility license.	3.6		4.5	
	2.2.					
	Subtotal		3		2	
3. Radiation Control	2.3.5	G2.3.5, Ability to use the radiation monitoring system	2.9		2.9	
	2.3.6	G2.3.6, Ability to approve release permit	2.0		3.8	
	2.3.12	G2.3.12, Knowledge of radiological safety principles pertaining to licensed operator duties	3.2		3.7	
	2.3.					
	2.3.					
	2.3.					
	Subtotal		2		1	
4. Emergency Procedures / Plan	2.4.6	G2.4.6, Knowledge symptom based EOP mitigation strategies	3.7		4.7	
	2.4.16	G2.4.16, Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines.	3.5		4.4	
	2.4.17	G2.4.17, Knowledge of EOP terms and definitions.	3.9		4.3	
	2.4.44	G2.4.44, Knowledge of emergency plan protective action recommendations	2.4		4.4	
	2.4.47	G2.4.47, Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control reference material.	4.2		4.2	
	2.4.					
	Subtotal		3		2	
Tier 3 Point Total			10	10	7	7

Facility: St. Lucie Date of Examination: 3/2/2015

Examination Level: RO X SRO X Operating Test Number: HLC 22 NRC

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N, S N, R	**A1 RO:** 2B EDG Inoperable – Evaluate Opposite Train Components **A1 SRO:** 2B EDG Inoperable – Evaluate Opposite Train Components AND Evaluate Technical Specifications
Conduct of Operations	N, R N, R	**A2 RO:** Perform RCS Inventory Balance **A2 SRO:** Perform RCS Inventory Balance and evaluate Technical Specifications
Equipment Control	N, R	**A3:** Perform Borated Water Source Surveillance for Mode 1 – Unit 2
Radiation Control	D, C, P R	**A4 RO:** Operate Portable Radiation Monitoring Equipment RM-23P (St. Lucie Bank JPM 0321307) **A4 SRO:** Determine Radiation Exposure Limits under Emergency Conditions
Emergency Procedures/Plan	D, R	**A5 SRO:** Implement EPIP for SGTR/LOOP (St. Lucie Bank JPM 0821138T)

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

* Type Codes & Criteria:

(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

ADM. JPM SUMMARY DESCRIPTION

A1 RO: *2B EDG Inoperable – Evaluate Opposite Train Components*
(G2.1.31) Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. 4.6/4.3

A suspect relay on the 2B Emergency Diesel Generator leads the crew to evaluate the operability of the A Train safety-related equipment. During performance of 2-OSP-59.01B Attachment 1, Operability Checklist Prior to Removing 2B EDG from Service, the Desk RCO should recognize that multiple pieces of equipment that are required to be operable with the 2B Emergency Diesel Generator out of service, are not available. The Desk RCO reports this to the Unit Supervisor.

A1 SRO: *2B EDG Inoperable – Evaluate Opposite Train Components AND Evaluate Technical Specifications*
(G2.1.31) Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. 4.6/4.3

A suspect relay on the 2B Emergency Diesel Generator leads the crew to evaluate the operability of the A Train safety-related equipment. The Desk RCO reports that 2C Auxiliary Feedwater Pump is cleared for maintenance and is not available. The Unit Supervisor must review the completed Attachment 1, Operability Checklist Prior to Removing 2B EDG from Service, from 2-OSP-59.01B, 2B Emergency Diesel Generator Monthly Surveillance, and evaluate any Tech Spec impact (3.7.1.2 and 3.8.1.1.b).

2 RO: *Perform RCS Inventory Balance*
(G2.1.7) Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. 4.4/4.7

The crew suspects unusually high RCS leakage. The Unit Supervisor has entered 2-AOP-01.08, RCS Leakage Abnormal Operation. The Unit Supervisor directs the Desk RCO to perform a one hour manual RCS leak rate determination per 2-OSP-01.03, Reactor Coolant System Inventory Balance, Attachment 4, Manual Leak Rate Calculation. The candidate should determine that Identified Leakage is within Tech Spec limits and Unidentified Leakage is NOT within Tech Spec limits.

A2 SRO: *Perform RCS Inventory Balance and evaluate Technical Specifications*
(G2.1.7) Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. 4.4/4.7

The crew suspects unusually high RCS leakage. The Unit Supervisor has entered 2-AOP-01.08, RCS Leakage Abnormal Operation. The Unit Supervisor directs the Desk RCO to perform a one hour manual RCS leak rate determination per 2-OSP-01.03, Reactor Coolant System Inventory Balance, Attachment 4, Manual Leak Rate Calculation. The SRO candidate must perform the leak rate calculation, determine that Identified Leakage is within Tech Spec limits and Unidentified Leakage is in excess of Tech Spec limits, and determine any required actions based on the results of the leak rate calculation, including any related time constraints.

A3 RO/SRO: *Perform Borated Water Source Surveillance for Mode 1 – Unit 2*
(G2.2.12) Knowledge of surveillance procedures. 3.7/4.1

A routine surveillance is due on the current shift. The candidate is assigned to perform 2-OSP-02.07, Boration Flowpath and Sources. The candidate should determine that the level in one borated water source, 2B Boric Acid Makeup Tank, is low. The candidate should also determine that sufficient borated water sources are available with the combined contents of the Refueling Water Tank and the 2A Boric Acid Makeup Tank.

A4 RO: *Operate Portable Radiation Monitoring Equipment RM-23P*
(G2.3.5) Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. 2.9/2.9

With the remote indication for Main Steam Line Monitor 1 for the "B" Main Steam Line, RIM-26-72, out of service, the candidate is directed to obtain a local reading using the portable radiation monitor, RM-23P, in accordance with 2-NOP-26.01, Radiation Monitors. The RM-23P will be pre-staged in the Turbine Building, and the functional test will be assumed to have already been performed.

A4 SRO: *Determine Radiation Exposure Limits under Emergency Conditions*
(G2.3.4) Knowledge of radiation exposure limits under normal or emergency conditions. 3.2/3.7

During a LOCA event, a 10 gpm leak has been identified on the suction of 2A Charging Pump. The first re-entry team was unsuccessful at isolating the leak. The second re-entry team is prepared to make repairs and close the valve. The candidate must approve the entry, taking into account the local dose rates and current annual accumulated dose of the worker. The candidate should correctly calculate estimated dose for the worker, identify the applicable dose limits (5 Rem TEDE and 50 Rem CDE), and conclude that the worker CANNOT perform the work due to the potential for exceeding the identified TEDE limit.

A5 SRO: *Implement EPIP for SGTR/LOOP (SRO ONLY)*
(G2.4.30) Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator. 2.7/4.1

Unit 2 has just been manually tripped from 100% power due to a steam generator tube rupture in the 2A SG. Letdown has been isolated and all three charging pumps are running. Pressurizer level is dropping and secondary radiation is rising. Following the trip, a Loss of Offsite Power occurred and ADV's must be used for RCS Heat Removal since SBCS is now unavailable. SIAS has actuated.

The candidate is tasked with:

- Classifying the event per EPIP-01, "Classification of Emergencies" and then, if required
- Fill out the Florida Nuclear Plant Emergency Notification Form and notify the State and County agencies per EPIP-08, "Off-Site Notifications and Protective Action Recommendations."

These actions are **TIME CRITICAL**.

Facility: St. Lucie Date of Examination: 3/2/2015
Exam Level: RO X SRO-I X SRO-U X Operating Test No.: HLC 22 NRC

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
All (S-1) Verify CSAS – Unit 2 (0821014A) K/A 026A4.01	A, M, EN, S, L	5
All (S-2) Withdraw Shutdown Group CEAs in preparation for reactor startup –Unit 2 K/A 001A2.11	A, L, N, S	1
All (S-3) Respond to a CCW Header Rupture-Unit 2 K/A 008A2.02	A, E,S	8
RO & SRO-I (S-4) Manually actuate AFAS, Unit 2 K/A 035A2.01	A, E, L, S, M	4p
RO & SRO-I (S-5) Respond to Abnormal Pressure Control - PCV-1100E Fails Open - Unit 2 K/A 010A2.02	A, E, P, S	3
RO & SRO-I (S-6) Respond to Control Room OAI radiation alarms, Unit 2 K/A 072A3.01	S, E	7
RO & SRO-I (C-1) Pump ECCS Area Sumps to RDT Post LOCA – Unit1 (0821089) K/A 006K4.08	P, E, C, D	2
RO ONLY (S-7) Energize 2A3 4.16KV bus from Unit1 SBO Cross-tie Bkr (0821129) K/A 062A2.05	D, S, E, L	6

In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

All (P-1) Alternate Charging Flow Path to RCS Through the "A" HPSI Header K/A 006A2.02	E, N, R	2
All (P-2) Return Static Inverter 2A to Service–Unit 2 (0821211) K/A 062A3.04	D	6
RO & SRO-I (P-3) Align Unit 2 CST to Supply the 1C AFW Pump (0821062) K/A 061A1.03	D, P, E	4s

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

JPM SUMMARY DESCRIPTION

SIMULATOR

S-1: *Verify CSAS- Unit 2*
026A4.01 Ability to manually operate and/or monitor in the control room: CSS controls. 4.5/4.3

A LOCA is in progress on Unit 2. The US directs that Step 12 of EOP-03 be performed (Verify CSAS signal). Both trains of CSAS must be manually actuated and other components must be manually operated IAW a table in 2-EOP-99 to complete the task. This JPM was modified from a PSL bank JPM. The guidance in EOP 3 has been revised / reworded to better describe contingency actions for ESFAS actuations that are faulted. This is an alternate path JPM. **All candidates will perform this JPM.**

S-2 *Withdraw Shutdown Group CEAs in preparation for reactor startup –Unit 2*
001A2.11 Ability to (a) predict the impacts of situations requiring a reactor trip on the CRDS- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations. situations requiring a reactor trip. 4.4/4.7

Unit 2 is starting up after a 10 day forced outage following repairs to the main generator. 2-GOP-302, "Reactor Plant Startup-Mode 3 To Mode 2 is in progress. Shutdown bank "A" has been withdrawn to the upper electrical limit. The Operating crew is at step 4.3.1.5 with Shutdown Bank "B" having been withdrawn 37 inches. As CEA Shutdown bank " B" is withdrawn, CEA #40 will stop moving with the rest of the group at 42 inches. 2-GOP-302 directs CEA movement to stop if a deviation between CEAs in a group exceeds 6 inches and enter 2-AOP-66.01, "Dropped or Misaligned CEA Abnormal Operation". After the deviation occurs and the CEA withdraw switch is released, Bank "B" CEAs will to continue to move outward. Efforts to stop the movement are not successful. The candidate must recognize that conditions for a manual reactor trip are met per 2-AOP-66.01. After the plant is tripped, CEA#40 will not fully insert into the core so Emergency Boration must be established (Reactivity Control – EOP-01) either from memory or using 2-AOP-02.02, "Emergency Boration". **All candidates will perform this JPM**.

S-3 *Respond to a CCW Header Rupture-Unit 2*.
008A2.02 Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High / Low CCW surge tank level. 3.2/3.5

The Unit will be in Mode 3, NOP, NOT. A confirmed CCW header rupture has just occurred and the US has directed the RCO to carry out the actions of 2-AOP-14.01 Component Cooling Water Abnormal Operation to perform applicable steps for a ruptured CCW header. Annunciator LB-10 will clear indicating the rupture is in the 'A' header. When the candidate performs steps to restore CCW to the "N" header from the "B" header HCV-14-10 will not open. This will require the RCP's to be stopped within 10 minutes. This JPM is time critical.
This is an alternate path JPM since the candidate must exit from the actions of responding to a ruptured CCW header to the actions for loss of CCW to the RCPS's. **All candidates will perform this JPM**.

S-4 ***Manually actuate AFAS, Unit 2***

035A2.01 Ability to predict the impacts of the following malfunctions or operations on the SG and based on these predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: faulted or ruptured S/Gs. 4.5/4.6

Unit 2 has experienced a SGTR on the 2B SG. The 2B SG has been isolated and AFW flow to the 2A SG has isolated on an AFAS lockout due to ΔP between the 2A and 2B SG pressure. AFAS-1 will be manually initiated. Upon manual initiation, MV-09-11 and MV-09-9 fail to open. When the applicant opens either valve it will fail closed 5 seconds later. (NOTE: both valves have this failure in but when the first valve selected is placed to open it will clear the fault on the other valve, allowing the 2A OR the 2C AFW pump to feed the 2A SG). This is an alternate path JPM in that the initial cue requires the candidate to evaluate a caution in EOP-04 and manually initiate AFAS-1 to restore AFW to the 2A SG. Following that action and the MOV failures, the candidate must refer to an Ops Hard Card for guidance on manually opening the faulted AFW valves and establishing AFW flow because the 2A SG levels are lowering and not meeting the RCS Heat Removal safety function of EOP-04. **ONLY ROs and SRO-Is will perform this JPM.**

S-5 ***Respond to Abnormal Pressure Control - PCV-1100E Fails Open – Unit 2***

010 A2.02 Ability to (a) predict the impacts of a spray valve failure on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of a spray valve failures. 3.9/3.9

The Unit is at power when PCV-1100E, Pressurizer spray valve failed open. The valve cannot be closed from the Control Room. The success path is to trip the Reactor and stop the 2B2 Reactor Coolant pump to terminate the depressurzation. This is an alternate path JPM. **ONLY ROs and SRO-Is will perform this JPM**.

S-6 ***Respond to Control Room OAI radiation alarms, Unit 2***

072A3.01 Ability to monitor automatic operation of the ARM system including: Changes in ventilation alignment. 2.9/3.1

Unit 1 is experiencing a LBLOCA with a breach in Containment integrity. As a result of this release, Unit 2 Control Room has gone on ventilation recirc due to high radiation in the outside air intakes. Compliance with the procedure requires verification of the ventilation lineup IAW 2-AOP-25.02, "Ventilation Systems", Appendix B. As Appendix B is being followed, numerous damper failures must be noted and corrective actions must be taken. **ONLY ROs and SRO-Is will perform this JPM.**

UNIT 1 CONTROL ROOM

C-1 – ***Pump ECCS Area Sumps to RDT Post Loca – Unit 1***

006K4.08 Knowledge of ECCS design feature(s) and/or interlock(s) which provide for the following: Recirculation flowpath of reactor building sump. 3.4/3.6

Unit 1 has experienced a LOCA and RAS has occurred with all normal post-trip power available. The US directs the desk RO to align the ECCS sumps to the Reactor Drain Tank in accordance with 1-EOP-03, step 40. **ONLY ROs and SRO-Is will perform this JPM.**

SIMULATOR

S-7 – *Energize A3 4.16KV bus from Unit 1 SBO cross tie breaker- Unit 2*
062A2.05 Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Methods for energizing a dead bus. 2.9/3.3

Unit 2 is in a station blackout and Unit 1 has both emergency buses being supplied by their Diesel Generators. Direction is given to cross tie the 1AB and 2AB 4.16KV Bus IAW 1-EOP-99, Appendix V, "Receiving AC Power from Unit 1 using the SBO Crosstie". Table 7 has been completed for Unit 2. **Only the RO candidates will perform this JPM.**

IN-PLANT

P-1 *Alternate Charging Flowpath to RCS Through the "A" HPSI Header – Unit2*
006A2.02 Ability to predict the impacts of the following malfunctions or operations on the ECCS and based on these predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of flow path. 3.9/4.3

The Charging Header has developed a severe leak down stream of V2523, "Charging pump Discharge at Pen# 27 Isolation valve". The normal Charging flow path is unavailable. There is NO fire event involved. Perform the steps of 2-AOP-02.03, "Charging and Letdown" Attachment 2 to align the alternate charging flow path to the RCS using the "A" HPSI Header. **All candidates will perform this JPM.**

(Radiation Controlled Area JPM)

P-2 *Return Static Inverter 2A to Service – Unit 2 (0821211)*
062A3.04 Ability to monitor automatic operation of the ac distribution system, including: Operation of inverter (e.g., precharging synchronizing light, static transfer). 2.7/2.9

The 2MA/2MA-1 Instrument Bus is currently on its alternate source of power due to an inverter failure. EM has completed repairs to the 2A Static Inverter. The candidate is to perform actions to return the inverter to service. **All candidates will perform this JPM.**

P-3 *Align Unit 2 CST to Supply the 1C AFW Pump (0821062)*
061A1.03 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including: Interactions when multi unit systems are cross tied 3.1/3.6

Unit 1 CST is not available due to tornado damage. Direction will be given to align the Unit 2 CST to the suction of the Unit 1, 1C Auxiliary feedwater pump IAW 1-AOP-09.02, "Auxiliary Feedwater," Attachment 5. **ONLY ROs and SRO-Is will perform this JPM.**