FINAL SUBMITTAL

ST. LUCIE EXAM
50-335, 389/2001-301

MAY 14 - 18 & 21 - 25, 2001

FINAL RO LICENSE EXAM

REFERENCE MATERIAL

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Facility:St. Lucie (01-301) Date of Exam: 5/14/01 Exam Level: RO

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	2	2	3				3	3			3	16
	2	2	2	4				3	3			3	17
	3	1	1						1				3
	Tier Totals	5	5	7				6	7			6	36
2. Plant Systems	1	2	1	2	3	2	2	1	3	2	2	3	23
	2	2	2	3	3	1	1	2	1	2	1	2	20
	3	1		1	1			1	1	1	1	1	8
	Tier Totals	5	3	6	7	3	3	4	5	5	4	6	51

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
	4	3	3	3	13

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. Actual point totals must match those specified in the table.
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.

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01	ST. Lucie (01-301) PWR RO examination Outline Form Emergency and Abnormal Plant Evolutions - Tier 1/Group 1								ES-401-4
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000005 Inoperable/Stuck Control Rod / I	X						AK1.06 Bases for power limit, for Rod misalignment	2.9/3.8	B
000015/17 RCP Malfunctions / IV						X	G2.1.28 Knowledge of the purpose and function of major systems/components/controls	3.2/3.3	B
BW/E09; **CE/A13**; W/E09&E10 Natural Circ. / IV	X						AK1.2 Normal, abnormal and emergency operating procedures associated with Nat. Circ.	3.2/3.5	B
000024 Emergency Boration / I		X					AK2.03 Knowledge of Emergency Boration and controllers and positioners	2.6/2.5	B
000026 Loss of Component Cooling Water / VIII			X				AK3.02 Automatic alignments within CCWS from actuation of ESFAS	3.6/3.9	B
000027 Pressurizer Pressure Control System Malfunction / III						X	G2.2.3 Knowledge of design, procedural, operational Unit differences	3.1/3.3	R
000040 (BW/E05; **CE/E05**; W/E12) Steam Line Rupture - Excessive Heat Transfer / IV					X		EA2.2 Adherence to procedures and operation within the facility license and amendments	3.4/4.2	B
CE/A11; W/E08 RCS Overcooling - PTS / IV			X				AK3.3 Manipulation of controls to obtain desired operating results during abnormal and emergency situations	3.1/3.5	B
000051 Loss of Condenser Vacuum / IV					X		AA2.02 Conditions requiring reactor and/or turbine trip	3.9/4.1	B
000055 Station Blackout / VI					X		EA2.06 Faults and lockouts that must be cleared prior to re-energizing busses	3.7/4.1	B
000057 Loss of Vital AC Elec. Inst. Bus / VI				X			AA1.06 Manual control of components on loss of vital AC when auto control is lost.	3.5/3.5	B
000062 Loss of Nuclear Service Water / IV			X				AK3.03 Guidance contained in EOP for loss of Nuclear service water	4.0/4.2	B
000067 Plant Fire On-site / IX						X	G2.4.25 Knowledge of fire protection procedures	2.9/3.4	R
000068 (BW/A06) Control Room Evac. / VIII				X			AA1.01 Ability to operate ADV's as they apply to Control room evac.	4.3/4.5	B
000069 (W/E14) Loss of CTMT Integrity / V									
000074 (W/E06&E07) Inad. Core Cooling / IV		X					EK2.05 Knowledge of inadequate core cooling and LPSI pumps	3.9/4.1	B
000076 High Reactor Coolant Activity / IX				X			AA1.04 Ability to operate/monitor failed fuel monitoring equipment	3.2/3.4	B
K/A Category Totals:	2	2	3	3	3	3	Group Point Total:		16

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01

St. Lucie (01-310) PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000001 Continuous Rod Withdrawal / I			X				AK3.02 Tech-Spec limits on rod operability	3.2/4.3	B
000003 Dropped Control Rod / I					X		AA2.02 Ability to determine/interpret signal inputs to the rod control system resulting from a dropped rod.	2.7/2.8	B
000007 (BW/E02&E10; **CE/E02**) Reactor Trip - Stabilization - Recovery / I				X			EA1.1 Ability to operate/monitor components and functions of control and safety systems including signals, interlocks, failure modes, automatic and manual features	3.7/3.7	B
000008 Pressurizer Vapor Space Accident / III					X		AA2.03 PORV position indicators and accoustic monitors	3.9/3.9	B
000009 Small Break LOCA / III		X					EK2.03 Interrelations between SBLOCA and S/G's	3.0/3.3	B
000011 Large Break LOCA / III						X	G2.4.14 Knowledge of general guidelines for EOP flowchart use	3.0/3.9	B
000022 Loss of Reactor Coolant Makeup / II				X			AA1.08 Ability to operate/monitor VCT level as applicable to loss of Reactor Coolant makeup	3.4/3.3	B
000025 Loss of RHR System / IV	X						AK1.01 Loss of RHRS during all modes of operation	3.9/4.3	B
000029 Anticipated Transient w/o Scram / I	X						EK1.05 Operational implications/definition of negative temperature coefficient as applied to PWR during ATWAS	2.8/3.2	B
000032 Loss of Source Range NI / VII									
000037 Steam Generator Tube Leak / III					X		AA2.13 Ability to interpret which SG is leaking	4.1/4.3	B
000038 Steam Generator Tube Rupture / III				X			EA1.11 Ability to operate and monitor S/G level indicators as they apply to a SGTR	3.8/3.9	B
000054 (CE/E06) Loss of Main Feedwater / IV						X	G2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm.	3.3/3.6	B
000058 Loss of DC Power / VI			X				AK3.02 Knowledge of the reasons for actions contained in EOP for loss of DC power	4.0/4.2	B
000059 Accidental Liquid RadWaste Rel. / IX			X				AK3.01 Termination of release of radioactive liquid	3.5/3.9	R
000060 Accidental Gaseous Radwaste Rel. / IX		X					AK2.02 Knowledge of interrelations between accidental release and Aux. Building ventilation systems	2.7/3.1	B
000061 ARM System Alarms / VII			X				AK3.02 Knowledge of reasons for guidance contained in alarm response for ARM alarm	3.4/3.6	B
CE/E09 Functional Recovery						X	G2.4.16 Knowledge of EOP implementation hierarchy and coordination with other support procedures	3.0/4.0	B
K/A Category Point Totals:	2	2	4	3	3	3	Group Point Total:		17

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01

St. Lucie (01-301) PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 3

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000028 Pressurizer Level Malfunction / II	X						AK1.01 Knowledge of operational implications of PZR reference leak	2.8/3.1	B
000036 (BW/A08) Fuel Handling Accident / VIII									
000056 Loss of Off-site Power / VI									
000065 Loss of Instrument Air / VIII					X		AA2.06 Ability to determine when to trip reactor if instrument air pressure is decreasing	3.6/4.2	B
CE/A16 Excess RCS Leakage / II		X					AK2.1 Components and functions of control and safety systems including Inst. Signals, interlocks, failure modes and auto features	3.2/3.5	B
K/A Category Point Totals:	1	1			1		Group Point Total:		3

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01

St. Lucie (01-301) PWR RO Examination Outline
Plant Systems - Tier 2/Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	Imp.	Exam
001 Control Rod Drive						X					X	K6.11 Location and operation of CRDS fault detection and reset system including rod control annhunciator G2.2.12 Knowledge of surveillance procedures	2.9/3.2 3.0/3.4	R B
003 Reactor Coolant Pump			X								X	K3.04 Knowledge of the effect that a loss or malfunction of RCP's will have on the RPS G2.4.18 Knowledge of the specific bases for EOP's	3.9/4.2 2.7/3.6	B B
004 Chemical and Volume Control							X		X			A1.07 Ability to predict and or monitor changes in parameters to prevent exceeding design limits associated with CVCS and maximum specified letdown flow. A3.03 Ability to monitor automatic operation of CVCS and ion exchanger bypass	2.7/3.1 2.9/2.9	B R
013 Engineered Safety Features Actuation		X				X						K2.01 Knowledge of bus power supplies to ESFAS/safeguards equipment control K6.01 Knowledge of the effect of a loss or malfunction of sensors and detectors will have on the ESFAS	3.6/3.8 2.7/3.1	R B
015 Nuclear Instrumentation				X	X							K4.02 Knowledge of NIS design features on rod motion inhibits K5.15 Knowledge of operational implications on effects of xenon on local flux and factors affecting xenon concentrations	3.7/3.9 3.3/3.7	R B
017 In-core Temperature Monitor										X		A4.01 Ability to monitor in control room in-core temperatures	3.8/4.1	B
022 Containment Cooling	X							X				K1.01 Knowledge of relationship between CCS and SWS/cooling system A2.03 Ability to predict impact of fan motor thermal overload/high speed operation	3.5/3.7 2.6/3.0	B R
056 Condensate	X											K1.03 Knowledge of physical connections and/or cause effect between Condensate and MFW	2.6/2.6	R
059 Main Feedwater			X					X				K3.02 Knowledge of effect that a loss of MFW will have on AFW system A2.12 Ability to predict impact of failure of feedwater reg. Valves on MFW	3.6/3.7 3.1/3.4	B R
061 Auxiliary/Emergency Feedwater				X				X				K4.02 Knowledge of AFW design features/interlocks which provide AFW auto start upon loss of MFW pp, S/G level, blackout or SI A2.03 Ability to predict impact on AFW for loss of DC power	4.5/4.6 3.1/3.4	B B
068 Liquid Radwaste									X			A3.02 Ability to monitor auto isolation	3.6/3.6	B
071 Waste Gas Disposal				X							X	K4.04 Knowledge of design feature and/or interlocks for isolation of waste gas release tanks G2.1.32 Ability to explain and apply system limits and precautions	2.9/3.4 3.4/3.8	B R
072 Area Radiation Monitoring					X					X		K5.01 Knowledge of radiation theory, sources types, units, and effects A4.02 Ability to manually operate or monitor major components	2.7/3.0 2.5/2.5	R B
K/A Category Point Totals:	2	1	2	3	2	2	1	3	2	2	3	Group Point Total:		23

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01

St. Lucie (01-301) PWR RO Examination Outline
Plant Systems - Tier 2/Group 2

System # / Name	K 1	K2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	Imp.	Exam
002 Reactor Coolant							X					A1.04 Predict and monitor changes in Subcooled Margin.	3.9/4.1	B
006 Emergency Core Cooling									X		X	A3.08 Automatic transfer of ECCS flowpaths (RAS). G2.1.20 Ability to execute ECCS procedure steps.	4.2/4.3 4.3/4.2	B B
010 Pressurizer Pressure Control					X							K5.01 Determine condition of fluid in Pzr, using Steam Tables.	3.5/4.0	B
011 Pressurizer Level Control								X				A2.11 Predict impact of Pzr level instrument failing low.	3.4/3.6	B
012 Reactor Protection				X								K4.01 Design feature or interlock that provides trip logic with one channel in trip or bypass.	3.7/4.0	R
014 Rod Position Indication				X								K4.06 Rod position indications for individual or group misalignment.	3.4/3.7	R
026 Containment Spray							X					A1.03 Predict and monitor changes in Containment sump level with Containment Spray.	3.5/3.5	B
029 Containment Purge									X			A3.01 Ability to monitor automatic operation of the Containment Purge System including isolation.	3.8/4.0	B
033 Spent Fuel Pool Cooling			X									K3.03 Effect of a loss of Spent Fuel Pool Cooling on Spent Fuel temperature.	3.0/3.3	B
035 Steam Generator						X						K6.03 Effect of a malfunction or a loss of a S/G level instrument on S/G level.	2.6/3.0	B
039 Main and Reheat Steam			X									K3.05 Effect that a malfuction or a loss of Main or Reheat Steam will have on the RCS.	3.6/3.7	R
055 Condenser Air Removal			X									K3.01 Effect a loss of Condenser Air Removal will have on the Main Condenser.	2.5/2.7	B
062 AC Electrical Distribution		X										K2.01 Bus power supplies to major system Loads.	3.3/3.4	B
063 DC Electrical Distribution		X										K2.01 Bus power supplies to major DC loads.	2.9/3.1	B
064 Emergency Diesel Generator				X								K4.02 System design features that provide trips for the EDG during normal and emergency conditions.	3.9/4.2	B
073 Process Radiation Monitoring											X	G2.1.32 Explain and apply system limit and precautions.	3.4/3.8	R
075 Circulating Water	X											K1.02 Physical connections or relationship between the Circulating Water System and Liquid radwaste discharge.	2.9/3.1	B
079 Station Air	X											K1.01 Physical connections or relationship between Station Air and Instrument Air System.	3.0/3.1	R
086 Fire Protection										X		A4.02 Manually operate or monitor Fire Protection Panels from the Control Room.	3.5/3.5	B
K/A Category Point Totals:	2	2	3	3	1	1	2	1	2	1	2	Group Point Total:		20

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01

St. Lucie (01-301) PWR RO Examination Outline
Plant Systems - Tier 2/Group 3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Exam
005 Residual Heat Removal				X								K4.03 Knowledge of RHRS design features or interlocks which provide for RHR heat exchanger bypass flow control.	2.9/3.2	R
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water								X				A2.02 Predict impact of CCW High/Low surge tank level on plant operations.	3.2/3.5	R
027 Containment Iodine Removal	X											K1.01 Physical connections or relationship between Containment Iodine Removal Sys. And the Containment Spray Sys.	3.4/3.7	B
028 Hydrogen Recombiner and Purge Control											X	G2.4.21 Knowledge of parameter and logic used to assess safety functions.	3.7/4.3	R
034 Fuel Handling Equipment														
041 Steam Dump/Turbine Bypass Control										X		A4.08 Manually operate or monitor operation of the Steam Dump Valves	3.0/3.1	R
045 Main Turbine Generator									X			A3.07 Monitor auto operation including stop/gov. valve position on trip	3.5/3.6	B
076 Service Water														
078 Instrument Air			X									K3.02 Affect that a loss or malfunction of the Instrument Air Sys. Will have on systems with pneumatic valves and controls.	3.4/3.6	B
103 Containment							X					A1.01 Predict and monitor changes in Containment pressure, temperature, and humidity to prevent exceeding design limits.	3.7/4.1	R
K/A Category Point Totals:	1		1	1			1	1	1	1	1	Group Point Total:		8

ES-401-4	Generic Knowledge and Abilities Outline (Tier 3)	
Facility: St. Lucie (01-301)	Date of Exam: 5/14/01	Exam Level: RO

Category	K/A #	Topic	Imp.	Exam
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirments	3.7/3.8	B
	2.1.7	Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation	3.7/4.4	B
	2.1.11	Knowledge of less than one hour TS action statements	3.0/3.8	B
	2.1.20	Ability to execute procedure steps	4.3/4.2	B
	Total			4
Equipment Control	2.2.1	Ability to perform pre-startup procedures including operating those controls associated with equipment that could affect reactivity.	3.7/3.6	B
	2.2.11	Knowledge of the process for controlling temporary changes.	2.5/3.4	B
	2.2.30	Knowledge of RO duties in the control room during fuel handling activities such as alarms from fuel handling area, communications with fuel storage facility, systems operated in the control room to support fueling operations, and supporting instrumentation.	3.5/3.3	R
	Total			3
Radiation Control	2.3.1	Knowledge of 10 CFR:20 and related facility radiation control requirements.	2.6/3.0	B
	2.3.2	Knowledge of facility ALARA program	2.5/2.9	R
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5/3.1	B
	Total			3
Emergency Procedures and Plan	2.4.6	Knowledge of symptom based EOP mitigation strategies.	3.1/4.0	B
	2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions.	3.7/4.3	B
	2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0/4.0	R
	Total			3
Tier 3 Target Point Total				13

Facility:St. Lucie (01-301) Date of Exam: 5/14/01 Exam Level: RO

Tier	Group	K/A Category Points											Point Total
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	2	2	2	4				3	3			3	17
	3	1	1						1				3
	Tier Totals	5	5	7				6	7			6	36
2. Plant Systems	1	2	1	2	3	2	2	1	3	2	2	3	23
	2	2	2	3	3	1	1	2	1	2	1	2	20
	3	1		1	1			1	1	1	1	1	8
	Tier Totals	5	3	6	7	3	3	4	5	5	4	6	51

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
	4	3	3	3	13

Note:
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2. Actual point totals must match those specified in the table.
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.

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01	ST. Lucie (01-301) PWR RO examination Outline Form Emergency and Abnormal Plant Evolutions - Tier 1/Group 1								ES-401-4
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000005 Inoperable/Stuck Control Rod / I	X						AK1.06 Bases for power limit, for Rod misalignment	2.9/3.8	B
000015/17 RCP Malfunctions / IV						X	G2.1.28 Knowledge of the purpose and function of major systems/components/controls	3.2/3.3	B
BW/E09**; CE/A13**; W/E09&E10 Natural Circ. / IV	X						AK1.2 Normal, abnormal and emergency operating procedures associated with Nat. Circ.	3.2/3.5	B
000024 Emergency Boration / I		X					AK2.03 Knowledge of Emergency Boration and controllers and positioners	2.6/2.5	B
000026 Loss of Component Cooling Water / VIII			X				AK3.02 Automatic alignments within CCWS from actuation of ESFAS	3.6/3.9	B
000027 Pressurizer Pressure Control System Malfunction / III						X	G2.2.3 Knowledge of design, procedural, operational Unit differences	3.1/3.3	R
000040 (BW/E05; **CE/E05**; W/E12) Steam Line Rupture - Excessive Heat Transfer / IV					X		EA2.2 Adherence to procedures and operation within the facility license and amendments	3.4/4.2	B
CE/A11; W/E08 RCS Overcooling - PTS / IV			X				AK3.3 Manipulation of controls to obtain desired operating results during abnormal and emergency situations	3.1/3.5	B
000051 Loss of Condenser Vacuum / IV					X		AA2.02 Conditions requiring reactor and/or turbine trip	3.9/4.1	B
000055 Station Blackout / VI					X		EA2.06 Faults and lockouts that must be cleared prior to re-energizing busses	3.7/4.1	B
000057 Loss of Vital AC Elec. Inst. Bus / VI				X			AA1.06 Manual control of components on loss of vital AC when auto control is lost.	3.5/3.5	B
000062 Loss of Nuclear Service Water / IV			X				AK3.03 Guidance contained in EOP for loss of Nuclear service water	4.0/4.2	B
000067 Plant Fire On-site / IX						X	G2.4.25 Knowledge of fire protection procedures	2.9/3.4	R
000068 (BW/A06) Control Room Evac. / VIII				X			AA1.01 Ability to operate ADV's as they apply to Control room evac.	4.3/4.5	B
000069 (W/E14) Loss of CTMT Integrity / V									
000074 (W/E06&E07) Inad. Core Cooling / IV		X					EK2.05 Knowledge of inadequate core cooling and LPSI pumps	3.9/4.1	B
000076 High Reactor Coolant Activity / IX				X			AA1.04 Ability to operate/monitor failed fuel monitoring equipment	3.2/3.4	B
K/A Category Totals:	2	2	3	3	3	3	Group Point Total:		16

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01 St. Lucie (01-310) PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000001 Continuous Rod Withdrawal / I			X				AK3.02 Tech-Spec limits on rod operability	3.2/4.3	B
000003 Dropped Control Rod / I					X		AA2.02 Ability to determine/interpret signal inputs to the rod control system resulting from a dropped rod.	2.7/2.8	B
000007 (BW/E02&E10; **CE/E02**) Reactor Trip - Stabilization - Recovery / I				X			EA1.1 Ability to operate/monitor components and functions of control and safety systems including signals, interlocks, failure modes, automatic and manual features	3.7/3.7	B
000008 Pressurizer Vapor Space Accident / III					X		AA2.03 PORV position indicators and accoustic monitors	3.9/3.9	B
000009 Small Break LOCA / III		X					EK2.03 Interrelations between SBLOCA and S/G's	3.0/3.3	B
000011 Large Break LOCA / III						X	G2.4.14 Knowledge of general guidelines for EOP flowchart use	3.0/3.9	B
000022 Loss of Reactor Coolant Makeup / II				X			AA1.08 Ability to operate/monitor VCT level as applicable to loss of Reactor Coolant makeup	3.4/3.3	B
000025 Loss of RHR System / IV	X						AK1.01 Loss of RHRS during all modes of operation	3.9/4.3	B
000029 Anticipated Transient w/o Scram / I	X						EK1.05 Operational implications/definition of negative temperature coefficient as applied to PWR during ATWAS	2.8/3.2	B
000032 Loss of Source Range NI / VII									
000037 Steam Generator Tube Leak / III					X		AA2.13 Ability to interpret which SG is leaking	4.1/4.3	B
000038 Steam Generator Tube Rupture / III				X			EA1.11 Ability to operate and monitor S/G level indicators as they apply to a SGTR	3.8/3.9	B
000054 (CE/E06) Loss of Main Feedwater / IV						X	G2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm.	3.3/3.6	B
000058 Loss of DC Power / VI			X				AK3.02 Knowledge of the reasons for actions contained in EOP for loss of DC power	4.0/4.2	B
000059 Accidental Liquid RadWaste Rel. / IX			X				AK3.01 Termination of release of radioactive liquid	3.5/3.9	R
000060 Accidental Gaseous Radwaste Rel. / IX		X					AK2.02 Knowledge of interrelations between accidental release and Aux. Building ventilation systems	2.7/3.1	B
000061 ARM System Alarms / VII			X				AK3.02 Knowledge of reasons for guidance contained in alarm response for ARM alarm	3.4/3.6	B
CE/E09 Functional Recovery						X	G2.4.16 Knowledge of EOP implementation hierarchy and coordination with other support procedures	3.0/4.0	B
K/A Category Point Totals:	2	2	4	3	3	3	Group Point Total:		17

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01

St. Lucie (01-301) PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 3

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000028 Pressurizer Level Malfunction / II	X						AK1.01 Knowledge of operational implications of PZR reference leak	2.8/3.1	B
000036 (BW/A08) Fuel Handling Accident / VIII									
000056 Loss of Off-site Power / VI									
000065 Loss of Instrument Air / VIII					X		AA2.06 Ability to determine when to trip reactor if instrument air pressure is decreasing	3.6/4.2	B
CE/A16 Excess RCS Leakage / II		X					AK2.1 Components and functions of control and safety systems including Inst. Signals, interlocks, failure modes and auto features	3.2/3.5	B
K/A Category Point Totals:	1	1			1		Group Point Total:		3

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01

St. Lucie (01-301) PWR RO Examination Outline
Plant Systems - Tier 2/Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	Imp.	Exam
001 Control Rod Drive						X					X	K6.11 Location and operation of CRDS fault detection and reset system including rod control annhunciator G2.2.12 Knowledge of surveillance procedures	2.9/3.2 3.0/3.4	R B
003 Reactor Coolant Pump			X								X	K3.04 Knowledge of the effect that a loss or malfunction of RCP's will have on the RPS G2.4.18 Knowledge of the specific bases for EOP's	3.9/4.2 2.7/3.6	R B
004 Chemical and Volume Control							X		X			A1.07 Ability to predict and or monitor changes in parameters to prevent exceeding design limits associated with CVCS and maximum specified letdown flow. A3.03 Ability to monitor automatic operation of CVCS and ion exchanger bypass	2.7/3.1 2.9/2.9	B R
013 Engineered Safety Features Actuation		X				X						K2.01 Knowledge of bus power supplies to ESFAS/safeguards equipment control K6.01 Knowledge of the effect of a loss or malfunction of sensors and detectors will have on the ESFAS	3.6/3.8 2.7/3.1	R B
015 Nuclear Instrumentation				X	X							K4.02 Knowledge of NIS design features on rod motion inhibits K5.15 Knowledge of operational implications on effects of xenon on local flux and factors affecting xenon concentrations	3.7/3.9 3.3/3.7	R B
017 In-core Temperature Monitor										X		A4.01 Ability to monitor in control room in-core temperatures	3.8/4.1	B
022 Containment Cooling	X							X				K1.01 Knowledge of relationship between CCS and SWS/cooling system A2.03 Ability to predict impact of fan motor thermal overload/high speed operation	3.5/3.7 2.6/3.0	B R
056 Condensate	X											K1.03 Knowledge of physical connections and/or cause effect between Condensate and MFW	2.6/2.6	B
059 Main Feedwater			X					X				K3.02 Knowledge of effect that a loss of MFW will have on AFW system A2.12 Ability to predict impact of failure of feedwater reg. Valves on MFW	3.6/3.7 3.1/3.4	B R
061 Auxiliary/Emergency Feedwater				X				X				K4.02 Knowledge of AFW design features/interlocks which provide AFW auto start upon loss of MFW pp, S/G level, blackout or SI A2.03 Ability to predict impact on AFW for loss of DC power	4.5/4.6 3.1/3.4	B B
068 Liquid Radwaste									X			A3.02 Ability to monitor auto isolation	3.6/3.6	B
071 Waste Gas Disposal				X							X	K4.04 Knowledge of design feature and/or interlocks for isolation of waste gas release tanks G2.1.32 Ability to explain and apply system limits and precautions	2.9/3.4 3.4/3.8	B R
072 Area Radiation Monitoring					X					X		K5.01 Knowledge of radiation theory, sources types, units, and effects A4.02 Ability to manually operate or monitor major components	2.7/3.0 2.5/2.5	R B
K/A Category Point Totals:	2	1	2	3	2	2	1	3	2	2	3	Group Point Total:		23

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01

St. Lucie (01-301) PWR RO Examination Outline
Plant Systems - Tier 2/Group 2

System # / Name	K 1	K2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	Imp.	Exam
002 Reactor Coolant							X					A1.04 Predict and monitor changes in Subcooled Margin.	3.9/4.1	B
006 Emergency Core Cooling									X		X	A3.08 Automatic transfer of ECCS flowpaths (RAS). G2.1.20 Ability to execute ECCS procedure steps.	4.2/4.3 4.3/4.2	B B
010 Pressurizer Pressure Control					X							K5.01 Determine condition of fluid in Pzr, using Steam Tables.	3.5/4.0	B
011 Pressurizer Level Control								X				A2.11 Predict impact of Pzr level instrument failing low.	3.4/3.6	B
012 Reactor Protection				X								K4.01 Design feature or interlock that provides trip logic with one channel in trip or bypass.	3.7/4.0	R
014 Rod Position Indication				X								K4.06 Rod position indications for individual or group misalignment.	3.4/3.7	R
026 Containment Spray							X					A1.03 Predict and monitor changes in Containment sump level with Containment Spray.	3.5/3.5	B
029 Containment Purge									X			A3.01 Ability to monitor automatic operation of the Containment Purge System including isolation.	3.8/4.0	B
033 Spent Fuel Pool Cooling			X									K3.03 Effect of a loss of Spent Fuel Pool Cooling on Spent Fuel temperature.	3.0/3.3	B
035 Steam Generator						X						K6.03 Effect of a malfunction or a loss of a S/G level instrument on S/G level.	2.6/3.0	B
039 Main and Reheat Steam			X									K3.05 Effect that a malfuction or a loss of Main or Reheat Steam will have on the RCS.	3.6/3.7	R
055 Condenser Air Removal			X									K3.01 Effect a loss of Condenser Air Removal will have on the Main Condenser.	2.5/2.7	B
062 AC Electrical Distribution		X										K2.01 Bus power supplies to major system Loads.	3.3/3.4	B
063 DC Electrical Distribution		X										K2.01 Bus power supplies to major DC loads.	2.9/3.1	B
064 Emergency Diesel Generator				X								K4.02 System design features that provide trips for the EDG during normal and emergency conditions.	3.9/4.2	B
073 Process Radiation Monitoring											X	G2.1.32 Explain and apply system limit and precautions.	3.4/3.8	R
075 Circulating Water	X											K1.02 Physical connections or relationship between the Circulating Water System and Liquid radwaste discharge.	2.9/3.1	B
079 Station Air	X											K1.01 Physical connections or relationship between Station Air and Instrument Air System.	3.0/3.1	R
086 Fire Protection										X		A4.02 Manually operate or monitor Fire Protection Panels from the Control Room.	3.5/3.5	B
K/A Category Point Totals:	2	2	3	3	1	1	2	1	2	1	2	Group Point Total:		20

ES-401-4 St. Lucie (01-301) Date of Exam: 5/14/01

St. Lucie (01-301) PWR RO Examination Outline
Plant Systems - Tier 2/Group 3

System # / Name	K1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	Imp.	Exam
005 Residual Heat Removal				X								K4.03 Knowledge of RHRS design features or interlocks which provide for RHR heat exchanger bypass flow control.	2.9/3.2	R
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water								X				A2.02 Predict impact of CCW High/Low surge tank level on plant operations.	3.2/3.5	R
027 Containment Iodine Removal	X											K1.01 Physical connections or relationship between Containment Iodine Removal Sys. And the Containment Spray Sys.	3.4/3.7	B
028 Hydrogen Recombiner and Purge Control											X	G2.4.21 Knowledge of parameter and logic used to assess safety functions.	3.7/4.3	R
034 Fuel Handling Equipment														
041 Steam Dump/Turbine Bypass Control										X		A4.08 Manually operate or monitor operation of the Steam Dump Valves	3.0/3.1	R
045 Main Turbine Generator									X			A3.07 Monitor auto operation including stop/gov. valve position on trip	3.5/3.6	B
076 Service Water														
078 Instrument Air			X									K3.02 Affect that a loss or malfunction of the Instrument Air Sys. Will have on systems with pneumatic valves and controls.	3.4/3.6	B
103 Containment							X					A1.01 Predict and monitor changes in Containment pressure, temperature, and humidity to prevent exceeding design limits.	3.7/4.1	R
K/A Category Point Totals:	1		1	1			1	1	1	1	1	Group Point Total:		8

ES-401-4	Generic Knowledge and Abilities Outline (Tier 3)	
Facility: St. Lucie (01-301)	Date of Exam: 5/14/01	Exam Level: RO

Category	K/A #	Topic	Imp.	Exam
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirments	3.7/3.8	B
	2.1.7	Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation	3.7/4.4	B
	2.1.11	Knowledge of less than one hour TS action statements	3.0/3.8	B
	2.1.20	Ability to execute procedure steps	4.3/4.2	B
	Total			4
Equipment Control	2.2.1	Ability to perform pre-startup procedures including operating those controls associated with equipment that could affect reactivity.	3.7/3.6	B
	2.2.11	Knowledge of the process for controlling temporary changes.	2.5/3.4	B
	2.2.30	Knowledge of RO duties in the control room during fuel handling activities such as alarms from fuel handling area, communications with fuel storage facility, systems operated in the control room to support fueling operations, and supporting instrumentation.	3.5/3.3	R
	Total			3
Radiation Control	2.3.1	Knowledge of 10 CFR:20 and related facility radiation control requirements.	2.6/3.0	B
	2.3.2	Knowledge of facility ALARA program	2.5/2.9	R
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5/3.1	B
	Total			3
Emergency Procedures and Plan	2.4.6	Knowledge of symptom based EOP mitigation strategies.	3.1/4.0	B
	2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions.	3.7/4.3	B
	2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0/4.0	R
	Total			3
Tier 3 Target Point Total				13

FINAL SUBMITTAL

ST. LUCIE EXAM
50-335, 389/2001-301

MAY 14 - 18 & 21 - 25, 2001

FINAL SRO LICENSE EXAM

REFERENCE MATERIAL

FINAL SUBMITTAL

ST. LUCIE EXAM
50-335, 389/2001-301

MAY 14 - 18 & 21 - 25, 2001

FINAL SRO LICENSE EXAM

REFERENCE MATERIAL

Facility: St. Lucie (01-301) Date of Exam: 5/14/01 Exam Level: SRO

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	3	4	4				4	5			4	24
	2	1	2	2				3	4			4	16
	3	1	1						1				3
	Tier Totals	5	7	6				7	10			8	43
2. Plant Systems	1	2	1	1	2	1	1	2	3	1	2	3	19
	2	2	2	2		1	1	1	2	2	1	3	17
	3			1					1	1		1	4
	Tier Totals	4	3	4	2	2	2	3	6	4	3	7	40

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	17
	5	5	3	4	

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. Actual point totals must match those specified in the table.
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.

ES-401 St. Lucie (01-301) Date of Exam: 5/14/01	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						Form ES-401-3	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000001 Continuous Rod Withdrawal / I			X				AK3.02 Tech-Spec limits on rod operability	3.2/4.3	B
000003 Dropped Control Rod / I					X		AA2.02 Ability to determine/interpret signal inputs to the rod control system resulting from a dropped rod.	2.7/2.8	B
000005 Inoperable/Stuck Control Rod / I	X						AK1.06 Bases for power limit, for Rod misalignment	2.9/3.8	B
000011 Large Break LOCA / III						X	G2.4.14 Knowledge of general guidelines for EOP flowchart use	3.0/3.9	B
000015/17 RCP Malfunctions / IV						X	G2.1.28 Knowledge of the purpose and function of major systems/components/controls	3.2/3.3	B
BW/E09; **CE/A13**; W/E09&E10 Natural Circ. / IV	X					X	AK1.2 Normal, abnormal and emergency operating procedures associated with Nat. Circ. G2.4.11 Knowledge of abnormal condition procedures	3.2/3.5 3.4/3.6	B S
000024 Emergency Boration / I		X					AK2.03 Knowledge of Emergency Boration and controllers and positioners	2.6/2.5	B
000026 Loss of Component Cooling Water / VIII			X				AK3.02 Automatic alignments within CCWS from actuation of ESFAS	3.6/3.9	B
000029 Anticipated Transient w/o Scram / I	X						EK1.05 Operational implications/definition of negative temperature coefficient as applied to PWR during ATWAS	2.8/3.2	B
000040 (BW/E05; **CE/E05**; W/E12) Steam Line Rupture - Excessive Heat Transfer / IV					X		EA2.2 Adherence to procedures and operation within the facility license and amendments	3.4/4.2	B
CE/A11; W/E08 RCS Overcooling - PTS / IV			X			X	G2.4.22 Knowledge of bases for prioritizing safety functions AK3.3 Manipulation of controls to obtain desired operating results during abnormal and emergency situations	3.0/4.0 3.1/3.5	S B
000051 Loss of Condenser Vacuum / IV					X		AA2.02 Conditions requiring reactor and/or turbine trip	3.9/4.1	B
000055 Station Blackout / VI				X	X		EA1.06 Restoration of power with one EDG EA2.06 Faults and lockouts that must be cleared prior to re-energizing busses	4.1/4.5 3.7/4.1	S B
000057 Loss of Vital AC Elec. Inst. Bus / VI				X			AA1.06 Manual control of components on loss of vital AC when auto control is lost.	3.5/3.5	B
000062 Loss of Nuclear Service Water / IV			X				AK3.03 Guidance contained in EOP for loss of Nuclear service water	4.0/4.2	B
000067 Plant Fire On-site / IX					X		AA2.13 Ability to determine and interpret need for emergency plant shutdown	3.3/4.4	S
000068 (BW/A06) Control Room Evac. / VIII		X		X			AK2.07 Knowledge of Control room evacuation and EDG AA1.01 Ability to operate ADV's as they apply to Control room evac.	3.3/3.4 4.3/4.5	S B
000069 (W/E14) Loss of CTMT Integrity / V		X					AK2.03 Loss of containment integrity, personnel/emergency hatch	2.8/2.9	S
000074 (W/E06&E07) Inad. Core Cooling / IV		X					EK2.05 Knowledge of inadequate core cooling and LPSI pumps	3.9/4.1	B
000076 High Reactor Coolant Activity / IX				X			AA1.04 Ability to operate/monitor failed fuel monitoring equipment	3.2/3.4	B
K/A Category Totals:	3	4	4	4	5	4	Group Point Total:		24

ES-401 St. Lucie (01-301) Date of Exam: 5/14/01	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-3	
E/APE # / Name / Safety Function	K1	K2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000007 (BW/E02&E10; **CE/E02**) Reactor Trip - Stabilization - Recovery /				X			EA1.1 Ability to operate/monitor components and functions of control and safety systems including signals, interlocks, failure modes, automatic and manual features	3.7/3.7	B
000008 Pressurizer Vapor Space Accident / III					X		AA2.03 PORV position indicators and accoustic monitors	3.9/3.9	B
000009 Small Break LOCA / III		X					EK2.03 Interrelations between SBLOCA and S/G's	3.0/3.3	B
000022 Loss of Reactor Coolant Makeup / II				X			AA1.08 Ability to operate/monitor CVCS letdown and charging as they apply to loss of RC pump makeup	3.4/3.3	B
000025 Loss of RHR System / IV	X						AK1.01 Loss of RHRS during all modes of operation	3.9/4.3	B
000027 Pressurizer Pressure Control System Malfunction / III						X	G2.4.48 Ability to interpret control room indications to verify status/operation of system, and understand how operator action affect plant conditions.	3.5/3.8	S
000032 Loss of Source Range NI / VII						X	G2.2.3 Knowledge of design, procedural and operational differences between units	3.1/3.3	S
000033 Loss of Intermediate Range NI / VII							Not chosen due to St. Lucie plant has no intermediate range NI's		
000037 Steam Generator Tube Leak / III					X		AA2.13 Ability to interpret which SG is leaking	4.1/4.3	B
000038 Steam Generator Tube Rupture / III				X			EA1.11 Ability to operate and monitor S/G level indicators as they apply to a SGTR	3.8/3.9	B
000054 (CE/E06) Loss of Main Feedwater / IV						X	G2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm.	3.3/3.6	B
000058 Loss of DC Power / VI			X		X		AK3.02 Knowledge of the reasons for actions contained in EOP for loss of DC power AA2.03 Ability to determine DC loads lost; impact on ability to operate and monitor plant systems	4.0/4.2 3.5/3.9	B S
000060 Accidental Gaseous Radwaste Rel. / IX		X					AK2.02 Knowledge of interrelations between accidental release and Aux. Building ventilation systems	2.7/3.1	B
000061 ARM System Alarms / VII			X				AK3.02 Knowledge of reasons for guidance contained in alarm response for ARM alarm	3.4/3.6	B
000065 Loss of Instrument Air / VIII					X		AA2.06 Ability to determine when to trip reactor if instrument air pressure is decreasing	3.6/4.2	B
CE/E09 Functional Recovery						X	G2.4.16 Knowledge of EOP implementation hierarchy and coordination with other support procedures	3.0/4.0	B
K/A Category Point Totals:	1	2	2	3	4	4	Group Point Total:		16

ES-401 St. Lucie (01-301) Date of Exam: 5/14/01

PWR SRO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 3

Form ES-401-3

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000028 Pressurizer Level Malfunction / II	X						AK1.01 Knowledge of operational implications of PZR reference leak	2.8/3.1	B
000036 (BW/A08) Fuel Handling Accident / VIII									
000056 Loss of Off-site Power / VI					X		AA2.20 AFW flow indicator	3.9/4.1	S
CE/A16 Excess RCS Leakage / II		X					AK2.1 Components and functions of control and safety systems including Inst. Signals, interlocks, failure modes and auto features	3.2/3.5	B
K/A Category Point Totals:	1	1			1		Group Point Total:		3

ES-401 St. Lucie (01-301) Date of Exam: 5/14/01 | PWR SRO Examination Outline Plant Systems - Tier 2/Group 1 | Form ES-401-3

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	Imp.	Exam
001 Control Rod Drive											X	G2.2.12 Knowledge of surveillance procedures	3.0/3.4	B
003 Reactor Coolant Pump								X			X	A2.02 Conditions for an abnormal shutdown of RCP compared to normal shutdown of RCP G2.4.18 Knowledge of the specific bases for EOP's	3.7/3.9 2.7/3.6	S B
004 Chemical and Volume Control							X					A1.07 Ability to predict and or monitor changes in parameters to prevent exceeding design limits associated with CVCS and maximum specified letdown flow.	2.7/3.1	B
013 Engineered Safety Features Actuation						X						K6.01 Knowledge of the effect of a loss or malfunction of sensors and detectors will have on the ESFAS	2.7/3.1	B
014 Rod Position Indication														
015 Nuclear Instrumentation					X			X				K5.15 Knowledge of operational implications on effects of xenon on local flux and factors affecting xenon concentrations A2.05 Impact of core void formation on NIS	3.3/3.7 3.3/3.5	B S
017 In-core Temperature Monitor										X		A4.01 Ability to monitor in control room in-core temperatures	3.8/4.1	B
022 Containment Cooling	X											K1.01 Knowledge of relationship between CCS and SWS/cooling system	3.5/3.7	B
026 Containment Spray							X				X	A1.03 Predict and monitor changes in Containment sump level with Containment spray G2.4.21 Knowledge of parameters and logic used to assess status of safety functions	3.5/3.5 3.7/4.3	B S
056 Condensate	X											K1.03 Knowledge of physical connections and/or cause effect between Condensate and MFW	2.6/2.6	B
059 Main Feedwater			X									K3.02 Knowledge of effect that a loss of MFW will have on AFW system	3.6/3.7	B
061 Auxiliary/Emergency Feedwater				X				X				K4.02 Knowledge of AFW design features/interlocks which provide AFW auto start upon loss of MFW pp, S/G level, blackout or SI A2.03 Ability to predict impact on AFW for loss of DC power	4.5/4.6 3.1/3.4	B B
063 DC Electrical Distribution		X										K2.01 Bus power supplies to major DC loads.	2.9/3.1	B
068 Liquid Radwaste									X			A3.02 Ability to monitor auto isolation	3.6/3.6	B
071 Waste Gas Disposal				X								K4.04 Knowledge of design feature and/or interlocks for isolation of waste gas release tanks	2.9/3.4	B
072 Area Radiation Monitoring										X		A4.02 Ability to manually operate or monitor major components	2.5/2.5	B
K/A Category Point Totals:	2	1	1	2	1	1	2	3	1	2	3	Group Point Total:		19

ES-401 St. Lucie (01-301) Date of Exam: 5/14/01	PWR SRO Examination Outline Plant Systems - Tier 2/Group 2											Form ES-401-3		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	Imp.	Exam
002 Reactor Coolant							X					A1.04 Predict and monitor changes in subcooled margin.	3.9/4.1	B
006 Emergency Core Cooling									X		X	A3.08 Automatic transfer of ECCS flowpaths (RAS). G2.1.20 Ability to execute ECCS procedure steps.	4.2/4.3 4.3/4.2	B B
010 Pressurizer Pressure Control					X							K5.01 Determine condition of fluid in Pzr, using Steam Tables.	3.5/4.0	B
011 Pressurizer Level Control								X				A2.11 Predict impact of Pzr level instrument failing low.	3.4/3.6	B
012 Reactor Protection											X	G2.1.33 Ability to recognize indications for entry-level conditions for technical specifications	3.4/4.0	S
027 Containment Iodine Removal	X											K1.01 Physical connections or relationship between Containment Iodine Removal Sys. And the Containment Spray Sys.	3.4/3.7	B
028 Hydrogen Recombiner and Purge Control								X				A2.02 LOCA condition and related concern over hydrogen	3.5/3.9	S
029 Containment Purge									X			A3.01 Ability to monitor automatic operation of the Containment Purge System including isolation.	3.8/4.0	B
033 Spent Fuel Pool Cooling			X									K3.03 Effect of a loss of Spent Fuel Pool Cooling on Spent Fuel temperature.	3.0/3.3	B
035 Steam Generator						X						K6.03 Effect of a malfunction or a loss of a S/G level instrument on S/G level.	2.6/3.0	B
039 Main and Reheat Steam														
055 Condenser Air Removal		X										K3.01 Effect a loss of Condenser Air Removal will have on the Main Condenser.	2.5/2.7	B
062 AC Electrical Distribution		X										K2.01 Bus power supplies to major system Loads.	3.3/3.4	B
064 Emergency Diesel Generator			X								X	K4.02 System design features that provide trips for the EDG during normal and emergency conditions. G2.2.23 Ability to track limiting conditions for operations	3.9/4.2 2.6/3.8	B S
073 Process Radiation Monitoring														
075 Circulating Water	X											K1.02 Physical connections or relationship between the Circulating Water System and Liquid radwaste discharge.	2.9/3.1	B
079 Station Air														
086 Fire Protection										X		A4.02 Manually operate or monitor Fire Protection Panels from the Control Room.	3.5/3.5	B
103 Containment														
K/A Category Point Totals:	2	2	2		1	1	1	2	2	1	3	Group Point Total:		17

ES-401 St. Lucie (01-301) Date of Exam: 5/14/01								PWR SRO Examination Outline Plant Systems - Tier 2/Group 3					Form ES-401-3	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	Imp.	Exam
005 Residual Heat Removal											X	G2.4.2 Knowledge of system setpoints, interlocks and automatic actions associated with EOP entry conditions.	3.9/4.1	S
007 Pressurizer Relief/Quench Tank								X				A2.03 Ability to predict the impact of overpressurization of the PZR and correct or mitigate the consequences	3.6/3.9	S
008 Component Cooling Water														
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator									X			A3.07 Monitor auto operation including stop/gov. valve position on trip	3.5/3.6	B
076 Service Water														
078 Instrument Air			X									K3.02 Affect that a loss or malfunction of the Instrument Air Sys. Will have on systems with pneumatic valves and controls.	3.4/3.6	B
K/A Category Point Totals:			1					1	1		1	Group Point Total:		4

ES-401 Facility: St. Lucie (01-301)		Generic Knowledge and Abilities Outline (Tier 3) Date of Exam: 5/14/01		Form ES-401-5 Exam Level: SRO
Category	K/A #	Topic	Imp.	Exam
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirments	3.7/3.8	B
	2.1.7	Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation	3.7/4.4	B
	2.1.11	Knowledge of less than one hour TS action statements	3.0/3.8	B
	2.1.12	Ability to apply technical specifications for a system	2.9/4/0	S
	2.1.20	Ability to execute procedure steps	4.3/4.2	B
	Total			5
Equipment Control	2.2.1	Ability to perform pre-startup procedures including operating those controls associated with equipment that could affect reactivity.	3.7/3.6	B
	2.2.11	Knowledge of the process for controlling temporary changes.	2.5/3.4	B
	2.2.18	Knowledge of the process for managing maintenance activities during shutdown activities	2.3/3.6	S
	2.2.24	Ability to analyze the affect of maintenance activities on LCO status.	2.6/3.8	S
	2.2.29	Knowledge of SRO fuel handling duties	1.6/3.8	S
	Total			5
Radiation Control	2.3.1	Knowledge of 10 CFR:20 and related facility radiation control requirements.	2.6/3.0	B
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5/3.1	B
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9/3.3	S
	Total			3
Emergency Procedures and Plan	2.4.6	Knowledge of symptom based EOP mitigation strategies.	3.1/4.0	B
	2.4.9	Knowledge of low power/shutdown implications (LOCA/loss of RHR) in accident mitigation strategies	3.3/3.9	S
	2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions.	3.7/4.3	B
	2.4.40	Knowledge of SRO's responsibilities in emergency plan implementation	2.3/4/0	S
	Total			4
				17
Tier 3 Target Point Total SRO				17

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. U/E/S	6. Explanation
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward		
2												S	Clarify that no operator action is taken OK
3												E	Justify this Q under 55.41. Language in Q not the same as ONP. 55.41.b(10) NO CHANGE REQ'D
7												S	Is applicant to determine that Hot Leg is covered based on subcooling? No data given for RVLS to satisfy EOP-03 step 25D. - VESSEL LEVEL ADDED
8												E	Show tie to 55.41 55.41.b(7)
9												U	Loss of Nuc Svc Water (K/A) refers to ICW, NOT CCW (Q). Loss of CCW is covered under 000026, NOT 000062. Change Q. FIXED SAT
10												E	Show connection to 55.43 or demonstrate tie to SRO L.O. 0902723-02 SAT
11												U	Does not address KA (Operational implications of some aspect of Rad Theory). FIXED SAT
13												E	Q Sat. Distractor D implausible - thermal overloads don't relate to thermal conditions FIXED SAT
14												U	Change "Failed" to Fails." Q doesn't satisfy K/A. K/A calls for predicting impact on pzr level control system. Question tests impact on pzr pressure control system. FIXED SAT
16												U	Q doesn't agree with K/A, which calls for effect of malf on RCS, not RPS. FIXED SAT

Instructions

[Refer to Appendix B for additional information regarding each of the following concepts.]

1. Enter the level of knowledge (LOK) of each question as either (F)undamental or (H)igher cognitive level.

2. Enter the level of difficulty (LOD) of each question using a 1 - 5 (easy - difficult) rating scale (questions in the 2 - 4 range are acceptable).

3. Check the appropriate box if a psychometric flaw is identified:
   - The stem lacks sufficient focus to elicit the correct answer (e.g., unclear intent, more information is needed, or too much needless information).
   - The stem or distractors contain cues (i.e., clues, specific determiners, phrasing, length, etc).
   - The answer choices are a collection of unrelated true/false statements.
   - More than one distractor is not credible.
   - One or more distractors is (are) partially correct (e.g., if the applicant can make unstated assumptions that are not contradicted by stem).

4. Check the appropriate box if a job content error is identified:
   - The question is not linked to the job requirements (i.e., the question has a valid K/A but, as written, is not operational in content).
   - The question requires the recall of knowledge that is too specific for the closed reference test mode (i.e., it is not required to be known from memory).
   - The question contains data with an unrealistic level of accuracy or inconsistent units (e.g., panel meter in percent with question in gallons).
   - The question requires reverse logic or application compared to the job requirements.

5. Based on the reviewer's judgment, is the question as written (U)nacceptable (requiring repair or replacement), in need of (E)ditorial enhancement, or (S)atisfactory?

6. For any "U" ratings, at a minimum, explain how the Appendix B psychometric attributes are not being met.

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. U/E/S	6. Explanation
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward		
17												E	Explain why this isn't trivially simple - what might lead someone to pick OTHER than C? FIXED SAT
19												S	Make statement making it clear that CCW is in a normal full power lineup - both trains operable and cross-connected through N hdr. SAT
20												S	Verify solenoid valve closure is not off a trip relay no associated with CS pump brkr. LP says it closes if pump stops, it doesn't say valve won't open if pump doesn't start.
25												E	Too Simplistic and C&D are implausible. SAT FIX-LARRY F/U ON MCC 2A5
26												U	Distractors not effective. Q really asks "can you read figure 9?" SAT FIX
27												E	Supporting info doesn't make it clear that answer is correct. Need something that shows one "A" side ADV powered from "B" side modutronic. Ref mat'l talks about valves being able to be closed - not controlled.
28												E	"D" doesn't have supporting info that talks to going to "reset" then to "auto." Also, specify which 4160 breaker.
30												E	These are not ALL the actions necessary that must be taken to cooldown to SDC entry conditions. Better to ask "which one of the following describes the actions necessary to commence a cooldown..." SAT FIX
34												U	Show tie to 55.41. C is not correct - EOP-03 req's "all available operating..." Stem says no equip OOS. So, C should specify 2 in service. 41.6(8) SAT FIX
37												E	How does CBO T>200 compare with Table 1 max of 180? Change "normal" in D to "acceptable" or "sat" SAT FIX
42												E	Show link to 55.41 41(b)7 SAT
43												E	Show link to 55.41 41(b)6 SAT
49												E	make it clear in the stem that 1A is being lost. SAT FIX
50												E	Make link to 55.41. 41(b)(11) SAT
51												E	Make link to 55.41. 41(b)(7) SAT
58												E	Can't find a reference to "Group Motion Inhibit alarm." Can this Q be written without stating that Rx power decreases? That statement tends to make distractors C & D implausible. SAT FIX
60												E	Change K/A ref on Q to 2.2 from 2.1. Show tie to 55.41. 55.41(b)(10)

A SAT

A SAT w/ rev

A SAT FIX

St. Lucie Written Exam Comments

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. U/E/S	6. Explanation
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward		
61												E	Does not explicitly satisfy the K/A (Knowledge of reason for manipulation of controls to obtain desired operating results). Reference to instrument air in stem diminishes value of distractor A. SAT AS-WRITTEN
62												U	Q doesn't satisfy KA (Knowledge of the effect of a loss or malfunction of SG level detectors will have on SGS) SAT FIX
63												E	Show tie to 55.41 55.41(b)12
64												E	Show tie to 55.41. Also, distractor A does not appear to have any discriminatory value. Why would an applicant choose this? SAT FIX 55.41(b)10 - CHANGE PENDING
65												E	Show tie to 55.41. Also, add statement that SG blowdown is in alarm to make it clear that the only steam plant activity success path is to isolate SGs. SAT FIX ~~41(b)10~~ 41(b)10)
67												E	Suggestion - use 25 gpm as the makeup flow rate for distractors A and C - allows for error in reading the units of the x axis for this curve. SAT/FIXED
68												U	Q doesn't satisfy K/A - K/A calls for knowledge of the basis for the power limit for rod misalignment. Q calls for basis of time limit. SAT FIX
73												U	Q doesn't satisfy K/A - reason for T/S limits on operability SAT FIX
74												U	"correct answer" is incorrect. Should be 55 minutes. Make distractor C 50 minutes and D 55 minutes. SAT FIX
78												E	Q states that this is a "both" question, but it only appears on the RO exam outline SAT
81												E	Unclear what the distractor analysis for "C" has to do with "C" itself SAT FIX
82												E	Add "Unit 1" in distractor D - otherwise, C looks like a specific determiner SAT FIX
83												E	Show link to 55.41. 55.41(b)7 SAT
89												E	Specify whether leakage is identified or unidentified. SAT FIX
91												U	Show tie to 55.41 55.41(b)10 If audible count rate selected to "A," won't loss of A CIS monitor result in a loss of audible counts to containment? If so, "A" may seem like right answer - at least until another channel is selected. WRONG - Q SAT Distractor analysis for A - shouldn't it be 2 req'd, vice 3? NO - SAT Distractor analysis for B - what's the difference between a wide range detector and a wide range flux monitor? SAT Does "refueling operations" = "Core alterations?" SAT
94												E	Show tie to 55.41 55.41(b)(1) SAT

St. Lucie Written Exam Comments

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. U/E/S	6. Explanation
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward		
100												U	This does not appear to test the K/A ("knowledge of bases for prioritizing safety functions during abnormal/emergency operations"). Recommend either changing this to a "what is the basis of..." question, or modifying conditions so that one additional (minimum) distractor's safety function is not met, forcing the applicant to demonstrate a knowledge of the basis by truly prioritizing. SAT FIX
101												E	Verify that 0702830-11 is an SRO-level LO → TRY 0902704-5 SAT
103												E	Verify that 0702812-06 is an SRO-level LO → ~~TRY~~ REWRITE SAT 43.b.5
111												E	Change "the required" to "required" in the question in stem - the choices do not list ALL of the required action, just some. SAT FIX
113												E	Distractor C seems implausible. Try "Heat added by RCP operation" Change Cog Level to 2 SAT FIX *
118												E	Is "header throttle valve" synonymous with "flow control valve?" SAT FIX
125												E	Appears to be level 2. Clarify the electrical source of the gravity feed valves. SAT FIX *

* VERIFY NEW COUNTS

St. Lucie Plant
May 2001 NRC Exam

Q Num	K/A	Source	Level	Key	Exam	RO	SRO
						Q NUM	Q NUM
1	061.A2.03	Bank	2	D	Both	1	1
2	026.AK3.02	New	2	C	Both	2	2
3	051.AA2.02	New	1	C	Both	3	3
4	068.AA1.01	New	1	A	Both	4	4
5	13.AK1.2	Bank 00 ANO NRC	2	D	Both	5	5
6	028.AK1.01	99 PSL NRC	2	B	Both	6	6
7	074.EK2.05	New	2	B	Both	7	7
8	055.EA2.06	New	2	C	Both	8	8
9	062.AK3.03	New	1	A	Both	9	9
10	069.AK2.03	Mod. 00 NRC	2	C	SRO		10
11	072.K5.01	New	1	C	RO	10	
12	022.A2.03	New	2	D	RO	11	
13	022.K1.01	New	1	A	Both	12	11
14	011.A2.11	New	1	C	Both	13	12
15	056.K1.03	Mod. 00 NRC	2	C	Both	14	13
16	039.K3.05	New	2	B	RO	15	
17	059.A2.12	New	2	C	RO	16	
18	064.K4.02	New	1	B	Both	17	14
19	008.A2.02	New	2	B	RO	18	
20	027.K1.01	Bank	2	D	Both	19	15
21	078.K3.02	New	2	A	Both	20	16
22	063.K2.01	New	2	C	Both	21	17
23	045.A3.07	New	2	C	Both	22	18
24	005.K4.03	New	1	D	RO	23	
25	062.K2.01	New	1	B	Both	24	19
26	026.A1.03	New	2	B	Both	25	20
27	057.AA1.06	New	2	D	Both	26	21
28	027.G.2.2.3	New	2	D	RO	27	
29	010.K5.01	New	2	A	Both	28	22
30	041.A4.08	New	2	C	RO	29	
31	004.A3.03	New	2	C	RO	30	
32	076.AA1.04	New	1	A	Both	31	23
33	065.AA2.06	New	1	D	Both	32	24
34	028.G2.4.21	New	1	C	RO	33	
35	002.A1.04	New	2	C	Both	34	25
36	006.G2.1.20	New	2	B	Both	35	26
37	15/17.G2.1.28	Mod. 99 NRC	2	C	Both	36	27
38	004.A1.07	New	2	A	Both	37	28
39	09.EK2.03	New	2	B	Both	38	29
40	068.A3.02	New	1	C	Both	39	30
41	058.AK3.02	New	2	A	Both	40	31
42	08.AA2.03	New	1	B	Both	41	32
43	03.AA2.02	New	2	B	Both	42	33
44	013.K6.01	New	2	D	Both	43	34
45	013.K2.01	Bank	2	C	RO	44	
46	015.K5.15	New	2	B	Both	45	35
47	017.A4.01	New	1	A	Both	46	36
48	2.2.11	New	1	C	Both	47	37
49	079.K1.01	New	1	B	RO	48	

St. Lucie Plant
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Q Num	K/A	Source	Level	Key	Exam	RO	SRO
						Q NUM	Q NUM
50	037.AA2.13	New	1	B	Both	49	38
51	054.G2.4.45	New	2	A	Both	50	39
52	033.K3.03	New	2	A	Both	51	40
53	071.K4.04	New	1	D	Both	52	41
54	061.K4.02	New	2	B	Both	53	42
55	003.G2.4.18	New	2	C	Both	54	43
56	072.A4.02	New	1	A	Both	55	44
57	012.K4.01	New	2	A	RO	56	
58	014.K4.06	New	2	B	RO	57	
59	029.A3.01	Modified Bank	1	B	Both	58	45
60	040.EA2.1	New	2	A	Both	59	46
61	CE/A11.AK3.3	New	1	B	Both	60	47
62	035.K6.03	New	1	D	Both	61	48
63	2.3.1	New	1	D	Both	62	49
64	2.1.11	New	1	C	Both	63	50
65	2.4.21	New	2	D	Both	64	51
66	2.1.20	Mod. 00 NRC	1	C	Both	65	52
67	025.AK1.01	Mod. 00 NRC	2	D	Both	66	53
68	005.AK1.06	New	1	B	Both	67	54
69	024.AK2.03	New	2	C	Both	68	55
70	086.A4.02	New	1	A	Both	69	56
71	015.K4.02	New	2	B	RO	70	
72	059.K3.02	New	1	A	Both	71	57
73	001.AK3.02	New	2	A	Both	72	58
74	2.3.4	New	2	C	Both	73	59
75	007.EA1.1	New	1	C	Both	74	60
76	001.K6.11	New	1	B	RO	75	
77	001.G2.2.12	New	1	D	Both	76	61
78	003.K3.04	New	2	B	RO	77	
79	071.G2.1.32	New	1	A	RO	78	
80	026.G2.4.21	New	2	B	SRO		62
81	2.4.49	New	1	B	RO	79	
82	2.1.1	New	1	C	Both	80	63
83	2.1.7	New	2	B	Both	81	64
84	006.A3.08	New	2	A	Both	82	65
85	00011.G2.4.14	New	2	C	Both	83	66
86	00067.G2.4.25	New	2	C	RO	84	
87	075.K1.02	New	1	A	Both	85	67
88	055.K3.01	New	2	B	Both	86	68
89	CE/A16.AK2.1	New	2	D	Both	87	69
90	CE/EO9.G2.4.16	Bank	2	C	Both	88	70
91	2.2.30	New	1	D	RO	89	
92	0000038.EA1.11	New	1	C	Both	90	71
93	2.3.2	New	1	B	RO	91	
94	2.2.1	New	2	B	Both	92	72
95	2.4.6	Mod.99 NRC	2	A	Both	93	73
96	000029.EK1.05	New	1	D	Both	94	74
97	059.AK3.01	New	1	C	RO	95	
98	000022.AA1.08	New	1	A	Both	96	75

St. Lucie Plant
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Q Num	K/A	Source	Level	Key	Exam	RO	SRO
						Q NUM	Q NUM
99	CE/A13.G2.4.11	New	2	B	SRO		76
100	CE/A11.G2.4.22	New	2	D	SRO		77
101	000055.EA1.06	New	2	B	SRO		78
102	000057.AA2.13	New	1	A	SRO		79
103	000068.AK.2.07	New	2	D	SRO		80
104	003.A2.02	Bank	2	A	SRO		81
105	060.AK2.02	New	1	A	Both	97	82
106	061.AK3.02	New	1	B	Both	98	83
107	073.G2.1.32	New	1	B	RO	99	
108	103.A1.01	New	1	A	RO	100	
109	012.G2.1.33	New	1	D	SRO		84
110	028.A2.02	New	1	A	SRO		85
111	064.G2.2.23	New	2	A	SRO		86
112	005.G2.4.2	New	2	D	SRO		87
113	007.A2.03	New	2	A	SRO		88
114	2.4.40	New	2	C	SRO		89
115	000027.G2.4.48	New	1	D	SRO		90
116	000032.G2.2.3	New	1	C	SRO		91
117	000058.AA2.03	New	2	A	SRO		92
118	000056.AA2.20	New	1	C	SRO		93
119	2.2.29	New	1	C	SRO		94
120	2.2.18	New	1	C	SRO		95
121	2.3.10	New	1	C	SRO		96
122	2.1.12	New	2	A	SRO		97
123	2.4.9	New	1	B	SRO		98
124	015.A2.05	New	2	C	SRO		99
125	2.2.24	New	2	A	SRO		100

St. Lucie Plant
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Cell: A28
Comment: Que. 26
Reference required:
1-EOP-99 Fig. 9

Cell: A39
Comment: Que. 37
Reference required:
1-NOP-01.02 RCP seal flow vs. pressure

Cell: A72
Comment: Que. 67
Reference required:
SDC ONP-1-0440030
Fig. 1 & 2

Cell: A90
Comment: Que. 85
Reference required:
1-EOP-99 Fig. 2

Cell: A107
Comment: Que. 99
Reference required:
2-0120039 Nat. Circ.
Cooldown Fig. 3

Cell: A122
Comment: Que. 114
Reference required:
EPIP-01 classifications of emergencies

Question 2

Unit 1 has experienced a LOOP followed by a LOCA. The 1B CCW pump failed to start following the LOOP. Which of the following describes the configuration of the CCW system?

(assume all 'AB' lineup to the 'B' side and no Operator actions)

A. The 1A and 1C CCW pumps running with the 1C CCW pump supplying both the 'A' and 'B' CCW headers.

B. The 1A and 1C CCW pumps running with the 1C CCW pump supplying only the 1B CCW header.

C. The 1A CCW pump running supplying only the 1A CCW header.

D. The 1A CCW pump running supplying the 1A and 1B CCW headers.

A. Incorrect, 1C CCW pump remains in pull to lock until manually removed

B. Incorrect, 1C CCW pump remains in pull to lock until manually removed

C. **Correct**

D. Incorrect, the 'N' header valves close on SIAS which isolates the A and B headers

Question level: 2
Question source: New
Exam: Both
K/A: 026.AK3.02
Importance: 3.6/3.9
References: Text 0711209, LP 0702209-08

Question 3

Unit 1 Turbine load is 350 MWE and increasing at 2 MWE per minute. Which of the following requires the Unit to be manually tripped?

A. Condenser A reads 3.6" Hg absolute, Condenser B reads 2" Hg absolute.

B. Condenser A reads 4" Hg absolute, Condenser B reads 2" Hg absolute.

C. Condenser A reads 5.2" Hg absolute, Condenser B reads 2.6" Hg absolute.

D. Condenser A reads 5.4 Hg absolute, Condenser B reads 3" Hg absolute.

A. Incorrect, Condenser ΔP is < 2.5" Hg and because power is > 30%, trip limit is 5.5" Hg backpressure

B. Incorrect, Condenser ΔP is < 2.5" Hg and because power is > 30%, trip limit is 5.5" Hg backpressure

C. Correct, Condenser ΔP >2.5" Hg

D. Incorrect, 5.5" Hg > 30% power and 2.5" Hg Condenser ΔP trip criteria.

Question level: 1
Question source: New
Exam: Both
K/A: 051.AA2.02
Importance: 3.9/4.1
References: Loss of Condenser Vacuum ONP-1-0610031, LP 0702812-38
10CFR55.41.b(10)

Question 49

Due to a loss of instrument air, Unit 2 Instrument Air System has been cross-tied with the Station Air System.

In accordance with ONP-2-1010030, Loss of Instrument Air, what actions must be taken within 1 hour?

A. Install a diesel driven air compressor to augment the Station Air supply.

B. Blow down the Instrument Air header drains to remove oil, water, and crud build-up.

C. Isolate the Station Air cross-tie and open the Unit 1 cross-tie to the Unit 2 Instrument Air System.

D. Perform a controlled downpower and take the Unit off the line.

A. Incorrect, not necessary, the Station Air System can supply Instrument Air.

B. **Correct**

C. Incorrect, Unit 1 cross-tie opens automatically when Instrument Air pressure is decreasing.

D. Incorrect, not necessary, the Station Air System can supply Instrument Air.

Question level: 1
Question source: New
Exam: RO
K/A: 079.K1.01
Importance: 3.0
Reference: 2-1010030, Loss of Instrument Air, 0702812-2

Question 7

Unit 1 has entered 1-EOP-03 LOCA with a LOOP and the following conditions:

- RCS pressure 280 psia stable
- Thot 390ºF
- Rep. CET 398ºF
- Pressurizer level 35% and stable
- Reactor Vessel level indicates 4 through 8 covered
- 1A S/G level 18% wide range with 155 gpm AFW flow
- 1B S/G level 14% wide range 200 gpm AFW flow

Which of the following prohibits stopping the LPSI pumps?

A. Pressurizer level

B. Subcooling

C. RCS pressure

D. S/G level

A. Incorrect, pressurizer level >30% and stable

B. Correct, Rep CET <20ºF subcooled (even though Thot >20ºF subcooled)

C. Incorrect, RCS pressure >200 psia and controlled (stable)

D. Incorrect, only 1 S/G >15% wide range with feed needed

Question level: 2
Question Source: New
Exam: Both
KA074.EK2.2.05
Importance 3.9 / 4.1
References: 1-EOP-03. LP 0702824-02

Question 8

Unit 2 is in a station blackout. The 2B Diesel was out of service prior to the event and the 2A Diesel did not load on the bus. Below are some of the alarms received on RTGB 201:

- B-14 4.16 KV 2A3 Δ current trip
- B-6 2A Emer. D/G Brk. Failure
- B-35 480V LC 2A5 UV/UV test/ground
- B-46 4.16 KV Emerg. SWGR. 2A3 UV/UV test
- B-28 480 V LC 2A2 UV/UV test ground
- B-48 4.16 KV SWGR./480V LC/MCC 2AB UV
- B-39 480V MCC 2A5/2A6/2A8 Non-Ess. Sect. Lockout

When conditions permit, which of the following action will re-energize the 2A3 4.16 KV bus from the 2A Diesel generator?

A. Manually close the 2A Diesel Generator output breaker from RTGB 201

B. Reset the 4.16 KV Undervoltage relays

C. Reset the differential current relay

D. Reset the Non-Essential section lockout

A. Incorrect, the Diesel breaker will immediately reopen due to the Δ current relay trip.

B. Incorrect, relays will not reset and energize the bus

C. **Correct, Diesel breaker will immediately close**

D. Incorrect, Non-Essential section cannot be reset until voltage back on bus

Question level: 2
Question Source: New
Exam: Both
KA: 055.EA2.06
Importance 3.7 / 4.1
References: 2-0910054, 0702502-07
10CFR55.41.b(7)

Question 9

Unit 1 is in a station blackout. Unit 2 is supplying Unit 1 with its only operable Diesel Generator.

In accordance with 1-EOP-10 'Station Blackout', which of the following Unit 1 pumps **CANNOT** be started?

A. Intake cooling water pump.

B. Electrical driven Auxiliary feedwater pump.

C. High pressure safety injection pump.

D. Low pressure safety injection pump.

A. Correct (highest load on diesel)

B. Incorrect

C. Incorrect.

D. Incorrect.

Question level: 1
Question Source: New
Exam: Both
KA: 062.AK3.03
Importance 4.0 / 4.2
References: 1-EOP-10 Station Blackout

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

CAUTION

If AC power is being supplied from a Unit 2 Diesel, then EDG loading restrictions may preclude starting an ICW or CCW pump until adequate margin exists. Do NOT restart an ICW or CCW pump if power is from the only operating EDG on Unit 2.

☐ 19. If AC power is from any source **other than** the only operating EDG on Unit 2, Then:

A. ENSURE at least **ONE** ICW pump is operating and RESTORE operating ICW Pump Discharge Valve(s) to NORMAL position.

B. ENSURE ICW System is vented. **REFER TO** OP 1-0640020, Intake Cooling Water System Operation.

C. ENSURE CCW is restored to operation. **REFER TO** OP 1-0310020, Component Cooling Water - Normal.

Question 10

Given the following:

- Unit 2 is in Mode 5 on SDC preparing to heatup the RCS.
- One Personnel airlock door is closed and one currently open.
- Equipment and escape hatch are closed.
- A loss of shutdown cooling occurs and the RCS temperature rises to 207ºF

Which of the below statements describes the current status of containment integrity?

Containment Integrity is:

A. not required for the current conditions.

B. not required if, within 1 hour, RCS temperature is lowered to 190ºF.

C. met with one airlock door closed

D. not met. Both airlock doors must be maintained closed

A. Incorrect, containment integrity required in Mode 4

B. incorrect, containment integrity must be restored within 1 hour

C. **Correct**

D. incorrect, one door required to be closed

Question level: 2
Question source: Modified from 2000 PSL NRC exam
Exam: SRO
K/A: 000069.AK2.03
Importance: 2.9
Reference: Loss of Containment Integrity/Air Locks ONP 1-1300030, LP 0902723-02

Question 11

Which of the following explains the Unit 1 & 2 Spent Fuel Pool Area Radiation Monitors?

A. Gamma and Beta detection, using sodium iodine that emits light when it is excited by ionizing radiation

B. Gamma detection, using scintillation detectors with photomultipliers.

C. Gamma detection, using a gas filled chamber that is ionized by the incident radiation.

D. Beta and Alpha detection using a beta scintillation from one side and a alpha detector on the other side

A. Incorrect, process monitor

B. Incorrect, these are Unit 1 control room outside air intake monitors.

C. **Correct**

D. Incorrect, particulate filters

Question level: 1
Question source: New
Exam: RO
K/A: 000072 K5.01
Importance: 2.7
References: 0711410-12, Unit 1 Radiation Monitoring, 0711411 Unit 2 Radiation Monitoring

- Quantity
- Detectors
- Alarms / Setpoint
- Auto actions
- Operation

In addition to the Unit 2 Radiation Monitoring System just described, three additional radiation monitoring systems are utilized for the site steam generator blowdown treatment facility, which processes the S/G blowdown from both Unit 1 and Unit 2.

The treatment facility radiation monitoring includes:

- A liquid radiation monitoring system
- A gas radiation monitoring system
- An area gamma radiation monitoring system.

(The SGBDTF Radiation Monitoring is covered in the Unit 1 Radiation Monitoring Lesson Text, 0711410.)

DETAILED DESCRIPTION

AREA RADIATION MONITORING STATIONS

The area monitors serve to support operations personnel in assessing the general area radiological conditions throughout specific plant locations. The typical area monitor station configuration consists of one or more detectors coupled to a RM-80 processor. Refer to Figure 3. Where local indication is desired, an RL-10 Local Indicator/Display may be present. The detectors used for area monitoring are either the G-M Tube, the ion chamber, or the scintillation tube with photomultiplier. Each station also has either a low activity CS-137 'check source' that is used as a convenient operational and gross calibration check or has a 32 μCi CS-137 'keep alive' source, which provides a live-zero for the associated RM. Additionally, each area Radiation Monitoring Station is provided with three alarms. One alarm is set high enough above the normal background level to prevent spurious alarms, yet low enough to pickup transient level increases. A second

TABLE 1
(continued)

{PRIVATE }MONITOR	MONITOR TYPE[1]	INSTRUMENT NO.	CD[2]	CHANNEL NO.
ECCS Exhaust Duct	W.R.G.M.	RS-26-70	Low Mid High Eff.	AAL-611 AAM-612 AAH-613 AAE-614
Plant Stack Accident	W.R.G.M.	RS-26-90	Low Mid High Eff.	AAL-621 AAM-622 AAH-623 AAE-624
Main Steam Line #1	S.L.M.	RIM-26-71		AS1-631
Main Steam Line #2	S.L.M.	RIM-26-72		AS2-632
Main Steam Line Bkgd	S.L.M.	RIM-26-73		ASB-633
Control Room	AREA	RIM-26-1		GAG-001
CIAS A	AREA	RIM-26-3		GAG-003
CIAS B	AREA	RIM-26-4		GAG-004
CIAS C	AREA	RIM-26-5		GAG-005
CIAS D	AREA	RIM-26-6		GAG-006
Spent Fuel Pool A	AREA	RIM-26-7		GAG-007
Spent Fuel Pool B	AREA	RIM-26-8		GAG-008
Spent Fuel Pool C	AREA	RIM-26-9		GAG-009
Spent Fuel Pool D	AREA	RIM-26-10		GAG-010
Spent Fuel Pool E	AREA	RIM-26-11		GAG-011
Spent Fuel Pool F	AREA	RIM-26-12		GAG-012
Containment Post Accident A	AREA	RIM-26-38		AAG-638
Containment Post Accident B	AREA	RIM-26-39		AAG-639
Personnel Lock Area	AREA	RIM-26-32		GAG-032
Refueling Canal Area	AREA	RIM-26-33		GAG-033
Fuel Pool Pump Area	AREA	RIM-26-34		GAG-034
Boric Acid Preconcentrator Filter Area	AREA	RIM-26-35		GAG-035

TABLE 3

AREA MONITORS - SAFETY-RELATED

MONITOR	DETECTOR TYPE		LOCATION
*CIAS A	Geiger-Mueller	RAB el 25'	Containment el 90'
*CIAS B	Geiger-Mueller	RAB el 25'	Containment el 90'
*CIAS C	Geiger-Mueller	RAB el 25'	Containment el 90'
*CIAS D	Geiger-Mueller	RAB el 25'	Containment el 90'
*Spent Fuel Pool A	Geiger-Mueller	FHB el 68'	FHB el 61'
*Spent Fuel Pool B	Geiger-Mueller	FHB el 68'	FHB el 61'
*Spent Fuel Pool C	Geiger-Mueller	FHB el 68'	FHB el 61'
*Spent Fuel Pool D	Geiger-Mueller	FHB el 68'	FHB el 61'
*Spent Fuel Pool E	Geiger-Mueller	FHB el 68'	FHB el 61'
*Spent Fuel Pool F	Geiger-Mueller	FHB el 68'	FHB el 61'
Containment Post Accident A	Ion Chamber	RAB el 64.5	Below FHB roof at el 85'
Containment Post Accident B	Ion Chamber	RAB el 67.5	Above RAB roof at el 85'
*Containment High Range	Ion Chamber	RAB el 65'	RCB el 90'
*Containment High Range	Ion Chamber	RAB el 65'	RCB el 90'
*Control Room OAI	$\beta\gamma$ Scintillation	Cable Spreading Room	Intake Ventilation Duct
*Control Room OAI	$\beta\gamma$Scintillation	Cable Spreading Room	Intake Ventilation Duct
*Control Room OAI	$\beta\gamma$ Scintillation	Cable Spreading Room	Intake Ventilation Duct
*Control Room OAI	$\beta\gamma$ Scintillation	Cable Spreading Room	Intake Ventilation Duct

*** Tech. Spec. Monitors**

to produce a meter readout of true dose rate. The dose rate accounts for both the number of events per unit time and particle energy. This is useful in instruments used to perform dose rate measurements. Ion chambers are the most accurate and least sensitive of the gas-filled detectors.

The Geiger-Muller tube operates with a very high applied voltage. The G-M tube operates in the G-M region (Region V) of Figure 2. In this voltage region, the primary ion pairs are accelerated fast enough to create secondary ionizations. Each event starts an avalanche of ion pairs, which is seen as one output pulse for each event starting the avalanche. A sheath of positive ions forms near the center electrode, temporarily destroying the applied event. The fill gas is typically Argon or Neon. A small amount of halogen gas is also added for quenching. The quench gas hastens the removal of positive ions around the center electrode and reduces the detector dead time. The dead time is the time during which the detector is incapable of sensing another ionizing event. Without a quench gas, the G-M tube would continuously discharge. The tube life is limited by depletion of the quench gas. If the G-M tube becomes saturated due to a high radiation level, it will normally fail low, giving a false indication.

Due to the high amplification characteristics of G-M tube detectors, a weak ionizing event will produce the same pulse as a much stronger ionizing event. Thus, the G-M detector does not discriminate between high or low energy ionization, making it the most sensitive of the gas-filled detectors. The G-M tube is also relatively insensitive to applied voltage changes that make precise voltage regulation unnecessary. The maximum acceptable slope of region V of Figure 2 is 3 percent. Additional advantages of these detectors are low cost, ruggedness, and reliability. They are commonly used for gamma and beta detection.

Scintillation Detectors

A simplified scintillation detector is illustrated in Figure 3. Sodium-Iodide, in the crystalline form, is a phosphor that emits light when it is excited by ionizing radiation. Trace amounts of Thallium are used in the crystal to create fluorescent centers that

These radiation monitors are designed to withstand a LOCA containment environment for a period of at least 15 minutes after an accident.

Channels 3-6 also activate an annunciator to warn operators of an impending CIS condition. This alarm is activated by a radiation level of 1 R/hr (Modes 1-4) and ~60 mR/hr (Mode 6), CNTMT HI RADIATION CIS PRE-TRIP. (The containment evacuation alarm will also sound.)

Fuel Pool Radiation Monitor

One Area Radiation Monitor is provided in the Spent Fuel Pool area.

PROCESS RADIATION MONITORING SYSTEM

LIQUID PROCESS MONITORS

Liquid Radwaste (LRW) Discharge Monitor (Channel 43)

The Unit 1 Liquid Radwaste Discharge Monitor's primary purpose is to continuously monitor and record the activity in the liquid waste being released to the circulating water canal. This monitor will terminate the liquid discharge from the plant if the activity being released exceeds the monitor setpoint. The monitor setpoint is set below the activity release limits.

This is a skid mounted off-line monitor. Refer to Figure 7. Flow is caused by the differential pressure across flow element FE-6627 which is installed in the waste management system discharge line to the circulating water canal. Monitoring before dilution with circulating water allows greater accuracy of measurement. This Nuclear Measurement Corporation (NMC) liquid monitor assembly consists of a heavy duty stainless steel skid to hold a shield assembly, junction box, gamma scintillation detector, radioactive check source, a 2.7 liter sample canister with a bottom drain and the detector check source assembly. The monitor is completely enclosed with a door on the top that can be opened for inspection and maintenance.

SYSTEM DATA

TABLE 1 - AREA RADIATION MONITORS

CHANNEL NO.	MONITORED AREA	RANGE	TYPE DETECTOR
1	Control Room	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
2	Fuel Pool Filter Area	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
*3	CIS	10^{-1} to 10^{5} mR/hr	Geiger-Mueller
*4	CIS	10^{-1} to 10^{5} mR/hr	Geiger-Mueller
*5	CIS	10^{-1} to 10^{5} mR/hr	Geiger-Mueller
*6	CIS	10^{-1} to 10^{5} mR/hr	Geiger-Mueller
*7	Fuel Pool	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
**8	Refueling Canal	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
9	Fuel Pool Pump (Fuel Handling Bldg)	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
10	Boric Acid Preconcentrator Filter	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
11	Waste Filter	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
12	Laundry Filter	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
13	Waste Gas Compressor	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
14	Charging Pump	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
15	Holdup Drain Pump	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
16	Sample Room	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
17	Ion Exchanger Valve	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
18	Ion Exchanger Valve	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
19	Drumming Station	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
20	Purification Filter	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
21	Spent Resin Tank	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
22	ECCS Equipment	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
23	Decontamination	10^{-1} to 10^{4} mR/hr	Geiger-Mueller
24	HVAC Room	10^{-1} to 10^{4} mR/hr	Geiger-Mueller

TABLE 4 - ST. LUCIE PLANT RADIATION MONITORS

TYPE	MONITORS	TECH. SPEC.	ODCM	NON-TECH. SPEC.
AREA	CIS	X		
	Fuel Pool	X		
	Containment High Range	X		
	Containment Post LOCA			X
LIQUID	Liquid Radioactive Waste		X	
	Steam Generator Blowdown (1A &1B)		X	
	Component Cooling Water (1A &1B) CCW			X
	Letdown (Gross & Iodine Activity)			X
GAS	Waste Gas		X	
	Control Room O.A.I. (1A & 1B)			X
	Condenser Air Ejector		X	
	Plant Vent (PV) *	X	X	
	Fuel Handling Bldg. (FHB) *	X	X	
	Steam Generator Blowdown Treatment Facility Vent (SGBDTF)	X	X	
	Containment Atmosphere (Part. & Gas)	X		
	Main Steam Line (1A & 1B)	X		
	Emergency Core Cooling System * (ECCS)	X		

ODCM = Off-Site Dose Calculation Manual, Chemistry Procedure C-200

* EBERLINE SPING -- monitor Particulate, Iodine, Low-Range Gas, Mid-Range Gas & High-Range Gas

Question 13

Unit 1 is in Mode 5 when the CCW valve (MV-14-6) to the 1A and 1B Containment fan coolers failed closed.

Which of the following states the impact of this CCW valve closure on the 1A and 1B Containment fan coolers?

The Containment fan coolers will:

A. continue to run with no CCW flow to the motors and cooling coils.

B. continue to run with only the cooling coils losing CCW flow.

C. trip on low CCW flow.

D. trip on high temperature.

A. Correct

B. Incorrect, would be correct on Unit 2 only

C. Incorrect, no low flow trip, only annunciator associated with loss of CCW

D. Incorrect, no high temperature associated with loss of CCW. There is a high containment temperature alarm from the outlet of the CCW coolers.

Question level: 1
Question source: New
Exam: Both
K/A: 022.K1.01
Importance: 3.5 / 3.7
References: Containment cooling lesson text 0711207, ECCS and Containment Cooling Lesson plan 0702209-07

Question 14

Unit 2 is at 100% power with Pressurizer Level Control Channel 1110-Y selected for control.

Level transmitter 1110Y fails low

Which of the following describes the plant response? (assume no Operator actions)

A. All heaters on, Pressurizer pressure increases. Spray valves open on high pressure.

B. Maximum letdown, Pressurizer level and pressure decrease, all but one charging pump off.

C. Minimum letdown, Pressurizer level and pressure increases. Spray valves open on high pressure.

D. Minimum letdown, all charging pumps and Pressurizer heaters on. Spray valves open on high pressure.

A. Incorrect, correct for level channel failing high

B. Incorrect, correct for level channel failing high.

C. **Correct**

D. Incorrect, combination of actions for high and low failures.

Question level: 1
Question source: New
Exam: Both
KA: 011 A2.11
Importance: 3.4/3.6
Reference: LP 0702206-13, PPLCS, ONP1-0120035 & ONP 2-0120035, Pressurizer Pressure and Level

TABLE 1 - Selected Level Channel Failures

SELECTED LEVEL CHANNEL FAILS HIGH

AUTOMATIC RESPONSE TO FAILURE

- High/Low Level Alarm (+ 10% Deviation) [67%]
- Maximum Letdown - Letdown (128 gpm) exceeds Charging Flow (+ 9.2% Deviation)
- All Heaters On, All But One Charging Pump Off (+ 3.6%)

PLANT RESPONSE TO FAILURE

- Actual PZR Level and Pressure Decreases
- High/Low Level Alarm on Operable Channel at –5% Deviation
- Low/Low Level Alarm on Operable Channel, All Heaters Off at 28 [27]%
- TM/LP Trip

OPERATOR ACTION

- Select Operable Channel on HS-1110-2 or Take Manual Control

SELECTED LEVEL CHANNEL FAILS LOW

AUTOMATIC RESPONSE TO FAILURE

- High/Low Level Alarm and Standby Charging Pumps ON (-5% Deviation)
- Minimum Letdown (29 gpm)
- Low/Low Level Alarm, All heaters Off 28% [27%]
- Opens 4160V breaker on one side and 480V breakers on the other

PLANT RESPONSE TO FAILURE

- Actual PZR Level and Pressure Increases
- High/Low Level Alarm from Operable Channel (+10% Deviation) [67%]
- Spray Valves Open on High Pressure
- High Pressure Reactor Trip When Solid 2370 [2400] psia

OPERATOR ACTION

- Take Manual Control of HIC-1110
- On Unit 1 Place HS-1110-2 to Operable Channel
- [Select level bypass]
- Reset/Close 480V breakers

Question 15

Unit 1 is at 48% power increasing at 4 MWE/Min. with the following:

- Both Main Feedwater pumps are running
- Both Condensate pumps are running

If the 1A Condensate pump trips and the power increase is allowed to continue, which of the following will occur first?

A. The 1A Main Feedwater pump trips on low suction pressure.

B. The 1A Main Feedwater pump trips on low suction flow.

C. The 1A Main Feedwater pump trips as a direct result of 2A Condensate pump trip.

D. The plant trips on low S/G level.

A. Incorrect, suction pressure will be low, but the electrical interlock to trip the 1A MFP will be first

B. Incorrect, suction flow will not be at the setpoint of <2500 GPM

C. Correct will occur at >50% power

D. Incorrect, at >50% power 1A Feedwater pump will trip one Condensate pump will handle 55% power.

Question Level: 2
Question Source: Modified from 2000 PSL NRC Exam
Exam: Both
K/A: 056.K1.03
Importance: 2.6/2.6
References: 0711301 'Condensate, Feedwater, and Heater Vents and Drains' Lesson Text. 0702301-08 Lesson plan

Question 16

At 100% power a MSR TCV (8" valve) suddenly goes fully closed. Which of the following explains the initial plant response?
(assume no operator action)

	RCS Temperature	RCS Pressure	Reactor Power
A.	Increase	Increase	Increase
B.	Increase	Increase	Decrease
C.	Decrease	Decrease	Decrease
D.	Decrease	Decrease	Increase

A. Incorrect, reactor power decreases

B. Correct

C. Incorrect, temperature and pressure increase

D. Incorrect, temperature and pressure increase, reactor power decreases

Question Level: 2
Question Source: New
Exam: RO
K/A: 039.K3.05
Importance: 3.6
References: 0711304 Main, Reheat, and Auxiliary Steam System, 0702304-8 Main Steam Lesson plan

to vent were also unsuccessful, possibly because the MSIV air system had not been fully restored and was not in a proper configuration for this method to be successful.

SCRD 96-2747, Unplanned Closure of Moisture Separator Reheater (MSR) Warmup Valves Due to Improper Removal of Pressure Gages

In 1996, while Unit 2 was operating at 100% power, operators noticed RCS pressure and temperature were increasing unexpectedly. They quickly realized that two MSR 8" TCVs indicated closed. They borated and secured pressurizer heaters to reduce RCS temperature and pressure and began to investigate why the valves closed. Just as RCS temperature had begun to decrease, the other two 8" TCVs went closed, again resulting in a load rejection and increase in RCS pressure and temperature. Operators again took action to mitigate the increases, and within 30 minutes had stabilized the plant at approximately 94% power.

The work control group supervisor reported that I&C had been given permission to work in the vicinity of the MSRs. A clearance was hung which confirmed isolation of the 3" TCVs. These air operated valves are normally open; and manually isolated at power by procedure. An I&C technician went to replace a signal input air pressure gage at the positioner (used to show pneumatic controller output to the positioner) to the TCV-08-7 (3" valve). The gage read approximately 30 psig as expected, and the technician removed it. As the line immediately depressurized, the technician noted that TCV-08-7 stroked closed, which was also anticipated. What had not been recognized was that the limit switch from TCV-08-7 sends a signal to TCV-08-1 (8" valve), which made it close. Simultaneously, because the input is shared, the pneumatic positioner closed TCV-08-8, which then closed TCV-08-2 by the same sequence.

Approximately five minutes later, the technician removed and replaced another signal line pressure gage for TCV-08-10, initiating a nearly identical sequence for MSR steam supply valves TCV-08-3 and 4, which closed.

When the second set of valves closed, indicated cold leg temperature peaked at approximately 551.2°F, and pressure had again increased. Generator load was reduced by approximately 50 MW. Technical Specification LCO 3.2.5 DNB Parameter limit of a maximum RCS cold leg temperature of 549°F was exceeded, and operators

Question 17

Unit 2 is performing a Turbine startup with the 15% Main Feedwater bypass valves in automatic utilizing the Low Power Feedwater Control System (LPFWCS). The Turbine has been latched and both Main Feedwater block valves are closed.

Which of the following conditions will terminate Main Feedwater flow to the 2B S/G?

A. NI channel 10 fails high

B. The turbine trip pushbutton is depressed.

C. LPFWCS loss of power.

D. LPFWCS CPU failure (red light on in a flashing mode).

A. Incorrect, will not allow auto transfer to main feedwater valve.

B. Incorrect, will not close the 15% valves, they will go to the 5% flow position.

C. Correct

D. Incorrect, valve fails as is.

Question Level: 2
Question Source: New
Exam: RO
K/A: 059.A2.12
Importance: 3.1
References: 2-GOP-502, Data sheets required for heatup, S/G Level control text 0711408, LP 0702408-09

Question 19

Unit 2 is at 100% power when a 'B' side CCW leak, greater than capacity of the makeup occurs.

Which of the following describes the configuration of the CCW system in response to the leak?

(assume normal line-up and no Operator action)

A. All running CCW pumps will lose suction.

B. All the 'N' header valves will close separating the 'A' CCW header from the 'B' CCW header.

C. Only the 'N' header valves from the 'B' side will close separating the 'A' CCW header from the 'B' side CCW header.

D. Only the 'N' header valves from the 'A' side will close separating the 'A' CCW header from the 'B' side CCW header.

A. Incorrect, would be correct if Unit 1 (N header valves don't close)

B. Correct

C. Incorrect, surge tank will lower on both headers, closing all 'N' header valves.

D. Incorrect, surge tank will lower on both headers, closing all 'N' header valves.

Question Level: 2
Question Source: New
Exam: RO
K/A: 008.A2.02
Importance: 3.2
References: CCW Lesson Text 0711209, CCW LP 0702209-08

Question 23

While performing 1-EOP-01 Standard Post Trip Actions, the following indications are observed:

- RCS temperature 538ºF lowering
- Turbine Throttle valve additive position: 100% with position indicating lights red
- Turbine Governor valve additive position: 80% with position indicating lights on valves 1-3 red, valve 4 red and green

Which of the following describes the FIRST required Operator action?

A. Open the Generator OCB's 8W30 and 8W26

B. Open the Exciter supply breaker CB FB 1

C. Close the Main Steam isolation valves

D. Trip the Turbine at the front standard.

A. Incorrect, required after the turbine is tripped

B. Incorrect, required after the turbine is tripped

C. Correct

D. Incorrect, not the first required action.

Question Level: 2
Question Source: New
Exam: Both
K/A: 045.A3.07
Importance: 3.5 / 3.6
References: 1-EOP-01 Standard post trip actions, LP 0702822-05

Question 25

Unit 2 is experiencing a transient with the following indications:

- Channel A RPS indicates loss of power
- Four TCB's indicate open

Which of the below electrical malfunctions has resulted in the above transient?

Loss of:

A. Vital AC bus

B. Instrument AC bus

C. MCC 2A3

D. Both AC power supplies to a logic matrix

A. Incorrect, 120V Vital AC bus has only non-safety related loads.

B. **Correct**

C. Incorrect, would not result in loss of inverter that feeds the instrument bus.

D. Incorrect, would result in 8 TCB's opening and only partial loss of power on RPS.

Question level:1
Question source: New
Exam: Both
K/A: 062.K2.01
Importance: 3.3/3.4
Reference: 0702503-5, 1-0970030, 120V Instrument and Vital AC Systems

Question 26

Unit 1 is in 1-EOP-03 'Loss of Coolant Accident' with the following conditions:

- Containment pressure is 15 psig
- Pre LOCA RWT level was 33 feet
- Current RWT level is 9 feet
- Containment sump level is 22 feet

The Containment sump level indicates:

A. significant RWT inventory is not being transferred to the sump.

B. all RWT water up to this point has remained in the Containment sump.

C. additional water other than RWT inventory has been added to the sump.

D. some sump inventory is being lost outside containment.

References required: 1-EOP-99 Figure 9

A. Incorrect

C. Correct

C. Incorrect

D. Incorrect

Question Level: 2
Question Source: New
Exam: Both
K/A: 026.A1.03
Importance: 3.5/3.5
References: 1-EOP-99 Fig. 9,
0711207 ECCS lesson text, 0702401-02 ESFAS Lesson plan

Question 28

A small break LOCA has occurred on Unit 2. SIAS and CIAS have actuated, pressurizer level initially dropped to 10% and now has recovered to 29%.

Which of the following describes the minimum actions necessary to re-energize the pressurizer heaters?

A. Place the heater control switches for all proportional and back-up heaters to the RESET position, then back to AUTO.

B. Place the backup interlock bypass keyswitch to the LEVEL position then place the heater control switches to the RESET position, then back to AUTO.

C. Reset SIAS, then place the heater control switches to the RESET position, then back to AUTO.

D. Reset SIAS, close the 4160V Pzr. feeder breaker, then place the heater control switches to the RESET position, then back in AUTO.

A. Incorrect, would be correct on Unit 1

B. Incorrect, SIAS and 4160V breaker required to be reset

C. Incorrect, must reset 4.16V breaker also

D. **Correct**

Question level: 2
Question source: New
Exam: RO
K/A: 027.G2.2.3
Importance: 3.1
Reference: ONP 1-0120035, Pressurizer Pressure and Level, 0702206-13

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☒* 63. If the RCS is water solid, Then ESTABLISH a bubble in the Pressurizer by performing **ALL** of the following: A. ENERGIZE available Pressurizer Heaters by performing **ALL** of the following: 1. ENSURE SIAS is RESET 2. ENERGIZE Pressurizer Heaters Buses 2A3 and 2B3. 3. RESET **ALL** available Pressurizer Heaters.	

(Continued on Next Page)

UNIT 2 - PRESSURIZER HEATER CONTROL LOGIC

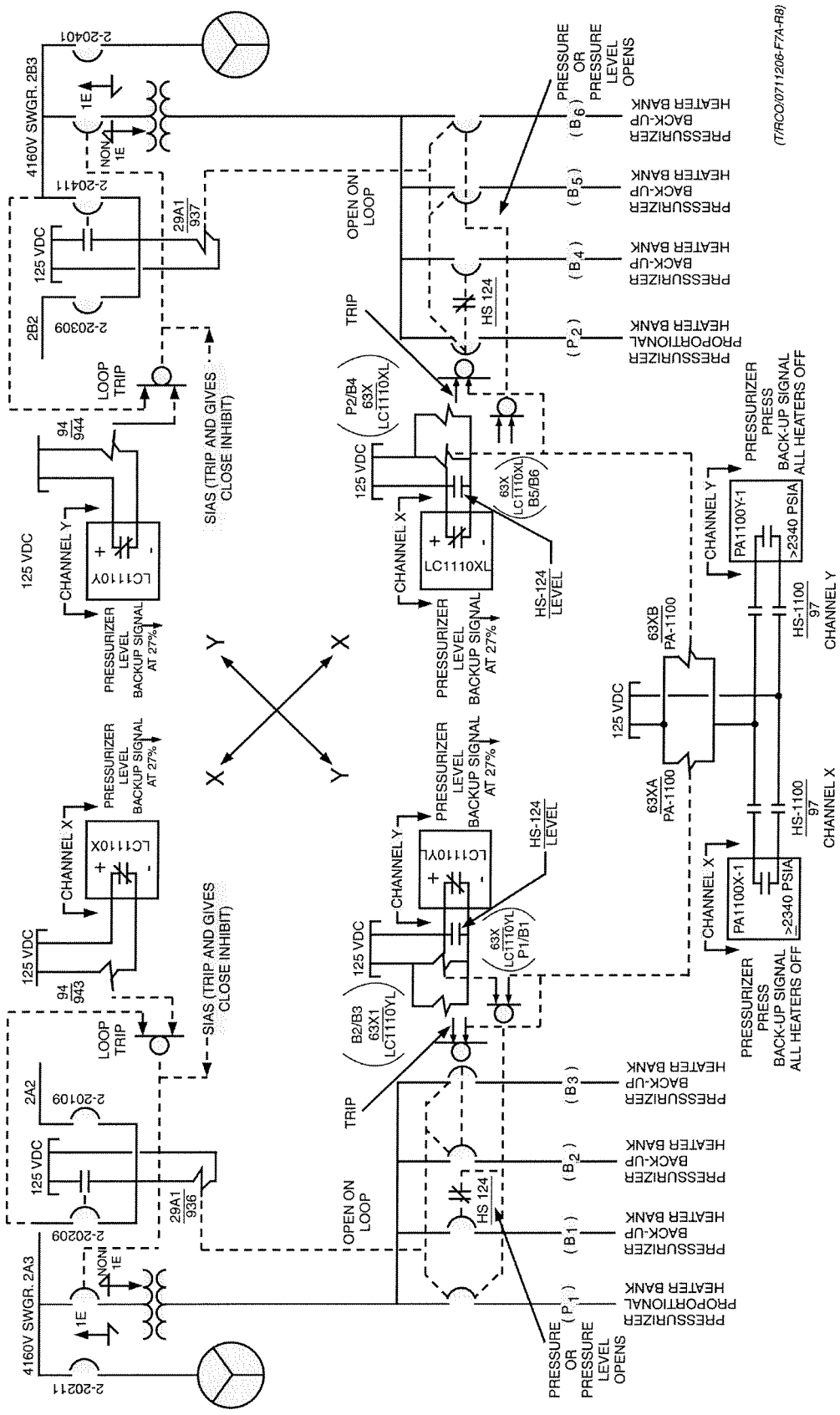

FIGURE 9

Question 30

Unit 2 tripped due to a loss of condenser vacuum. Condenser vacuum lowered to 15" Hg backpressure before recovering. The following post-trip conditions now exist:

- Tave is 532°F and stable
- 2A and 2B S/G pressure is 900 psia
- Condenser backpressure is 5.5" Hg
- SBCS PCV-8801 is in MANUAL

Which of the following describes the actions that must be taken to commence a cooldown to SDC entry conditions using the SBCS?

A. Place the SBCS permissive switch in MANUAL and manually control the cooldown using PCV-8801.

B. Place the SBCS permissive switch in AUTO, the SBCS valves will automatically modulate as needed.

C. Depress the vacuum interlock reset pushbutton and place the permissive switch in MANUAL to manually control the cooldown using PCV-8801.

D. Depress the vacuum interlock reset pushbutton and place the permissive switch in AUTO, the SBCS valves will automatically modulate as needed.

A. Incorrect, vacuum interlock has not been reset.

B. Incorrect, vacuum interlock has not been reset.

C. **Correct**

D. Incorrect, PCV-8801 in manual, none of the valves will automatically reopen.

Question level: 2
Question source: New
Exam: RO
K/A: 041.A4.08
Importance: 3.0
Reference: 0702406-6.c, 0711406, Steam Bypass Control System

Question 34

Unit 1 is implementing 1-EOP-03 due to a large break LOCA with the following:

- Containment Hydrogen Concentration is 1.0%

Which of the following is the **minimum** equipment lineup that will satisfy the Containment Combustible Gas Control safety function?
(assume no equipment out of service at start of event)

	Hydrogen Recombiners	**Hydrogen purge**
A.	None	None
B.	None	Two in service
C.	Two in service	None
D.	Two in service	One is service

A. incorrect, would be correct is H2 < 0.5%

B. incorrect, H2 Recombiners always placed in service before H2 purge system

C. Correct

D. H2 purge not put in service at 1% H2

Question Level: 1
Question Source: New
Exam: RO
K/A: 028.G2.4.21
Importance: 3.7
References:1-EOP-03 Appendix A, 0702824-09 Lesson plan LOCA event and procedure
10CFR55.41.b(8)

Question 37

Unit 1 is heating up the RCS with the following conditions:

- RCS pressure 1800 psia
- RCS temperature 515° F

	RCP 1A1	RCP 1A2	RCP 1B1	RCP 1B2
	Running	Running	Running	Running
RCP controlled bleedoff flow	0.85 GPM	0.95 GPM	0.9 GPM	1.1 GPM
Middle cavity pressure	1100 psia	1120 psia	1070 psia	950 psia
Upper cavity pressure	610 psia	610 psia	600 psia	615 psia
Controlled Bleedoff pressure	80 psia	75 psia	80 psia	90 psia
Controlled Bleedoff Temperature	180°F	170°F	175°F	178°F

Which of the below statements describes the status of the RCP's?

A. 1A1 bleedoff temperature is higher than allowable limit.

B. 1A2 is indicating failed seal.

C. 1B2 has excessive controlled bleedoff flow

D. Parameters are acceptable for continued operation of all RCP's.

References required

A. Incorrect, 250°F for >10 minutes or 300°F upper limit

B. Incorrect, seal pressures within normal band

C. Correct, 1.075 gpm upper limit

D. Incorrect 1B2 not normal

Question Level: 2
Question Source: Modified from 1999 PSL NRC Exam
Exam: Both

K/A 0000015/17.G2.1.28
Importance 3.2/3.3
Reference 1-NOP-01.02 RCP Operation, RCP LP 0702202-7C

Question 42

Which of the following constitutes positive indication that a PORV is open on Unit 1?

A. Red position indicating light on the RTGB.

B. PORV acoustic monitor LED's lit.

C. Tailpipe temperature on TIA-1106 on RTGB 103.

D. Quench Tank parameters, temperature, pressure, and level increasing.

A. Incorrect, position indicating lights show solenoid position, not valve stem position.

B. **Correct**

C. Incorrect, TIA-1106 is combined PORV/Safety Valve tailpipe temperature and may remain elevated even when the PORV is re-closed.

D. Incorrect, Quench Tank parameters increase for PORV, Safety Valve, or certain valve packing leakoff

Question level: 1
Question source: New
Exam: Both
K/A: 08.AA2.03
Importance: 3.9/3.9
Reference: 0711206, Pressurizer Level and Pressure Control, 0702206-8
10CFR55.41.b(7)

Question 43

Unit 2 is in Mode 2, 1 x 10^{-5} % power. CEA's are in manual sequential being withdrawn with CEA group 5 at 62 inches withdrawn. CEA #59 drops fully into the core.

Which of the following interlock will prevent continued CEA motion in manual sequential?

CEA:

A. withdrawal prohibit

B. motion inhibit

C. auto withdraw prohibit

D. PDIL

A. Incorrect, comes from RPS, not position CEA deviation

B. Correct, due to CEA deviation from other CEA's

C. Incorrect, auto withdraw has been defeated at PSL, but annunciator still active

D. Incorrect, PDIL not active until 10^{-4}% power

Question Level: 2
Question Source: New
Exam: Both
K/A: 03.AA2.02
Importance: 2.7 / 2.8
References:0711405 Control Element Drive system, 0702405-10 Control Element Drive system Lesson plan
10CFR55.41.b(6)

Question 50

During the performance of Standard Post trip actions on Unit 2, you observe the 2A Steam Generator (S/G) blowdown radiation monitor on the PC-11 as 'Magenta' and the 2B Steam Generator (S/G) blowdown radiation monitor as 'Yellow'.

Which of the following conditions does this indicate?

2A S/G has a:

A. monitor communication failure, 2B S/G is in 'high' alarm on radiation.

B. monitor communication failure, 2B S/G is in 'alert' alarm on radiation.

C. loss of process flow, 2B S/G is in 'high' alarm on radiation.

D. loss of process flow, 2B S/G is in 'alert' alarm on radiation.

A. Incorrect, 2B S/G in alert

B. Correct

C. Incorrect, 2A S/G loss of communication, 2B S/G in alert

D. Incorrect, 2A S/G loss of communication

Question Level: 1
Question Source: New
Exam: Both
K/A: 037.AA2.13
Importance: 4.1 / 4.3
References: 0711411 Unit 2 Radiation Monitoring system lesson text, 0702411-07 Unit 2 Radiation Monitoring system lesson plan, 10CFR55.41.b(11)

Question 51

During a Unit 2 rapid downpower the following annunciators were received:

- G-9 2B S/G Level High/Low
- G-15 'FW Reg. Valve supply Air Press Low

Instrument air has been lost to the 2B Main Feedwater Regulating Valve (MFRV)

Which of the following explains the 2B S/G level response as the downpower continues? (assume no Operator actions)

2B S/G level is trending:

A. high due the MFRV failing as is

B. high due to the MFRV failing open

C. low due to the MFRV failing closed

D. low due to the MFRV failing as is

A. **correct, feed flow will exceed steam flow during the downpower and level will increase.**

D. incorrect, MFRV fails as is

E. incorrect, MFRV fails as is

F. Incorrect, level will be high

Question Level: 2
Question Source: New
Exam: Both
K/A: 054.G2.4.45
Importance: 3.3 / 3.6
References: 0711408 Steam Generators and Feedwater control system Lesson Text
0702408-06 Steam Generators and Feedwater control system Lesson Plan,
10CFR55.41.b(7)

Question 58

On Unit 2 Group 5 CEA's have just been withdrawn to 100 inches when the following alarms and indications occur:

- CEA motion inhibit alarm
- Group out of sequence alarm
- Pulse counter indicates Group 5 and CEA #9 at 100 inches
- CEA #9 rod bottom light on the core mimic is not illuminated
- CEA #9 lower electrical limit (LEL) on the CEDMCS panel is illuminated

Which of the following explains why the pulse counters indicate CEA #9 at 100 inches.

A. 100 inches is the actual CEA #9 position

B. Pulse counter will not automatically reset if the CEA did not drop to rod bottom position.

C. Pulse counter has to be manually reset for any single dropped CEA.

D. Pulse counter has malfunctioned, the LEL should have reset CEA #9 to the actual position.

A. Incorrect, actual position is 1 inch from bottom

B. Correct

C. Incorrect, dropped rod contact automatically resets pulse counter

D. Incorrect, dropped rod contact automatically resets pulse counter

Question Level: 2
Question Source: New
Exam: RO
K/A: 014.K4.06
Importance: 3.4
References: 0711405 Control Element Drive System lesson text, 0702405-07 Control Element Drive System Lesson plan

As previously described, the ACTM controls the sequencing of the CEDM coils by providing sequential pulses to the coils. These pulses control the direction of movement of the CEAs.

The CEDMs, as previously described, contain a series of coils to hold, withdraw, or insert the CEAs. The sequencing of these coils is controlled by the CEDMCS logic circuits through the ACTMs. In the absence of a control power signal, all coils are de-energized and the CEAs fall into the core.

{PRIVATE }DIGITAL DATA PROCESSING SYSTEM (DDPS) POSITION INDICATION, ALARMS AND CONTROL{tc \l 1 "DIGITAL DATA PROCESSING SYSTEM (DDPS) POSITION INDICATION, ALARMS AND CONTROL"}

{PRIVATE }Component Description{tc \l 2 "Component Description"}

DDPS position indication circuitry includes the ACTM and the data processor. Refer to Figure 15. This position indicating system infers CEA position by maintaining a record of the raise and lower control pulses sent from the ACTMs to the CEDMs. The system is incorporated in the DDPS. Position information for each CEA is available via the DDPS line printer. The position of each CEA is periodically printed out for a permanent record. A printout is available, on operator demand, of the position of all CEAs or of all CEAs within a given group.

The DDPS also provides deviation information. If the deviation in position between the highest and the lowest CEA in any group exceeds a preset amount, annunciators are sounded and a printout of actual positions of all CEAs within that group is initiated. The DDPS also provides position indication information for regulating groups out of sequence, and power and pre-power dependent insertion annunciators. Annunciators associated with the DDPS:

- **CEA GROUP OUT OF SEQUENCE** - indicates that at least one group is out of overlap alignment. There are three setpoints depending on whether rods are stationary, being withdrawn, or being inserted. Refer to the annunciator response procedure for K-19.

Question 60

1-EOP-05 Excess Steam Demand is being implemented with the following:

- A S/G pressure is 880 psia and steady
- B S/G pressure is 230 psia and steady
- RCS pressure is 1050 psia
- RCS Thot is 485ºF
- One RCP in each Loop is Operating
- Pressurizer level 100%
- Reactor Vessel level 100%

Which of the following actions should be performed?

A. cooldown the RCS, establish a bubble in the pressuirzer.

B. cooldown the RCS, stop the running RCP's

C. depressurize the RCS, maintain temperature constant.

D. depressurize the RCS, stop the running RCP's

A. **Correct**

B. Incorrect, RCP operating criteria met for two RCP's

C. Incorrect, maintaining temperature constant would be correct if RCS was not solid.

D. Incorrect, RCS is to be depressurized by cooling down and removal of inventory

Question Level: 2
Question Source: New
Exam: Both
K/A: 040.EA2.2
Importance: 3.4 / 4.2
References: 1-EOP-5 Excess Steam Demand, 0702826-09 Excess Steam Demand Lesson plan,10CFR55.41.b(10)

Question 62

The following S/G level indications are observed on Unit 2 at 100% power:

- LT 9013A has failed high and has yet to be bypassed.
- LT 9013D is drifting high
- LT 9013 B and LT 9013 C indicate 65% and stable.

When 9013D reaches 80% S/G level, which of the following explains the plant response?
(assume no Operator action)

A. Main Feedwater regulating and 100% bypass valves receive a close signal.

B. Both Main Feedwater pumps will trip.

C. Unit will trip on high S/G water level.

D. The 2A Main Feedwater regulating valve receives a close signal.

A. Incorrect, 100% bypass valves only receive a close signal on Unit 1

B. Incorrect, this occurs at 88% S/G level

C. Incorrect, this occurs at 88% S/G level

D. Correct

Question Level: 1
Question Source: New
Exam: Both
K/A: 035.K6.03
Importance: 2.6 / 3.0
References: 0711408 S/G level control Lesson Text, 0702408-08 S/G level control Lesson Plan

('B' S/G). They provide input signals to their respective level indicator controller (LIC) located on RTGB 102 [202], which provides indication of level span, from 0 to 100%.

The LIC also provides a level input to the feedwater high level override and turbine trip protection circuitry, to the Reactor Protection System (RPS) for low S/G level trip, and to the Auxiliary Feedwater Actuation System (AFAS) for AFW initiation.

Individual level channel output signals may be blocked with [key] switches on the front [back] of RTGB 102 [202].

High level override (HLO) occurs when 2/4 level channels for a particular S/G exceed **82% [80%]**. High level override **shuts the affected main feed regulating valve (and the Unit 1 100% bypass valve for 35 seconds, if open).** The two high level override channels are located behind RTGB 102 [202].

A high level override cancel pushbutton, located at the high level override channel, allows overridding the high level override signal and restores control of the main feed regulating valve to the MFWCS. This button has no effect on the turbine trip signal to the main feed regulating valve (and the Unit 1 100% bypass).

The high S/G level turbine trip provides protection against possible water slugging of the turbine due to excessive water level transients. The inputs feed a 2/4 coincidence logic matrix, one for each steam generator. At a Hi-Hi level of **90% [88%]** in 2/4 indicators for a particular S/G, the **turbine is tripped, and both FW pumps are tripped**.

As illustrated in Figures 20, 21 and 22, on a turbine trip, the feedwater control system will shunt its signal to ground via relay K-2. Grounding the signal forces the E/P converter to close the main feed regulating valve; this prevents overfeeding and overcooling the S/G. A turbine trip signal (or High Level Override) also closes the Unit 1 100% bypass valve for 35 seconds, via relay K-2, to limit overfeeding the S/Gs.

At the same time, relay K-3 initiates a 5% flow bias signal that maintains the 15% bypass valve in the 5% flow position, to limit overfeeding the S/Gs. K-3 also fails open the FW pump recirc valve, to prevent the FW pump from tripping on low flow. Following a turbine trip, the K-3 relay can be reset to restore LIC output control of the 15% bypass

S/G HIGH LEVEL OVERRIDE AND TURBINE TRIP LOGIC

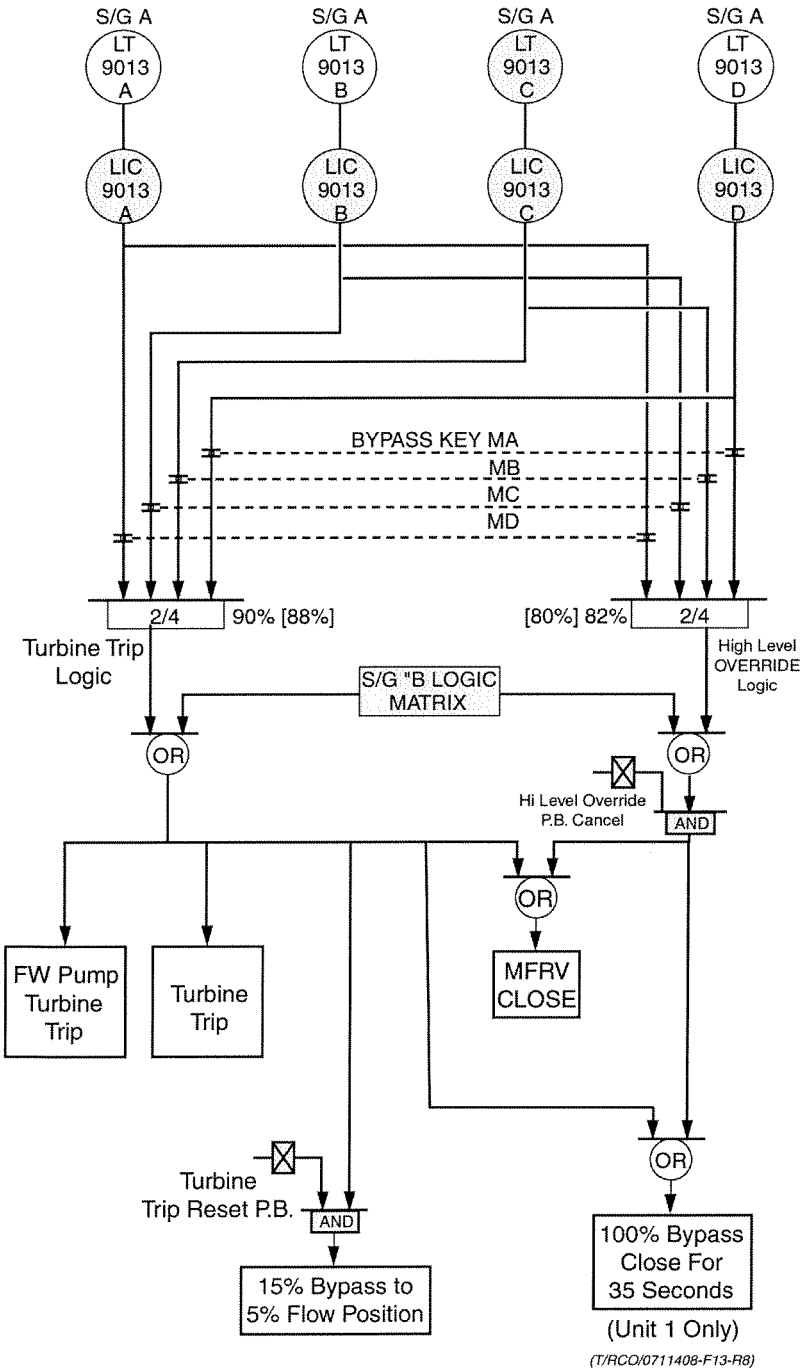

FIGURE 19

Question 63

Which of the following is the annual regulatory dose limit (NRC) for total dose equivalent (TEDE)

A. 1000 mrem

B. 2500 mrem

C. 4500 mrem

D. 5000 mrem

A. Incorrect, FPL guidline without extension

B. Incorrect, FPL guidline with extension

C. incorrect, All FPL sites

D. Correct

Question Level: 1
Question Source: New
Exam: Both
K/A: 2.3.1
Importance: 2.6 / 3.0
References:HP-2 FP&L Health Physics Manual, 10CFR55.41.b(12)

Question 64

A reactor start-up is being performed at Unit 2.

- Mode 2 was entered at 40 inches on CEA Group 3.
- The reactor was critical at 60 inches on CEA Group 5.
- CEAs are being withdrawn to raise power to the POAH.
- A steam bypass control valve stuck open.
- Tave is currently 512°F.

What operator actions are required to be taken?

Restore Tave to:

A. $\geq$ 515°F within 30 minutes.

B. $\geq$ 525°F within 15 minutes.

C. $\geq$ 515°F within 15 minutes.

D. $\geq$ 525°F within 30 minutes.

A. Incorrect, restore within 15 minutes.

B. Incorrect, restore to > 515°F.

C. Correct, T.S. minimum temperature for criticality.

D. Incorrect, T.S. surveillance requirements.

Question level: 1
Question source: New
Exam: Both
K/A: 2.1.11
Importance: 3.0/3.8
Reference: Unit 2 Tech Spec 3.1.1.5, 0702842-7, 10CFR55.41.b(10)

Question 65

Unit 2 has a Loss of Offsite Power with a Steam Generator tube rupture. During the downpower, blowdown and SJAE radiation monitors were in alarm. Due to AFW problems the crew has entered 2-EOP-15 'Functional Recovery' with the following conditions:

- RCS Thot 520ºF
- RCS pressure 1650 psia
- Local surveys indicate secondary activity
- CIAS monitors indicate no alarms or increasing trends

Which of the following is the status of Containment Isolation Safety function?

Containment Isolation Safety function:

A. is currently met due to CIAS actuated

B. is currently met due to CIAS monitors indicate no alarms or increasing trends

C. will be met when offsite power restored and the faulted S/G is no longer steaming by ADV's.

D. will be met when the faulted Steam Generator is isolated per Appendix R from EOP-99.

A. Incorrect, faulted S/G must be isolated (<515ºF Thot)

B. Incorrect, faulted S/G must be isolated (<515ºF Thot)

C. Incorrect, faulted S/G must be isolated (<515ºF Thot)

D. Correct, faulted S/G required to be isolated to meet safety function.

Question Level: 2
Question Source: New
Exam: Both
K/A: 2.4.21
Importance: 3.7 / 4.3
References: 2-EOP-15 'Functional Recovery' 0702828-06 Functional Recovery Lesson Plan, 10CFR55.41.b(10)

Question 67

Unit 1 is drained down to Mid-Loop with the following conditions:

- The Unit has been shutdown for 4 days.
- RCS temperature is 120°F.
- Shutdown Cooling has been lost.

Which of the following is the time to boil and the makeup flow rate for Boil off?

A. 11 minutes, 25 gpm

B. 11 minutes, 65 gpm

C. 14 minutes, 25 gpm

D. 14 minutes, 65 gpm

Reference Required: ONP-1-0440030, FIGURE 1 AND 2.

A. Incorrect, 11 minutes is 2 days shutdown, 45 gpm is 10 days shutdown.

B. Incorrect, 11 minutes is 2 days shutdown, 65 gpm is correct.

C. Incorrect, 14 minutes is correct, 45 gpm is 10 days shutdown.

D. **Correct**

Question level: 2
Question source: Modified from 2000 PSL NRC exam
Exam: Both
K/A: 025.AK1.01
Importance: 3.9/4.3
Reference: ONP-1-0440030, Shutdown Cooling Off-Normal

Question 68

A CEA on Unit 1 has dropped to the bottom of the core while at 100% power. The CEA is unable to be re-aligned within the required time limits. Which of the following states the reason for power reduction?

Reduce reactor power to:

A. maintain Shutdown margin.

B. prevent exceeding DNBR based on the total unrodded integrated radial peaking factor (F_r^t)r.

C. prevent exceeding DNBR based on Unrodded Planar Radial Peaking Factor (F_{xy}).

D. prevent exceeding linear heat rate based on Azimuthal Power Tilt (T_q),

A. Incorrect, required for inoperable CEA

B. **Correct**

C. Incorrect, total peaking factor required

D. Incorrect, core quadrant power, not peak pin power

Question Level: 1
Question Source: New
Exam: Both
K/A: 005.AK1.06
Importance: 2.9/3.8
References:T.S. 3.1.3.1 LCO for Movable Control Assemblies, T.S. Bases ¾.1.3 Movable Control Assemblies
1-0110030 CEA Off-normal operation and realignment

3/4.1.3 MOVABLE CONTROL ASSEMBLIES (continued)

The ACTION statements applicable to misaligned or inoperable CEAs include requirements to align the OPERABLE CEAs in a given group with the inoperable CEA. Conformance with these alignment requirements brings the core, within a short period of time, to a configuration consistent with that assumed in generating LCO and LSSS setpoints. However, extended operation with CEAs significantly inserted in the core may lead to perturbations in 1) local burnup, 2) peaking factors, and 3) available shutdown margin which are more adverse than the conditions assumed to exist in the safety analyses and LCO and LSSS setpoints determination. Therefore, time limits have been imposed on operation with inoperable CEAs to preclude such adverse conditions from developing.

The requirement to reduce power in certain time limits, depending upon the previous F_r^t, is to eliminate a potential nonconservatism for situations when a CEA has been declared inoperable. A worst case analysis has shown that a DNBR SAFDL violation may occur during the CEA misalignment if this requirement is not met. This potential DNBR SAFDL violation is eliminated by limiting the time operation is permitted at FULL POWER before power reductions are required. These reductions will be necessary once the deviated CEA has been declared inoperable. The time allowed to continue operation at a reduced power level can be permitted for the following reasons:

1. The margin calculations that support the Technical Specifications are based on a steady-state radial peak of F_r^t > the limits of Specification 3.2.3.

2. When the actual $F_r^t \leq$ the limits of Specification 3.2.3, significant additional margin exists.

3. This additional margin can be credited to offset the increase in F_r^t with time that can occur following a CEA misalignment.

4. This increase in F_r^t is caused by xenon redistribution.

5. The present analysis can support allowing a misalignment to exist without correction, if the time constraints and initial F_r^t limits of COLR Figure 3-1-1a are met.

Operability of the CEA position indicators (Specification 3.1.3.3) is required to determine CEA positions and thereby ensure compliance with the CEA alignment and insertion limits and ensures proper operation of the rod block circuit. The CEA "Full In" and "Full Out" limits provide an additional independent means for determining the CEA positions when the CEAs are at either their fully inserted or fully withdrawn positions. Therefore, the ACTION statements applicable to inoperable CEA position indicators permit continued operations when the positions of CEAs with inoperable position indicators can be verified by the "Full In" or "Full Out" limits.

Question 73

Unit 1 is in Mode 2 with CEA's being withdrawn for a Reactor Startup. When Group 7 rods are stepped out to 70" withdrawn, CEA #41 continues to withdraw with the CEDMCS panel in off. CEA #41 stops moving at 77 inches withdrawn.

Which of the following describes the operability of CEA #41?

CEA #41 is:

A. operable and meets the meets the technical specification alignment requirements.

B. operable, but must be realigned to 70" withdrawn within one hour.

C. inoperable and the remainder of group 7 CEA's must be positioned to 77" withdrawn within one hour.

D. inoperable, and shutdown margin requirements must be satisfied.

A. **Correct**

B. Incorrect, CEA meets alignment requirements of 7.5"

C. Incorrect, CEA not inoperable but would apply if misaligned 7.5-<15" and CEA was declared inoperable

D. Incorrect, shutdown margin required only if CEA inoperable and misaligned <15".

Question Level: 2
Question Source: New
Exam: Both
K/A: 001.AK3.02
Importance: 3.2/4.3
References: 1-0110030 CEA Off-Normal operation and realignment, Tech. Spec. 3.1.3.1, LP 0702405-12 CEDMCS Lesson Plan

Question 74

A St. Lucie non-licensed operator is being sent to perform a valve alignment in the RAB. The dose rate in the area of the job is 120 mr/hr. The operator's exposure record to date for the year is 890 mrem.

What is the maximum time the Operator can stay in this area without exceeding his FPL annual limit?

A. 40 minutes

B. 45 minutes

C. 55 minutes

D. 60 minutes

A. Incorrect, can stay 55 minutes.

B. Incorrect, can stay 55 minutes.

C. Correct

D. Incorrect, will exceed limits

Question level: 2
Question source: New
Exam: Both
K/A: 2.3.4
Importance: 2.5/3.1
Reference: HP-2, FPL Health Physics Manual

Question 78

Unit 1 is performing a startup with the following conditions:

- 0.3% power
- 1B Main Feedwater pump in service

A loss 2B1 6.9 KV bus occurs.

Which of the following explains the initial plant response?

Unit will:

A. trip on low S/G level

B. trip on low RCS flow

C. not trip due to Zero Power Mode bypass in service

D. not trip due to Loss of Load bypass in service.

A. Incorrect, although loss of the 1B Feedwater pump will occur, a low S/G level will take many minutes to generate a reactor trip.

B. Correct

C. Incorrect, ZPMB is automatically removed on Unit 1 at 0.1% power,0.5% on Unit 2.

D. Incorrect, Loss of Load bypass applicable <15% power with Turbine trip.

Question Level: 2
Question Source: New
Exam: RO
K/A: 003.K3.04
Importance: 3.9
References: RPS lesson text 0711404, RPS lesson plan 0702404-01

Question 81

Unit 2 has tripped from 100% power. Which of the following actions are specifically performed in 2-EOP-01 to prevent excessive RCS cooldown?

A. Throttling AFW flow to less than 150 gpm per Steam Generator.

B. Closing MSR block valves.

C. Resetting the Main Feedwater 15% bypass valves.

D. Closing the Steam Spillover Bypass valve MV 08-814

A. Incorrect, 150 gpm based on Feed Ring water hammer damage

B. Correct

C. Incorrect, AFAS is always received from 100% trip and will close the MFIV's.

D. Incorrect, this is performed to prevent losing vacuum

Question Level: 1
Question Source: New
Exam: RO
K/A: 2.4.49
Importance: 4.0
References: 2-EOP-01 Standard Post Trip Actions

Question 82

Which of the following do NOT require prior ANPS/NPS (individual with Control Room Command Function duties) concurrence and or approval.

A. Skipping parameter log entries

B. Shift relief during a surveillance that is in a steady state condition

C. On Unit 2, closing MSR block valves during performance of SPTA's

D. On Unit 1, adding 30 gallons of primary water to the RCS to maintain steady state RCS temperature.

A. Incorrect

B. Incorrect

C. Correct

D. Incorrect

Question Level: 1
Question Source: New
Exam: Both
K/A: 2.1.1
Importance: 3.7/3.8
References: Adm. 0010120 Conduct of Operations

Question 83

Unit 1 has experienced a SGTR on the 1A S/G. The ruptured S/G has been isolated. The crew is cooling down on the 1B S/G using SBCS and AFW, with the following conditions:

- 1A S/G pressure: 870 psia
- 1B S/G pressure: 780 psia
- 1A S/G level is 60% narrow range
- 1B S/G level is 20% narrow range

Assuming the 1A S/G remains at 870 psia during the cooldown, which of the following describes WHEN Operator actions would be required to re-establish AFW flow?

Manually initiate AFAS 2:

A. when 1B S/G pressure reaches 750 psia.

B. when 1B S/G pressure reaches 595 psia.

C. now, based on the current 1B S/G pressure.

D. now, based on the current 1B S/G level.

A. Incorrect, this will defeat the rupture ID earlier than allowed by procedure.

B. Correct

C. Incorrect, this will defeat the rupture ID earlier than allowed by procedure

D. Incorrect, current level within allowed safety function band.

Question Level: 2
Question Source: New
Exam: Both
K/A: 2.1.7
Importance: 3.7/4.4
References: ADM. 0010120 Conduct of Operations, Lesson Text 0711412 AFW/AFAS, Lesson Plan 0702412-11, 1-EOP-04 SGTR, 10CFR55.41.b(7)

Question 89

Unit 2 RCS unidentified leakage is currently 3.5 gpm and stable. When the Unit was shutdown a Loss of Offsite Power (LOOP) occurred with the following:

- Reactor Cavity leakage FR-07-3 indicates '0' flow immediately upon entering 2-EOP-03 LOCA procedure
- Annunciator 'Reactor Cavity Leakage High' (N-46) from LS-07-12 is illuminated

Which of the following describes the reason for the current flow indication on FR-07-3 and annunciator (N-46) response?

Loss of:

A. power to FR-07-3 and continued RCS leakage results in N-46 staying illuminated.

B. power to FR-07-3 and LS-07-12

C. instrument air pressure and loss of power to LS-07-12

D. instrument air pressure and continued RCS leakage results in N-46 staying illuminated.

A. Incorrect, FR-07-3 does not lose power on a LOOP

B. Incorrect, FR-07-3 and LS-07-12 do not lose power

C. Incorrect, LS-07-12 does not lose power.

D. Correct

Question Level: 2
Question Source: New
Exam: Both
K/A: CE/A16.AK2.1
Importance: 3.2/3.5
References: 0711600 Containment and Shield Building Lesson Text, 0702600-06,Containment and Shield Building Lesson Plan, 2-EOP-03 LOCA

Question 91

Unit 1 is moving fuel in the reactor core with the following:

- All Wide Range Neutron flux monitors operating with audible count rate selected to A.
- All CIS monitors operable

In accordance with Unit 1 Technical Specifications, which of the following requires immediate suspension of movement of fuel in the reactor core?

Loss of:

A. channel A CIS monitor.

B. channel B and D Wide Range Neutron flux monitors.

C. audible count rate indication in the Control Room.

D. audible count rate indication in the Containment.

A. Incorrect, three of four required operable

B. Incorrect, two Wide Range neutron flux monitors needed

C. Incorrect, would be correct for Unit 2 only

D. Correct

Question Level: 1
Question Source: New
Exam: RO
K/A: 2.2.30
Importance: 3.5
References: Technical Specification 3.9.2 , LP 0702842-07 Technical Specifications for RCO's, 10CFR55.41.b.(10)

TABLE 3.3-6

RADIATION MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ALARM SETPOINT	MEASUREMENT RANGE	ACTION
1. AREA MONITORS					
a. Fuel Storage Pool Area	1	*	$\leq$ 15 mR/hr	$10^{-1} - 10^{4}$ mR/hr	13
b. Containment (CIS)	3	6	$\leq$ 90 mR/hr	$1 - 10^{5}$ mR/hr	16
c. Containment Area – Hi Range	1	1, 2, 3, & 4	$\leq$ 10 R/hr	$1 - 10^{7}$ R/hr	15
2. PROCESS MONITORS					
a. Containment					
i. Gaseous Activity RCS Leakage Detection	1	1, 2, 3 & 4	Not Applicable	$10 - 10^{6}$ cpm	14
ii. Particulate Activity RCS Leakage Detection	1	1, 2, 3 & 4	Not Applicable	$10 - 10^{6}$ cpm	14
b. Fuel Storage Pool Area Ventilation System					
i. Gaseous Activity	1	**	***	$10^{-7} - 10^{5}$ µCi/cc	12
ii. Particulate Activity	1	**	***	$1 - 10^{6}$ cpm	12

* With fuel in the storage pool or building.

** With irradiated fuel in the storage pool or whenever there is fuel movement within the pool or crane operation with loads over the storage pool.

*** The Alarm Setpoints are determined and set in accordance with requirements of the Offsite Dose Calculation Manual.

REFUELING OPERATIONS

INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.9.2 As a minimum, two wide range logarithmic neutron flux monitors shall be operating, each with continuous visual indication in the control room and one with audible indication in the containment.

APPLICABILITY: MODE 6.

ACTION:

With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.2 Each wide range logarithmic neutron flux monitor shall be demonstrated OPERABLE by performance of:

a. A CHANNEL FUNCTIONAL TEST at least once per 7 days.

b. A CHANNEL FUNCTIONAL TEST within 8 hours prior to the start of CORE ALTERATIONS, and

c. A CHANNEL CHECK at least once per 12 hours during CORE ALTERATIONS.

Question 94

Unit 1 is in Mode 3, middle of core life, performing a Reactor startup. Which of the following evolutions could result in entering Mode 2 earlier than expected?

A. Placing the Boric Acid makeup tanks on Recirc.

B. Placing the Hogging Ejectors in service.

C. Starting the first Condensate pump.

D. Removing Steam Generator blowdown from service.

A. Incorrect, could cause addition of boric acid if various valves leaked through.

B. Correct, Main Steam flow to ejectors will cooldown the RCS adding positive reactivity.

C. Incorrect, Condensate pump not sufficient pressure to add feedwater to the Steam Generators.

D. Incorrect, will cause RCS temperature to increase adding negative reactivity.

Question Level: 2
Question Source: New
Exam: Both
K/A: 2.2.1
Importance: 3.7/3.6
References: NOP-1-0030122 Reactor Startup, Reactor Theory Chapter 12, applications and plant response LP 0702112-09,10CFR55.41.b.(1)

Question 100

Unit 1 has entered 1-EOP-05 Excess Steam Demand, with the following conditions:

- RCS pressure is 1300 psia and constant
- Thot is 352 ºF and constant
- CET 355 ºF and constant
- 1A S/G wide range level is '0' % with no feedwater flow
- 1B S/G level is 34% wide range and lowering, feeding at 100 gpm AFW flow
- Pressurizer level is '0' %
- One RCP in each loop is operating
- Reactor Vessel level sensors 7 and 8 covered

All ECCS equipment is operating as designed.

In the order of Safety Function hierarchy, which of the following safety functions is not being met and should be addressed next?

A. Core Heat Removal

B. RCS Heat Removal

C. RCS Inventory Control

D. RCS Pressure Control

A. Incorrect, Core heat removal is met

B. Incorrect, RCS heat removal not met, but pressure control higher hierarchy

C. Incorrect, RCS inventory control met

D. Correct, pressure is outside Figure 1 (>200 ºF subcooled)

Question Level: 2
Question Source: New
Exam: SRO
K/A: CE/A11.G2.4.22
Importance: 4.0
References: 1-EOP-05 Excess Steam Demand, 0702821-05 Safety Function Concept and EOP overview Lesson plan

APPENDIX A
SAFETY FUNCTION STATUS CHECK SHEET
(Page 8 of 12)

6. RCS HEAT REMOVAL

SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
A. Steam Generator Level	At least one unisolated in the normal band (60% to 70% narrow range) with feedwater available or being restored by total feedwater flow greater than or equal to 150 gpm.	
		AND
RCS T-avg	Less than 545°F and NOT increasing.	

END OF SAFETY FUNCTION 6

Question 101

A loss of offsite power has occurred with the following conditions:

- Unit 1 has no Diesel Generators operable
- Unit 2 has only the 2B Diesel Generator tied to the 2B3 4.16 KV bus.

Which of the following explains the preferred power lineup to supply power to Unit 1? (assume all equipment available to be energized on Unit 1)

Utilize 2B Diesel Generator through the:

A. Station Blackout crosstie breaker to the 1AB 4.16 KV bus to the 1A3 4.16 KV bus.

B. Station Blackout crosstie breaker to the 1AB 4.16 KV bus to the 1B3 4.16 KV bus.

C. 2B4 switchgear to the Unit 1 1B startup transformer to the 1B2 4.16 KV bus tied to the 1B3 4.16 KV bus.

D. 2B4 switchgear to the Unit 1 1B startup transformer to the 1B2 4.16 KV bus to the 1B3 4.16 KV bus to the 1AB 4.16 KV bus to the 1A3 4.16 KV bus.

A. Incorrect, preferred is to the 1B3 4.16 KV bus due to 10 CFR Appendix R considerations.

B. Correct

C. Incorrect, this is the alternate power source lineup

D. Incorrect, alternate power source lineup to the non preferred 1A3 4.16 KV bus.

Question Level: 2
Question Source: New
Exam: SRO
K/A: 000055.EA1.06
Importance: 4.5
References: 1-EOP-10 Station Blackout, 1-EOP-99 Appendixes/Figures/Tables, LP 0702830-11, LP 0902704-5 CEN 152 and EOP overview.

Question 103

Unit 1 has manned the Hot Shutdown Control Panel due to a fire in the Control Room. All subsequent actions from 1-ONP-100.02 Control Room Inaccessibility have been performed. A loss of offsite power occurs shortly after the Hot Shutdown Control Panel is manned.

Which of the following states the correct procedure to implement and the status of the 1B Diesel Generator?

A. Implement 1-EOP-09 LOOP. The 1B Diesel Generator will not start due to all normal/isolate switches in isolate.

B. Implement 1-EOP-09 LOOP. The 1B Diesel Generator will not start due to overspeed trip levers placed in trip.

C. Stay in 1-ONP-100.02 Control Room Inaccessibility. The IB Diesel Generator will start and load on the vital 4.16 KV bus.

D. Stay in 1-ONP-100.02 Control Room Inaccessibility. The IB Diesel Generator will start but not load on the vital 4.16 KV bus due to the Diesel output breaker normal/isolate switch in isolate.

A. Incorrect, 1-ONP-100.02 is designed for a LOOP. The 1B Diesel will start even with switches in isolate.

B. Incorrect, 1-ONP-100.02 is designed for a LOOP. The 1B Diesel will start, overspeed levers placed in trip only if fire in cable spreading room.

C. Incorrect, diesel will start but not load due to output breaker switch in isolate.

D. Correct

Question Level: 2
Question Source: New
Exam: SRO
K/A: 000068.AK.2.07
Importance: 3.4
References: 1-ONP-100.02 Control Room Inaccessibility. 0702812-06 ONP Lesson Plan, 10CFR55.43.b(5)

1.0 PURPOSE

This procedure provides instructions for placing the plant in a safe condition when operations cannot be conducted from the Control Room due to a fire in the Control Room or the Cable Spreading Room. Additionally, the instructions provided address actions to be taken should a simultaneous Loss of Offsite Power (LOOP) occur during this event. /R11

Evacuation of the Control Room for any reason other than a fire requires NPS concurrence. /R11

Revisions to this procedure shall be reviewed by Engineering to ensure the changes do NOT adversely affect compliance with Appendix R requirements (i.e., Safe Shutdown Analysis, Emergency Lighting, etc.).

2.0 REFERENCES

NOTE

One or more of the following symbols may be used in this procedure:

§ Indicates a Regulatory commitment made by Technical Specifications, Condition of License, Audit, LER, Bulletin, etc., and shall NOT be revised without Facility Review Group review and Plant General Manager approval.

¶ Indicates a management directive, vendor recommendation, plant practice or other non-regulatory commitment that should NOT be revised without consultation with the plant staff.

Ψ Indicates a step that requires a sign-off on a data sheet.

$§_1$ **2.1** St. Lucie Unit 1 Technical Specifications

$§_2$ **2.2** Unit 1 UFSAR Section 7.4 and Section 9.5A.5.

$§_5$ **2.3** EPIP-01, Classification of Emergencies.

2.4 AP 0010134, Component Cycles and Transients.

2.5 OP 1-0030127, Reactor Plant Cooldown - Hot Standby to Cold Shutdown.

2.6 NRC Inspection Report numbers 50-335/88-27 and 50-389/88-27.

Question 111

Unit 1 Diesel Generator 1A was declared out of service at 0235 on March 5. The diesel was discovered to have a corroded radiator and was leaking coolant. The current time is 0245 March 5.

Which of the following describes required actions as a result of the 1A diesel being declared out of service?

Demonstrate operability of offsite AC sources no later than:

A. 0335 March 5 and restore the 1A Diesel Generator to operable status by 0235 March 19.

B. 0335 March 5 and restore the 1A Diesel Generator to operable status by 0235 March 8.

C. 1035 March 5 and demonstrate the operability of the 1B Diesel Generator by performing the specified surveillance no later than 0235 March 8.

D. 1035 March 5 and demonstrate the operability of the 1C AFW by performing the specified surveillance no later than 0335 March 5.

A. Correct

B. Incorrect, restore Diesel within 14 days

C. Incorrect, offsite power to be verified within one hour

D. Incorrect, 1C AFW pump requires operability check but surveillance does not need to be performed.

Question Level: 2
Question Source: New
Exam: SRO
K/A: 064.G2.2.23
Importance: 3.8
References: Technical Specification 3.8.1.1 0711842 Technical Specification Lesson Plan

Question 113

Unit 1 RCS is solid at 310 psia preparing to start an RCP on an idle loop during fill and vent. Upon starting the RCP, RCS pressure rapidly increases.

Which of the following caused the pressure excursion?

A. RCS temperature was 40ºF lower than Steam Generator temperature on the idle loop.

B. RCS temperature was 40ºF higher than Steam Generator temperature on the idle loop.

C. RCS temperature increase due to heat added from running RCP.

D. Loss of the 1D DC bus

A. **Correct**

B. Incorrect, backward logic

C. Incorrect, RCP would add heat to the RCS but, would be slow and not cause a rapid pressure excursion.

D. Incorrect, possible if loss of safety related DC bus.

Question Level: 2
Question Source: New
Exam: SRO
K/A: 007.A2.03
Importance: 3.9
References:2-EOP-05 Excess Steam Demand

Question 118

A Loss of Offsite power has occurred on Unit 1. The transient has resulted in various breakers tripping. As a result, AFW flow instrumentation on the RTGB is unavailable. Which of the following describes an alternate method of determining approximately 150 gpm AFW flow to each S/G's?

A. Adjust the 1C AFW turbine speed to equal 100 psig above the S/G pressure with the header throttle valves fully open.

B. Locally open the respective header FCV to 10 turns open on each AFW header.

C. On each AFW header, open the respective header FCV for six seconds from the full closed position.

D. On each AFW header, close the respective header FCV for six seconds from the full open position.

A. Incorrect, this method is used in Appendix G 1-EOP-99 for local operation on the 1C AFW pump. This method is not intended to be used for flow control purposes.

B. Incorrect, 10 turns open is for the ICW pump start on a depressurized header.

C. Correct

D. Incorrect, backward from the correct method.

Question Level: 1
Question Source: New
Exam: SRO
K/A: 000056.AA2.20
Importance: 4.2
References 1-ONP-100.02 Control Room Inaccessibility

Question 125

Unit 1 is operating at 100% power with the 1A Charging Pump out of service. The 1B BAM tank is out of service on low level. Both gravity feed valves have just been declared out of service due to discovery of non qualified parts on the motors.

The Tech Spec LCO for boration flow paths will:

A. be met by two of the three flow paths available.

B. be met by one of the three flow paths available.

C. not be met since two of the three flow paths are unavailable.

D. not be met since none of the flow paths are available.

A. **Correct, one flow path available from BAM tank via BAM pump to charging pump, one flow path from RWT via charging pump.**

B. Incorrect, requires two of the three flow paths available.

C. Incorrect, two of the three flow paths are available.

D. Incorrect, two of the three flow paths are available.

Question level: 2
Question source: New
Exam: SRO
K/A: 2.2.24
Importance: 3.8
Reference: Unit 1 Tech Spec 3.1.2.2