Facility: Salem Generating Station Printed: 05/07/2004

Date Of Exam: 06/12/2004

Tier	Group	RO K/A Category Points												SRO-Only Points				
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	K	A	A2	G*	
1. Emergency & Abnormal Plant Evolutions	1	3	3	3				3	3			3	18	0	0	0	0	0
	2	2	2	2				1	1			1	9	0	0	0	0	0
	Tier Totals	5	5	5				4	4			4	27	0	0	0	0	0
2. Plant Systems	1	4	3	3	2	2	2	2	3	2	2	3	28	0	0	0	0	0
	2	0	1	1	1	1	0	1	1	2	1	1	10	0	0	0	0	0
	Tier Totals	4	4	4	3	3	2	3	4	4	3	4	38	0	0	0	0	0
3. Generic Knowledge And Abilities Categories					1		2		3		4		10	1	2	3	4	0
					3		2		2		3			0	0	0	0	

Note:

1. Ensure that at least two topics from every K/A category are sampled within each tier of the RO outline (i.e., the "Tier Totals" in each K/A category shall not be less than two). Refer to Section D.1.c for additional guidance regarding the SRO sampling.
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Select topics from many systems and evolutions; avoid selecting more than two 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 (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. The SRO K/As must also be linked to 10 CFR 55.43 or an SRO-level learning objective.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) for the applicable license level, and the point totals for each system and category. Enter the group and tier totals for each category in the columns labeled "K" and "A". Use duplicate pages for RO and SRO-only exams.
8. For Tier 3, enter the K/A numbers, descriptions, importance ratings, and point totals on Form ES-401-3.
9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.

PWR RO Examination Outline

Printed: 05/07/2004

Facility: Salem Generating Station

ES - 401 **Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1** **Form ES-401-2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
000007 Reactor Trip - Stabilization - Recove				X			EA1.02 - MFW System	3.8	1
000008 Pressurizer Vapor Space Accident / 3		X					AK2.02 - Sensors and detectors	2.7*	1
000009 Small Break LOCA / 3		X					EK2.03 - S/Gs	3.0	1
000011 Large Break LOCA / 3		X					EK2.02 - Pumps	2.6*	1
000011 Large Break LOCA / 3			X				EK3.06 - Actuation of Phase A and B during LOCA initiation	4.3*	1
000015/000017 RCP Malfunctions / 4			X				AK3.01 - Potential damage from high winding and/or bearing temperatures	2.5	1
000022 Loss of Rx Coolant Makeup / 2	X						AK1.03 - Relationship between charging flow and PZR level	3.0	1
000026 Loss of Component Cooling Water /					X		AA2.01 - Location of a leak in the CCWS	2.9	1
000026 Loss of Component Cooling Water /						X	2.1.2 - Knowledge of operator responsibilities during all modes of plant operation.	3.0	1
000027 Pressurizer Pressure Control System						X	2.4.31 - Knowledge of annunciators alarms and indications, and use of the response instructions.	3.3	1
000027 Pressurizer Pressure Control System			X				AK3.04 - Why, if PZR level is lost and then restored, that pressure recovers much more slowly	2.8	1
000040 Steam Line Rupture - Excessive Hea					X		AA2.03 - Difference between steam line rupture and LOCA	4.6	1
000055 Station Blackout / 6					X		EA2.01 - Existing valve positioning on a loss of instrument air system	3.4	1
000056 Loss of Off-site Power / 6				X			AA1.18 - Control room normal ventilation supply fan	3.2	1
000057 Loss of Vital AC Inst. Bus / 6						X	2.1.23 - Ability to perform specific system and integrated plant procedures during all modes of plant operation.	3.9	1
000062 Loss of Nuclear Svc Water / 4				X			AA1.06 - Control of flow rates to components cooled by the SWS	2.9	1
W/E04 LOCA Outside Containment / 3	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the LOCA Outside Containment	3.5	1
W/E05 Inadequate Heat Transfer - Loss of S	X						EK1.1 - Components, capacity, and function of emergency systems	3.8	1
K/A Category Totals:	**3**	**3**	**3**	**3**	**3**	**3**	**Group Point Total:**		**18**

PWR RO Examination Outline

Printed: 05/07/2004

Facility: Salem Generating Station

ES - 401 **Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2** **Form ES-401-2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1			X				AK3.04 - Tech-Spec limits for inoperable rods	3.4	1
000032 Loss of Source Range NI / 7					X		AA2.01 - Normal/abnormal power supply operation	2.6	1
000037 Steam Generator Tube Leak / 3	X						AK1.01 - Use of steam tables	2.9*	1
000060 Accidental Gaseous Radwaste Rel. /	X						AK1.02 - Biological effects on humans of the various types of radiation, exposure levels that are acceptable for personnel in a nuclear reactor power plant; the units used for radiation intensity measurements and for radiation exposure levels	2.5	1
000067 Plant Fire On-site / 9				X			AA1.05 - Plant and control room ventilation systems	3.0	1
000068 Control Room Evac. / 8		X					AK2.03 - Controllers and positioners	2.9	1
000068 Control Room Evac. / 8		X					AK2.01 - Auxiliary shutdown panel layout	3.9	1
W/E08 RCS Overcooling - PTS / 4			X				EK3.1 - Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics	3.4	1
W/E10 Natural Circ. / 4						X	2.2.22 - Knowledge of limiting conditions for operations and safety limits.	3.4	1
K/A Category Totals:	**2**	**2**	**2**	**1**	**1**	**1**	**Group Point Total:**		**9**

PWR RO Examination Outline

Printed: 05/07/2004

Facility: Salem Generating Station

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
003 Reactor Coolant Pump				X								K4.02 - Prevention of cold water accidents or transients	2.5	1
003 Reactor Coolant Pump									X			A3.01 - Seal injection flow	3.3	1
004 Chemical and Volume Control		X										K2.04 - BWST tank heaters	2.6	1
005 Residual Heat Removal			X									K3.05 - ECCS	3.7*	1
006 Emergency Core Cooling					X							K5.05 - Effects of pressure on a solid system	3.4	1
006 Emergency Core Cooling									X			A3.08 - Automatic transfer of ECCS flowpaths	4.2	1
008 Component Cooling Water			X									K3.03 - RCP	4.1	1
008 Component Cooling Water										X		A4.01 - CCW indications and controls	3.3	1
010 Pressurizer Pressure Control				X								K4.03 - Over pressure control	3.8	1
010 Pressurizer Pressure Control						X						K6.03 - PZR sprays and heaters	3.2	1
012 Reactor Protection	X											K1.02 - 125V dc system	3.4	1
012 Reactor Protection		X										K2.01 - RPS channels, components, and interconnections	3.3	1
013 Engineered Safety Features Act								X				A2.03 - Rapid depressurization	4.4	1
026 Containment Spray											X	2.1.27 - Knowledge of system purpose and or function.	2.8	1
039 Main and Reheat Steam					X							K5.08 - Effect of steam removal on reactivity	3.6	1
039 Main and Reheat Steam								X				A2.04 - Malfunctioning steam dump	3.4	1
059 Main Feedwater										X		A4.08 - Feed regulating valve controller	3.0*	1
059 Main Feedwater	X											K1.04 - S/GS water level control system	3.4	1
061 Auxiliary/Emergency Feedwate						X						K6.01 - Controllers and positioners	2.5	1
062 AC Electrical Distribution							X					A1.01 - Significance of D/G load limits	3.4	1
062 AC Electrical Distribution								X				A2.10 - Effects of switching power supplies on instruments and controls	3.0	1
063 DC Electrical Distribution		X										K2.01 - Major DC loads	2.9*	1
063 DC Electrical Distribution			X									K3.02 - Components using DC control power	3.5	1
064 Emergency Diesel Generator											X	2.1.28 - Knowledge of the purpose and function of major system components and controls.	3.2	1

PWR RO Examination Outline

Printed: 05/07/2004

Facility: Salem Generating Station

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
073 Process Radiation Monitoring	X											K1.01 - Those systems served by PRMs	3.6	1
073 Process Radiation Monitoring							X					A1.01 - Radiation levels	3.2	1
078 Instrument Air	X											K1.04 - Cooling water to compressor	2.6	1
078 Instrument Air											X	2.1.32 - Ability to explain and apply all system limits and precautions.	3.4	1
K/A Category Totals:	4	3	3	2	2	2	2	3	2	2	3	**Group Point Total:**		28

PWR RO Examination Outline

Printed: 05/07/2004

Facility: Salem Generating Station

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
001 Control Rod Drive								X				A2.13 - ATWS	4.4	1
002 Reactor Coolant							X					A1.11 - Relative level indications in the RWST, the refueling cavity, the PZR and the reactor vessel during preparation for refueling	2.7	1
002 Reactor Coolant									X			A3.03 - Pressure, temperatures, and flows	4.4	1
028 Hydrogen Recombiner and Pur										X		A4.02 - Location and interpretation of containment pressure indications	3.7*	1
033 Spent Fuel Pool Cooling			X									K3.02 - Area and ventilation radiation monitoring systems	2.8	1
035 Steam Generator									X			A3.01 - S/G water level control	4.0	1
041 Steam Dump/Turbine Bypass C											X	2.4.49 - Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0	1
045 Main Turbine Generator					X							K5.18 - Purpose of low-power reactor trips (limited to 25% power)	2.7	1
072 Area Radiation Monitoring				X								K4.02 - Fuel building isolation	3.2*	1
075 Circulating Water		X										K2.03 - Emergency/essential SWS pumps	2.6*	1
K/A Category Totals:	**0**	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**2**	**1**	**1**	**Group Point Total:**		**10**

Generic Knowledge and Abilities Outline (Tier 3)

PWR RO Examination Outline

Printed: 05/07/2004

Facility: Salem Generating Station

Form ES-401-3

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.10	Knowledge of conditions and limitations in the facility license.	2.7	1
	2.1.28	Knowledge of the purpose and function of major system components and controls.	3.2	1
	2.1.32	Ability to explain and apply all system limits and precautions.	3.4	1
		Category Total:		**3**
Equipment Control	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.	4.0	1
	2.2.12	Knowledge of surveillance procedures.	3.0	1
		Category Total:		**2**
Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	2.6	1
	2.3.11	Ability to control radiation releases.	2.7	1
		Category Total:		**2**
Emergency Procedures/Plan	2.4.3	Ability to identify post-accident instrumentation.	3.5	1
	2.4.6	Knowledge symptom based EOP mitigation strategies.	3.1	1
	2.4.7	Knowledge of event based EOP mitigation strategies.	3.1	1
		Category Total:		**3**
		Generic Total:		**10**

Facility: **SALEM 1 & 2** Date of Examination: **06/07/2004**
Examination Level: **RO** Operating Test Number: **HOTEL**

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N	Description: **Identify and Isolate Non-Essential Heat Loads** K/A: 2.1.25 Ability to obtain and interpret station ref materials such as graphs, monographs, and tables which contain performance data. (2.8, 3.1) CFR: 55.45(12)
Conduct of Operations	N	Description: **Perform RCS Water Inventory Balance** K/A: 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (3.9, 4.0) CFR: 55.45(12)
Equipment Control	M	Description: **Prepare an Equipment Clearance** K/A: 2.2.13 Knowledge of tagging and clearance procedures. (3.6, 3.8) CFR: 55.45(13)
Radiation Control	N	Description: **Determine Radiological Conditions for Personnel Exposure** K/A: 2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure. (2.9, 3.3) CFR: 55.45(10)
Emergency Plan		

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

Facility: **SALEM 1 & 2** Date of Examination: **06/07/2004**

Examination Level: **SRO** Operating Test Number: **HOTEL**

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N	Description: **Identify and Isolate Non-Essential Heat Loads** K/A: 2.1.25 Ability to obtain and interpret station ref materials such as graphs, monographs, and tables which contain performance data. (2.8, 3.1) CFR: 55.45(12)
Conduct of Operations	N	Description: **Review RCS Water Inventory Balance** K/A: 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (3.9, 4.0) CFR: 55.45(12)
Equipment Control	M	Description: **Review an Equipment Clearance** K/A: 2.2.13 Knowledge of tagging and clearance procedures. (3.6, 3.8) CFR: 55.45(13)
Radiation Control	N	Description: **Determine Radiological Conditions for Personnel Exposure** K/A: 2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure. (2.9, 3.3) CFR: 55.45(10)
Emergency Plan	M	Description: **Classify an Event** K/A: 2.4.41 Knowledge of the emergency action level thresholds and classifications. (2.3, 4.1) CFR: 55.45(11)

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

Facility: **SALEM 1 &2**	Date of Examination: **06/07/2004**
Exam Level (circle one): **RO / SRO(I)** / SRO(U)	Operating Test No.: **HOTEL**

Control Room Systems (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)		
System / JPM Title	Type Code*	Safety Function
a. Perform an RCS Dilution	DS	1
b. Respond to High Activity in the Reactor Coolant	NS	2
c. Transfer to Cold Leg Recirculation (**RO Only**)	DS	3
d. Spurious Isolation of RCP Motor Bearing CCW	ALNS	4
e. Respond to High Containment Sump Level (CFCU Leak)	ADS	5
f. Synchronize Main Generator to Grid	ADS	6
g. Manually Actuate Control Room Accident Pressurized Mode Ops	ANS	7
h. Start a Component Cooling Water Pump	AS	8
In-Plant Systems (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i. Locally Close MSIV and Operate Associated ARV	D	4
j. Manually Isolate Seal Injection	NR	5
k. Start and Synchronize an Emergency Diesel Generator	D	6

* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA

Facility: **SALEM 1 & 2** Scenario No.: **NRC #1** Op-Test No.: **HOTEL**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: **90% Rated Thermal Power, MOL, Equilibrium Conditions**

Turnover: **Unit 2 is at 90% power with the following equipment is out of service: 2A EDG taken OOS 4 hours ago for injector maintenance, 21 RHR Pump taken OOS 4 hours ago for coupling alignment. Maintenance on both components expected to be completed 8 hours from now. All required surveillances are complete. Weather conditions are normal. Unit 1 is at 100% power. Hope Creek is in a refueling outage. Shift orders are to raise power to 100% at 10% per hour.**

Event No.	Malf. No.	Event Type*	Event Description
1	----------	N CRS/PO R RO	Raise Reactor Power
2	SW0215A SW0339E	C CRS/PO	21 SW Pump Trip With Failure of 25 Service Water Pump to Auto Start
3	PR0016A	I CRS/RO	Pressurizer Pressure Channel I Fails Low (TS CRS)
4	VC0173A	----------	21 Cntmt Fan Coil Unit Trip (TS CRS)
5	CN0086	C ALL	Decreasing Condenser Vacuum
6	BF0105A&B RP0059A&B RP0058 PR0020A	M ALL	Mn Feed Pumps Trip on High Exh Hood Pressure, ATWT, Pzr Safety 2PR3 Fails Open
7	RP318G5	C CRS/PO	23 Aux Building Exhaust Fan Fails to Start on SEC
			Terminate after SI flow reduction evaluation in LOCA-1

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

Facility: **SALEM 1 & 2** Scenario No.: **NRC #2** Op-Test No.: **HOTEL**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: **100% Rated Thermal Power, BOL, Equilibrium Conditions**

Turnover: **Unit 2 is at 100% power. Unit 1 and Hope Creek are also at 100% power. Solar magnetic disturbances have been occurring. Current SMD K3. 22 AFW Pump was taken OOS 2 hours ago for motor bearing replacement. AFW pump maintenance is expected to be complete 6 hours from now. All required surveillances are complete. The crew is directed to maintain 100% power.**

Event No.	Malf. No.	Event Type*	Event Description
1	NI0193A	I CRS/RO	PRNIS Channel N41 Fails High (TS CRS)
2	CF81 (OVDI)	C CRS/PO	24MS10 Relief Fails Open (Pressure Setpoint Decrease)
3	DA033D (RF)	----------	Failure of RTB Shunt Trip Capability (TS CRS)
4	TU0081G	N CRS/PO R RO	Main Turbine Governor Valve 23MS29 Fails Closed
5	VL0447 RP0058 RP0069 RP0073 RP0279A&B	C ALL	SG Fdwtr Control 22BF19 Fails Closed, Turbine Fails To Trip, Auto MSLIS Fails to Actuate
6	EL0144 AF0183	M ALL	Loss of 2A 4KV Vital Bus and 23 AFW Pump Trip
			Terminate when feed flow re-established to a SG

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

Facility: **SALEM 1 & 2** Scenario No.: **NRC #3** Op-Test No.: **HOTEL**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: **3% Rated Thermal Power, MOL**

Turnover: **Unit 2 is at 3% power, recovering from a 7 day forced outage to repair body to bonnet leak on Pzr Spray Bypass Valve 2PS4. Mode change is approved. Weather conditions are normal. Unit 1 and Hope Creek are at 100% power. Shift orders are to raise power in preparation for placing the main turbine in service. Procedure in use: IOP-3 at Step 5.4.14.**

Event No.	Malf. No.	Event Type*	Event Description
1	----------	N CRS/PO R RO	**Raise Reactor Power**
2	**PR0017A**	I CRS/RO	**Pressurizer Level Channel I (LT459) Fails Low (TS CRS)**
3	**SG0078A**	C ALL	**21 SG Tube Leak (5 gpm) (TS CRS)**
4	**BF0105A**	C CRS/PO	**21 Main Feed Pump Trip**
5	**RC0012C**	C CRS/RO	**23 RCP High Vibration**
6	**SG0078A** **EL0134**	M ALL	**SGTR with Loss of Offsite Power**
7	**SJ0184A**	C CRS/PO	**21 SI Pump Fails to Auto Start**
			Terminate scenario when depressurization criteria met (SGTR-1 Table F)

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

Facility: **SALEM 1 & 2** Scenario No.: **NRC #4** Op-Test No.: **HOTEL**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: **100% Rated Thermal Power**

Turnover: **Unit at 100% power. 22 SGFP has a control oil leak. 23 AFW Pump taken OOS two hours ago for pump bearing replacement. All required surveillances are complete. Weather conditions are normal. Unit 1 and Hope Creek are at 100% power. Shift orders are to reduce power to 60% at 10% per hour to repair SGFP oil leak.**

Event No.	Malf. No.	Event Type*	Event Description
1	----------	N: CRS/PO R: RO	Reduce Power to 60% To Repair SGFP Oil Leak
2	SG0095D		24 SG Lvl Xmtr (549) Ch II Fails Low (TS-CRS)
3	CV0029A	C CRS/RO	Letdown Hx CCW Outlet 2CC71 Fails Closed
4	RM0241A		Cntmt Area Hi Rad Monitor 2R44B Fails High [TS-CRS]
5	BF0105B RD0061	C CRS/RO	22 Fd Pump Trip w/Rod Speed Control Program Failure to 8 Steps Per Minute
6	MS0088D MS0092G MS0092H	M ALL	24 MSL Break In Containment, 23 MSIV and 24 MSIV Fail to Close
7	AF0182B	C CRS/PO	22 AFW Pump Override Protection Failure
9	RP0276A RP0276B RP0277A RP0277B	C CRS/PO	Phase B and Containment Spray Signas Fail to Automatically Actuate

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