Facility: Palisades Date of Exam: July 2008

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

Note:

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

ES-401 PWR Examination Outline Form ES-401-2
Emergency and Abnormal Plant Evolutions – Tier 1/Group 1 (RO)

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	IR	#
CE/E02 Reactor Trip - Stabilization - Recovery / 1		1					EK2.1 - Knowledge of the interrelations between the (Reactor Trip Recovery) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.3	1
000008 Pressurizer Vapor Space Accident / 3			04				AK3.04 - Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: RCP tripping requirements.	4.2	2
000009 Small Break LOCA / 3				04			EA1.04 - Ability to operate and monitor the following as they apply to a small break LOCA: CVCS.	3.7	3
000015/17 RCP Malfunctions / 4					08		AA2.08 - Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): When to secure RCPs on high bearing temperature.	3.4	4
000022 Loss of Rx Coolant Makeup / 2						2.2.44	G2.2.44 - Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.2	5
000025 Loss of RHR System / 4	01						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to Loss of Residual Heat Removal System: Loss of RHRS during all modes of operation.	3.9	6
000026 Loss of Component Cooling Water / 8			02				AK3.02 - Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS.	3.6	7
000027 Pressurizer Pressure Control System Malfunction / 3			03				AK3.03 - Knowledge of the reasons for the following responses as they apply to the Pressurizer Pressure Control Malfunctions: Actions contained in EOP for PZR PCS malfunction.	3.7	8
000029 ATWS / 1				12			EA1.12 - Ability to operate and monitor the following as they apply to a ATWS: M/G set power supply and reactor trip breakers.	4.1	9
000038 Steam Gen. Tube Rupture / 3					03		EA2.03 - Ability to determine or interpret the following as they apply to a SGTR: Which S/G is ruptured.	4.4	10
CE/E05 Steam Line Rupture - Excessive Heat Transfer / 4						2.4.2	G2.4.2 - Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.5	11
CE/E06 Loss of Main Feedwater / 4	3						EK1.3 - Knowledge of the operational implications of the following concepts as they apply to the Loss of Feedwater: Annunciators and conditions indicating signals, and remedial actions.	3.2	12
000056 Loss of Off-site Power / 6	01						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: Principle of cooling by natural convection.	3.7	13
000057 Loss of Vital AC Inst. Bus / 6			01				AK3.01 - Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital ac electrical instrument bus.	4.1	14

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions – Tier 1/Group 1 (RO) cont'd							Form ES-401-2	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	IR	#
000058 Loss of DC Power / 6				01			AA1.01 - Ability to operate and / or monitor the following as they apply to the Loss of DC Power: Cross-tie of the affected dc bus with the alternate supply	3.4	15
000062 Loss of Nuclear Svc Water / 4					02		AA2.02 - Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: The cause of possible SWS loss	2.9	16
000065 Loss of Instrument Air / 8						2.1.7	G2.1.7 - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	17
000077 Generator Voltage and Electric Grid Disturbances / 6	03						AK1.03 - Knowledge of the operational implications of the following concepts as they apply to Generator Voltage and Electric Grid Disturbances: Under-excitation	3.3	18
K/A Category Point Totals:	4	1	4	3	3	3	Group Point Total:		18

ES-401 PWR Examination Outline Form ES-401-2
Emergency and Abnormal Plant Evolutions – Tier 1/Group 2 (RO)

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	IR	#
000028 Pressurizer Level Malfunction / 2						2.1.31	G2.1.31 - Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.6	19
000036 Fuel Handling Accident / 8	01						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents: Radiation exposure hazards.	3.5	20
000037 Steam Generator Tube Leak / 3					07		AA2.07 - Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Flowpath for dilution of ejector exhaust air.	3.1	21
000061 ARM System Alarms / 7			02				AK3.02 - Knowledge of the reasons for the following responses as they apply to the Area Radiation Monitoring (ARM) System Alarms: Guidance contained in alarm response for ARM system.	3.4	22
000067 Plant Fire On-site / 8				06			AA1.06 - Ability to operate and / or monitor the following as they apply to the Plant Fire on Site: Fire alarm.	3.5	23
000068 Control Room Evac. / 8					04		AA2.04 - Ability to determine and interpret the following as they apply to the Control Room Evacuation: S/G pressure.	3.7	24
000069 Loss of CTMT Integrity / 5						2.4.9	G2.4.9 - Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	3.8	25
CE/A11 RCS Overcooling - PTS / 4	2						AK1.2 - Knowledge of the operational implications of the following concepts as they apply to the RCS Overcooling: Normal, abnormal and emergency operating procedures.	3.0	26
CE/A16 Excess RCS Leakage / 2		1					AK2.1 - Knowledge of the interrelations between the Excess RCS Leakage and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.2	27
K/A Category Point Totals:	2	1	1	1	2	2	Group Point Total:		9

ES-401	PWR Examination Outline Plant Systems – Tier 2/Group 1 (RO)											Form ES-401-2		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
003 Reactor Coolant Pump	03											K1.03 - Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: RCP seal system.	3.3	28
003 Reactor Coolant Pump		01										K2.01 - Knowledge of bus power supplies to the following: RCPS.	3.1	29
004 Chemical and Volume Control			04									K3.04 - Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: RCPS.	3.7	30
005 Residual Heat Removal						03						K6.03 - Knowledge of the effect of a loss or malfunction on the following will have on the RHRS: RHR heat exchanger.	2.5	31
006 Emergency Core Cooling					08							K5.08 - Knowledge of the operational implications of the following concepts as they apply to ECCS: Operation of pumps in parallel.	2.9	32
007 Pressurizer Relief/Quench Tank					02							K5.02 - Knowledge of the operational implications of the following concepts as the apply to PRTS: Method of forming a steam bubble in the PZR.	3.1	33
007 Pressurizer Relief/Quench Tank							01					A1.01 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Maintaining quench tank water level within limits.	2.9	34
008 Component Cooling Water								03				A2.03 - Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High/low CCW temperature.	3.0	35
010 Pressurizer Pressure Control									02			A3.02 - Ability to monitor automatic operation of the PZR PCS, including: PZR Pressure.	3.6	36
010 Pressurizer Pressure Control										02		A4.02 - Ability to manually operate and/or monitor in the control room: PZR heaters.	3.6	37
012 Reactor Protection											2.2.37	G2.2.37 - Ability to determine operability and/or availability of safety related equipment.	3.6	38
012 Reactor Protection						02						K6.02 - Knowledge of the effect of a loss or malfunction of the following will have on the RPS: Redundant channels.	2.9	39
013 Engineered Safety Features Actuation		01										K2.01 - Knowledge of bus power supplies to the following: ESFAS/safeguards equipment control.	3.6	40
022 Containment Cooling			01									K3.01 - Knowledge of the effect that a loss or malfunction of the CCS will have on the following: Containment equipment subject to damage by high or low temperature, humidity, and pressure.	2.9	41
026 Containment Spray				01								K4.01 - Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: Source of water for CSS, including recirculation phase after LOCA.	4.2	42

ES-401	PWR Examination Outline Plant Systems – Tier 2/Group 1 (RO) cont'd											Form ES-401-2		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
039 Main and Reheat Steam					05							K5.05 - Knowledge of the operational implications of the following concepts as the apply to the MRSS: Bases for RCS cooldown limits.	2.7	43
059 Main Feedwater				18								K4.18 - Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: Automatic feedwater reduction on plant trip.	2.8	44
059 Main Feedwater							03					A1.03 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW controls including: Power level restrictions for operation of MFW pumps and valves.	2.7	45
061 Auxiliary/Emergency Feedwater								04				A2.04 - Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: pump failure or improper operation.	3.4	46
062 AC Electrical Distribution									04			A3.04 - Ability to monitor automatic operation of the ac distribution system, including: Operation of inverter (e.g., precharging synchronizing light, static transfer).	2.7	47
063 DC Electrical Distribution										03		A4.03 - Ability to manually operate and/or monitor in the control room: Battery discharge rate.	3.0	48
063 DC Electrical Distribution											2.1.30	G2.1.30 - Ability to locate and operate components, including local controls.	4.4	49
064 Emergency Diesel Generator	01											K1.01 - Knowledge of the physical connections and/or cause-effect relationships between the ED/G system and the following systems: AC distribution system.	4.1	50
073 Process Radiation Monitoring										01		A4.01 - Ability to manually operate and/or monitor in the control room: Effluent release.	3.9	51
073 Process Radiation Monitoring			01									K3.01 - Knowledge of the effect that a loss or malfunction of the PRM system will have on the following: Radioactive effluent releases.	3.6	52
076 Service Water				06								K4.06 - Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following: Service water train separation.	2.8	53
078 Instrument Air				02								K4.02 - Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following: Cross-over to other air systems.	3.2	54
103 Containment	05											K1.05 - Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: Personnel access hatch and emergency access hatch.	2.8	55
K/A Category Point Totals:	3	2	3	4	3	2	2	2	2	3	2	Group Point Total:		28

ES-401	PWR Examination Outline Plant Systems – Tier 2/Group 2 (RO)											Form ES-401-2		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
001 Control Rod Drive			01									K3.01 - Knowledge of the effect that a loss or malfunction of the CRDS will have on the following: CVCS.	2.9	56
002 Reactor Coolant				02								K4.02 - Knowledge of RCS design feature(s) and/or interlock(s) which provide for the following: Monitoring reactor vessel level.	3.5	57
016 Non-nuclear Instrumentation					01							K5.01 - Knowledge of the operational implication of the following concepts as they apply to the NNIS: Separation of control and protection circuits.	2.7	58
033 Spent Fuel Pool Cooling							01					A1.01 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Spent Fuel Pool Cooling System operating the controls including: Spent fuel pool water level.	2.7	59
035 Steam Generator								02				A2.02 - Ability to (a) predict the impacts of the following malfunctions or operations on the S/GS: and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Reactor trip/turbine trip.	4.2	60
041 Steam Dump/Turbine Bypass Control						03						K6.03 - Knowledge of the effect of a loss or malfunction on the following will have on the SDS: Controller and positioners, including ICS, S/G, CRDS.	2.7	61
045 Main Turbine Generator									05			A3.05 - Ability to monitor automatic operation of the MT/G system, including: Electrohydraulic control.	2.6	62
055 Condenser Air Removal	06											K1.06 - Knowledge of the physical connections and/or cause-effect relationships between the CARS and the following systems: PRM system.	2.6	63
071 Waste Gas Disposal											2.1.30	G2.1.30 - Ability to locate and operate components, including local controls.	4.4	64
086 Fire Protection										02		A4.02 - Ability to manually operate and/or monitor in the control room: Fire detection panels.	3.5	65
K/A Category Point Totals:	1	0	1	1	1	1	1	1	1	1	1	Group Point Total:		10

Facility: Palisades			Date of Exam: July 2008	
Category	K/A #	Topic	RO	
			IR	#
1. Conduct of Operations	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	66
	2.1.39	Knowledge of conservative decision making practices.	3.6	67
	2.1.42	Knowledge of new and spent fuel movement procedures.	2.5	68
	Subtotal			3
2. Equipment Control	2.2.23	Ability to track Technical Specification limiting conditions for operations.	3.1	69
	2.2.40	Ability to apply Technical Specifications for a system.	3.4	70
	Subtotal			2
3. Radiation Control	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	71
	2.3.13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.4	72
	Subtotal			2
4. Emergency Procedures / Plan	2.4.20	Knowledge of the operational implications of EOP warnings, cautions, and notes.	3.8	73
	2.4.25	Knowledge of fire protection procedures.	3.3	74
	2.4.31	Knowledge of annunciator alarms, indications, or response procedures.	4.2	75
	Subtotal			3
Tier 3 Point Total				10

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions – Tier 1/Group 1 (SRO)				Form ES-401-2
E/APE # / Name / Safety Function	A2	G	K/A Topic(s)	IR	#
000025 Loss of RHR System / 4		2.4.11	G2.4.11 - Knowledge of abnormal condition procedures.	4.2	1
000029 ATWS / 1	07		EA2.07 - Ability to determine or interpret the following as they apply to a ATWS: Reactor trip breaker indicating lights.	4.3	2
CE/E06 Loss of Main Feedwater / 4		2.4.6	G2.4.6 - Knowledge of EOP mitigation strategies.	4.7	3
000055 Station Blackout / 6	04		EA2.04 - Ability to determine or interpret the following as they apply to a Station Blackout: Instruments and controls operable with only dc battery power available.	4.1	4
000056 Loss of Off-site Power / 6		2.4.21	G2.4.21 - Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	4.6	5
000062 Loss of Nuclear Svc Water / 4	03		AA2.03 - Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: The valve lineups necessary to restart the SWS while bypassing the portion of the system causing the abnormal condition.	2.9	6
K/A Category Point Totals:	3	3	Group Point Total:		6

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions – Tier 1/Group 2 (SRO)				Form ES-401-2
E/APE # / Name / Safety Function	A2	G	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1	05		AA2.05 - Ability to determine and interpret the following as they apply to the Continuous Rod Withdrawal: Uncontrolled rod withdrawal, from available indications	4.6	7
000024 Emergency Boration / 1		2.2.38	G2.2.38 - Knowledge of conditions and limitations in the facility license.	4.5	8
000037 Steam Generator Tube Leak / 3	10		AA2.10 - Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Tech-Spec limits for RCS leakage.	4.1	9
000068 Control Room Evac. / 8		2.4.30	G2.4.30 - Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	4.1	10
K/A Category Point Totals:	2	2	Group Point Total:		4

ES-401	PWR Examination Outline Plant Systems – Tier 2/Group 1 (SRO)				Form ES-401-2
System # / Name	A2	G	K/A Topic(s)	IR	#
026 Containment Spray	04		A2.04 - Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure of spray pump.	4.2	11
062 AC Electrical Distribution		2.2.44	G2.2.44 - Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.4	12
064 Emergency Diesel Generator	02		A2.02 - Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Load, VARS, pressure on air compressor, speed droop, frequency, voltage, fuel oil level, temperatures.	2.9	13
073 Process Radiation Monitoring		2.2.39	G2.2.39 - Knowledge of less than or equal to one hour Technical Specification action statements for systems.	4.5	14
078 Instrument Air	01		A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the IAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Air dryer and filter malfunctions	2.9	15
K/A Category Point Totals:	3	2	Group Point Total:		5

ES-401	PWR Examination Outline Plant Systems – Tier 2/Group 2 (SRO)				Form ES-401-2
System # / Name	A2	G	K/A Topic(s)	IR	#
001 Control Rod Drive	08		A2.08 - Ability to (a) predict the impacts of the following malfunction or operations on the CRDS- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of CCW to CRDS	3.3	16
002 Reactor Coolant	03		A2.03 - Ability to (a) predict the impacts of the following malfunctions or operations on the RCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of forced circulation	4.3	17
015 Nuclear Instrumentation		2.1.32	G2.1.32 - Ability to explain and apply system limits and precautions.	4.0	18
K/A Category Point Totals:	2	1	Group Point Total:		3

Facility: Palisades			Date of Exam: July 2008	
Category	K/A #	Topic	SRO-Only	
			IR	#
1. Conduct of Operations	2.1.14	Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc.	3.1	19
	2.1.29	Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.	4.0	20
	Subtotal			2
2. Equipment Control	2.2.38	Knowledge of conditions and limitations in the facility license.	4.5	21
	Subtotal			1
3. Radiation Control	2.3.12	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.7	22
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.8	23
	Subtotal			2
4. Emergency Procedures / Plan	2.4.2	Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.6	24
	2.4.3	Ability to identify post-accident instrumentation.	3.9	25
	Subtotal			2
Tier 3 Point Total				7