

Facility: Prairie Island Nuclear Generating Plant														Date of Exam: June 10, 2016				
Tier	Group	RO K/A Category Points											SRO-Only Points					
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1	3	2	4	N/A			3	3	N/A			3	18	3	3	6	
	2	1	1	1	N/A			2	2	N/A			2	9	2	2	4	
	Tier Totals	4	3	5	N/A			5	5	N/A			5	27	5	5	10	
2. Plant Systems	1	2	3	2	3	2	2	3	2	3	3	3	3	28	3	2	5	
	2	2	0	0	2	0	1	0	1	2	1	1	10	0	2	1	3	
	Tier Totals	4	3	2	5	2	3	3	3	5	4	4	38	5	3	8		
3. Generic Knowledge and Abilities Categories				1		2		3		4		10		1	2	3	4	7
				3		3		1		3		2	2	1	2			

- Note:
1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category).
 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 with justification; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
 4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
 5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
 6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
 7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
 8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in a category 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.
- G* Generic K/As

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000007 Reactor Trip - Stabilization - Recovery / 1				0 7			Ability to operate and monitor the following as they apply to a reactor trip: MT/G trip; verification that the MT/G has been tripped.	4.3	1
000008 Pressurizer Vapor Space Accident / 3					2 2		Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: Consequences of loss of pressure in RCS; methods for evaluating pressure loss.	3.8	2
000009 Small Break LOCA / 3						X	2.1.7: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	3
000011 Large Break LOCA / 3	0 1						Knowledge of the operational implications of the following concepts as they apply to the Large Break LOCA: Natural circulation and cooling, including reflux Boiling.	4.1	4
000015/17 RCP Malfunctions / 4		0 7					Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: RCP seals.	2.9	5
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4			0 1				Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: Shift to alternate flowpath.	3.1	6
000026 Loss of Component Cooling Water / 8				0 5			Ability to operate and/or monitor the following as they apply to the Loss of Component Cooling Water: The CCWS surge tank, including level control and level alarms, and radiation alarm.	3.1	7
000027 Pressurizer Pressure Control System Malfunction / 3									
000029 ATWS / 1					0 1		Ability to determine or interpret the following as they apply to a ATWS: Reactor nuclear instrumentation.	4.4	8
000038 Steam Gen. Tube Rupture / 3									
W/E12 Steam Line Rupture - Excessive Heat Transfer / 4						X	2.4.21: Knowledge of general operating crew responsibilities during emergency operations.	4.0	9
000054 Loss of Main Feedwater / 4	0 1						Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): MFW line break depressurizes the S/G (similar to a steam line break).	4.1	10
000055 Station Blackout / 6			0 2				Knowledge of the reasons for the following responses as they apply to the Station Blackout: Actions contained in EOP for loss of offsite and onsite power.	4.3	11
000056 Loss of Off-site Power / 6			0 1				Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: Order and time to initiation of power for the load Sequencer.	3.5	12
000057 Loss of Vital AC Inst. Bus / 6				0 6			Ability to operate and/or monitor the following as they apply to the Loss of Vital AC Instrument Bus: Manual control of components for which automatic control is lost.	3.5	13
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4									
000065 Loss of Instrument Air / 8					0 6		Ability to determine and interpret the following as they apply to the Loss of Instrument Air: When to trip reactor if instrument air pressure is decreasing.	3.6*	14

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
W/E04 LOCA Outside Containment / 3						X	2.1.23: Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	15
W/E11 Loss of Emergency Coolant Recirc. / 4	2						Knowledge of the operational implications of the following concepts as they apply to the (Loss of Emergency Coolant Recirculation): Normal, abnormal and emergency operating procedures associated with (Loss of Emergency Coolant Recirculation).	3.6	16
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4		2					Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.9	17
000077 Generator Voltage and Electric Grid Disturbances / 6			0 2				Knowledge of the reasons for the following responses as they apply to Generator Voltage and Electric Grid Disturbances: Actions contained in abnormal operating procedure for voltage and grid disturbances.	3.6	18
K/A Category Totals:	3	2	4	3	3	3	Group Point Total:		18

S-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1						X	2.4.11: Knowledge of abnormal condition procedures.	4.0	19
000003 Dropped Control Rod / 1									
000005 Inoperable/Stuck Control Rod / 1	0 2						Knowledge of the operational implications of the following concepts as they apply to Inoperable / Stuck Control Rod: Flux tilt.	3.1	20
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2		0 4					Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following: Pumps.	2.3	21
000060 Accidental Gaseous Radwaste Rel. / 9			0 2				Knowledge of the reasons for the following responses as they apply to the Accidental Gaseous Radwaste: Isolation of the auxiliary building ventilation.	3.3*	22
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8									
000068 Control Room Evac. / 8									
W/E14 Loss of CTMT Integrity / 5				2			Ability to operate and/or monitor the following as they apply to the (High Containment Pressure): Operating behavior characteristics of the facility.	3.3	23
W/E06 & E07 Inad. Core Cooling / 4									
000076 High Reactor Coolant Activity / 9									
W/E01 & E02 Rediagnosis & SI Termination / 3					1		Ability to determine and interpret the following as they apply to the (SI Termination): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.3	24
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
W/E16 High Containment Radiation / 9						X	2.4.3: Ability to identify post-accident instrumentation.	3.7	25
W/E03 LOCA Cooldown - Depress. / 4				1			Ability to operate and/or monitor the following as they apply to the (LOCA Cooldown and Depressurization): Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	4.0	26
W/E09 & E10 Natural Circ. / 4					1		Ability to determine and interpret the following as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.2	27
W/E08 RCS Overcooling - PTS / 4									
K/A Category Point Totals:	1	1	1	2	2	2	Group Point Total:		9

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)											Form ES-401-2		
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)	IR	#
003 Reactor Coolant Pump										0 3		Ability to manually operate and/or monitor in the control room: RCP lube oil and lift pump motor controls.	2.8	28
004 Chemical and Volume Control											X	2.1.31: Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.6	29
005 Residual Heat Removal		0 3										Knowledge of bus power supplies to the following: RCS pressure boundary motor-operated valves.	2.7*	30
006 Emergency Core Cooling			0 1									Knowledge of the effect that a loss or malfunction of the ECCS will have on the following: RCS.	4.1*	31
007 Pressurizer Relief/Quench Tank				0 1								Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: Quench tank cooling.	2.6	32
008 Component Cooling Water							0 4			1 0		A1.04: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCWS controls including: Surge tank level.	3.1	33
												A4.10: Ability to manually operate and/or monitor in the control room: Conditions that require the operation of two CCW coolers.	3.1*	34
010 Pressurizer Pressure Control					0 1	0 3						K5.01: Knowledge of the operational implications of the following concepts as they apply to the PZR PCS: Determination of condition of fluid in PZR, using steam tables.	3.2	35
												K6.03: Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: PZR sprays and heaters.	3.5	36
012 Reactor Protection							0 1					Ability to predict and/or monitor Changes in parameters (to prevent exceeding design limits) associated with operating the RPS controls including: Trip setpoint adjustment.	2.9*	37
013 Engineered Safety Features Actuation								0 1				Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: LOCA.	4.6	38
022 Containment Cooling		0 1								0 1		K2.01: Knowledge of power supplies to the following: Containment cooling fans.	3.0*	39
												A3.01: Ability to monitor automatic operation of the CCS, including: Initiation of safeguards mode of operation.	4.1	40

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)											Form ES-401-2		
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)	IR	#
026 Containment Spray										0 1		Ability to manually operate and/or monitor in the control room: CSS controls.	4.5	41
039 Main and Reheat Steam											X	2.1.19: Ability to use plant computers to evaluate system or component status.	3.9	42
059 Main Feedwater	0 3							0 3				K1.03: Knowledge of the physical connections and/or cause effect relationships between the MFW and the following systems: S/GS.	3.1	43
												A2.03: Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Overfeeding event.	2.7	44
061 Auxiliary/Emergency Feedwater	0 2				0 3							K2.02: Knowledge of bus power supplies to the following: AFW electric drive pumps.	3.7*	45
												K5.03: Knowledge of the operational implications of the following concepts as they apply to the AFW: Pump head effects when control valve is shut.	2.6	46
062 AC Electrical Distribution			0 2									Knowledge of the effect that a loss or malfunction of the ac distribution system will have on the following: ED/G.	4.1	47
063 DC Electrical Distribution				0 1								Knowledge of DC electrical system design feature(s) and/or interlock(s) which provide for the following: Manual/automatic transfers of control.	2.7	48
064 Emergency Diesel Generator						0 7						Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Air receivers.	2.7	49
073 Process Radiation Monitoring				0 1								Knowledge of PRM system design feature(s) and/or interlock(s) which provide for the following: Release termination when radiation exceeds setpoint.	4.0	50
076 Service Water							0 2				X	A1.02: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: Reactor and turbine building closed cooling water temperatures.	2.6*	51
												2.2.3: Knowledge of the design, procedural, and operational differences between units.	3.8	52
078 Instrument Air									0 1			Ability to monitor automatic operation of the IAS, including: Air pressure	3.1	53

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)											Form ES-401-2		
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)	IR	#
103 Containment	0	3							0	1		<p>K1.03: Knowledge of the physical connections and/or cause effect relationships between the containment system and the following systems: Shield Building Vent System.</p> <p>A3.01: Ability to monitor automatic operation of the containment system, including: Containment isolation.</p>	3.1*	54
K/A Category Point Totals:	2	3	2	3	2	2	3	2	3	3	3	Group Point Total:		28

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO)											Form ES-401-2		
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)	IR	#
001 Control Rod Drive														
002 Reactor Coolant						1 2						Knowledge of the effect or a loss or malfunction on the following RCS components: Code Safety valves.	3.0	56
011 Pressurizer Level Control														
014 Rod Position Indication								0 2				Ability to (a) predict the impacts of the following malfunctions or operations on the RPIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of power to the RPIS.	3.1	57
015 Nuclear Instrumentation														
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor									0 2			Ability to monitor automatic operation of the ITM system including: Measurement of in-core thermocouple temperatures at panel outside control room.	3.4*	58
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge										0 1		Ability to manually operate and/or monitor in the control room: Containment purge flow rate.	2.5	59
033 Spent Fuel Pool Cooling											X	2.1.25: Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	60
034 Fuel Handling Equipment	0 4											Knowledge of the physical connections and/or cause effect relationships between the Fuel Handling System and the following systems: NIS.	2.6	61
035 Steam Generator														
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator														
055 Condenser Air Removal									0 3			Ability to monitor automatic operation of the CARS, including: Automatic diversion of CARS exhaust.	2.5*	62
056 Condensate														
068 Liquid Radwaste	0 7											Knowledge of the physical connections and/or cause effect relationships between the Liquid Radwaste System and the following systems: Sources of liquid wastes for LRS.	2.7	63
071 Waste Gas Disposal														
072 Area Radiation Monitoring				0 3								Knowledge of ARM system design feature(s) and/or interlock(s) which provide for the following: Plant ventilation systems.	3.2*	64
075 Circulating Water														
079 Station Air				0 1								Knowledge of SAS design feature(s) and/or interlock(s) which provide for the following: Cross-connect with IAS.	2.9	65
086 Fire Protection														
K/A Category Point Totals:	2	0	0	2	0	1	0	1	2	1	1	Group 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	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#	
000009 Small Break LOCA / 3					1 5		Ability to determine or interpret the following as they apply to a small break LOCA: RCS parameters.	3.4	76	
000015/17 RCP Malfunctions / 4						X	2.2.12: Knowledge of surveillance procedures.	4.1	77	
000022 Loss of Rx Coolant Makeup / 2					0 2		Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: Charging pump problems.	3.7	78	
000055 Station Blackout / 6						X	2.4.20: Knowledge of the operational implications of EOP warnings, cautions, and notes.	4.3	79	
000056 Loss of Off-site Power / 6					0 7		Ability to determine and interpret the following as they apply to the Loss of Offsite Power: Operational status of emergency feedwater pump (motor driven).	4.3	80	
000077 Generator Voltage and Electric Grid Disturbances / 6						X	2.2.36: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	4.2	81	
K/A Category 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	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000024 Emergency Boration / 1					0 5		Ability to determine and interpret the following as they apply to the Emergency Boration: Amount of boron to add to achieve required SDM.	3.9	82
000033 Loss of Intermediate Range NI / 7						X	2.2.38: Knowledge of conditions and limitations in the facility license.	4.5	83
000067 Plant Fire On-site / 8					1 5		Ability to determine and interpret the following as they apply to the Plant Fire on Site: Requirements for establishing a fire watch.	3.9	84
W/E16 High Containment Radiation / 9						X	2.4.45: Ability to prioritize and interpret the significance of each annunciator or alarm.	4.3	85
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	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)	IR	#
008 Component Cooling Water											X	2.4.8: Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	4.5	86
022 Containment Cooling								0 5				Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Major leak in CCS.	3.5	87
061 Auxiliary/Emergency Feedwater								0 7				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: Air or MOV failure.	3.5	88
063 DC Electrical Distribution								0 2				Ability to (a) predict the impacts of the following malfunctions or operations on the DC distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of ventilation during battery charging.	3.1	90
076 Service Water											X	2.2.40: Ability to apply Technical Specifications for a system.	4.7	89
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	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)	IR	#	
014 Rod Position Indication												X	2.2.22: Knowledge of limiting conditions for operations and safety limits.	4.7	91
028 Hydrogen Recombiner and Purge Control								0 2					Ability to (a) predict the impacts of the following malfunctions or operations on the HRPS; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations: LOCA condition and related concern over hydrogen.	3.9	92
068 Liquid Radwaste								0 4					Ability to (a) predict the impacts of the following malfunctions or operations on the Liquid Radwaste System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure of automatic isolation.	3.3	93
K/A Category Point Totals:								2				1	Group Point Total:		3

Facility: Prairie Island Nuclear Generating Plant			Date of Exam: June 10, 2016			
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.13	Knowledge of facility requirements for controlling vital/controlled access.	2.5	66		
	2.1.32	Ability to explain and apply system limits and precautions.	3.8	67		
	2.1.36	Knowledge of procedures and limitations involved in core alterations.	3.0	68		
	2.1.18	Ability to make accurate, clear, and concise logs, records, status boards, and reports.			3.8	94
	2.1.35	Knowledge of fuel handling responsibilities of SROs.			3.9	95
	Subtotal				3	2
2. Equipment Control	2.2.1	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	4.5	69		
	2.2.12	Knowledge of surveillance procedures.	3.7	70		
	2.2.38	Knowledge of conditions and limitations in the facility license.	3.6	71		
	2.2.18	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.			3.9	96
	2.2.25	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.			4.2	97
	Subtotal			3		2
3. Radiation Control	2.3.11	Ability to control radiation releases.	3.8	72		
	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.			3.8	98
	Subtotal			1	1	
4. Emergency Procedures / Plan	2.4.18	Knowledge of the specific bases for EOPs.	3.3	73		
	2.4.29	Knowledge of the emergency plan.	3.1	74		
	2.4.34	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	75		
	2.4.29	Knowledge of the emergency plan.			4.4	99
	2.4.41	Knowledge of the emergency action level thresholds and classifications.			4.6	100
	Subtotal			3		2
Tier 3 Point Total				10		7