Facility: Prairie Island Nuclear Generating Plant Date of Exam: May/14-25, 2012

Tier	Group	RO K/A Category Points											SRO-Only Points		
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2	G*	Total
1. Emergency & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A		3	18	3	3	6
	2	1	1	1				2	2			2	9	2	2	4
	Tier Totals	4	4	4				5	5			5	27	5	5	10
2. Plant Systems	1	2	2	3	2	3	2	3	3	3	3	2	28	2	3	5
	2	1	1	0	1	1	1	1	1	1	1	1	10	1 1	1	3
	Tier Totals	5	4	3	4	3	2	2	3	4	4	4	38	4	4	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7
		3			2			3			2			2	2	2	1	

Note:

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

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

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1				R			RO: 1.02 – Ability to operate and monitor the following as they apply to a reactor trip: MFW System	3.8	1
000008 Pressurizer Vapor Space Accident / 3					R		RO: A2.25 – Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: Expected leak rate from open PORV or code safety	2.8	2
						S	SO: 2.2.42 – Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	4.6	76
000009 Small Break LOCA / 3						R	RO: 2.4.31 – Know ledge of annunciator alarms, indications, or response procedures.	4.2	3
000011 Large Break LOCA / 3	R						RO: K1.01 – 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		R					RO: K2.10 – Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: RCP indicators and controls	2.8	5
						S	SO: 2.4.6 – Knowledge of EOP mitigation strategies.	4.7	77
000022 Loss of Rx Coolant Makeup / 2							(Not Selected)		
000025 Loss of RHR System / 4		R					RO: K2.05 – Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: Reactor building sump	2.6	6
000026 Loss of Component Cooling Water / 8							(Not Selected)		
000027 Pressurizer Pressure Control System Malfunction / 3							(Not Selected)		
000029 ATWS / 1							(Not Selected)		
000038 Steam Gen. Tube Rupture / 3			R				RO: K3.03 – Knowledge of the reasons for the following responses as the apply to the SGTR: Automatic actions associated with high radioactivity in S/G sample lines	3.6	7
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4				R			RO: A1.14 – Ability to operate and / or monitor the following as they apply to the Steam Line Rupture: Nuclear Instrumentation	4.2	8
000054 (CE/E06) Loss of Main Feedwater / 4					R		RO: A2.04 – Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): Proper operation of AFW pumps and regulating valves	4.2	9
					S		SO: A2.07 – Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): Reactor trip first-out panel indicator	3.9	78
000055 Station Blackout / 6						R	RO: 2.1.20 – Ability to interpret and execute procedure steps.	4.6	10
000056 Loss of Off-site Power / 6	R						RO: K1.01 – 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	11
					S		SO: A2.53 – Ability to determine and interpret the following as they apply to the Loss of Offsite Power: Status of emergency bus under voltage relays	3.2	79

000057 Loss of Vital AC Inst. Bus / 6							(Not Selected)		
000058 Loss of DC Power / 6			R				K3.02 – Knowledge of the reasons for the following responses as they apply to the Loss of DC Power: Actions contained in EOP for loss of dc power	4.0	12
000062 Loss of Nuclear Svc Water / 4				R		S	A1.07 – Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Water (SWS): Flow rates to the components and systems that are serviced by the SWS; interactions among the components 2.2.42 – Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	2.9 4.6	13 80
000065 Loss of Instrument Air / 8					R		A2.01 – Ability to determine and interpret the following as they apply to the Loss of Instrument Air: Cause and effect of low-pressure instrument air alarm	2.9	14
W/E04 LOCA Outside Containment / 3						R	2.4.21 – 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.	4.0	15
W/E11 Loss of Emergency Coolant Recirc. / 4	R						K1.1 – Knowledge of the operational implications of the following concepts as they apply to the (Loss of Emergency Coolant Recirculation): Components, capacity, and function of emergency systems	3.7	16
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4		R			S		K2.1 – Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. A2.2 – Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink): Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.7 4.3	17 81
000077 Generator Voltage and Electric Grid Disturbances / 6			R				K3.02 - 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	3	3	3	3 / 3	3 / 3	Group Point Total:		18/6

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

Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)

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							(Not Selected)		
000003 Dropped Control Rod / 1							(Not Selected)		
000005 Inoperable/Stuck Control Rod / 1							(Not Selected)		
000024 Emergency Boration / 1				R			A1.03 – Ability to operate and / or monitor the following as they apply to Emergency Boration: Boric acid controller	3.5	19
000028 Pressurizer Level Malfunction / 2					R		A2.06 – Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Letdown flow indicator	2.7	20
000032 Loss of Source Range NI / 7						R	2.1.7 – Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	21
000033 Loss of Intermediate Range NI / 7	R						K1.01 – Knowledge of the operational implications of the following concepts as they apply to Loss of Intermediate Range Nuclear Instrumentation: Effects of voltage changes on performance	2.7	22
000036 (BW/A08) Fuel Handling Accident / 8		R					K2.02 – Knowledge of the interrelations between the Fuel Handling Incidents and the following: Radiation monitoring equipment (portable and installed)	3.4	23
000037 Steam Generator Tube Leak / 3			R				K3.07 – Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: Actions contained in EOP for S/G tube leak	4.2	24
000051 Loss of Condenser Vacuum / 4							(Not Selected)		
000059 Accidental Liquid RadWaste Rel. / 9					R		A2.04 – Ability to determine and interpret the following as they apply to the Accidental Liquid Radwaste Release: The valve lineup for a release of radioactive liquid	3.2	25
000060 Accidental Gaseous Radwaste Rel. / 9						R S	2.2.39 – Knowledge of less than or equal to one hour Technical Specification action statements for systems. 2.1.7 – Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	3.9 4.7	26 82
000061 ARM System Alarms / 7				R			A1.01 – Ability to operate and / or monitor the following as they apply to the Area Radiation Monitoring (ARM)System Alarms: Automatic actuation	3.6	27
000067 Plant Fire On-site / 8							(Not Selected)		
000068 (BW/A06) Control Room Evac. / 8					S		A2.07 – Ability to determine and interpret the following as they apply to the Control Room Evacuation: PZR level	4.3	83

000069 (W/E14) Loss of CTMT Integrity / 5							(Not Selected)		
000074 (W/E06&E07) Inad. Core Cooling / 4						S	2.1.25 – Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	84
000076 High Reactor Coolant Activity / 9							(Not Selected)		
W/EO1 & E02 Rediagnosis & SI Termination / 3							(Not Selected)		
W/E13 Steam Generator Over-pressure / 4							(Not Selected)		
W/E15 Containment Flooding / 5							(Not Selected)		
W/E16 High Containment Radiation / 9					S		A2.1 – Ability to determine and interpret the following as they apply to the (High Containment Radiation) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.3	85
BW/A01 Plant Runback / 1							(Not Applicable to plant)		
BW/A02&A03 Loss of NNI-X/Y / 7							(Not Applicable to plant)		
BW/A04 Turbine Trip / 4							(Not Applicable to plant)		
BW/A05 Emergency Diesel Actuation / 6							(Not Applicable to plant)		
BW/A07 Flooding / 8							(Not Applicable to plant)		
BW/E03 Inadequate Subcooling Margin / 4							(Not Applicable to plant)		
BW/E08; W/E03 LOCA Cooldown - Depress. / 4							(Not Selected)		
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4							(Not Selected)		
BW/E13&E14 EOP Rules and Enclosures							(Not Applicable to plant)		
CE/A11; W/E08 RCS Overcooling - PTS / 4							(Not Selected)		
CE/A16 Excess RCS Leakage / 2							(Not Applicable to plant)		
CE/E09 Functional Recovery							(Not Applicable to plant)		
K/A Category Point Totals:	1	1	1	2	2/2	2/2	Group Point Total:		9/4

ES-401 2	PWR Examination Outline												Form ES-401-	
Plant Systems - Tier 2/Group 1 (RO / SRO)														
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		R							R			RO: K2.01: Knowledge of bus power supplies to the following: RCPs. RO: A3.04: Ability to monitor automatic operation of the RCPs, including: RCS flow.	3.1 3.6	28 29
004 Chemical and Volume Control						R	R					RO: K6.13: Knowledge of the effect of a loss or malfunction on the following CVCS components: Purpose and function of the Boration/dilution batch controller. RO: A1.10: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CVCS controls including: Reactor Power.	3.1 3.7	30 31
005 Residual Heat Removal										R	S	RO: A4.02: Ability to manually operate and/or monitor in the control room: Heat exchanger bypass flow control. 2.1.28 – Knowledge of the purpose and function of major system components and controls.	3.4 4.1	32 86
006 Emergency Core Cooling			R			R		S				RO: K3.01: Knowledge of the effect that a loss or malfunction of the ECCS will have on the following: RCS. RO: K6.02: Knowledge of the effect of a loss or malfunction on the following will have on the ECCS: Core flood tanks (accumulators) A2.05 – Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Improper amperage to the pump motor	4.1 3.4 3.5	33 34 87
007 Pressurizer Relief/Quench Tank									R			RO: A3.01: Ability to monitor automatic operation of the PRTS, including: Components which discharge to the PRT.	2.7	35

008 Component Cooling Water		R						S				RO: K2.02: Knowledge of bus power supplies to the following: CCW pump, including emergency backup. A2.09 – 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: Results of excessive exit temperature from the letdown cooler, including the temperature effects on ion-exchange resins	3.0 2.8	36 88
010 Pressurizer Pressure Control										R		RO: 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	3.2	37
012 Reactor Protection									R			RO: A3.06: Ability to monitor automatic operation of the RPS, including: Trip logic.	3.7	38
013 Engineered Safety Features Actuation				R				R			S	RO: K4.04: Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following: Auxiliary feed actuation signal. RO: A2.02: Ability to (a) predict the impacts of the following malfunction 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: Excess steam demand. SO: 2.1.27 – Knowledge of system purpose and/or function.	4.3 4.3 4.0	39 40 89
022 Containment Cooling							R					RO: A1.01: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Containment temperature.	3.6	41
025 Ice Condenser												(Not Applicable to plant)		
026 Containment Spray							R					RO: A1.01: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Containment pressure.	3.9	42

039 Main and Reheat Steam					R						RO: K5.08: Knowledge of the operational implications of the following concepts as they apply to the MRSS: Effect of steam removal on reactivity.	3.6	43
059 Main Feedwater								R			RO: A2.05: Ability to (a) predict the impacts of the following malfunction 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: Rupture in MFW suction or discharge line.	3.1	44
061 Auxiliary/Emergency Feedwater	R				R						RO: K1.01: Knowledge of the physical connections and/or cause-effect relationships between the AFW and the following: S/G system. RO: K5.02: Knowledge of the operational implications of the following concepts as they apply to the AFW: Decay heat sources and magnitude.	4.1 3.2	45 46
062 AC Electrical Distribution										R	RO: 2.4.39: Knowledge of RO responsibilities in emergency plan implementation.	3.9	47
063 DC Electrical Distribution			R								RO: K3.02: Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: Components using DC control power.	3.5	48
064 Emergency Diesel Generator								R			RO: A2.16: Ability to (a) predict the impacts of the following malfunction 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: Loss of offsite power during full-load testing of ED/G.	3.3	49
073 Process Radiation Monitoring					R				R		RO: K5.03: Knowledge of the operational implications as they apply to the PRM system: Relationship between radiation intensity and exposure limits. RO: A4.01: Ability to manually operate and/or monitor in the control room: Effluent release.	2.9 3.9	50 51
076 Service Water			R	R							RO: K3.01: Knowledge of the effect that a loss or malfunction of the SWS will have on the following: Closed cooling water. RO: K4.06: Knowledge of SWS design feature(s) and/or interlock(s) which provide the following: Service water train separation.	3.4 2.8	52 53

078 Instrument Air										R		RO: A4.01: Ability to manually operate and/or monitor in the control room: Cross-tie valves with IAS.	2.7	54
103 Containment	R										S	RO: K1.08: Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: SIS, including action of safety injection reset. 2.1.25 – Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.6 4.2	55 90
K/A Category Point Totals:	2	2	3	2	3	2	3	3/2	3	3	2/3	Group Point Total:		28/5

ES-401 PWR Examination Outline Form ES-401-2
Plant Systems - Tier 2/Group 2 (RO / SRO)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
001 Control Rod Drive				R								K4.20 – Knowledge of CRDS design feature(s) and/or interlock(s) which provide for the following: The permissives and interlocks associated with increase from zero power	3.2	56
002 Reactor Coolant					R							K5.13 – Knowledge of the operational implications of the following concepts as they apply to the RCS: Causes of circulation	3.5	57
011 Pressurizer Level Control						R						K6.05 – Knowledge of the effect of a loss or malfunction on the following will have on the PZR LCS: Function of PZR level gauges as post accident monitors	3.1	58
014 Rod Position Indication												(Not Selected)		
015 Nuclear Instrumentation		R										K2.01 – Knowledge of bus power supplies to the following: NIS channels, components, and interconnections	3.3	59
016 Non-nuclear Instrumentation												(Not Selected)		
017 In-core Temperature Monitor								S				A2.01 – Ability to (a) predict the impacts of the following malfunctions or operations on the ITM system; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations: Core Damage	3.5	91
027 Containment Iodine Removal												(Not Selected)		
028 Hydrogen Recombiner and Purge Control												(Not Selected)		
029 Containment Purge											S	2.4.49 – Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.4	92
033 Spent Fuel Pool Cooling												(Not Selected)		
034 Fuel Handling Equipment				S								K4.01 – Knowledge of design feature(s) and/or interlock(s) which provide for the following: Fuel protection from binding and dropping	2.6	93
035 Steam Generator												(Not Selected)		
041 Steam Dump/Turbine Bypass Control							R					A1.02 – Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including: Steam pressure	3.1	60
045 Main Turbine Generator												(Not Selected)		
055 Condenser Air Removal												(Not Selected)		

056 Condensate								R				A2.04 – Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of condensate pumps	2.6	61
068 Liquid Radwaste									R			A3.02 – Ability to monitor automatic operation of the Liquid Radwaste System including: Automatic isolation	3.6	62
071 Waste Gas Disposal										R		A4.05 – Ability to manually operate and/or monitor in the control room: Gas decay tanks, including valves, indicators, and sample line	2.6	63
072 Area Radiation Monitoring											R	2.4.11 – Knowledge of abnormal condition procedures.	4.0	64
075 Circulating Water	R											K1.01 – Knowledge of the physical connections and/or cause effect relationships between the circulating water system and the following systems: Emergency/essential SWS	3.2	65
079 Station Air												(Not Selected)		
086 Fire Protection														
K/A Category Point Totals:	1	1	0	1/1	1	1	1	1/1	1	1	1/1	Group Point Total:		10/3