Facility: Prairie Island Date of Exam: SEPTEMBER 10, 2018

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	2	4	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	3	5				5	5			5	27	5	5	10
2. Plant Systems	1	3	2	2	3	2	1	3	3	3	3	3	28	3	2	5
	2	1	0	2	1	0	1	1	1	1	1	1	10	0 2	1	3
	Tier Totals	4	2	4	4	2	2	4	4	4	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 outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it 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 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' 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

* These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.

** These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

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 P8184L-004 109 (R1)		x					**007 Reactor Trip** **EK2.02:** Knowledge of the interrelations between a reactor trip and the following: Breakers, relays, and disconnects	**2.6**	**1**
000008 Pressurizer Vapor Space Accident / 3 P8197L-012 259 (R2)			x				**008 Pressurizer Vapor Space Accident** **AK3.03:** Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: Actions contained in EOP for PZR vapor space accident/LOCA	**4.1**	**1**
000009 Small Break LOCA / 3 P8180L-007 227 (R3)				x			**009 Small Break LOCA** **EA1.11:** Ability to operate and monitor the following as they apply to a small break LOCA: AFW/MFW	**4.1**	**1**
000011 Large Break LOCA / 3									
000015 RCP Malfunctions / 4 P8170L-002 151 (R4)					x		**015 RCP Malfunctions** **AA2.01:** Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions: Cause of RCP failure	**3.0**	**1**
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4									
000026 Loss of Component Cooling Water / 8 P8172L-002 205 (R5)			x				**026 Loss of Component Cooling Water** **AK3.03:** Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: Guidance actions contained in EOP for Loss of CCW	**4.0**	**1**
000027 Pressurizer Pressure Control System Malfunction / 3 P8197L-011 143 (R6)			x				**027 Pressurizer Pressure Control System Malfunction** **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**	**1**
000029 ATWS / 1 P8197L-014 183 (R7)						x	**029 ATWS** **2.1.20:** Ability to interpret and execute procedure steps	**4.6**	**1**
000038 Steam Gen. Tube Rupture / 3 P8197L-013 121 (R8)	x						**038 Steam Generator Tube Rupture** **EK1.01:** Knowledge of the operational implications of the following concepts as they apply to the SGTR: Use of steam tables	**3.1**	**1**
W/E12 Steam Line Rupture - Excessive Heat Transfer / 4 P8197L-012 260 (R9)				x			**Westinghouse E12 Uncontrolled Depressurization of all Steam Generators** **EA1.2:** Operating behavior characteristics of the facility	**3.6**	**1**

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**	**#**
000054 Loss of Main Feedwater / 4 P8174L-003 123 (R10)					X		**054 Loss of Main Feedwater (MFW)** **AA2.02:** Ability to determine and interpret the following as they apply to the Loss of Main Feedwater(MFW): Differentiation between loss of all MFW and trip of one MFW pump.	**4.1**	**1**
000055 Station Blackout / 6 P8140L-224 006 (R11)						X	**055 Loss of Offsite and Onsite Power (Station Blackout)** **2.4.49:** Ability to perform without reference to procedures those actions that require immediate operation of system components and controls	**4.6**	**1**
000056 Loss of Off-site Power / 6 P8170L-003 224 (R12)	X						**056 Loss of Offsite Power** **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.	**3.1***	**1**
000057 Loss of Vital AC Inst. Bus / 6									
000058 Loss of DC Power / 6 P8186L-005 044 (R13)		X					**058 Loss of DC Power** **AK2.02:** Knowledge of the interrelations between the Loss of DC Power and the following: Breakers, relays, and disconnects	**2.2***	**1**
000062 Loss of Nuclear Svc Water / 4 P8176L-003 084 (R14)			X				**062 Loss of Nuclear Service Water** **AK3.02:** Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: The automatic actions (alignments) within the nuclear service water resulting from the actuation of the ESFAS	**3.6**	**1**
000065 Loss of Instrument Air / 8 P8178L-005 054 (R15)				X			**065 Loss of Instrument Air** **AA1.05:** Ability to operate and / or monitor the following as they apply to the Loss of Instrument Air: RPS	**3.3***	**1**
000077 Generator Voltage and Electric Grid Disturbances / 6 P8186L-009 011 (R16)					X		**077 Generator Voltage and Electric Grid Distrurbances** **AA2.07:** Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: Operational status of engineered safety features	**3.6**	**1**
W/E04 LOCA Outside Containment / 3									
W/E11 Loss of Emergency Coolant Recirc. / 4 P8197L-012 261 (R17)						X	**Westinghouse E11 Loss of Emergency Coolant Recirc** **2.2.38:** Knowledge of conditions and limitations in the facility license	**3.6**	**1**
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4 P8197L-014 208 (R18)	X						**Westinghouse E05 Loss of Secondary Heat Sink** **EK1.2:** Knowledge of the operational implications of the following concepts as they apply to the (Loss of Secondary Heat Sink) Normal, abnormal, and emergency operating procedures associated with (Loss of Secondary Heat Sink)	**3.9**	**1**
K/A Category Totals:	**3**	**2**	**4**	**3**	**3**	**3**	**Group Point Total:**		**18**

ES-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									
000003 Dropped Control Rod / 1 P8184L-005 095 (R19)				x			**003 Dropped Control Rod** **AA1.03:** Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: Rod control switches	**3.6**	**1**
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2 P8170L-006 065 (R20)	x						**028 Pressurizer (PZR) Level Control Malfunction** **AK1.01** Knowledge of the operational implications of the following concepts as they apply to Pressurizer Level Control Malfunctions: PZR reference leak abnormalities	**2.8***	**1**
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7									
000036 Fuel Handling Incidents / 8									
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4 P8174L-005 029 (R21)					x		**051 Loss of Condenser Vacuum** **AA2.02** Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: Conditions requiring reactor and / or turbine trip	**3.9**	**1**
000059 Accidental Liquid Radwaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7 P8182L-002 059 (R22)						x	**061 Area Radiation Monitoring (ARM) System Alarms** **2.1.32:** Ability to explain and apply system limits and precautions	**3.8**	**1**
000067 Plant Fire On-site / 8									
000068 Control Room Evac. / 8 P8197L-008 016 (R23)				x			**068 Control Room Evacuation** **AA1.29** Ability to operate and / or monitor the following as they apply to the Control Room Evacuation: Calculation of boron needed for xenon-free shutdown.	**3.1***	**1**
W/E14 Loss of CTMT Integrity / 5									

ES-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**	**#**
W/E06 & E07 Inad. Core Cooling / 4 P8197L-014 216 (R24)					x		**Westinghouse E06 Degraded Core Cooling** **EA2.2:** Ability to determine and interpret the following as they apply to the (Degraded Core Cooling) Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	**3.5**	**1**
000076 High Reactor Coolant Activity / 9 P8172L-001A 148 (R25)						x	**076 High Reactor Coolant Activity** **2.1.27** Knowledge of system purpose and / or function.	**3.9**	**1**
000078 RCS Leak / 3									
W/E01 & E02 Rediagnosis & SI Termination / 3 P8180L-007 106 (R26)		x					**Westinghouse E01 Rediagnosis** **EK2.2** Knowledge of the interrelations between the (Reactor Trip or Safety Injection/Rediagnosis) 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	**3.5**	**1**
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
W/E16 High Containment Radiation / 9									
W/E03 LOCA Cooldown - Depress. / 4									
W/E09 & E10 Natural Circ. / 4									
W/E08 RCS Overcooling - PTS / 4 P8197L-014 217 (R27)			x				**Westinghouse E08 Pressurized Thermal Shock** **EK3.1** Knowledge of the reasons for the following responses as they apply to the (Pressurized Thermal Shock) 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**
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 P8184L-004 114 (R28) P8172L-002 103 (R29)			x					x				**003 Reactor Coolant Pump** **K3.04** Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: RPS **A2.01** Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Problems with RCP seals, especially rates of seal leak-off	**3.6*** **3.5**	**2**
004 Chemical and Volume Control P8172L-001A 040 (R30)				x								**004 Chemical and Volume Control System (CVCS)** **K4.03** Knowledge of CVCS design feature(s) and / or Interlock(s) which provide for the following: Protection of ion exchangers (high letdown temperature will isolate ion exchangers)	**2.8**	**1**
005 Residual Heat Removal P8140L-204 035 (R31)					x							**005 Residual Heat Removal System (RHRS)** **K5.03** Knowledge of the operational implications of the following concepts as they apply the RHRS: Reactivity effects of RHR fill water	**2.9***	**1**
006 Emergency Core Cooling P8180L-004 060 (R32)						x						**Emergency Core Cooling System (ECCS)** **K6.03** Knowledge of the effect of a loss or malfunction on the following will have on the ECCS: Safety Injection Pumps	**3.6**	**1**
007 Pressurizer Relief/Quench Tank P8170L-003 129 (R33)							x					**007 Pressurizer Relief Tank/Quench Tank System (PRTS)** **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**	**1**
008 Component Cooling Water P8172L-002 105 (R34) P8172L-002 104 (R35)								x	x			**008 Component Cooling Water System (CCWS)** **A2.01** 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: Loss of CCW pump **A3.04** Ability to monitor automatic operation of the CCWS, including: Requirements on and for the CCWS for different conditions of the power plant	**3.3** **2.9**	**2**

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**	**#**
010 Pressurizer Pressure Control P8170L-005 075 (R36)									x			**010 Pressurizer Pressure Control System (PZR PCS)** **A3.02** Ability to monitor automatic operation of the PZR PCS, including: PZR pressure.	**3.0**	**1**
012 Reactor Protection P8184L-004 115 (R37)										x		**012 Reactor Protection System** **A4.07** Ability to manually operate and / or monitor in the control room: M/G set breakers	**3.9***	**1**
013 Engineered Safety Features Actuation P8180L-006 051 (R38)											x	**013 Engineered Safety Features Actuation System (ESFAS)** **2.4.46** Ability to verify that the alarms are consistent with the plant conditions	**4.2**	**1**
022 Containment Cooling P8440L-401C 006 (R39)	x											**022 Containment Cooling System (CCS)** **K1.04** Knowledge of the physical connections and / or cause – effect relationships between the CCS and the following systems: Chilled Water	**2.9***	**1**
026 Containment Spray P8180L-002 077 (R40) P8180L-002 050 (R41)		x								x		**026 Containment Spray System (CSS)** **K2.01** Knowledge of bus power supplies to the following: Containment Spray pumps **A4.01** Ability to manually operate and / or monitor in the control room: CSS controls	**3.4*** **4.5**	**2**
039 Main and Reheat Steam P8174L-001 042 (R42) P8174L-001 043 (R43)			x								x	**039 Main and Reheat Steam System (MRSS)** **K3.03** Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: AFW Pumps **2.1.23** Ability to perform specific system and integrated plant procedures during all modes of plant operation	**3.2*** **4.3**	**2**
059 Main Feedwater P8174I-003 083 (R44)				x								**059 Main Feedwater (MFW) System** **K4.02** Knowledge of MFW design feature(s) and / or interlock(s) which provide for the following: Automatic turbine/reactor trip runback	**3.3**	**1**
061 Auxiliary/Emergency Feedwater P8180L-007 228 (R45)					x							**061 Auxiliary / Emergency Feedwater (AFW) System** **K5.03** Knowledge of the operational implications of the following concepts as the apply to the AFW: Pump head effects when control valve is shut	**2.6**	**1**

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**	**#**
062 AC Electrical Distribution P8186L-002 036 (R46) P8186L-003B 012 (R47)	x			X								**062 A.C. Electrical Distribution** **K1.04** Knowledge of the physical connections and / or cause-effect relationships between the ac distribution system and the following systems: Off-site power sources **K4.03** Knowledge of ac distribution system design feature(s) and / or interlock(s) which provide for the following: Interlocks between automatic bus transfer and breakers	**3.7** **2.8***	**2**
063 DC Electrical Distribution P8186L-005 043 (R48)							x					**063 D.C. Electrical Distribution** **A1.01** Ability to predict and / or monitor changes in parameters associated with operating the DC electrical system controls including: Battery capacity as it is affected by discharge rate	**2.5**	**1**
064 Emergency Diesel Generator P8186L-004 049 (R49) P8186L-004 050 (R50)		x						x				**064 Emergency Diesel Generator** **K2.01** Knowledge of bus power supplies to the following: Air compressor **A2.03** 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: Parallel operation of ED/Gs	**2.7*** **3.1**	**2**
073 Process Radiation Monitoring P8182L-002 094 (R51)										x		**073 Process Radiation Monitoring (PRM) System** **A4.02** Ability to manually operate and / or monitor in the control room: Radiation monitoring system control panel	**3.7**	**1**
076 Service Water P8176L-003 085 (R52)									x			**076 Service Water System (SWS)** **A3.02** Ability to monitor automatic operation of the SWS, including: Emergency heat loads	**3.7**	**1**
078 Instrument Air P8178L-005 055 (R53)											x	**078 Instrument Air System (IAS)** **2.4.47** Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material	**4.2**	**1**

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 P8180L-001 037 (R54) P8180L-002 024 (R55)	x						x					**103 Containment System** **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 **A1.01** Ability to predict and / or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: Containment pressure, temperature and humidity	**2.8*** **3.7**	**2**
~~053 Integrated Control~~														
K/A Category Point Totals:	**3**	**2**	**2**	**3**	**2**	**1**	**3**	**3**	**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														
011 Pressurizer Level Control P8170L-006 068 (R56)								x				**011 Pressurizer Level Control** **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 PRZR level	**3.8**	**1**
014 Rod Position Indication														
015 Nuclear Instrumentation P8184L-002 026 (R57)			x									**015 Nuclear Instrumentation System** **K3.01** Knowledge of the effect that a loss or malfunction of the NIS will have on the following: RPS	**3.9**	**1**
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor														
028 Hydrogen Recombiner and Purge Control P8180L-008 007 (R58)			x									**028 Hydrogen Recombiner and Purge Control System (HRPS)** **K3.01** Knowledge of the effect that a loss or malfunction of the HRPS will have on the following: Hydrogen concentration in containment	**3.3**	**1**
029 Containment Purge														
033 Spent Fuel Pool Cooling P8182L-004 029 (R59)					x							**033 Spent Fuel Pool Cooling System (SFPCS)** **K4.01** Knowledge of design feature(s) and / or interlock(s) which provide for the following: Maintenance of Spent Fuel Pool Level	**3.1**	**1**
034 Fuel Handling Equipment														
035 Steam Generator P8174L-001 027 (R60)						x						**035 Steam Generator System (S/GS)** **K6.02** Knowledge of the effect of a loss or malfunction on the following will have on the S/GS: Secondary PORV	**3.1**	**1**

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**	**#**
041 Steam Dump/Turbine Bypass Control P8174L-002 090 (R61)							x					**041 Steam Dump System (SDS) and Turbine Bypass Control** **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**	**1**
045 Main Turbine Generator														
055 Condenser Air Removal														
056 Condensate														
068 Liquid Radwaste														
071 Waste Gas Disposal P8182L-002 090 (R62)									x			**071 Waste Gas Disposal** **A3.03:** Ability to monitor automatic operation of the Waste Gas Disposal System including: Radiation monitoring system alarm and actuating signals	**3.6**	**1**
072 Area Radiation Monitoring P8182L-002 019 (R63)										x		**072 Area Radiation Monitoring (ARM) System** **A4.03** Ability to manually operate and / or monitor in the control room: Check source for operability demonstration	**3.1**	**1**
075 Circulating Water P8176L-002A 024 (R64)											x	**075 Circulating Water** **2.1.25** Ability to interpret reference materials, such as graphs, curves, tables, etc.	**3.9**	**1**
079 Station Air P8178L-005 008 (R65)	x											**079 Station Air System (SAS)** **K1.01** Knowledge of the physical connections and / or cause-effect relationships between the SAS and the following systems: IAS	**3.0**	**1**
086 Fire Protection														
~~050 Control Room Ventilation~~														
K/A Category Point Totals:	**1**	**0**	**2**	**1**	**0**	**1**	**1**	**1**	**1**	**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	#
000007 Reactor Trip - Stabilization - Recovery / 1									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
000011 Large Break LOCA / 3 P8197L-012 257 (S76)					x		**011 Large Break LOCA** **EA2.09** Ability to determine or interpret the following as they apply to a Large Break LOCA: Existence of adequate natural circulation	**4.3**	**1**
000015 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2 P8180L-005 016 (S77)						x	**022 Loss of Reactor Coolant Makeup** **2.2.42** Ability to recognize system parameters that are entry-level conditions for technical specifications	**4.6**	**1**
000025 Loss of RHR System / 4 P8180L-003 075 (S78)					x		**025 Loss of Residual Heat Removal System (RHRS)** **AA2.03** Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Increasing reactor building sump level	**3.8**	**1**
000026 Loss of Component Cooling Water / 8 P8172L-002 134 (S79)						x	**026 Loss of Component Cooling Water (CCW)** **2.2.40** Ability to apply Technical Specifications for a system.	**4.7**	
000027 Pressurizer Pressure Control System Malfunction / 3									
000029 ATWS / 1									
000038 Steam Gen. Tube Rupture / 3									
W/E12 Steam Line Rupture - Excessive Heat Transfer / 4									
000054 Loss of Main Feedwater / 4									
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6									

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	#
000057 Loss of Vital AC Inst. Bus / 6 P8186L-015 029 (S80)					**X**		**057 Loss of Vital AC Electrical Instrument Bus AA2.08** Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: Reactor power digital display and remote flux meter	**3.5***	**1**
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4									
000065 Loss of Instrument Air / 8									
000077 Generator Voltage and Electric Grid Disturbances / 6									
W/E04 LOCA Outside Containment / 3 P8140L-233 007 (S81)						**X**	**Westinghouse E04 LOCA Outside Containment** **2.4.3** Ability to identify post-accident instrumentation	**3.9**	**1**
W/E11 Loss of Emergency Coolant Recirc. / 4									
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
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	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1									
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2									
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7 P7410L-034 027 (S82)					x		**033 Loss of Intermediate Range Nuclear Instrumentation** **AA2.07** Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Confirmation of reactor trip	**4.2**	**1**
000036 Fuel Handling Incidents / 8 P8182L-004 028 (S83)						x	**036 Fuel Handling Incidents** **2.4.41** Knowledge of the emergency action level thresholds and classifications.	**4.6**	**1**
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8 P8140L-229 005 (S84)					x		**067 Plant fire on site** **AA2.05** Ability to determine and interpret the following as they apply to the Plant Fire on Site: Ventilation alignment necessary to secure affected area.	**3.6**	**1**
000068 Control Room Evac. / 8									
W/E14 Loss of CTMT Integrity / 5									
W/E06 & E07 Inad. Core Cooling / 4									
000076 High Reactor Coolant Activity / 9									

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	#
000078 RCS Leak / 3									
W/E01 & E02 Rediagnosis & SI Termination / 3									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
W/E16 High Containment Radiation / 9									
W/E03 LOCA Cooldown - Depress. / 4 P8197L-012 255 (S85)						x	**Westinghouse E03 LOCA Cooldown and Depressurization** **2.4.18** Knowledge of the specific bases for EOPs	**4.0**	**1**
W/E09 & E10 Natural Circ. / 4									
W/E08 RCS Overcooling - PTS / 4									
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	#
003 Reactor Coolant Pump														
004 Chemical and Volume Control														
005 Residual Heat Removal P8197L-012 262 (S86)								x				**005 Residual Heat Removal** **A2.01** Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure modes for pressure, flow, pump motor amps, motor temperature, and tank level instrumentation	**2.9***	**1**
006 Emergency Core Cooling														
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water														
010 Pressurizer Pressure Control														
012 Reactor Protection														
013 Engineered Safety Features Actuation (S87) P7410L-034 026											x	**013 Engineered Safety Features Actuation System (ESFAS)** **2.2.44** 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**	**1**
022 Containment Cooling														
026 Containment Spray P8180L-002 051 (S88)								x				**026 Containment Spray System (CSS)** **A2.08** 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: Safe securing of containment spray when it can be done	**3.7**	**1**
039 Main and Reheat Steam														
059 Main Feedwater														

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	#
061 Auxiliary/Emergency Feedwater P8197L-014 215 (S89)								**x**				**061 Auxiliary / Emergency Feedwater (AFW) System** **A2.05** 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: Automatic control malfunction	**3.4***	**1**
062 AC Electrical Distribution														
063 DC Electrical Distribution														
064 Emergency Diesel Generator P8197L-011 242 (S90)											**x**	**064 Emergency Diesel Generators (ED/G)** **2.4.20** Knowledge of the operational implications of EOP warnings, cautions, and notes	**4.3**	**1**
073 Process Radiation Monitoring														
076 Service Water														
078 Instrument Air														
103 Containment														
~~053 Integrated Control~~														
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	#
001 Control Rod Drive														
002 Reactor Coolant P8197L-014 214 (S91)								x				**002 Reactor Coolant System (RCS)** **A2.04** 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 Heat sinks	**4.6**	**1**
011 Pressurizer Level Control														
014 Rod Position Indication														
015 Nuclear Instrumentation														
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment														
035 Steam Generator														
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator P8140L-246 029 (S92)											x	**045 Main Turbine Generator (MT/G) System** **2.2.22** Knowledge of limiting conditions for operations and safety limits	**4.7**	**1**
055 Condenser Air Removal														
056 Condensate														

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	#
068 Liquid Radwaste P8182L-001A 011 (S93)								**x**				**068 Liquid Radwaste Systems (LRS)** **A2.04** Ability to (a) predict the impacts of the following malfunctions or operations on 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**	**1**
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
075 Circulating Water														
079 Station Air														
086 Fire Protection														
~~050 Control Room Ventilation~~														
K/A Category Point Totals:								**2**			**1**	**Group Point Total:**		**3**

Facility: Prairie Island Date of Exam:

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.18	Ability to make accurate, clear, and concise logs, records, status boards, and reports PI-OPS-GFE-038L 022 (R66)	3.6	1		
	2.1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation P8140L-233 006 (R67)	4.4	1		
	2.1.28	Knowledge of the purpose and function of major system components and controls P8180L-002 053 (R68)	4.1	1		
	Subtotal		3			
2. Equipment Control	2.2.36	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations P8186L-005 105 (R69)	3.1	1		
	2.2.37	Ability to determine operability and / or availability of safety related equipment P8180L-009H 020 (R70)	3.6	1		
	2.2.43	Knowledge of the process used to track inoperable alarms P9150L-024 043 (R71)	3.0	1		
	Subtotal		3			
3. Radiation Control	2.3.7	Ability to comply with radiation work permit requirements during normal or abnormal conditions P9130L-003 056 (R72)	3.5	1		
	Subtotal		1			
4. Emergency Procedures / Plan	2.4.12	Knowledge of general operating crew responsibilities during emergency operations P8197L-012 253 (R73)	4.0	1		
	2.4.8	Knowledge of how abnormal operating procedures are used in conjunction with EOPs P8197L-011 243 (R74)	3.8	1		
	2.4.27	Knowledge of "fire in the plant" procedures P8197L-009 034 (R75)	3.4	1		
	Subtotal		3			
Tier 3 Point Total			**Tier 3 Point Total**	**10**		

Facility: Prairie Island Date of Exam:

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation P8140L-231 004 (S94)			4.4	1
	2.1.14	Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes etc. P7410L-035 005 (S95)			3.1	1
	Subtotal				2	
2. Equipment Control	2.2.17	Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator. P9150L-005 018 (S96)			3.8	1
	2.2.15	Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc. P8180L-003 076 (S97)			4.3	1
	Subtotal				2	
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. P9130L-003 054 (S98)			3.7	1
	Subtotal				1	
4. Emergency Procedures / Plan	2.4.16	Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, and sever accident management guidelines P8140L-228 002 (S99)			4.4	1
	2.4.23	Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations P8197L-014 191 (S100)			4.4	1
	Subtotal				2	
Tier 3 Point Total			**Tier 3 Point Total**			7