

Facility:		Date of Exam:		Exam Level:									
Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1	2	2	4				3	4			1	16
	2	1	3	3				2	4			4	17
	3	1	0	0				1	1			0	3
	Tier Totals	4	5	7				6	9			5	36
2. Plant Systems	1	3	1	2	3	3	1	2	1	3	2	2	23
	2	2	0	2	3	2	2	2	2	2	3	0	20
	3	1	0	1	1	0	1	1	1	1	1	0	8
	Tier Totals	6	1	5	7	5	4	5	4	6	6	2	51
3. Generic Knowledge and Abilities					Cat 1		Cat 2		Cat 3		Cat 4		13
					4		3		3		3		
<p>Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).</p> <p>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 <math>\pm 1</math> from that specified in the table based on NRC revisions. The final exam must total 100 points.</p> <p>3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.</p> <p>4. Systems/evolutions within each group are identified on the associated outline.</p> <p>5. The shaded areas are not applicable to the category/tier.</p> <p>6.* The generic 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.</p> <p>7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.</p>													

ES-401		PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						Form ES-401-4 (R8, S1)	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1	1						AK1.05 Calculation of minimum shutdown margin	3.3	1
000015/17 RCP Malfunctions / 4			1				AK3.03 Sequence of events for manually tripping reactor and RCP as a result of an RCP malfunction	3.7	1
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					1		AA2.2 Adherence to appropriate procedures and operations within the limitations in the facility's license and amendments.	2.9	1
000024 Emergency Boration / 1								N/A	0
000026 Loss of Component Cooling Water / 8				1			AA1.02 Loads on the CCWs in the control room	3.2	1
000027 Pressurizer Pressure Control System Malfunction / 3			1				AK3.03 Actions contained in EOP for PZR PCS malfunction	3.7	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4					1		AA2.03 Difference between steam line rupture and a LOCA	4.6	1
CE/A11; W/E08 RCS Overcooling - PTS / 4		1					AK2.2 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.	3.2	1
000051 Loss of Condenser Vacuum / 4					1		AA2.02 Conditions requiring reactor and/or turbine trip	3.9	1
000055 Station Blackout / 6			1				EK3.02 Actions contained in EOP for loss of offsite and onsite power	4.3	1
000057 Loss of Vital AC Elec. Inst. Bus / 6					1		AA2.19 The plant automatic actions that will occur on the loss of a vital ac electrical instrumentation bus.	4.0	1
000062 Loss of Nuclear Service Water / 4						1	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.	3.9	1
000067 Plant Fire On-site / 9	1						AK1.02 Fire fighting	3.1	1
000068 (BW/A06) Control Room Evac. / 8				1			AA1.12 Auxiliary shutdown panel controls and indicators	4.4	1
000069 (W/E14) Loss of CTMT Integrity / 5		1					AK2.03 Personnel access hatch and emergency access hatch	2.8	1
000074 (W/E06&E07) Inad. Core Cooling / 4			1				EK3.11	4.0	1
BW/E03 Inadequate Subcooling Margin / 4								N/A	0
000076 High Reactor Coolant Activity / 9				1			AA1.04 Failed Fuel monitoring equipment	3.2	1
BW/A02&A03 Loss of NNI-X/Y / 7									
K/A Category Totals:	2	2	4	3	4	1	Group Point Total:		16

ES-401		PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2						Form ES-401-4 (R8, S1)	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1			1				AK3.02 Tech-spec limits on rod operability	3.2	1
000003 Dropped Control Rod / 1						1	2.1.20 Ability to execute procedure steps	4.3	1
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1		1					EK2.2 Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between proper operation of these systems to the operation of the facility.	3.5	1
BW/A01 Plant Runback / 1									0
BW/A04 Turbine Trip / 4									0
000008 Pressurizer Vapor Space Accident / 3				1			AA1.02	4.1	1
000009 Small Break LOCA / 3				1			EA1.13 ESFAS	4.4	1
000011 Large Break LOCA / 3					1		EA2.10 Verification of adequate core cooling	4.5	1
W/E04 LOCA Outside Containment / 3									0
BW/E08; W/E03 LOCA Cooledown/Depress. / 4									0
W/E11 Loss of Emergency Coolant Recirc. / 4									0
W/E01 & E02 Rediagnosis & SI Termination / 3									0
000022 Loss of Reactor Coolant Makeup / 2	1						AK1.03 Relationship between charging flow and PZR level	3.0	1
000025 Loss of RHR System / 4				1			AA1.03	3.0	1
000029 Anticipated Transient w/o Scram / 1		1					EK2.06 Breakers, relays, and disconnects	2.9	1
000032 Loss of Source Range NI / 7			1				AK3.02 Guidance contained in EOP for loss of source-range nuclear instrumentation	3.7	1
000033 Loss of Intermediate Range NI / 7					1		AA2.01	3.0	1
000037 Steam Generator Tube Leak / 3					1		AA2.06 S/G tube failure	4.3	1
000038 Steam Generator Tube Rupture / 3						1	2.1.7	3.7	1
000054 (CE/E06) Loss of Main Feedwater / 4									0
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									0
000058 Loss of DC Power / 6						1	2.1.12 Ability to apply technical specifications for a system	2.9	1
000059 Accidental Liquid RadWaste Rel. / 9						1	2.1.27 Knowledge of system purpose and/or function	2.8	1
000060 Accidental Gaseous Radwaste Rel. / 9					1		AA2.05 Ability to determine and interpret that the automatic safety actions have occurred as a result of a high ARM system signal	3.7	1
000061 ARM System Alarms / 7			1				AK3.02 Guidance contained in alarm response for ARM system	3.4	1
W/E16 High Containment Radiation / 9									0
CE/E09 Functional Recovery									0
K/A Category Point Totals:	1	3	3	2	4	4	Group Point Total:		17

ES-401		PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3						Form ES-401-4 (R8, S1)	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2				1			AA1.08	3.7	1
000036 (BW/A08) Fuel Handling Accident / 8									0
000056 Loss of Off-site Power / 6	1						AK1.01 Principle of cooling by natural convection	3.7	1
000065 Loss of Instrument Air / 8					1		AA2.05 When to commence plant shutdown if instrument air pressure is decreasing	3.4	1
BW/E13&E14 EOP Rules and Enclosures									0
BW/A05 Emergency Diesel Actuation / 6									0
BW/A07 Flooding / 8									0
CE/A16 Excess RCS Leakage / 2									0
W/E13 Steam Generator Over-pressure / 4									0
W/E15 Containment Flooding / 5									0
K/A Category Point Totals:	1	0	0	1	1	0	Group Point Total:		3

ES-401		PWR RO Examination Outline Plant Systems - Tier 2/Group 1										Form ES-401-4 (R8, S1)		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive		1										K2.02 One-line diagram of power supply to trip breakers	3.6	1
001 Control Rod Drive											1	2.2.1 Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity	3.7	1
003 Reactor Coolant Pump						1						K6.04 Containment isolation valves affecting RCP operation	2.8	1
003 Reactor Coolant Pump							1					A1.05 RCS flow	3.4	1
004 Chemical and Volume Control	1											K1.04 RCPs, including seal injection flows	3.4	1
004 Chemical and Volume Control											1	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures	4.3	1
013 Engineered Safety Features Actuation			1									K3.01 Fuel	4.4	1
013 Engineered Safety Features Actuation				1								K4.13 MFW isolation/reset	3.7	1
015 Nuclear Instrumentation					1							K5.05 Criticality and its indications	4.1	1
015 Nuclear Instrumentation							1					A1.03 NIS power indication	3.7	1
017 In-core Temperature Monitor									1			A3.01 Indications of normal, natural, and interrupted circulation of RCS	3.6	1
017 In-core Temperature Monitor					1							K5.03 Indications of superheating	3.7	1
022 Containment Cooling										1		A4.05 Containment readings of temperature, pressure, and humidity system	3.8	1
025 Ice Condenser														0
056 Condensate	1											K1.03 MFW	2.6	1
059 Main Feedwater			1									K3.03	3.5	1
061 Auxiliary/Emergency Feedwater				1								K4.02 AFW automatic start upon loss of MFW pump, S/G level, station blackout , or safety injection	4.5	1
061 Auxiliary/Emergency Feedwater								1				A2.04 pump failure or improper operation	3.4	1
068 Liquid Radwaste					1							K5.04 Biological hazards of radiation and the resulting goals of ALARA	3.2	1
068 Liquid Radwaste				1								K4.01 Safety and environmental precautions for handling hot, acidic, and radioactive liquids	3.4	1
071 Waste Gas Disposal	1											K1.06 ARM and PRM systems	3.1	1

071 Waste Gas Disposal									1			A3.03 Radiation monitoring system and actuating signals	3.6	1
072 Area Radiation Monitoring									1			A3.01 Changes in ventilation alignment	2.9	1
072 Area Radiation Monitoring										1		A4.01	3.0	1
K/A Category Point Totals:	3	1	2	3	3	1	2	1	3	2	2	Group Point Total:	23	

ES-401		PWR RO Examination Outline Plant Systems - Tier 2/Group 2											Form ES-401-4 (R8, S1)		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points	
002 Reactor Coolant							1					A1.04 Subcooling margin	3.9	1	
006 Emergency Core Cooling						1						K6.03 Loss of malfunction of Safety injection pumps	3.6	1	
010 Pressurizer Pressure Control									1			A3.02 PZR Pressure	3.6	1	
011 Pressurizer Level Control					1							K5.15 PZR level control when RCS is saturated	3.6	1	
012 Reactor Protection					1							K5.01 Knowledge of the operational implications of the concept of DNB as it applies to the RPS	3.3	1	
014 Rod Position Indication				1								K4.06 Knowledge of RPIS design features and/or interlocks which provide individual and group misalignment	3.4	1	
016 Non-nuclear Instrumentation						1						K6.01 Sensors and detectors	2.7	1	
026 Containment Spray										1		A4.01 CSS controls	4.5	1	
029 Containment Purge									1			A3.01 CPS isolation	4.0		
033 Spent Fuel Pool Cooling	1											K1.05 RWST	2.7	1	
035 Steam Generator								1				A2.01 Faulted or ruptured S/Gs	4.5	1	
039 Main and Reheat Steam							1					A1.06 Main Steam Pressure	3.0	1	
055 Condenser Air Removal			1									K3.01 Main Condenser	2.5	1	
062 AC Electrical Distribution								1				A2.11 Aligning standby equipment with correct emergency power source (D/G)	3.7	1	
063 DC Electrical Distribution			1									K3.01 ED/G	3.7	1	
064 Emergency Diesel Generator										1		A4.06 Manual start, loading, and stopping of the ED/G	3.9	1	
073 Process Radiation Monitoring				1								K4.01 Release termination when radiation exceeds setpoint	4.0	1	
075 Circulating Water	1											K1.08 Emergency/Essential SWS	3.2	1	
079 Station Air				1								K4.01 Cross connect with IAS	2.9	1	
086 Fire Protection										1		A4.05	3.4	1	
K/A Category Point Totals:	2	0	2	3	2	2	2	2	2	3	0	Group Point Total:		20	

ES-401		PWR RO Examination Outline Plant Systems - Tier 2/Group 3										Form ES-401-4 (R8, S1)		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal														0
007 Pressurizer Relief/Quench Tank														0
008 Component Cooling Water							1					A1.04 Surge tank level	3.1	1
027 Containment Iodine Removal														0
028 Hydrogen Recombiner and Purge Control	1											K1.01 Containment annulus ventilation system (including pressure limits)	2.5	1
034 Fuel Handling Equipment						1						K6.02 Radiation monitoring systems	2.6	1
041 Steam Dump/Turbine Bypass Control										1		A4.08 Steam Dump valves	3.0	1
045 Main Turbine Generator				1								K4.11 T/G reactor trip	3.6	1
076 Service Water								1				A2.01 Loss of SWS	3.5	1
078 Instrument Air									1			A3.01 Air pressure	3.1	1
103 Containment			1									K3.02 Loss of containment integrity under normal conditions	3.8	1
K/A Category Point Totals:	1	0	1	1	0	1	1	1	1	1	0	Group Point Total:		8
Plant-Specific Priorities														
System / Topic						Recommended Replacement for...						Reason		Points
Plant-Specific Priority Total: (limit 10)														



Facility:		Date of Exam:		Exam Level:	
Category	K/A #	Topic	Imp.	Points	
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements	3.7	1	
	2.1.7		3.7	1	
	2.1.20	Ability to execute procedural steps	4.3	1	
	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation	3.9	1	
	Total			4	
Equipment Control	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels	4.0	1	
	2.2.13	Knowledge of tagging and clearance procedures	3.6	1	
	2.2.22	Knowledge of limiting conditions for operation and safety limits	3.4	1	
	Total			3	
Radiation Control	2.3.1	Knowledge of 10 CFR 20 and related radiation control requirements	2.6	1	
	2.3.2		2.5	1	
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	1	
	Total			3	
Emergency Procedures/ Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps	4.3	1	
	2.4.34	Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications.	3.8	1	
	2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0	1	
	Total			3	
Tier 3 Point Total (RO)				13	

Facility:		Date of Exam:		Exam Level:									
Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1	4	4	5				2	6			3	24
	2	2	2	4				3	4			1	16
	3	1	0	0				1	1			0	3
	Tier Totals	7	6	9				6	11			4	43
2. Plant Systems	1	1	2	3	1	4	0	2	2	2	1	1	19
	2	3	0	1	2	2	2	2	2	1	2	0	17
	3	0	0	0	1	0	0	1	0	1	1	0	4
	Tier Totals	4	2	4	4	6	2	5	4	4	4	1	40
3. Generic Knowledge and Abilities					Cat 1		Cat 2		Cat 3		Cat 4		17
					4		4		4		5		
<p>Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).</p> <p>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 <math>\pm 1</math> from that specified in the table based on NRC revisions. The final exam must total 100 points.</p> <p>3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.</p> <p>4. Systems/evolutions within each group are identified on the associated outline.</p> <p>5. The shaded areas are not applicable to the category/tier.</p> <p>6.* The generic 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.</p> <p>7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.</p>													

<div>ES-401</div> <div>PWR SRO Examination Outline</div> <div>Emergency and Abnormal Plant Evolutions - Tier 1/Group 1</div> <div>Form ES-401-3 (R8, S1)</div>									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1			1				AK3.02 Tech-spec limits on rod operability	4.3	1
000003 Dropped Control Rod / 1						1	2.1.20 Ability to execute procedure steps	4.2	1
000003 Dropped Control Rod / 1		1					AK1.05 .	4.1	1
000005 Inoperable/Stuck Control Rod / 1	1						AK1.05 Calculation of minimum shutdown margin	4.1	1
000011 Large Break LOCA / 3					1		EA2.10 Verification of adequate core cooling	4.7	1
W/E04 LOCA Outside Containment / 3					1		EA2.2 Adherence to appropriate procedures and operations w/in the limitations of the facility's license and amendments	4.2	1
W/E01 & E02 Rediagnosis & SI Termination / 3									
000015/17 RCP Malfunctions / 4			1				AK3.03 Sequence of events for manually tripping reactor and RCP as a result of an RCP malfunction	4.0	1
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					1		AA2.2 Adherence to appropriate procedures and operations within the limitations in the facility's license and amendments.	3.8	1
000024 Emergency Boration / 1					1		AA2.02 When use of manual boration valve is needed.	4.4	1
000026 Loss of Component Cooling Water / 8				1			AA1.02 Loads on the CCWs in the control room	3.3	1
000029 Anticipated Transient w/o Scram / 1		1					EK3.12	4.7	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4	1						EK1.03 Effects of boron on reactivity	3.8	1
CE/A11; W/E08 RCS Overcooling - PTS / 4					1		AA2.03 Difference between steam line rupture and a LOCA	4.7	1
000051 Loss of Condenser Vacuum / 4		1					AK2.2 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.	3.4	1
000055 Station Blackout / 6			1				EK3.02 Actions contained in EOP for loss of offsite and onsite power	4.6	1
000057 Loss of Vital AC Elec. Inst. Bus / 6					1		AA2.19 The plant automatic actions that will occur on the loss of a vital ac electrical instrumentation bus.	4.3	1
000059 Accidental Liquid RadWaste Rel. / 9						1	2.1.27 Knowledge of system purpose and/or function	2.9	1
000062 Loss of Nuclear Service Water / 4						1	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation	4.0	1
000067 Plant Fire On-site / 9	1						AK1.02 Fire fighting	3.9	1
000068 (BW/A06) Control Room Evac. / 8					1		AA1.12 Auxiliary shutdown panel controls and indicators	4.4	1
000069 (W/E14) Loss of CTMT Integrity / 5		1					AK2.03 Personnel access hatch and emergency access hatch	2.9	1
000074 (W/E06&E07) Inad. Core Cooling / 4			1				EK3.09 Opening the cross connect valve from the LPI to the HPI suction	4.6	1

BW/E03 Inadequate Subcooling Margin / 4									
000076 High Reactor Coolant Activity / 9				1			AA1.04 Failed Fuel monitoring equipment		1
BW/A02&A03 Loss of NNI-X/Y / 7									
K/A Category Totals:							Group Point Total:		24

<div>ES-401</div> <div>PWR SRO Examination Outline</div> <div>Emergency and Abnormal Plant Evolutions - Tier 1/Group 2</div> <div>Form ES-401-3 (R8, S1)</div>									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1		1					EK2.2 Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between proper operation of these systems to the operation of the facility.	4.0	1
BW/A01 Plant Runback / 1									
BW/A04 Turbine Trip / 4									
000008 Pressurizer Vapor Space Accident / 3				1			AA1.01 PZR spray block valve and PORV block valve	4.0	1
000009 Small Break LOCA / 3				1			EA1.13 ESFAS	4.4	1
BW/E08; W/E03 LOCA Cooldown - Depress. / 4									
W/E11 Loss of Emergency Coolant Recirc. / 4									
000022 Loss of Reactor Coolant Makeup / 2	1						AK1.03 Relationship between charging flow and PZR level	3.4	1
000025 Loss of RHR System / 4				1			AA1.02 RCS inventory	3.9	1
000027 Pressurizer Pressure Control System Malfunction / 3			1				AK3.03Actions contained in EOP for PZR PCS malfunction	4.1	1
000032 Loss of Source Range NI / 7			1				AK3.02 Guidance contained in EOP for loss of source-range nuclear instrumentation	4.1	1
000033 Loss of Intermediate Range NI / 7			1				AK3.21 Guidance contained in EOP for loss of intermediate range instrumentation	3.9	1
000037 Steam Generator Tube Leak / 3					1		AA2.06 S/G tube failure	4.5	1
000038 Steam Generator Tube Rupture / 3	1						AK2.02	2.6	1
000054 (CE/E06) Loss of Main Feedwater / 4	1						AK1.01 MFW line break depressurizes the S/G(similar to a steam line break)	4.3	1
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
000058 Loss of DC Power / 6						1	2.1.12 Ability to apply technical specifications for a system	4.0	1
000060 Accidental Gaseous Radwaste Rel. / 9					1		AA2.05 Ability to determine and interpret that the automatic safety actions have occurred as a result of a high ARM system signal	4.2	1
000061 ARM System Alarms / 7			1				AK3.02 Guidance contained in alarm response for ARM system	3.6	1
W/E16 High Containment Radiation / 9									
000065 Loss of Instrument Air / 8				1			AA2.05 When to commence plant shutdown if instrument air pressure is decreasing	4.1	1
CE/E09 Functional Recovery					1		EA2.2 Adherence to appropriate procedures and operations within the limitations in the facility's license and amendments	4.0	1

K/A Category Point Totals:	3	1	4	4	3	1	Group Point Total:	16
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ES-401		PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3						Form ES-401-3 (R8, S1)	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2				1			AA1.01 PZR level reactor protection bistables	3.9	1
000036 (BW/A08) Fuel Handling Accident / 8									0
000056 Loss of Off-site Power / 6	1						AK1.01 Principle of cooling by natural convection	4.2	1
BW/E13&E14 EOP Rules and Enclosures									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
CE/A16 Excess RCS Leakage / 2					1		AA2.2 Adherence to appropriate procedures and operations within the limitations in the facility's license and amendments.	3.7	1
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
K/A Category Point Totals:	1	0	0	1	1	0	Group Point Total:		3

ES-401		PWR SRO Examination Outline Plant Systems - Tier 2/Group 1										Form ES-401-3 (R8, S1)		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive		1										K2.02 One-line diagram of power supply to trip breakers	3.7	1
001 Control Rod Drive											1	2.2.1 Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity	3.6	1
003 Reactor Coolant Pump							1					A1.05 RCS flow	3.5	1
004 Chemical and Volume Control					1							K5.11 Thermal stress, brittle fracture, pressurized thermal shock	3.9	1
013 Engineered Safety Features Actuation			1									K3.01 Fuel	4.7	1
014 Rod Position Indication			1									K3.02 Plant computer	2.8	1
015 Nuclear Instrumentation					1							K5.05 Criticality and its indications	4.4	1
015 Nuclear Instrumentation							1					A1.03 NIS power indication	3.7	1
017 In-core Temperature Monitor						1						K5.03 Indications of superheating	4.1	1
022 Containment Cooling											1	A4.05 Containment readings of temperature, pressure, and humidity system	3.8	1
025 Ice Condenser														
026 Containment Spray								1				A2.03 Failure of ESF	4.4	1
056 Condensate	1											K1.03 MFW	2.6	1
059 Main Feedwater			1									K3.02 AFW system	3.7	1
061 Auxiliary/Emergency Feedwater		1										K2.01 AFW system MOVs	3.3	1
061 Auxiliary/Emergency Feedwater								1				A2.04 pump failure or improper operation	3.8	1
063 DC Electrical Distribution				1								K4.01 Manual/automatic transfers of control	3.0	1
068 Liquid Radwaste					1							K5.04 Biological hazards of radiation and the resulting goals of ALARA	3.5	1
071 Waste Gas Disposal									1			A3.03 Radiation monitoring system and actuating signals	3.8	1
072 Area Radiation Monitoring										1		A3.01	2.7	1
K/A Category Point Totals:	1	2	3	1	3	1	2	2	1	1	2	Group Point Total:		19



ES-401		PWR SRO Examination Outline Plant Systems - Tier 2/Group 2										Form ES-401-3 (R8, S1)		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant							1					A1.04 Subcooling margin	4.1	1
006 Emergency Core Cooling						1						K6.03 Loss of malfunction of Safety injection pumps	3.9	1
010 Pressurizer Pressure Control									1			A3.02 PZR Pressure	3.5	1
011 Pressurizer Level Control					1							K5.15 PZR level control when RCS is saturated	4.0	1
012 Reactor Protection					1							K5.01 Knowledge of the operational implications of the concept of DNB as it applies to the RPS	3.8	1
016 Non-nuclear Instrumentation						1						K6.01 Sensors and detectors	2.5	1
027 Containment Iodine Removal														0
028 Hydrogen Recombiner and Purge Control	1											K1.01 Containment annulus ventilation system (including pressure limits)	2.5	1
029 Containment Purge														0
033 Spent Fuel Pool Cooling	1											K1.05 RWST	2.8	1
034 Fuel Handling Equipment														
035 Steam Generator								1				A2.01 Faulted or ruptured S/Gs	4.6	1
039 Main and Reheat Steam							1					A1.06 Main Steam Pressure	3.1	1
055 Condenser Air Removal			1									K3.01 Main Condenser	2.7	1
062 AC Electrical Distribution								1				A2.11 Aligning standby equipment with correct emergency power source (D/G)	4.1	1
064 Emergency Diesel Generator			1									A4.06	3.9	1
073 Process Radiation Monitoring				1								K4.01 Release termination when radiation exceeds setpoint	4.3	1
075 Circulating Water	1											K1.08 Emergency/Essential SWS	3.2	1
079 Station Air				1								K4.01 Cross connect with IAS	3.2	1
086 Fire Protection										1		A4.53 Deluge Valves	3.5	1
103 Containment														0
K/A Category Point Totals:	3	0	2	2	2	2	2	2	1	1	0	Group Point Total:		17

ES-401		PWR SRO Examination Outline Plant Systems - Tier 2/Group 3											Form ES-401-3 (R8, S1)	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal														0
007 Pressurizer Relief/Quench Tank														0
008 Component Cooling Water							1					A1.04 Surge tank level	3.2	1
041 Steam Dump/Turbine Bypass Control										1		A4.08 Steam Dump valves	3.1	1
045 Main Turbine Generator				1								K4.11 T/G reactor trip	3.9	1
076 Service Water														0
078 Instrument Air									1			A3.01 Air pressure	3.2	1
K/A Category Point Totals:	0	0	0	1	0	0	1	0	1	1	0	Group Point Total:		4
Plant-Specific Priorities														
System / Topic					Recommended Replacement for...					Reason			Points	
Plant-Specific Priority Total: (limit 10)														

Facility:		Date of Exam:		Exam Level:	
Category	K/A #	Topic	Imp.	Points	
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements	3.8	1	
	2.1.7		4.4	1	
	2.1.20	Ability to execute procedural steps	4.2	1	
	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation	4.0	1	
	Total			4	
Equipment Control	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels	3.5	1	
	2.2.13	Knowledge of tagging and clearance procedures	3.8	1	
	2.2.22	Knowledge of limiting conditions for operation and safety limits	4.1	1	
	2.2.25	.	3.7	1	
	Total			4	
Radiation Control	2.3.1	Knowledge of 10 CFR 20 and related radiation control requirements	3.0	1	
	2.3.2	.	2.9	1	
	2.3.9	Knowledge of the process for performing a containment purge.	3.4	1	
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3	1	
	Total			4	
Emergency Procedures/ Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps	4.6	1	
	2.4.6	Knowledge of symptom based EOP mitigation strategies.	4.0	1	
	2.4.29	Knowledge of the emergency plan.	4.0	1	
	2.4.34	Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications.	3.6	1	
	2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0	1	
	Total			5	
Tier 3 Point Total (SRO)				17	



Facility: <u>ANO Unit 2</u>		Date of Examination: <u>14 July 2003</u>
Examination Level (circle one): RO		Operating Test Number: _____
Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Condition of Operations 2.1.25	ANO-2-JPM-NRC-ECP Estimated Critical Condition
	Condition of Operations 2.1.29	Knowledge of how to conduct and verify a valve lineup
A.2	Equipment Control 2.2.12	Knowledge of surveillance procedures
A.3	Radiation Control 2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure
A.4	Emergency Procedures/Plan 2.4.34	<b>Question 1:</b> Given the following plant conditions: The selected Back Pressure Control Valve, 2CV-4810 has failed closed. Letdown relief valve, 2PSV-4822 has lifted and is stuck open. How long does the Control Room staff have to isolate this leak before it will be classified as RCS leakage for the purpose of Emergency Action Level classification?
		<b>QUESTION 2:</b> A General Emergency has been declared and a site evacuation declared. As a Control Room Operator: How are you accounted for, and, What is the time limit for initial accountability?

Facility: <u>ANO Unit 2</u> Exam Level: SRO		Date of Examination: <u>7/13/2003</u> Operating Test No.: <u>1</u>
B.1 Control Room Systems		
System / JPM Title	Type Code*	Safety Function
a. ANO-2-JPM-NRC-CVCS2 004 A 4.07 RO - 3.9/SRO - 3.7 Perform Emergency Boration	D/A/S/L	1 Reactivity
b. ANO-2-JPM-NRC- ELECXT 006 A 4.03 RO - 3.3 SRO - 3.1 Synchronize Cross connect of 480 VAC load centers 2B1 and 2B2.	N/S	6 Electrical
c. ANO-2-JPM-NRC-SIT01 006 A4.03 RO - 3.5 SRO - 3.5 Add Borated Water to a Safety Injection Tank	D/A/S	2 Inventory
d. ANO-2-JPM-NRC-EOP1 Secure Containment Spray (during recovery actions for SIAS)	D/S	5 Containment Integrity
e. ANO-2-JPM-NRC- NEW Restore Shutdown cooling following an Instrument Failure	N/	7 Instrumentation
f. ANO-2-JPM-NRC- NEW Operate Porportional Heaters locally	D	3 Reactor Pressure Control
g. ANO-2-JPM-NRC-RCP02 Restore Component Cooling Water to Reactor Coolant Pumps (Alternate Path)	D/A/C	6 Plant Service Systems
B.2 Facility Walk-Through		

a. ANO-2-JPM-NRC- 2RS4A 062 A2.03 RO - 2.9/SRO - 3.4 Place Alternate Inverter on 2RS4	D/A	6 Electrical
b. ANO-2-JPM-NRC- SFPSW 033 A2.03 RO - 3.1/SRO - 3.5 Add Water from Loop II SW to SFP	M/R/A	8 Plant Service Systems
c. ANO-2-JPM-NRC- New Local start of turbine driven EFW pump	D	4 Heat removal from Reactor Core
* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA		

Facility: <u>ANO Unit 2</u>		Date of Examination: <u>14 July 2003</u>
Examination Level (circle one): SRO		Operating Test Number: _____
Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Condition of Operations 2.1.25	ANO-2-JPM-NRC-ECP Estimated Critical Condition
	Condition of Operations 2.1.29	Knowledge of how to conduct and verify a valve lineup
A.2	Equipment Control 2.2.12	Knowledge of surveillance procedures
A.3	Radiation Control 2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure
A.4	Emergency Procedures/Plan 2.4.34	Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications



Facility: ANO Unit 2Date of Examination: 7/13/2003

Exam Level: SRO

Operating Test No.: 1

## B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a. ANO-2-JPM-NRC-CVCS2 004 A 4.07 RO - 3.9/SRO - 3.7 Perform Emergency Boration	D/A/S/L	1 Reactivity
b. ANO-2-JPM-NRC- ELECXT 006 A 4.03 RO - 3.3 SRO - 3.1 Synchronize Cross connect of 480 VAC load centers 2B1 and 2B2.	N/S	6 Electrical
c. ANO-2-JPM-NRC-SIT01 006 A4.03 RO - 3.5 SRO - 3.5 Add Borated Water to a Safety Injection Tank	D/A/S	2 Inventory
d. ANO-2-JPM-NRC-EOP1 Secure Containment Spray (during recovery actions for SIAS)	D/S	5 Containment Integrity
e. ANO-2-JPM-NRC- NEW Restore Shutdown cooling following an Instrument Failure	N/	7 Instrumentation
f. ANO-2-JPM-NRC- NEW Operate Porportional Heaters locally	D	3 Reactor Pressure Control
g. ANO-2-JPM-NRC-RCP02 Restore Component Cooling Water to Reactor Coolant Pumps (Alternate Path)	D/A/C	6 Plant Service Systems

B.2 Facility Walk-Through		
a. ANO-2-JPM-NRC- 2RS4A 062 A2.03 RO - 2.9/SRO - 3.4 Place Alternate Inverter on 2RS4	D/A	6 Electrical
b. ANO-2-JPM-NRC- SFPSW 033 A2.03 RO - 3.1/SRO - 3.5 Add Water from Loop II SW to SFP	M/R/A	8 Plant Service Systems
c. ANO-2-JPM-NRC- New Local start of turbine driven EFW pump	D	4 Heat removal from Reactor Core
* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA		