

Facility: Arkansas Nuclear One – Unit 1														Date of Exam: 8/26/2011				
Tier	Group	RO K/A Category Points												SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolution	1	3	3	3				3	3				3	18			6	
	2	2	2	1	N/A			2	1	N/A			1	9			4	
	Tier Totals	5	5	4				5	4				4	27			10	
2. Plant Systems	1	3	3	4	2	3	2	2	2	2	3	2	28				5	
	2	1	1	0	2	1	1	1	0	1	1	1	10				3	
	Tier Totals	4	4	4	4	4	3	3	2	3	4	3	38				8	
3. Generic Knowledge and Abilities Categories				1		2		3		4		10		1	2	3	4	7
				3		3		2		2								

Note:

- 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).
- 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  $\pm 1$  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.
- 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.
- 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.
- 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.
- Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
- \* 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.
- 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.
- 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 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	#	QID	Type	
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1				X			EA1.10-S/G pressure	3.7	1	23	D	
000008 Pressurizer Vapor Space Accident / 3							Not selected	N/A				
000009 Small Break LOCA / 3		X					EK2.03 – S/Gs	3.0	2	506	R	
000011 Large Break LOCA / 3	X						EK1.01 – Natural circulation and cooling, including reflux boiling	4.1	3	29	D	
000015/17 RCP Malfunctions / 4					X		AA2.10 – RCP indicators and controls	2.8	4	825	N	
000022 Loss of Rx Coolant Makeup / 2			X				AK3.04 – Isolating letdown	3.2	5	549	D	
000025 Loss of RHR System / 4	X						AK1.01-Loss of RHRS during all modes of operation	3.9	6	164	R	
000026 Loss of Component Cooling Water / 8			X				AK3.02-The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS.	3.6	7	95	D	
000027 Pressurizer Pressure Control System Malfunction / 3					X		AA2.04-Tech Spec limits for RCS pressure	3.7	8	824	N	
000029 ATWS / 1							Not selected	N/A				
000038 Steam Gen. Tube Rupture / 3					X		EA2.13-Magnitude of rupture.	3.1	9	345	D	
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4		X					AK2.01-Valves.	2.6	10	826	N	
000054 (CE/E06) Loss of Main Feedwater / 4			X				AK3.04-Actions contained in EOPs for Loss of MFW	4.4	11	662	D	
000055 Station Blackout / 6						X	2.4.1-Knowledge of EOP entry conditions and immediate action steps.	4.6	12	552	D	
000056 Loss of Off-site Power / 6						X	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	13	553	D	
000057 Loss of Vital AC Inst. Bus / 6						X	2.4.11-Knowledge of abnormal condition procedures.	4.0	14	414	D	
000058 Loss of DC Power / 6							Not selected	N/A				
000062 Loss of Nuclear Svc Water / 4				X			AA1.01- Nuclear service water temperature indications.	3.1	15	625	D	
000065 Loss of Instrument Air / 8				X			AA1.02- Components served by instrument air to minimize drain on system.	2.6	16	103	D	
W/E04 LOCA Outside Containment / 3							Not selected	N/A				

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E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	QID	Type
W/E11 Loss of Emergency Coolant Recirc. / 4							Not selected	N/A			
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4		X					EK2.2-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.	4.2	17	614	D
000077 Generator Voltage and Electric Grid Disturbances / 6	X						AK1.02-Over-excitation	3.3	18	827	N
K/A Category Totals:	3	3	3	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	#	QID	Type	
000001 Continuous Rod Withdrawal / 1							Not selected	N/A				
000003 Dropped Control Rod / 1							Not selected	N/A				
000005 Inoperable/Stuck Control Rod / 1	X						AK1.02-Flux tilt.	3.1	19	494	D	
000024 Emergency Boration / 1							Not selected	N/A				
000028 Pressurizer Level Malfunction / 2						X	2.1.7-Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	20	665	D	
000032 Loss of Source Range NI / 7							Not selected	N/A				
000033 Loss of Intermediate Range NI / 7							Not selected	N/A				
000036 (BW/A08) Fuel Handling Accident / 8							Not selected	N/A				
000037 Steam Generator Tube Leak / 3					X		AA2.16-Pressure at which to maintain RCS during S/G cooldown.	4.1	21	819	N	
000051 Loss of Condenser Vacuum / 4							Not selected	N/A				
000059 Accidental Liquid RadWaste Rel. / 9							Not selected	N/A				
000060 Accidental Gaseous Radwaste Rel. / 9							Not selected	N/A				
000061 ARM System Alarms / 7							Not selected	N/A				
000067 Plant Fire On-site / 8							Not selected	N/A				
000068 (BW/A06) Control Room Evac. / 8							Not selected	N/A				
000069 (W/E14) Loss of CTMT Integrity / 5							Not selected	N/A				
000074 (W/E06&E07) Inad. Core Cooling / 4							Not selected	N/A				
000076 High Reactor Coolant Activity / 9							Not selected	N/A				
W/E01 & E02 Rediagnosis & SI Termination / 3							Not selected	N/A				
W/E13 Steam Generator Over-pressure / 4							Not selected	N/A				
W/E15 Containment Flooding / 5							Not selected	N/A				
W/E16 High Containment Radiation / 9							Not selected	N/A				
BW/A01 Plant Runback / 1				X			AA1.2-Operating behavior characteristics of the facility	3.2	22	162	D	
BW/A02&A03 Loss of NNI-X/Y / 7	X						AK1.3- Annunciators and conditions indicating signals, and remedial actions associated with the (Loss of NNI-X).	3.8	23	828	N	
BW/A04 Turbine Trip / 4							Not selected	N/A				
BW/A05 Emergency Diesel Actuation / 6		X					AK2.1- Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	4.0	24	829	M	

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E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	QID	Type	
BW/A07 Flooding / 8							Not selected	N/A				
BW/E03 Inadequate Subcooling Margin / 4		X					EK2.2-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.	4.3	25	290	D	
BW/E08; W/E03 LOCA Cooldown - Depress. / 4							Not selected	N/A				
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4			X				EK3.2-Normal, abnormal and emergency operating procedures associated with Natural Circulation Cooldown.	3.0	26	172	M	
BW/E13&E14 EOP Rules and Enclosures				X			EA1.3- Desired operating results during abnormal and emergency situations.	3.4	27	237	D	
CE/A11; W/E08 RCS Overcooling - PTS / 4							Not selected	N/A				
CE/A16 Excess RCS Leakage / 2							Not selected	N/A				
CE/E09 Functional Recovery							Not selected	N/A				
K/A Category Point Totals:	2	2	1	2	1	1	Group Point Total:	9				

PWR Examination Outline Plant Systems – Tier 2/Group 1 (RO)													Form ES-401-2			
	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	#	QID	Type
003 Reactor Coolant Pump						X						K6.02- Containment isolation valves affecting RCP operation.	2.7	28	53	D
003 Reactor Coolant Pump										X		A4.01-Seal injection	3.3	29	834	N
004 Chemical and Volume Control		X										K2.02- Makeup pumps	2.9	30	657	D
005 Residual Heat Removal					X							K5.09-Dilution and boration considerations	3.2	31	820	N
006 Emergency Core Cooling									X			A3.05-Safety Injection Pumps	4.2	32	266	D
006 Emergency Core Cooling	X											K1.08-CVCS	3.6	33	303	D
007 Pressurizer Relief/Quench Tank			X									K3.01-Containment	3.3	34	821	D
008 Component Cooling Water		X										K2.02-CCW pump, including emergency backup	3.0	35	562	D
008 Component Cooling Water								X				A2.01-Loss of CCW Pump	3.3	36	822	M
010 Pressurizer Pressure Control						X						K6.01-Pressure detection systems	2.7	37	628	D
012 Reactor Protection			X									K3.01- Sensors and detectors	2.7	38	629	D
013 Engineered Safety Features Actuation	X											K1.02-RCP	3.2	39	265	D
022 Containment Cooling	X											K1.01-SWS/cooling system	3.5	40	256	D
025 Ice Condenser												Not Selected	N/A			
026 Containment Spray		X										K2.01-Containment spray pumps	3.4	41	830	N
039 Main and Reheat Steam										X		A4.04-Emergency feedwater pump turbines	3.8	42	831	D
059 Main Feedwater									X			A3.07-ICS	3.4	43	63	D
061 Auxiliary/Emergency Feedwater					X							K5.01-Relationship between AFW flow and RCS heat transfer	3.6	44	435	D
061 Auxiliary/Emergency Feedwater								X				A2.04-Pump failure or improper operation	3.4	45	538	D

PWR Examination Outline													Form ES-401-2			
Plant Systems – Tier 2/Group 1 (RO)																
	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	#	QID	Type
062 AC Electrical Distribution											X	2.4.31-Knowledge of annunciator alarms, indications, or response procedures.	4.2	46	413	D
062 AC Electrical Distribution										X		A4.01-all breakers (including available switchyard)	3.3	47	616	D
063 DC Electrical Distribution			X									K3.01-ED/G	3.7	48	87	D
064 Emergency Diesel Generator				X								K4.05-Incomplete-start relay	2.8	49	88	D
064 Emergency Diesel Generator					X							K6.08-Fuel oil storage tanks	3.2	50	823	M
073 Process Radiation Monitoring			X									K3.01-Radioactive effluent releases	3.6	51	271	D
076 Service Water											X	2.1.32	3.8	52	832	N
076 Service Water							X					A1.02-Reactor and turbine building closed cooling water temperatures	2.6	53	46	D
078 Instrument Air				X								K4.02-Cross-over to other air systems	3.2	54	227	D
103 Containment							X					A1.01-Containment Pressure, Temperature, and Humidity	3.7	55	716	R
K/A Category Point Totals:	3	3	4	2	3	2	2	2	2	3	2	Group Point Total:				28

ES-401		PWR Examination Outline Plant Systems – Tier 2/Group 2 (RO)												Form ES-401-2			
System # / Name	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	#	QID	Type	
001 Control Rod Drive												Not selected	N/A				
002 Reactor Coolant												Not selected	N/A				
011 Pressurizer Level Control					X							K5.13-Impact of high/low PZR level on interrelated system	3.2	56	220	D	
014 Rod Position Indication				X								K4.04-Zone reference lights	2.6	57	833	D	
015 Nuclear Instrumentation									X			A3.03-Verification of proper functioning/operability	3.9	58	464	D	
016 Non-nuclear Instrumentation										X		A4.01-NNI channel select controls	2.9	59	403	D	
017 In-core Temperature Monitor												Not selected	N/A				
027 Containment Iodine Removal												Not selected	N/A				
028 Hydrogen Recombiner and Purge Control		X										K2.01-Hydrogen Recombiners	2.5	60	723	R	
029 Containment Purge												Not selected	N/A				
033 Spent Fuel Pool Cooling							X					A1.01-Spent fuel pool water level	2.7	61	200	D	
034 Fuel Handling Equipment												Not selected	N/A				
035 Steam Generator												Not selected	N/A				
041 Steam Dump/Turbine Bypass Control												Not selected	N/A				
045 Main Turbine Generator												Not selected	N/A				
055 Condenser Air Removal												Not selected	N/A				
056 Condensate											X	2.1.28- Knowledge of the purpose and function of major system components and controls	4.1	62	434	D	
068 Liquid Radwaste												Not selected	N/A				
071 Waste Gas Disposal												Not selected	N/A				
072 Area Radiation Monitoring												Not selected	N/A				
075 Circulating Water				X								K4.01- Heat sink	2.5	63	205	D	
079 Station Air	X											K1.01-IAS	3.0	64	541	D	
086 Fire Protection						X						K6.04- Fire, smoke, and heat detectors	2.6	65	151	D	
K/A Category Point Totals:	1	1	0	2	1	1	1	0	1	1	1	Group Point Total:	10				



Facility: Arkansas Nuclear One – Unit 1

Date of Exam: 8/26/2011

Category	K/A #	Topic	RO		QID	Type#
			IR	#		
1. Conduct of Operations	2.1.17	Ability to make accurate, clear, and concise verbal reports.	3.9	66	836	N
	2.1.1	Knowledge of conduct of operations requirements.	3.8	67	837	N
	2.1.4	Knowledge of individual licensed operator responsibilities related shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.	3.3	68	838	N
	Subtotal					
2. Equipment Control	2.2.35	Ability to determine Technical Specification Mode of Operation.	3.6	69	458	D
	2.2.12	Knowledge of surveillance procedures.	3.7	70	233	D
	2.2.13	Knowledge of tagging and clearance procedures.	4.1	71	231	D
	Subtotal					
3. Radiation Control	2.3.11	Ability to control radiation releases.	3.8	72	817	N
	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	73	121	D
	Subtotal					
4. Emergency Procedures / Plan	2.4.25	Knowledge of fire protection procedures.	3.3	74	392	N
	2.4.13	Knowledge of crew roles and responsibilities during EOP usage.	4.0	75	835	N
	Subtotal					
Tier 3 Point Total				10		

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		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1												18	3	3	6		
	2												9	3	1	4		
	Tier Totals												27	6	4	10		
2. Plant Systems	1												28	4	1	5		
	2												10	2	1	3		
	Tier Totals												38	6	2	8		
3. Generic Knowledge and Abilities Categories				1		2		3		4		10		1	2	3	4	7
														2	2	1	2	

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
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  $\pm 1$  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.

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000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1					X		EA2.2-Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	4.0	76	741	D	
000008 Pressurizer Vapor Space Accident / 3					X		AA2.01- RCS pressure and temperature indicators and alarms.	4.2	77	753	M	
000009 Small Break LOCA / 3							Not selected	N/A				
000011 Large Break LOCA / 3							Not selected	N/A				
000015/17 RCP Malfunctions / 4							Not selected	N/A				
000022 Loss of Rx Coolant Makeup / 2							Not selected	N/A				
000025 Loss of RHR System / 4						X	2.4.4-Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.7	78	639	D	
000026 Loss of Component Cooling Water / 8							Not selected	N/A				
000027 Pressurizer Pressure Control System Malfunction / 3							Not selected	N/A				
000029 ATWS / 1							Not selected	N/A				
000038 Steam Gen. Tube Rupture / 3							Not selected	N/A				
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4					X		EA2.2-Adherence to appropriate procedures and operation within the limitations in the facilities license and amendments.	4.0	79	731	D	
000054 (CE/E06) Loss of Main Feedwater / 4							Not selected	N/A				
000055 Station Blackout / 6							Not selected	N/A				
000056 Loss of Off-site Power / 6							Not selected	N/A				
000057 Loss of Vital AC Inst. Bus / 6						X	2.4.11-Knowledge of abnormal condition procedures.	4.2	80	412	D	
000058 Loss of DC Power / 6						X	2.2.25-Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	4.2	81	840	N	
000062 Loss of Nuclear Svc Water / 4							Not selected	N/A				
000065 Loss of Instrument Air / 8							Not selected	N/A				
W/E04 LOCA Outside Containment / 3							Not selected	N/A				

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E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	QID	Type
W/E11 Loss of Emergency Coolant Recirc. / 4							Not selected	N/A			
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4							Not selected	N/A			
000077 Generator Voltage and Electric Grid Disturbances / 6							Not selected	N/A			
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	#	QID	Type	
000001 Continuous Rod Withdrawal / 1							Not selected	N/A				
000003 Dropped Control Rod / 1						X	2.2.22- Knowledge of limiting conditions for operations and safety limits.	4.7	82	841	N	
000005 Inoperable/Stuck Control Rod / 1							Not selected	N/A				
000024 Emergency Boration / 1							Not selected	N/A				
000028 Pressurizer Level Malfunction / 2							Not selected	N/A				
000032 Loss of Source Range NI / 7							Not selected	N/A				
000033 Loss of Intermediate Range NI / 7					X		AA2.10- Tech-spec limits if both intermediate-range channels have failed.	3.8	83	590	D	
000036 (BW/A08) Fuel Handling Accident / 8					X		AA2.02-Occurrence of a fuel handling incident.	4.1	84	347	D	
000037 Steam Generator Tube Leak / 3							Not selected	N/A				
000051 Loss of Condenser Vacuum / 4							Not selected	N/A				
000059 Accidental Liquid RadWaste Rel. / 9							Not selected	N/A				
000060 Accidental Gaseous Radwaste Rel. / 9							Not selected	N/A				
000061 ARM System Alarms / 7							Not selected	N/A				
000067 Plant Fire On-site / 8							Not selected	N/A				
000068 (BW/A06) Control Room Evac. / 8							Not selected	N/A				
000069 (W/E14) Loss of CTMT Integrity / 5							Not selected	N/A				
000074 (W/E06&E07) Inad. Core Cooling / 4							Not selected	N/A				
000076 High Reactor Coolant Activity / 9					X		AA2.02- Corrective actions required for high fission product activity in the RCS.	3.4	85	342	D	
W/E01 & E02 Rediagnosis & SI Termination / 3							Not selected	N/A				
W/E13 Steam Generator Over-pressure / 4							Not selected	N/A				
W/E15 Containment Flooding / 5							Not selected	N/A				
W/E16 High Containment Radiation / 9							Not selected	N/A				
BW/A01 Plant Runback / 1							Not selected	N/A				
BW/A02&A03 Loss of NNI-X/Y / 7							Not selected	N/A				
BW/A04 Turbine Trip / 4							Not selected	N/A				
BW/A05 Emergency Diesel Actuation / 6							Not selected	N/A				
BW/A07 Flooding / 8							Not selected	N/A				
BW/E03 Inadequate Subcooling Margin / 4							Not selected	N/A				
BW/E08; W/E03 LOCA Cooldown - Depress. / 4							Not selected	N/A				

BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4							Not selected	N/A			
BW/E13&E14 EOP Rules and Enclosures							Not selected	N/A			
CE/A11; W/E08 RCS Overcooling - PTS / 4							Not selected	N/A			
CE/A16 Excess RCS Leakage / 2							Not selected	N/A			
CE/E09 Functional Recovery							Not selected	N/A			
K/A Category Point Totals:					3	1	Group Point Total:		4		

PWR Examination Outline Plant Systems – Tier 2/Group 1 (SRO)													Form ES-401-2			
	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	#	QID	Type
003 Reactor Coolant Pump												Not Selected	N/A			
004 Chemical and Volume Control								X				A2.07- Isolation of letdown/makeup.	3.7	86	465	D
005 Residual Heat Removal												Not Selected	N/A			
006 Emergency Core Cooling												Not Selected	N/A			
007 Pressurizer Relief/Quench Tank								X				A2.01-Abnormal pressure in the PRT.	2.6	87	842	M
008 Component Cooling Water												Not Selected	N/A			
010 Pressurizer Pressure Control												Not Selected	N/A			
012 Reactor Protection											X	2.2.39-Knowledge of less than or equal to one hour Technical Specification action statements for systems.	3.9	88	843	N
013 Engineered Safety Features Actuation												Not Selected	N/A			
022 Containment Cooling												Not Selected	N/A			
025 Ice Condenser												Not Selected	N/A			
026 Containment Spray								X				A2.07-Loss of Containment Spray pump suction when in recirculation mode, possibly caused by clogged sump screen, pump inlet high temperature, exceeded cavitation,	3.9	89	844	M
039 Main and Reheat Steam												Not Selected	N/A			
059 Main Feedwater												Not Selected	N/A			
061 Auxiliary/Emergency Feedwater								X				A2.03- Loss of DC Power.	3.4	90	740	D
062 AC Electrical Distribution												Not Selected	N/A			
063 DC Electrical Distribution												Not Selected	N/A			
064 Emergency Diesel Generator												Not Selected	N/A			
073 Process Radiation Monitoring												Not Selected	N/A			
076 Service Water												Not Selected	N/A			
078 Instrument Air												Not Selected	N/A			



103 Containment														Not Selected	N/A			
K/A Category Point Totals:								4				1		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	#	QID	Type
001 Control Rod Drive												Not selected	N/A			
002 Reactor Coolant								X				A2.03-Loss of forced circulation	4.3	91	570	D
011 Pressurizer Level Control												Not selected	N/A			
014 Rod Position Indication												Not selected	N/A			
015 Nuclear Instrumentation												Not selected	N/A			
016 Non-nuclear Instrumentation												Not selected	N/A			
017 In-core Temperature Monitor												Not selected	N/A			
027 Containment Iodine Removal												Not selected	N/A			
028 Hydrogen Recombiner and Purge Control												Not selected	N/A			
029 Containment Purge												Not selected	N/A			
033 Spent Fuel Pool Cooling												Not selected	N/A			
034 Fuel Handling Equipment											X	2.2.40- Ability to apply Technical Specifications for a system.	4.7	92	450	D
035 Steam Generator												Not selected	N/A			
041 Steam Dump/Turbine Bypass Control												Not selected	N/A			
045 Main Turbine Generator								X				A2.07-Malfunction of electrohydraulic control.	2.9	93	845	N
055 Condenser Air Removal												Not selected	N/A			
056 Condensate												Not selected	N/A			
068 Liquid Radwaste												Not selected	N/A			
071 Waste Gas Disposal												Not selected	N/A			
072 Area Radiation Monitoring												Not selected	N/A			
075 Circulating Water												Not selected	N/A			
079 Station Air												Not selected	N/A			
086 Fire Protection												Not selected	N/A			
K/A Category Point Totals:								2			1	Group Point Total:		3		

Facility: Arkansas Nuclear One – Unit 1						
Date of Exam: 8/26/2011						
Category	K/A #	Topic	SRO			
			IR	#	QID	Type#
1. Conduct of Operations	2.1.35	Knowledge of the fuel-handling responsibilities of the SRO.	3.9	94	846	M
	2.1.4	Knowledge of individual licensed operator responsibilities related shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.	3.8	95	407	D
	Subtotal			2		
2. Equipment Control	2.2.22	Knowledge of limiting conditions for operations and safety limits.	4.7	96	119	D
	2.2.36	Knowledge of maintenance work order requirements	3.4	97	815	R
	Subtotal			2		
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.7	98	391	N
	Subtotal			1		
4. Emergency Procedures / Plan	2.4.30	Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the state, the NRC, or the transmission system operator.	4.1	99	411	R
	2.4.40	Knowledge of the SRO's responsibilities in emergency plan implementation.	4.5	100	357	D
	Subtotal			2		
Tier 3 Point Total				7		

[illegible]

Facility: ANO-1

Scenario No.: 1

Op-Test No.: 2011-1

Examiners: \_\_\_\_\_

Operators: \_\_\_\_\_

**Initial Conditions:**

- ~100% Power
- 250 EFPD
- Need to perform API/RPI Verification Surveillance
- 

**Turnover:**

- ~100% Power
- 250 EFPD
- Need to perform API/RPI Verification Surveillance

Event No.	Malf. No.	Event Type*	Event Description
1		N-(BOP)	Perform 1105.009 Sup. 1 API/RPI Channel Check
2	RC464	C-(ATC) C-(SRO) TS	Small RCS leak in HPI line (C HPI Line)
3	DI_ICC0009R DI_ICC0009L	C-(ATC) C-(SRO)	Unit Load Demand fails to respond
4		R-(ATC)	Power reduction/ Plant Shutdown
5	DI_A113R	C-(BOP) CT	A112 fails to open automatically during transfer of auxiliaries
6	RC464	M-(ALL)	RCS leakrate rises requiring Rx Trip
7	CV063	C-(BOP) C-(SRO)TS CT	ES HPI pump trips post ESAS actuation

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Facility: ANO-1

Scenario No.: 2

Op-Test No.: 2011-1

Examiners: \_\_\_\_\_

Operators: \_\_\_\_\_

**Initial Conditions:**

- ~40% Power
- 250 EFPD
- Both MFW Pumps in service
- Ready to commence power escalation
- P7B EFW pump fails to autostart and cannot be manually started from handswitch

**Turnover:**

- ~40% Power
- 250 EFPD
- Both MFW Pumps in service
- Need to Place P-36B in service and secure P-36A due to small oil leak on P-36A that is scheduled for repair
- Ready to commence power escalation

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-(BOP) N-(SRO)	Swap running makeup pumps. Place P36B in service and place P36A in standby.
2	N/A	R-(ATC)	Power escalation
3	CV6604	C-(BOP) C-(SRO)	Gland Seal Regulator Failure
4	TR572	I-(ATC) I-(SRO)	SG Startup Range level instrument fails downscale slowly
5	CO_P4B	C-(BOP) C-(SRO) TS	P-4B SW pump trips
6	TRPAMFW CV2827	C-(ATC) CT	MFW pump trip w/ failure of discharge cross-tie valve to open requires reactor trip.
7	TRPBMFW CO_P7B FW617	C-(ATC) C-(SRO)TS	Remaining main feedwater pump trips resulting in EFW actuation. Electric EFW pump fails to autostart and will not start from the handswitch.
8	CV6601	M-(ALL) TS CT	EFW steam driven pump trips on overspeed resulting in overheating condition. EFW pump P7A reset and EFW flow restored.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: ANO-1

Scenario No.: 3

Op-Test No.: 2011-1

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Initial Conditions:**

- 99.4% Power
- 250 EFPD
- CV-3037 T-40B HLD Failed Closed
- CV-2670 EFW isolation to "A" SG from P-7A failed open
- CV-2646 EFW control to "A" SG from P-7A failed open
- RPS reactor trips failed
- Reactor Trip Pushbutton failed

**Turnover:**

- 99.4% Power
- 250 EFPD

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-(BOP) N-(SRO)	Swap running vacuum pumps
2	FW087	R-(ATC)	Heater Drain Pump Trip (P-8B)
3	CV3037	C-(BOP) C-(SRO)	HLD Control Valve fails to operate properly
4	TR631	I-(ATC) I-(SRO)	RCP Seal Injection Flow Transmitter Failure (PDT-1239)
5	CV2691	C-(ATC) C-(SRO) ts (CT)	MSIV Closure @ Power / Reactor Trip
6	MS141	M- (ALL)	One MSSV fails to reseal resulting in Overcooling event
7	CV2670 CV2646	C-(ALL) ts (CT)	EFW valves, CV-2670 & CV-2646 will be failed open and will not close
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: Arkansas Nuclear One – Unit 1Date of Examination: 08/29/2011Exam Level: RO ☒ SRO-I ☐ SRO-U ☒Operating Test No.: 1

Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. A1JPM-RO-AOP37 Respond to Continuous Rod Withdrawal 001 AA1.05 (RO 4.3/SRO N/A) <b>SRO-U</b>	A/N/S	1 Reactivity Control
b. A1-JPM-RO-RPS07 Place Channel "A" in Shutdown Bypass 012 A4.03 (RO 3.6/SRO 3.6) <b>SRO-U</b>	EN/L/N/S	7 Instrumentation
c. A1JPM-RO-MUP06 Perform RCS Delithiation 004 A1.11 (RO 3.0/SRO 3.0) <b>SRO-U</b>	A/D/S	2 Reactor Coolant System Inventory Control
d. A1JPM-RO-EOP15 Perform Reactor Trip Immediate Actions with a Loss of D01 058 AA1.01 (RO 3.4/SRO 3.5)	A/D/E/S	6 Electrical
e. A1JPM-RO-HYD04 Place Hydrogen Recombiner M-55B in Operation 028 A4.01 (RO 4.0/SRO 4.0)	M/S	5 Containment Integrity
f. A1JPM-RO-PZR05 Respond to Low RCS Pressure due to Stuck Open Spray Valve 010 A3.02 (RO 3.6/SRO 3.5)	A/D/P/S	3 Reactor Pressure Control



g.	A1JPM-RO-EOP08 Perform Actions required to correct Degraded Power (EFW System Operation) 061 A1.02 (RO 3.3/SRO 3.6)	D/EN/S	4 Heat Removal From Reactor Core (Secondary)
h.	A1JPM-RO-ICW02 Perform Switching of ICW Pumps (P-33A/B/C) 008 A2.01 (RO 3.3/SRO 3.6)	D/S	8 Plant Service Systems
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
i.	A1JPM-RO-EFW02 Manual Control of Emergency Feedwater Pump P-7A at the Turbine 061 A2.05 (RO 3.1/SRO 3.4) <b>SRO-U</b>	D/E/EN/R	4 Heat Removal From Reactor Core (Secondary)
j.	A1JPM-RO-ED022 Inverter Y11 Shutdown with RS1 Supplied from Y-11 Alternate AC Source 062 A4.07 (RO 3.1/SRO 3.1) <b>SRO-U</b>	D/EN	6 Electrical
k.	A1JPM-RO-LRW01 Liquid Radiation waste release 2.3.11 (RO 3.8/SRO 4.3)	A/D/P/R	9 Reactivity Release
<sup>@</sup> All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.			
* Type Codes		Criteria for RO / SRO-I / SRO-U	
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator		4-6 (5) / 4-6 / 2-3 (2)  ≤ 9 (8) / ≤ 8 / ≤ 4 (3) ≥ 1 (2) / ≥ 1 / ≥ 1 (2) - / - / ≥ 1 (1) (control room system) ≥ 1 (1) / ≥ 1 / ≥ 1 (1) ≥ 2 (3) / ≥ 2 / ≥ 1 (2) ≤ 3 (2) / ≤ 3 / ≤ 2 (0) (randomly selected) ≥ 1 (2) / ≥ 1 / ≥ 1 (1)	

Facility: <u>ANO-1</u>		Date of Examination: <u>8-29-2011</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: <u>2011-1</u>

  

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations A1.        2.1.23 (Imp 4.3)	D/R	A1JPM-RO-RCS3  Ability to perform specific system and integrated plant procedures during all modes of plant operation.
Conduct of Operations A2.        2.1.19 (Imp 3.9)	D/S	A1JPM-RO-PMS2  Ability to use plant computers to evaluate system or component status.
Equipment Control A3.        2.2.13 (Imp 4.1)	N/R	A1JPM-RO-HCRD4  Knowledge of tagging and clearance procedures.
Radiation Control A4.        2.3.7 (Imp 3.5)	D/P/R	A1JPM-NRC-ADMINRWP1  Ability to comply with radiation work permit requirements during normal or abnormal conditions.
Emergency Procedures/Plan A5.	N/A	N/A

  

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

  

\* Type Codes & Criteria:

(C)ontrol room, (S)imulator, or Class(R)oom

(D)irect from bank ( $\leq 3$  **(3)** for ROs;  $\leq 4$  for SROs & RO retakes)

(N)ew or (M)odified from bank ( $\geq 1$ ) **(1)**

(P)revious 2 exams ( $\leq 1$ ; randomly selected) **(1)**

Facility: <u>ANO-1</u>		Date of Examination: <u>8-29-2011</u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: <u>2011-1</u>

  

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations A1. 2.1.20 (Imp 4.6)	M/R	A1JPM-SRO-PROC2 Ability to determine and execute procedure steps.
Conduct of Operations A2. 2.1.25 (Imp 4.2)	D/R	A1JPM-SRO-TREND Ability to interpret reference materials, such as graphs, curves, tables, etc.
Equipment Control A3. 2.2.13 (Imp 4.3)	N/R	A1JPM-SRO-HCRD4 Knowledge of tagging and clearance procedures.
Radiation Control A4. 2.3.7 (Imp 3.6)	D/P/R	A1JPM-NRC-ADMINRWP1 Ability to comply with radiation work permit requirements during normal or abnormal conditions.
Emergency Procedures/Plan A5. 2.4.44 (Imp 4.4)	M/R	A1JPM-SRO-PAR2 Knowledge of emergency protective action recommendations.

  

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

  

\* Type Codes & Criteria:

(C)ontrol room, (S)imulator, or Class(R)oom

(D)irect from bank ( $\leq 3$  for ROs;  $\leq 4$  **(2)** for SROs & RO retakes)

(N)ew or (M)odified from bank ( $\geq 1$ ) **(3)**

(P)revious 2 exams ( $\leq 1$ ; randomly selected) **(1)**

Facility: ANO-1		Date of Exam: 08/29/2011		Operating Test No.: 2011-1											
A P P L I C A N T	E V E N T  T Y P E	Scenarios										T O T A L	M I N I M U M (*)		
		1			2			3 (spare)							
		CREW POSITION			CREW POSITION			CREW POSITION							
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P					
												R	I	U	
RO-1	RX		4					2					1	1	0
	NOR						1						1	1	1
	I/C		2, 3				3, 5		4, 5, 7				4	4	2
	MAJ		6				8		6				2	2	1
	TS												0	2	2
RO-2	RX					2							1	1	0
	NOR			1						1			1	1	1
	I/C			5, 7		4, 6, 7				3, 7			4	4	2
	MAJ			6		8				6			2	2	1
	TS												0	2	2
SRO-U	RX												1	1	0
	NOR				1			1					1	1	1
	I/C	2, 3, 7			3, 4, 5, 6, 7			3, 4, 5, 7					4	4	2
	MAJ	6			8			6					2	2	1
	TS	2, 7			5, 7, 8			5, 7					0	2	2

Instructions:

- Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
- Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (\*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.
- Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.