

Facility: ANO Unit 2 2011 NRC Exam													Date of Exam: 01/28/2011				
Tier	Group	RO K/A Category Points											SRO-Only Points				
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2	G*	Total	
1. Emergency - Abnormal Plant evolutions	1	3	3	3	N/A			3	3	N/A			3	18			
	2	2	2	1	N/A			2	1	N/A			1	9			
	Tier Totals	5	5	4	N/A			5	4	N/A			4	27			
2. Plant Systems	1	3	2	3	3	2	2	3	3	2	2	3	28				
	2	1	1	1	1	0	1	1	1	1	1	1	10				
	Tier Totals	4	3	4	4	2	3	4	4	3	3	4	38				
3. Generic Knowledge and Abilities Categories				1		2		3		4				1	2	3	4
				2		3		3		2		10					

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

PWR Examination Outline										
Emergency and Abnormal Evolutions - Tier 1/Group 1 (RO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Q	IR	#
000007 Reactor Trip - Stabilization - Recovery / 1	X						EK1.03 - Knowledge of the operational implications of the following concepts as they apply to the reactor trip: - Reasons for closing the main turbine governor valve and the main turbine stop valve after a reactor trip	1	3.7	1
000008 Pressurizer Vapor Space Accident / 3		X					AK2.03 - Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: - Controllers and positioners	2	2.5	1
000009 Small Break LOCA / 3	X						EK1.02 - Knowledge of the operational implications of the following concepts as they apply to the small break LOCA: - Use of steam tables	3	3.5	1
000011 Large Break LOCA / 3						X	2.4.20 - Emergency Procedures/Plan - Knowledge of operational implications of EOP warnings, cautions, and notes.	4	3.8	1
000015/000017 RCP Malfunctions / 4		X					AK2.10 - Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions and the following: - RCP indicators and controls	5	2.8	1
000022 Loss of Rx Coolant Makeup / 2			X				AK3.04 - Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Pump Makeup: - Isolating letdown	6	3.2	1
000025 Loss of RHR System / 4			X				AK3.03 - Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: - Immediate actions contained in EOP for Loss of RHRS	7	3.9	1
000027 Pressurizer Pressure Control System Malfunction / 3				X			AA1.04 - Ability to operate and/or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: - Pressure recovery, using emergency-only heaters	8	3.9	1
000029 ATWS / 1					X		EA2.08 - Ability to determine and interpret the following as they apply to a ATWS: - Rod bank step counters and RPI	9	3.4	1
000038 Steam Gen. Tube Rupture / 3						X	2.4.47 - Emergency Procedures/Plan - Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	10	4.2	1

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Emergency and Abnormal Evolutions - Tier 1/Group 1 (RO)										
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000040 Steam Line Rupture - Excessive Heat Transfer / 4		X					AK2.01 - Knowledge of the interrelations between the Steam Line Rupture and the following: - Valves	11	2.6	1
000054 Loss of Main Feedwater / 4				X			AA1.03 - Ability to operate and/or monitor the following as they apply to the Loss of Main Feedwater (MFW): - AFW auxiliaries, including oil cooling water supply	12	3.5	1
000055 Station Blackout / 6	X						EK1.02 - Knowledge of the operational implications of the following concepts as they apply to the Station Blackout: - Natural circulation cooling	13	4.1	1
000056 Loss of Off-site Power / 6				X			AA1.07 - Ability to operate and/or monitor the following as they apply to the Loss of Offsite Power: - Service water pump	14	3.2	1
000057 Loss of Vital AC Inst. Bus / 6					X		AA2.18 - Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: - The indicator, valve, breaker, or damper position which will occur on a loss of power	15	3.1	1
000058 Loss of DC Power / 6						X	2.2.12 - Equipment Control - Knowledge of surveillance procedures.	16	3.7	1
000062 Loss of Nuclear Svc Water / 4			X				AK3.04 - Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: - Effect on the nuclear service water discharge flow header of a loss of CCW	17	3.5	1
000065 Loss of Instrument Air / 8					X		AA2.08 - Ability to determine and interpret the following as they apply to the Loss of Instrument Air: - Failure modes of air-operated equipment	18	2.9	1
K/A Category Totals:	3	3	3	3	3	3	Group Point Totals:			18

PWR Examination Outline										
Emergency and Abnormal Evolutions - Tier 1/Group 2 (RO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Q	IR	#
000032 Loss of Source Range NI / 7			X				AK3.01 - Knowledge of the reasons for the following responses as they apply to the Loss of Source Range Nuclear Instrumentation: - Startup termination on source-range loss	19	3.2	1
000037 Steam Generator Tube Leak / 3				X			AA1.05 - Ability to operate and/or monitor the following as they apply to the Steam Generator Tube Leak: - Radiation monitor for auxiliary building exhaust processes	20	3.3	1
000060 Accidental Gaseous Radwaste Rel. / 9					X		AA2.05 - Ability to determine and interpret the following as they apply to the Accidental Gaseous Radwaste Release: - That the automatic safety actions have occurred as a result of a high ARM system signal	21	3.7	1
000061 ARM System Alarms / 7						X	2.1.20 - Conduct of Operations - Ability to interpret and execute procedure steps.	22	4.6	1
000068 Control Room Evac. / 8		X					AK2.02 - Knowledge of the interrelations between the Control Room Evacuation and the following: - Reactor trip system	23	3.7	1
000069 Loss of CTMT Integrity / 5	X						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to Loss of Containment Integrity: - Effect of pressure on leak rate	24	2.6	1
000074 Inad. Core Cooling / 4				X			EA1.15 - Ability to operate and/or monitor the following as they apply to an Inadequate Core Cooling: - Hot-leg and cold-leg temperature recorders	25	3.9	1
CE/A11 RCS Overcooling - PTS / 4		X					EK2.1 - Knowledge of the interrelations between the (RCS Overcooling) and the following: - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	26	3.2	1
CE/A13 Natural Circ. / 4	X						EK1.2 - Knowledge of the operational implications of the following concepts as they apply to the (Natural Circulation Operations): - Normal, abnormal and emergency operating procedures associated with (Natural Selection Operations)	27	3.2	1
K/A Category Totals:	2	2	1	2	1	1	Group Point Totals:			9

PWR Examination Outline															
Plant Systems - Tier 2/Group 1 (RO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A3	G	K/A Topic(s)	Q	IR	#
003 Reactor Coolant Pump								X				A2.03 - 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 associated with RCP motors, including faulty motors and current, and winding and bearing temperature problems	28	2.7	1
004 Chemical and Volume Control											X	2.1.28 - Conduct of Operations - Knowledge of the purpose and function of major system components and controls.	29	4.1	1
004 Chemical and Volume Control			X									K3.05 - Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: - PZR LCS	30	3.8	1
005 Residual Heat Removal			X									K3.06 - Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: - CSS	31	3.1	1
006 Emergency Core Cooling						X						K6.10 - Knowledge of the effect of a loss or malfunction of the following will have on the ECCS: - Valves	32	2.6	1
007 Pressurizer Relief/Quench Tank								X				A2.02 - Ability to (a) predict the impacts of the following malfunctions or operations on the PRTS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Abnormal pressure in the PRT	33	2.6	1

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Plant Systems - Tier 2/Group 1 (RO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A3	G	K/A Topic(s)	Q	IR	#
008 Component Cooling Water											X	A4.02 - Ability to manually operate and/or monitor in the control room: - Filling and draining operations of the CCWS including the proper venting of the components	34	2.5	1
008 Component Cooling Water				X								K4.09 - Knowledge of CCWS design feature(s) and/or interlock(s) which provide for the following: - The "standby" feature for the CCW pumps	35	2.7	1
010 Pressurizer Pressure Control					X							K5.02 - Knowledge of the operational implications of the following concepts as they apply to the PZR PCS: - Constant enthalpy expansion through a valve	36	2.6	1
012 Reactor Protection					X							K5.01 - Knowledge of the operational implications of the following concepts as they apply to the RPS: - DNB	37	3.3	1
013 Engineered Safety Features Actuation								X				A2.02 - Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Excess steam demand	38	4.3	1
022 Containment Cooling							X					A1.04 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: - Cooling water flow	39	3.2	1

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Plant Systems - Tier 2/Group 1 (RO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A3	G	K/A Topic(s)	Q	IR	#
026 Containment Spray				X								K4.08 - Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: - Automatic swapper to containment sump suction for recirculation phase after LOCA (RWST low-low level alarm)	40	4.1	1
026 Containment Spray											X	2.4.11 - Emergency Procedures/Plan - Knowledge of abnormal condition procedures.	41	4.0	1
039 Main and Reheat Steam	X											K1.04 - Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: - RCS temperature monitoring and control	42	3.1	1
059 Main Feedwater									X			A3.04 - Ability to monitor automatic operation of the MFW System, including: - Turbine driven feed pump	43	2.5	1
059 Main Feedwater							X					A1.07 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW System controls including: - Feed Pump speed, including normal control speed for ICS	44	2.5	1
061 Auxiliary/Emergency Feedwater									X			A3.01 - Ability to monitor automatic operation of the AFW System, including: - AFW startup and flows	45	4.2	1
061 Auxiliary/Emergency Feedwater						X						K6.02 - Knowledge of the effect of a loss or malfunction of the following will have on the AFW System components: - Pumps	46	2.6	1
062 AC Electrical Distribution										X		A4.02 - Ability to manually operate and/or monitor in the control room: - Remote racking in and out of breakers	47	2.5	1

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Plant Systems - Tier 2/Group 1 (RO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A3	G	K/A Topic(s)	Q	IR	#
062 AC Electrical Distribution			X									K3.03 - Knowledge of the effect that a loss or malfunction of the A.C. Distribution System will have on the following: - DC system	48	3.7	1
063 DC Electrical Distribution				X								K4.02 - Knowledge of D.C. Electrical System design feature(s) and/or interlock(s) which provide for the following: - Breaker interlocks, permissives, bypasses and cross-ties	49	2.9	1
064 Emergency Diesel Generator		X										K2.02 - Knowledge of bus power supplies to the following: - Fuel oil pumps	50	2.8	1
073 Process Radiation Monitoring	X											K1.01 - Knowledge of the physical connections and/or cause-effect relationships between the PRM System and the following systems: - Those systems served by PRMs	51	3.6	1
076 Service Water											X	2.2.22 - Equipment Control - Knowledge of limiting conditions for operations and safety limits.	52	4.0	1
076 Service Water		X										K2.04 - Knowledge of bus power supplies to the following: - Reactor building closed cooling water	53	2.5	1
078 Instrument Air	X											K1.05 - Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: - MSIV air	54	3.4	1
103 Containment							X					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	55	3.7	1
K/A Category Totals:	3	2	3	3	2	2	3	3	2	2	3	Group Point Totals:			28

PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A3	G	K/A Topic(s)	Q	IR	#
001 Control Rod Drive		X										K2.05 - Knowledge of bus power supplies to the following: - M/G sets	56	3.1	1
016 Non-nuclear Instrumentation											X	2.4.31 - Emergency Procedures/Plan - Knowledge of annunciator alarms, indications, or response procedures.	57	4.2	1
029 Containment Purge							X					A1.02 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Containment Purge System controls including: - Radiation levels	58	3.4	1
034 Fuel Handling Equipment				X								K4.02 - Knowledge of Fuel Handling System design feature(s) and/or interlock(s) which provide for the following: - Fuel movement	59	2.5	1
035 Steam Generator						X						K6.02 - Knowledge of the effect of a loss or malfunction of the following will have on the S/GS: - Secondary PORV	60	3.1	1
041 Steam Dump/Turbine Bypass Control			X									K3.02 - Knowledge of the effect that a loss or malfunction of the SDS will have on the following: - RCS	61	3.8	1
045 Main Turbine Generator	X											K1.18 - Knowledge of the physical connections and/or cause-effect relationships between the MT/G System and the following systems: - RPS	62	3.6	1
068 Liquid Radwaste											X	A4.02 - Ability to manually operate and/or monitor in the control room: - Remote radwaste release	63	3.2	1
072 Area Radiation Monitoring									X			A3.01 - Ability to monitor automatic operation of the ARM system, including: - Changes in ventilation alignment	64	2.9	1

PWR Examination Outline															
Plant Systems - Tier 2/Group 2 (RO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A3	G	K/A Topic(s)	Q	IR	#
086 Fire Protection								X				A2.02 - Ability to (a) predict the impacts of the following malfunctions or operations on the Fire Protection System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Low FPS header pressure	65	3.0	1
K/A Category Totals:	1	1	1	1	0	1	1	1	1	1	1	Group Point Totals:			10

Facility: ANO Unit 2 2011 NRC Exam Date of Exam: 01/28/2011							
Category	K/A #	Topic	Q	RO		SRO Only	
				IR	#	IR	#
1 - Conduct of Operations	2.1.43	Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc.	66	4.1	1		
	2.1.44	Knowledge of RO duties in the control room during fuel handling, such as responding to alarms from the fuel handling area, communication with the fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	67	3.9	1		
	Subtotal				2		
2 - Equipment Control	2.2.7	Knowledge of the process for conducting special or infrequent tests.	68	2.9	1		
	2.2.13	Knowledge of tagging and clearance procedures.	69	4.1	1		
	2.2.38	Knowledge of conditions and limitations in the facility license.	70	3.6	1		
	Subtotal				3		
3 - Radiological Controls	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	71	3.2	1		
	2.3.7	Ability to comply with radiation work permit requirements during normal or abnormal conditions.	72	3.5	1		
	2.3.13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	73	3.4	1		
	Subtotal				3		
4 - Emergency Procedures/Plan	2.4.17	Knowledge of EOP terms and definitions.	74	3.9	1		
	2.4.34	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	75	4.2	1		
	Subtotal				2		
Tier 3 Point Total					10		

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		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2	G*	Total	
1. Emergency - Abnormal Plant evolutions	1				N/A					N/A					3	3	6
	2				N/A					N/A					2	2	4
	Tier Totals				N/A					N/A					5	5	10
2. Plant Systems	1														3	2	5
	2														0	2	1
	Tier Totals														5	3	8
3. Generic Knowledge and Abilities Categories				1		2		3		4				1	2	3	4
														2	2	1	2
																7	

- 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).
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 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.
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 - 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.
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PWR Examination Outline										
Emergency and Abnormal Evolutions - Tier 1/Group 1 (SRO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Q	IR	#
000026 Loss of Component Cooling Water / 8					X		AA2.01 - Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: - Location of a leak in the CCWS	76	3.5	1
000062 Loss of Nuclear Svc Water / 4						X	2.2.21 - Equipment Control - Knowledge of pre- and post-maintenance operability requirements.	77	4.1	1
000077 Generator Voltage and Electric Grid Disturbances / 6					X		AA2.03 - Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: - Generator current outside the capability curve	78	3.6	1
CE/E02 Reactor Trip - Stabilization - Recovery / 1						X	2.1.19 - Conduct of Operations - Ability to use plant computers to evaluate system or component status.	79	3.8	1
CE/E05 Steam Line Rupture - Excessive Heat Transfer / 4					X		EA2.2 - Ability to determine and interpret the following as they apply to the (Excess Steam Demand): - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	80	4.2	1
CE/E06 Loss of Main Feedwater / 4						X	2.2.42 - Equipment Control - Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	81	4.6	1
K/A Category Totals:	0	0	0	0	3	3	Group Point Totals:			6

PWR Examination Outline										
Emergency and Abnormal Evolutions - Tier 1/Group 2 (SRO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Q	IR	#
000028 Pressurizer Level Malfunction / 2						X	2.4.20 - Emergency Procedures/Plan - Knowledge of operational implications of EOP warnings, cautions, and notes.	82	4.3	1
000036 Fuel Handling Accident / 8					X		AA2.01 - Ability to determine and interpret the following as they apply to the Fuel Handling Incidents: - ARM system indications	83	3.9	1
000051 Loss of Condenser Vacuum / 4					X		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	84	4.1	1
000076 High Reactor Coolant Activity / 9						X	2.4.47 - Emergency Procedures/Plan - Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	85	4.2	1
K/A Category Totals:	0	0	0	0	2	2	Group Point Totals:			4

PWR Examination Outline															
Plant Systems - Tier 2/Group 1 (SRO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A3	G	K/A Topic(s)	Q	IR	#
012 Reactor Protection								X				A2.07 - Ability to (a) predict the impacts of the following malfunctions or operations on the RPS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Loss of dc control power	86	3.7	1
013 Engineered Safety Features Actuation								X				A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - LOCA	87	4.8	1
039 Main and Reheat Steam											X	2.4.49 - Emergency Procedures/Plan - Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	88	4.4	1
064 Emergency Diesel Generator								X				A2.07 - 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: - Consequences of operating under/over-excited	89	2.7	1
078 Instrument Air											X	2.4.4 - Emergency Procedures/Plan - Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	90	4.7	1

PWR Examination Outline															
Plant Systems - Tier 2/Group 1 (SRO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A3	G	K/A Topic(s)	Q	IR	#
K/A Category Totals:	0	0	0	0	0	0	0	3	0	0	2	Group Point Totals:			5

PWR Examination Outline															
Plant Systems - Tier 2/Group 2 (SRO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A3	G	K/A Topic(s)	Q	IR	#
055 Condenser Air Removal											X	2.1.45 - Conduct of Operations - Ability to identify and interpret diverse indications to validate the response of another indication.	91	4.3	1
056 Condensate								X				A2.05 - Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Condenser tube leakage	92	2.5	1
071 Waste Gas Disposal								X				A2.05 - Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: - Power failure to the ARM and PRM Systems	93	2.6	1
K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	1	Group Point Totals:			3

Facility: ANO Unit 2 2011 NRC Exam Date of Exam: 01/28/2011							
Category	K/A #	Topic	Q	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.	94			4.4	1
	2.1.32	Ability to explain and apply system limits and precautions.	95			4.0	1
	Subtotal						2
2 - Equipment Control	2.2.20	Knowledge of the process for managing troubleshooting activities.	96			3.8	1
	2.2.35	Ability to determine Technical Specification Mode of Operation.	97			4.5	1
	Subtotal						2
3 - Radiological Controls	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	98			3.8	1
	Subtotal						1
4 - Emergency Procedures/Plan	2.4.18	Knowledge of the specific bases for EOPs.	99			4.0	1
	2.4.28	Knowledge of procedures relating to a security event (non-safeguards information).	100			4.1	1
	Subtotal						2
Tier 3 Point Total							7

Facility: <u>Arkansas Nuclear One Unit 2</u>		Date of Examination: <u>01/28/2011</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
A1. Conduct of Operations 2.1.32 RO (3.8)	P/R	Apply limit and precautions to transferring Unit Auxiliaries to Start Up Transformer #2. ANO-2-JPM-NRC-ADMIN-SU2LOAD
A2. Conduct of Operations 2.1.37 RO (4.3)	D/R	Perform a dilution calculation (Manual method) ANO-2-JPM-NRC-ADMIN-CVCS6
A3. Equipment Control 2.2.37 RO (3.6)	N/R	Determine applicable Tech Specs for EFW ANO-2-JPM-NRC-ADMIN-EFWTS
A4. Radiation Control 2.3.15 RO (2.9)	N/R	Determine Condenser Off gas Radiation monitor setting. ANO-2-JPM-NRC-ADMIN-CRADMON
Emergency Procedures/Plan		
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 (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected)		

Facility: <u>Arkansas Nuclear One Unit 2</u>		Date of Examination: <u>01/28/2011</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
A5. Conduct of Operations 2.1.23 SRO (4.4)	D/R	Review CEA#1 Upper Gripper Coil Temperature Data and determine correct temperature. ANO-2-JPM-NRC-ADMIN-XTCEA
A6. Conduct of Operations 2.1.29 SRO (4.0)	D/R	Review CCW system line up to normal operation. ANO-2-JPM-NRC-ADMIN-CCWVLU
A7. Equipment Control 2.2.37 SRO (4.6)	N/R	Determine applicable Tech Spec for Control Room Ventilation. ANO-2-JPM-NRC-ADMIN-CREVSTS
A8. Radiation Control 2.3.14 SRO (3.8)	P/R	Approve administration of Potassium Iodide. ANO-2-JPM-NRC-ADMIN-KI
A9. Emergency Procedures/Plan 2.4.41 SRO (4.6)	D/R	Determine Emergency Action Level for given conditions. ANO-2-JPM-NRC-ADMIN-EAL11
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 (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected)		

Facility: <u>Arkansas Nuclear One Unit 2</u>		Date of Examination: <u>01/28/2011</u>	
Exam Level: RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>2011-1</u>	
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	
S1. ANO-2-JPM-NRC-AOP3 010 A2.02 RO-3.9/SRO-3.9 Isolate failed PZR spray valve	A/N/S	3 Pressure Control	
S2. ANO-2-JPM-NRC-SIT08 006 A1.13 RO-3.5/SRO-3.7 Lower SIT level	D/EN/S	2 Inventory Control	
S3. ANO-2-JPM-NRC-EDG06 064 A4.06 RO-3.9/SRO-3.9 Align 2A-2 to 2A-4	D/S	6 Electrical	
S4. ANO-2-JPM-NRC-CEA02 012 A4.06 RO-4.3/SRO-4.3 Test a Reactor Trip Circuit Breaker	D/S	7 Instrumentation	
S5. ANO-2-JPM-NRC-CEA01 001 A4.03 RO-4.0/SRO-3.7 Perform a CEA exercise	D/S	1 Reactivity control	
S6. ANO-2-JPM-NRC-CNMT2 103 A3.01 RO-3.9/SRO-4.2 Drain the containment sump	A/N/S	5 Containment Integrity	
S7. ANO-2-JPM-NRC-RCP02 003 A4.08 RO-3.2/SRO-2.9 Restore CCW to RCPs	A/D/L/S	4 Heat Removal	
S8.			
In-Plant Systems [@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
P1. ANO-2-JPM-NRC-AACLS 064 A4.01 RO-4.0/SRO-4.3 Start up AAC diesel generator manually locally during a LOOP	A/P/E/L	6 Electrical	
P2. ANO-2-JPM-NRC-AUADV 041 A4.08 RO-3.0/SRO-3.1 Operate SDBCS valves locally	D/E/L	4 Heat Removal	
P3. ANO-2-JPM-NRC-SFPAW 033 A2.03 RO-3.1/SRO-3.5 Fill SFP from RWT	D/R	8 Plant service systems	
<p>[@] 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.</p>			
* Type Codes	Criteria for RO / SRO-I / SRO-U		
(A)lternate path	4-6 / 4-6 / 2-3		
(C)ontrol room			
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4		
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1		
(EN)gineered safety feature	- / - / ≥ 1 (control room system)		
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1		
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1		
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)		
(R)CA	≥ 1 / ≥ 1 / ≥ 1		
(S)imulator			

Facility: <u>Arkansas Nuclear One Unit 2</u>		Date of Examination: <u>01/28/2011</u>
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>2011-1</u>
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
S1. ANO-2-JPM-NRC-AOP3 010 A2.02 RO-3.9/SRO-3.9 Isolate failed PZR spray valve	A/N/S	3 Pressure Control
S2. ANO-2-JPM-NRC-SIT08 006 A1.13 RO-3.5/SRO-3.7 Lower SIT level	D/EN/S	2 Inventory Control
S3. ANO-2-JPM-NRC-EDG06 064 A4.06 RO-3.9/SRO-3.9 Align 2A-2 to 2A-4	D/S	6 Electrical
S4. ANO-2-JPM-NRC-CEA02 012 A4.06 RO-4.3/SRO-4.3 Test a Reactor Trip Circuit Breaker	D/S	7 Instrumentation
S5. ANO-2-JPM-NRC-CEA01 001 A4.03 RO-4.0/SRO-3.7 Perform a CEA exercise	D/S	1 Reactivity control
S6. ANO-2-JPM-NRC-CNMT2 103 A3.01 RO-3.9/SRO-4.2 Drain the containment sump	A/N/S	5 Containment Integrity
S7. ANO-2-JPM-NRC-RCP02 003 A4.08 RO-3.2/SRO-2.9 Restore CCW to RCPs	A/D/L/S	4 Heat Removal
S8. ANO-2-JPM-NRC-CCW02 008 A4.01 RO-3.3/SRO-3.1 Shift running CCW pumps	P/S	8 Plant service systems
In-Plant Systems [@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
P1. ANO-2-JPM-NRC-AACLS 064 A4.01 RO-4.0/SRO-4.3 Start up AAC diesel generator manually locally during a LOOP	A/P/E/L	6 Electrical
P2. ANO-2-JPM-NRC-AUADV 041 A4.08 RO-3.0/SRO-3.1 Operate SDBCS valves locally	D/E/L	4 Heat Removal
P3. ANO-2-JPM-NRC-SFPAW 033 A2.03 RO-3.1/SRO-3.5 Fill SFP from RWT	D/R	8 Plant service systems
<p>[@] 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.</p>		
* Type Codes	Criteria for RO / SRO-I / SRO-U	
(A)lternate path	4-6 / 4-6 / 2-3	
(C)ontrol room		
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4	
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	
(EN)gineered safety feature	- / - / ≥ 1 (control room system)	
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1	
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	
(R)CA	≥ 1 / ≥ 1 / ≥ 1	
(S)imulator		

Facility: <u>Arkansas Nuclear One Unit 2</u>		Date of Examination: <u>01/28/2011</u>
Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>		Operating Test No.: <u>2011-1</u>
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
S1. ANO-2-JPM-NRC-AOP3 010 A2.02 RO-3.9/SRO-3.9 Isolate failed PZR spray valve	A/N/S	3 Pressure Control
S2. ANO-2-JPM-NRC-SIT08 006 A1.13 RO-3.5/SRO-3.7 Lower SIT level	D/EN/S	2 Inventory Control
In-Plant Systems [@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
P1. ANO-2-JPM-NRC-AACLS 064 A4.01 RO-4.0/SRO-4.3 Start up AAC diesel generator manually locally during a LOOP	A/P/E/L	6 Electrical
P2. ANO-2-JPM-NRC-AUADV 041 A4.08 RO-3.0/SRO-3.1 Operate SDBCS valves locally	D/E/L	4 Heat Removal
P3. ANO-2-JPM-NRC-SFPAW 033 A2.03 RO-3.1/SRO-3.5 Fill SFP from RWT	D/R	8 Plant service systems
<p>[@] 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.</p>		
* Type Codes	Criteria for RO / SRO-I / SRO-U	
(A)lternate path	4-6 / 4-6 / 2-3	
(C)ontrol room		
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4	
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	
(EN)gineered safety feature	- / - / ≥1 (control room system)	
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1	
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	
(R)CA	≥ 1 / ≥ 1 / ≥ 1	
(S)imulator		

Facility: ANO-2		Scenario No.: 1 (New)		Op-Test No.: 2011-1	
Examiners:			Operators:		
Initial Conditions: 100% MOL, All Engineered Safety Features systems are in standby. Gland Seal Steam Pressure Control Valve 2PCV-0231 jacked closed. RED Train Maintenance Week.					
Turnover: 100% Power 250 EFPD. EOOS indicates 'Minimal Risk'. Gland Seal Steam Pressure Control Valve 2PCV-0231 is jacked closed; manually control seal steam pressure. RED Train Maintenance Week. Evolution scheduled: Fill the Quench Tank to ~76% IAW 2103.007 Quench Tank and Reactor Drain Tank Operations. Step 7.2.1 of 2103.007 for filling the quench tank is complete.					
Event No.	Malf. No.	Event Type*	Event Description		
1		N (BOP) N (SRO)	Fill the Quench Tank.		
2	CV0242	R (ATC) C (SRO)	#1 Main Turbine Generator Control Valve fails Closed. Tech Spec for SRO.		
3	RCSLOCATCA	C (ATC) C (SRO)	Shutdown required due to 15 gpm Reactor Coolant system leak on 'A' cold leg. Tech Spec for SRO.		
4	2C-11 AI_TIC_1602 MTGVIBINC	I (BOP) I (SRO)	Main Turbine Generator lube oil controller setpoint fails high. Main Turbine Generator Vibrations increase causing a reactor trip.		
5	500LOSE500 500LOSE161	M (ALL)	Loss of Offsite Power causing natural circulation of the RCS.		
6	FW2PW5BAFT	M(ALL)	'B' Main Feed water line breaks inside containment.		
7	416 A308	C (BOP) C (SRO)	#1 EDG output breaker fails to automatically close.		
8	CVC2P36LOLVL CVC2P36BSIAS CVC2P36CSIAS	I (ATC) I (SRO)	Backup Charging pumps fail to start on SIAS or Low PZR level. (Not credited for Malfunction after EOP entry due to possibly being discovered prior to EOP entry)		
9	BS2P35BFAL BS2P35AFAULT K06-B01	C (BOP) C (SRO)	2P-35B Spray pump failed to automatically start and 2P-35A trips upon start.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Total malfunctions. = 8, Malfunctions after EOP entry = 2, Abnormal events = 3, Major transient = 2, EOPs with substantive actions =1, EOP Contingencies = 1, Critical tasks = 2.

Scenario #1 Objectives

- 1) Evaluate individual ability to operate reactor coolant auxiliary equipment.
- 2) Evaluate individual response to a failure of a Main Turbine Control valve.
- 3) Evaluate individual response to a small Reactor Coolant system leak.
- 4) Evaluate individual ability to perform a reduction in plant power.
- 5) Evaluate individual ability to respond to a failed controller.
- 6) Evaluate individual ability to respond to Degraded Electrical power.
- 7) Evaluate individual response to a failure of Emergency Diesel Generator output breaker to automatically close.
- 8) Evaluate individual ability to mitigate an Excess Steam Demand inside containment.
- 9) Evaluate individual response to a failure of automatic control of Pressurizer level control.
- 10) Evaluate individual ability to monitor operation of Engineered Safety Features equipment.

SCENARIO #1 NARRATIVE

Simulator session begins with the plant at 100% power steady state. Gland Seal Steam Pressure Control Valve, 2PCV-0231 is jacked closed.

When the crew has completed their control room walk down and brief, The BOP will fill the Quench Tank using the reactor makeup water system.

After the BOP has completed filling the Quench Tank to the appropriate level and cued by lead examiner; the #1 MTG control valve will fail closed. The SRO will enter AOP, 2203.024 Loss of Turbine Load. The SRO will direct the ATC to commence normal boration from a Boric Acid Makeup tank to lower reactor power until Tave and Tref are within 2 degrees. The SRO should call work management to investigate failure and may decide to fail #1 CV closed or have the BOP hold the test pushbutton for #1 CV which will maintain the valve closed.

When cued by the lead examiner, a 15 gpm RCS leak will start. The SRO will enter the excess RCS leakage AOP, OP 2203.016. ATC and BOP will perform RCS Leak rate determinations. The SRO will enter Tech Spec 3.4.6.2. The SRO will direct the ATC to maintain pressurizer level within 5% of set point by starting additional charging pumps as needed. The SRO will also direct the ATC to isolate letdown to determine the leak location. After the crew has determined the leak is not in letdown, they will restore letdown and the crew will change the boration method to commence a plant shutdown.

SCENARIO #1 NARRATIVE (continued)

After letdown has been restore to service and cued by the lead examiner, the Main Turbine Generator (MTG) lube oil temperature controller setpoint will fail high causing lube oil temperatures to raise. The SRO should refer to the high bearing temperature annunciator corrective action 2K02- B7 (alarm setpoint is 225°F) and attempt to manually control lube oil temperature. If bearing temperature goes above 230 degrees Fahrenheit, the crew should manually trip the reactor. If bearing temperature does not go about 230 degrees Fahrenheit, then Turbine vibrations will begin to rise requiring a turbine and reactor trip.

The Crew will implement Standard Post Trip Actions (SPTA), OP 2202.001. When the Reactor trips a Loss of Offsite Power will occur. The output breaker for #1 EDG will not automatically close and the BOP should close the output breaker. The ATC will notice that the backup charging pumps did not start.

Also, when the reactor trips a Feedwater line break will start on the feedwater line to 'B' S/G due to a water hammer on the Feedwater line Check valve. The Crew will manually actuate Main Steam Isolation Signal (MSIS) or verify that a Main Steam Isolation signal automatically actuates. The Crew should secure and/or verify that Emergency Feedwater (EFW) is not feeding 'B' Steam generator. The ATC will secure two Reactor Coolant Pumps when RCS pressure goes below 1400 psia. The Containment Spray pump 2P-35B will fail to automatically start and Containment Spray pump 2P-35A will trip. The BOP will manual start 2P-35B to ensure containment design pressure is not exceeded.

The SRO will diagnose Functional Recovery due to two events in progress (Excess RCS leakage and Excess Steam demand) and enter OP 2202.009, Functional Recovery. The crew will manually control Reactor Coolant Temperature once the 'B' SG boils dry using the upstream Atmospheric Dump Valve on 'A' SG. The ATC will control RCS pressure using auxiliary spray.

Facility: ANO-2		Scenario No.: 3 (New)		Op-Test No.: 2011-1	
Examiners:			Operators:		
_____			_____		
_____			_____		
Initial Conditions: 60% MOL, All Engineered Safety Features systems are in standby. Gland Seal Steam Pressure Control Valve 2PCV-0231 jacked closed. RED Train Maintenance Week.					
Turnover: 60% power for repair of 2P-1B Feedwater pump. 250 EFPD. EOOS indicates 'Minimal Risk'. Gland Seal Steam Pressure Control Valve 2PCV-0231 jacked closed, manually control seal steam pressure. RED Train Maintenance Week. 'B' Main Feedwater pump PMT is complete and is idling for oxygen control. Evolution scheduled: Place 'B' Main Feedwater pump in service and raise power to 100%. Step 10.1 of 2106.007, Main Feedwater pump and FWCS operation, for placing the 'B' Main Feedwater pump in service is complete. Commence power escalation using applicable 2104.002 steps 9.1 through 9.11 are complete and steps 9.13 to 9.18 and 9.20 to 9.30 are not applicable or complete with the exception of placing 'B' Main feedwater pump in service (step 9.25). (provide markup copy of Power OPS procedure 2104.002 Section 9)					
Event No.	Malf. No.	Event Type*	Event Description		
1		N (BOP) N (SRO)	Place 'B' MFWP in service.		
2		R (ATC) N (SRO)	Power Ascension.		
3	XRC2TE46111	I (BOP) I (SRO)	Tc temperature transmitter fails high. Tech Spec for SRO.		
4	CVC4817DEM	I (ATC) I (SRO)	Letdown Hand Indicating Controller (HIC) demand fails high causing low pressurizer level.		
5	XRCCHBPLVL	I (ATC) I (SRO)	Channel 'B' Pressurizer level channel fails low. Tech Spec for SRO.		
6	EHSYSLEAK	M (ALL)	Leak in the Electro Hydraulic system causing a turbine trip, reactor trip and a loss of main feedwater pumps.		
7	XMSHDRPRS	I (BOP) I(SRO)	SDBCS input fails low after the Reactor trip.		
8	CV0332 EFW2P7BFLT	C (BOP) C (SRO)	2P-7A Emergency Feedwater pump overspeed trips on start and 2P-7B motor trips due to a winding failure.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Total malfunctions. = 6, Malfunctions after EOP entry = 2, Abnormal events = 3, Major transient = 1, EOPs with substantive actions =1, EOP Contingencies = 0, Critical tasks = 2.

Scenario #3 Objectives

- 1) Evaluate individual ability to place a Main Feedwater pump in service.
- 2) Evaluate individual ability to perform a power escalation.
- 3) Evaluate individual response to a RCS temperature instrument failure.
- 4) Evaluate individual response to a failure of a Hand indicating controller failure.
- 5) Evaluate individual response to a failure of a Pressurizer level control channel.
- 6) Evaluate individual response to an Electro Hydraulic system leak.
- 7) Evaluate individual response to a failure of the Steam Dump Bypass control system to function in automatic.
- 8) Evaluate individual ability to mitigate a Loss of Feedwater event.
- 9) Evaluate individual ability to monitor operation of Engineered Safety Features equipment.

SCENARIO #3 NARRATIVE

Simulator session begins with the plant at 60% power steady state Gland Seal Regulator, 2PCV-0231 is jacked closed.

When the crew has completed their control room walk down and brief, The BOP will place the 2P-1B feedwater pump in service. Also, while the BOP is placing 2P-1B feedwater pump in service the ATC will raise reactor power using RCS dilution.

After the BOP has placed the 'B' feedwater pump in service and the ATC has completed the required reactivity manipulation and cued by lead examiner, 2TE-4611-1(2TI-4605-1) RCS temperature transmitter will fail high. The ATC/BOP will announce Trip and Pretrip alarms on 'A' PPS channel. The SRO will refer to the ACA for RPS Pretrip-Trip alarms and Technical Specifications. Then the SRO will direct that points on 'A' channel PPS for LPD, and DNBR must be bypassed in 1 hour as required by Tech Specs.

After the 'A' channel PPS points have been bypassed and cued by lead examiner, the demand on the Letdown Hand Indicating controller (HIC) will ramp to 100%. This will result in letdown going to maximum flow. The elevated letdown flow will cause pressurizer level to lower and the volume control tank level to trend up until the automatic setpoint is reached to divert the excess letdown flow to the online holdup tank. Eventually, a backup charging pump will start based on low pressurizer level causing the low oil pressure alarm to come in and then clear. The ATC and SRO should diagnose that the letdown controller demand does not match the demand from the pressurizer level controller. The ATC will take the letdown flow controller to manual and control PZR level.

After letdown has been placed in manual and pressurizer level is being restored to set point by manual control and cued by the lead examiner, the 'B' channel pressurizer level instrument will fail low. This will cause the backup charging pumps to automatically start and will de-energize all pressurizer heaters. AOP 2203.028, PZR Systems Malfunctions, will be entered and actions directed by the SRO. The ATC will verify that the other level control channel is reading correctly and select that channel for control and place the PZR low level cutoff switch to the unaffected channel. The ATC will also restore the pressurizer proportional heaters to service. The SRO will enter Tech Spec 3.3.3.5 Remote Shutdown instrumentation and 3.3.3.6 Post Accident Instrumentation.

SCENARIO #3 NARRATIVE (continued)

After the ATC has placed 'A' Channel pressurizer level control in service and restored pressurizer proportional heaters, an EH leak will start down stream of isolation valve 2EH-1A (on EH Pump Skid) on the common header. EH pressure will degrade to ~1300 psig over the next 3 minutes. Annunciator 2K02-A9, LOW EH Pressure, will alarm and the standby EH pump will automatically start. EH pressure will rise and then lower again as the leak degrades. Annunciator 2K02-C10, EH Tank Low Level will alarm about 5 minutes after the start of the malfunction. The Main Turbine Generator will automatically trip at 1100 psig EH pressure. The Main Feed Pumps will automatically trip at 400 psig EH pressure. The crew will secure the EH pumps and the CRS will enter SPTA's.

The Crew will implement Standard Post Trip Actions (SPTA), OP 2202.001. When the reactor trips, the input to the Steam Dump Bypass Control System (SDBCS) will fail low. This will cause the SDBCS valves to have no demand and remain closed. The crew should take manual control of the SDBCS valves to control S/G pressure. 2P-7B Emergency Feedwater pump will trip when it starts due to a motor fault. During SPTAs, 2P-7A will overspeed trip due to an oil leak. The ATC will secure two Reactor Coolant Pumps (RCP) during SPTAs based on no available feedwater and the BOP will close the Steam Generator blowdown valves. If the SRO directs all RCPs secured during SPTAs, the ATC will align for Auxiliary spray to control RCS pressure.

The SRO will diagnose Loss of Feedwater due no feedwater feeding the Steam Generators and enter OP 2202.006, Loss of Feedwater.

The crew will secure all RCPs if not secured during SPTAs. The ATC will align for Auxiliary spray to control RCS pressure if not aligned during SPTAs.

Facility: ANO-2		Scenario No.: 2 (New)		Op-Test No.: 2011-1	
Examiners:			Operators:		
Initial Conditions: 100% MOL; All Engineered Safety Features systems are in standby. Gland Seal Steam Pressure Control Valve 2PCV-0231 jacked closed. RED Train Maintenance Week					
Turnover: 100%. 250 EFPD. EOOS indicates 'Minimal Risk'. Gland Seal Steam Pressure Control Valve 2PCV-0231 jacked closed; manually control seal steam pressure. RED Train Maintenance Week.					
Event No.	Malf. No.	Event Type*	Event Description		
1	XSI2LT-5637	I (BOP) I (SRO)	RWT level transmitter fails low. Tech Spec for SRO.		
2	SW2P4AWND	C (BOP) C (SRO)	2P-4A Service water pump high winding temperature causing pump swap.		
3	SGATUBE	R (ATC) N (BOP) N (SRO)	Shutdown required due to 4 gpm steam generator tube leak on 'A' steam generator. Tech Spec for SRO.		
4	CVC2P39B	C(ATC) C(SRO)	2P-39B Boric Acid Makeup pump will trip when it is started.		
5	SGATUBE	M (ALL)	'A' Steam Generator tube leakage ramps up to 200 gpm over 5 minutes. Manual reactor trip criteria when greater than 44 gpm.		
6	CEA35STUCK CV48731 CVC4916SIAS	C (ATC) C (SRO)	Control Element Assembly #35 remains fully withdrawn when the reactor trips. The VCT outlet will not close and the emergency borate valve will not automatically open.		
7	ESFK401AAF 416A406 K05-C03	C (BOP) C (SRO)	2CV-5017-1, 2CV-5015-1 Low pressure safety injection (LPSI) and High pressure safety injection valves (HPSI) fail to open and the "B" HPSI pump trips due to motor overload.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Total malfunctions. = 7, Malfunctions after EOP entry = 2, Abnormal events = 3, Major transient = 1, EOPs with substantive actions =1, EOP Contingencies = 0, Critical tasks = 3.

Scenario #2 Objectives

- 1) Evaluate individual response to a failure of a Refueling water tank level transmitter.
- 2) Evaluate individual response to a failure of a Service Water pump motor.
- 3) Evaluate individual ability to operate safety related equipment.(swap service water pump)
- 4) Evaluate individual response to a primary to secondary leak.
- 5) Evaluate individual ability to perform a reduction in plant power.
- 6) Evaluate individual response to a failure of a Boric Acid Makeup pump.
- 7) Evaluate individual response to a stuck out CEA after a Reactor Trip.
- 8) Evaluate individual response to failed ESF relays causing multiple high pressure and low pressure injection valve to not automatically reposition.
- 9) Evaluate individual ability to mitigate a Steam Generator Tube rupture.
- 10) Evaluate individual ability to monitor operation of Engineered Safety Features equipment.

SCENARIO #2 NARRATIVE

Simulator session begins with the plant at 100% power steady state Gland Seal Regulator; 2PCV-0231 is jacked closed.

When the crew has completed their control room walk down and brief, the RWT level transmitter 2LT-5637-2 will fail low. The SRO should enter Tech Specs 3.3.2.1 ESF Actuation system instrumentation and 3.3.3.6 Post accident instrumentation. The BOP will be required to bypass the Plant Protection System channel 2 for RWT level point 18.

When the appropriate Tech specs have been entered and the BOP goes to the back panel to bypass point 18 and cued by lead examiner; the 'A' Service Water Pump (2P-4A) winding temperature will come into alarm. The SRO will use the Annunciator Corrective action and direct swapping service water pumps. The BOP will swap service water pumps by placing 2P-4B Service Water Pump in service supplying loop 1 Service Water.

After the Crew has swapped service water pumps and cued by lead examiner, a primary to secondary leak will start. The SRO will enter the primary to secondary leakage AOP, OP 2203.038. ATC and BOP will perform RCS Leak rate determinations. The SRO will enter Tech Spec 3.4.6.2. The SRO will direct the NLO's to control secondary contamination using standard attachment 19 and direct the chemists to sample the SG's for activity. The crew will isolate Main steam from 'A' Steam Generator to 2P-7A EFW pump and commence a plant shutdown using boration from Boric Acid Make up tank.

SCENARIO #2 NARRATIVE (continued)

When the boration is started 2P-39B Boric Acid Makeup pump will trip and the ATC will need to swap boric acid make up pumps. If the ATC attempts to use the gravity feed boration method, it will not work due to the Volume Control tank outlet valve not closing. The SRO may refer to the TRM for boration flow paths.

After the ATC has performed the required power reduction and cued by the lead examiner, the primary to secondary leak value will ramp up to 200 GPM. The Crew will recognize that the leak rate is greater than reactor trip criteria of 44 GPM. The SRO will direct tripping the reactor and actuating Safety Injection Actuation Signal and Containment Cooling Actuation Signal.

The Crew will implement Standard Post Trip Actions (SPTA), OP 2202.001. When the reactor trips one CEA will remain withdrawn which requires emergency boration. The VCT outlet will remain open and emergency borate valve will fail to auto open from SIAS. The ATC will commence emergency boration by opening 2CV-4916-2 emergency borate valve. Two LPSI and HPSI injection valve fail to automatically open. The BOP will open HPSI valves and the crew may determine to open the LPSI even though they are not currently required for plant conditions. The ATC will secure two Reactor coolant Pumps when RCS pressure goes below 1400 psia. The Crew will lower Steam Dump master controller setpoint during SPTAs to aid in maintaining margin to saturation. The BOP will also override Service Water to Component Cooling water to allow RCP operation.

The SRO will diagnose a Steam Generator Tube Rupture event and enter OP 2202.004, Steam Generator Tube Rupture. The ATC will cool down the RCS to less than 535°F using the bypass valves to the condenser. The BOP will override Service Water to Auxiliary Cooling Water. The BOP will isolate the 'A' SG using standard attachment 10 when RCS That is less than 535°F.

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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(*) R I U		
		1			2(selected as spare)			3			4						
		CREW POSITION			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	S R O	A T C	B O P				
RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX	2											1	1	1	0	
	NOR					3			1					1	1	1	1
	I/C	3,8				1,2,7			3,7,8					5	4	4	2
	MAJ	5,6				5,			6					3	2	2	1
	TS													0	0	2	2
RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX					3			2					1	1	1	0
	NOR			1										1	1	1	1
	I/C			4,7,9		4,6			4,5					5	4	4	2
	MAJ			5,6		5			6					3	2	2	1
	TS													0	0	2	2
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/> X	RX													0	1	1	0
	NOR	1												1	1	1	1
	I/C	2,3,4,7,8,9												6	4	4	2
	MAJ	5,6												2	2	2	1
	TS	2,3												2	0	2	2
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/> X	RX													0	1	1	0
	NOR					3			1,2					2	1	1	1
	I/C					1,2,4,6,7			3,4,5,7,8					5	4	4	2
	MAJ					5			6					1	2	2	1
	TS					1,3			3,5					2	0	2	2
Instructions: 1. 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 <i>additionally</i> serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position. 2. Reactivity manipulations may be conducted under normal or <i>controlled</i> 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. 3. 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.																	

Facility: Arkansas Nuclear One			Date of Exam: 1-28-11			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 (selected as spare)			3			4						
		CREW POSITION			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	S R O	A T C	B O P		R	I	U
RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	RX	2											1	1	1	0	
	NOR			3			1,2						2	1	1	1	
	I/C	3,8		1,2,4,6,7			3,4,5,7,8						7	4	4	2	
	MAJ	5,6		5			6						3	2	2	1	
	TS			1,3			3,5						2	0	2	2	
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX													1	1	0	
	NOR													1	1	1	
	I/C													4	4	2	
	MAJ													2	2	1	
	TS													0	2	2	
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX													1	1	0	
	NOR													1	1	1	
	I/C													4	4	2	
	MAJ													2	2	1	
	TS													0	2	2	
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX													1	1	0	
	NOR													1	1	1	
	I/C													4	4	2	
	MAJ													2	2	1	
	TS													0	2	2	
Instructions: 1. 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 <i>additionally</i> serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position. 2. Reactivity manipulations may be conducted under normal or <i>controlled</i> 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. 3. 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.																	

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Competencies	APPLICANTS											
	RO <input checked="" type="checkbox"/> X SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>			RO <input type="checkbox"/> X SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>			RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/> X			RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/> X		
	SCENARIO			SCENARIO			SCENARIO			SCENARIO		
	1	2	3	1	2	3	1	2	3	1	2	3
	BOP	ATC	ATC	ATC	BOP	BOP	SRO	SRO	BOP	ATC	SRO	SRO
Interpret/Diagnose Events and Conditions	2,4,5,6,7,9	3,4,5,6	3,4,5	2,3,5,6,8	1,2,7	3,6,7,8	2,3,4,5,6,7,8,9	1,2,3,4,5,6,7	3,6,7,8	2,3,5,6,8	1,2,3,4,5,6,7	3,4,5,6,7,8
Comply With and Use Procedures (1)	1,3	3	2,5	2,3	1,2,3	1,3	2,3,4,5,6,7,8,9	1,2,3,4,5,6,7	1,3	2,3	1,2,3,4,5,6,7	2,3,4,5,6,7,8
Operate Control Boards (2)	1,3,4,6,7,9	3,4,5,6	2,4,5	2,3,6,8	1,2,3,7	1,3,6,7,8	N/A	N/A	1,3,6,7,8	2,3,6,8	N/A	N/A
Communicate and Interact	1,2,3,4,5,6,7,9	3,4,5,6	2,4,5,6	2,3,5,6,8	1,2,3,7	1,3,6,7,8	1,2,3,4,5,6,7,8,9	1,2,3,4,5,6,7	1,3,6,7,8	2,3,5,6,8	1,2,3,4,5,6,7	1,2,3,4,5,6,7,8
Demonstrate Supervisory Ability (3)	N/A	N/A	N/A	N/A	N/A	N/A	1,2,3,4,5,6,7,8,9	1,2,3,4,5,6,7	N/A	N/A	1,2,3,4,5,6,7	1,2,3,4,5,6,7,8
Comply With and Use Tech. Specs. (3)	N/A	N/A	N/A	N/A	N/A	N/A	2,3	1,3	N/A	N/A	1,3	3,5

Notes:

- (1) Includes Technical Specification compliance for an RO.
- (2) Optional for an SRO-U.
- (3) Only applicable to SROs.

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Competencies	APPLICANTS											
	RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>			RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>			RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>			RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>		
	SCENARIO			SCENARIO			SCENARIO			SCENARIO		
	1 ATC	2 SRO	3 SRO	1 SRO	2 SRO	3 SRO	1	2	3	1	2	3
Interpret/Diagnose Events and Conditions	2,3,5,6,8	1,2,3,4,5,6,7	3,4,5,6,7,8	2,3,4,5,6,7,8,9	1,2,3,4,5,6,7	3,4,5,6,7,8						
Comply With and Use Procedures (1)	2,3	1,2,3,4,5,6,7	2,3,4,5,6,7,8	2,3,4,5,6,7,8,9	1,2,3,4,5,6,7	2,3,4,5,6,7,8						
Operate Control Boards (2)	2,3,6,8	N/A	N/A	N/A	N/A	N/A						
Communicate and Interact	2,3,5,6,8	1,2,3,4,5,6,7	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8,9	1,2,3,4,5,6,7	1,2,3,4,5,6,7,8						
Demonstrate Supervisory Ability (3)	N/A	1,2,3,4,5,6,7	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8,9	1,2,3,4,5,6,7	1,2,3,4,5,6,7,8						
Comply With and Use Tech. Specs. (3)	N/A	1,3	3,5	2,3	1,3	3,5						

- Notes:
- (1) Includes Technical Specification compliance for an RO.
 - (2) Optional for an SRO-U.
 - (3) Only applicable to SROs.