

Facility: Arkansas Nuclear One Unit 1													Date of Exam: August 2016				
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 Evolutions	1	4	2	3	N/A			3	4	N/A			2	18			6
	2	1	0	3	N/A			2	1	N/A			2	9			4
	Tier Totals	5	2	6	N/A			5	5	N/A			4	27			10
2. Plant Systems	1	3	2	2	3	4	2	3	1	4	2	2	28			5	
	2	0	1	1	2	1	0	2	2	0	1	0	10			3	
	Tier Totals	3	3	3	5	5	2	5	3	4	3	2	38			8	
3. Generic Knowledge and Abilities Categories				<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	10		1	2	3	4	7			
				3	2	2	3										

- 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). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category).
 - 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.
 - Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted with justification; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
 - 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 a category other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
 - For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.
- G* Generic K/As

ES-401 2		PWR Examination Outline						Form ES-401-	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G *	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1						X	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR 41.7)	4.1	7 608 2005
000008 Pressurizer Vapor Space Accident / 3			X				AK3.03 Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: Actions contained in EOP for PZR vapor space accident/ LOCA. (CFR 41.5, 41.10 / 45.6 / 45.13)	4.1	1 324 2005
000009 Small Break LOCA / 3			X				EK3.23 Knowledge of the reasons for the following responses as they apply to the small break LOCA: RCP tripping requirements. (CFR 41.5 / 41.10 / 45.6 / 45.13)	4.2	2 1089 1998
000011 Large Break LOCA / 3					X		EA2.11 Ability to determine or interpret the following as they apply to a Large Break LOCA: Conditions for throttling or stopping HPI. (CFR 43.5 / 45.13)	3.9	3 684 2008
000015/17 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2	X						AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup: Consequences of thermal shock to RCP seals. (CFR 41.8 / 41.10 / 45.3)	2.8	4 183 2008
000025 Loss of RHR System / 4				X			AA1.03 Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: LPI pumps. (CFR 41.7 / 45.5 / 45.6)	3.4	5 New 1091
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. (CFR: 43.5 / 45.13)	2.9	6 8 2004
000027 Pressurizer Pressure Control System Malfunction / 3									
000029 ATWS / 1							Replaced with system 001 due to conflict with operating exam.		(7)

000038 Steam Gen. Tube Rupture / 3	X					EK1.02 Knowledge of the operational implications of the following concepts as they apply to the SGTR: Leak rate vs. pressure drop. (CFR 41.10)	3.2	8 2007 332
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4		X				EK2.1. Knowledge of the interrelations between the (Excessive Heat Transfer) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. (CFR: 41.7 / 45.7)	3.8	9 686 2008
000054 (CE/E06) Loss of Main Feedwater / 4					X	2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)	4.5	10 146 2004
000055 Station Blackout / 6					X	EA2.03 Ability to determine or interpret the following as they apply to a Station Blackout: Actions necessary to restore power. (CFR 43.5 / 45.13)	3.9	11 New 1097
000056 Loss of Off-site Power / 6			X			AK3.01 Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: Order and time to initiation of power for the load sequencer. (CFR 41.5,41.10 / 45.6 / 45.13)	3.5	12 New 1057
000057 Loss of Vital AC Inst. Bus / 6				X		AA1.06 Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus: Manual control of components for which automatic control is lost. (CFR 41.7 / 45.5 / 45.6)	3.5	13 New 1095
000058 Loss of DC Power / 6					X	AA2.03 Ability to determine and interpret the following as they apply to the Loss of DC Power: DC loads lost; impact on ability to operate and monitor plant systems. (CFR: 43.5 / 45.13)	3.5	14 513 2008
000062 Loss of Nuclear Svc Water / 4				X		AA1.06 Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Water (SWS): Control of flow rates to components cooled by the SWS. (CFR 41.7 / 45.5 / 45.6)	2.9	15 New 1058
000065 Loss of Instrument Air / 8	X					AA1.02 Ability to operate and / or monitor the following as they apply to the Loss of Instrument Air: Components served by instrument air to minimize drain on system (CFR 41.7 / 45.5 / 45.6)	2.6	16 MOD 691
W/E04 LOCA Outside Containment / 3								

W/E11 Loss of Emergency Coolant Recirc. / 4											
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	X								<p>EK1.3. Knowledge of the operational implications of the following concepts as they apply to the (Inadequate Heat Transfer): Annunciators and conditions indicating signals, and remedial actions associated with the (Inadequate Heat Transfer).</p> <p>(CFR: 41.8 / 41.10 / 45.3)</p>	4.0	17 626 2005
000077 Generator Voltage and Electric Grid Disturbances / 6		X							<p>AK2.07 Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following: Turbine / generator control</p> <p>(CFR: 41.4, 41.5, 41.7, 41.10 / 45.8)</p>	3.6	18 891 2014 Repeat
K/A Category Totals:	4	2	3	3	4	2			Group Point Total:		18

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)						Form ES-401-2		
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1	X						AK1.13 Knowledge of the operational implications of the following concepts as they apply to Dropped Control Rod: Interaction of ICS control stations as well as purpose, function, and modes of operation of ICS. (CFR 41.8 / 41.10 / 45.3)	3.2	19 320 1999
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2									
000032 Loss of Source Range NI / 7			X				AK3.02 Knowledge of the reasons for the following responses as they apply to the Loss of Source Range Nuclear Instrumentation: Guidance contained in EOP for loss of source-range nuclear instrumentation. (CFR 41.5, 41.10 / 45.6 / 45.13)	3.7	20 184 2001
000033 Loss of Intermediate Range NI / 7									
000036 (BW/A08) Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3						X	AA2.14 Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Actions to be taken if S/G goes solid and water enters steam lines (CFR: 43.5 / 45.13)	4.0	21 New 1061
000051 Loss of Condenser Vacuum / 4						X	2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. (CFR: 41.7 / 45.7 / 45.8)	4.5	22 MOD 1062
000059 Accidental Liquid Radwaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8									
000068 (BW/A06) Control Room Evac. / 8									
000069 (W/E14) Loss of CTMT Integrity / 5									
000074 (W/E06&E07) Inad. Core Cooling / 4									

000076 High Reactor Coolant Activity / 9			X				AK3.05 Knowledge of the reasons for the following responses as they apply to the High Reactor Coolant Activity : Corrective actions as a result of high fission-product radioactivity level in the RCS (CFR 41.5,41.10 / 45.6 / 45.13)	2.9	23 New 1096
W/E01 & E02 Rediagnosis & SI Termination / 3									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
W/E16 High Containment Radiation / 9									
BW/A01 Plant Runback / 1				X			AA1.2 Ability to operate and / or monitor the following as they apply to the (Plant Runback) : Operating behavior characteristics of the facility. (CFR: 41.7 / 45.5 / 45.6)	3.2	24 MOD 162
BW/A02&A03 Loss of NNI-X/Y / 7									
BW/A04 Turbine Trip / 4									
BW/A05 Emergency Diesel Actuation / 6				X			AA1.1 Ability to operate and / or monitor the following as they apply to the (Emergency Diesel Actuation) Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. (CFR: 41.7 / 45.5,45.6)	4.3	25 276 2005
BW/A07 Flooding / 8				X			AK3.2 Knowledge of the reasons for the following responses as they apply to the (Flooding) : Normal, abnormal and emergency operating procedures associated with (Flooding). (CFR: 41.5 / 41.10, 45.6, 45.13)	3.2	26 New 1064
BW/E03 Inadequate Subcooling Margin / 4									
BW/E08; W/E03 LOCA Cooldown - Depress. / 4						X	2.2.39 Knowledge of less than or equal to one hour Technical Specification action statements for systems. (CFR: 41.5 / 41.7 / 41.10)	3.9	27 MOD 1105
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4									
BW/E13&E14 EOP Rules and Enclosures									
CE/A11; W/E08 RCS Overcooling - PTS / 4									
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:	1	0	3	2	1	2	Group Point Total:		9

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)											Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
003 Reactor Coolant Pump						X						K6.02 Knowledge of the effect of a loss or malfunction on the following will have on the RCPS: RCP seals and seal water supply. (CFR: 41.7 / 45/5)	2.7	28 326 2014 Repeat
004 Chemical and Volume Control					X							K5.26 Knowledge of the operational implications of the following concepts as they apply to the CVCS: Relationship between VCT pressure and NPSH for charging pumps. (CFR: 41.5/45.7)	3.1	29 258 1999
004 Chemical and Volume Control									X			A3.02 Ability to monitor automatic operation of the CVCS, including: Letdown isolation. (CFR: 41.7 / 45.5)	3.6	30 654 2007
005 Residual Heat Removal	X											K1.09 Knowledge of the physical connections and/or cause-effect relationships between the RHRS and the following systems: RCS. (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.6	31 New 1068
005 Residual Heat Removal							X					A1.05 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including: Detection of and response to presence of water in RHR emergency sump. (CFR: 41.5 / 45.5)	3.3	32 611 2013 Repeat
006 Emergency Core Cooling		X										K2.04 Knowledge of bus power supplies to the following: ESFAS-operated valves. (CFR: 41.7)	3.6	33 MOD 1090
007 Pressurizer Relief/Quench Tank					X							K5.02 Knowledge of the operational implications of the following concepts as they apply to the PRTS: Method of forming a steam bubble in the PZR. (CFR: 41.7)	3.1	34 561 2010

008 Component Cooling Water									X		A3.04 Ability to monitor automatic operation of the CCWS, including: Requirements on and for the CCWS for different conditions of the power plant. (CFR: 41.7 / 45.5)	2.9	35 627 2005
008 Component Cooling Water										X	2.4.31 Knowledge of annunciator alarms, indications, or response procedures. (CFR: 41.10 / 45.3)	4.2	36 MOD 1070
010 Pressurizer Pressure Control					X						K6.03 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: PZR sprays and heaters. (CFR: 41.7 / 45.7)	3.2	37 New 1071
012 Reactor Protection		X									K2.01 Knowledge of bus power supplies to the following: RPS channels, components, and interconnections. (CFR: 41.7)	3.3	38 85 2002
012 Reactor Protection										X	A4.04 Ability to manually operate and/or monitor in the control room: Bistable, trips, reset and test switches. (CFR: 41.7 / 45.5 to 45.8)	3.3	39 1093 bank
013 Engineered Safety Features Actuation			X								K3.03 Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: Containment. (CFR: 41.7 / 45.6)	4.3	40 New 1073
013 Engineered Safety Features Actuation										X	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	4.1	41 New 1103
022 Containment Cooling				X							K4.03 Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: Automatic containment isolation. (CFR: 41.7)	3.6	42 909 2014 Repeat
025 Ice Condenser													
026 Containment Spray						X					A1.03 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: Containment sump level. (CFR: 41.5 / 45.5)	3.5	43 New 1075

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO)											Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
001 Control Rod Drive								X				A2.17 Ability to (a) predict the impacts of the following malfunction or operations on the CRDS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Rod-misalignment alarm. (CFR: 41.5/43.5/45.3/45.13)	3.3	56 674 2007
002 Reactor Coolant					X							K5.10 Knowledge of the operational implications of the following concepts as they apply to the RCS: Relationship between reactor power and RCS differential temperature. (CFR: 41.5 / 45.7)	3.6	57 193 2005
011 Pressurizer Level Control														
014 Rod Position Indication														
015 Nuclear Instrumentation		X										K2.01 Knowledge of bus power supplies to the following: NIS channels, components, and interconnections. (CFR: 41.7)	3.3	58 New 1066
016 Non-Nuclear Instrumentation			X									K3.04 Knowledge of the effect that a loss or malfunction of the NNIS will have on the following: MFW system. (CFR: 41.7 / 45.6)	2.6	65 309 2007
017 In-Core Temperature Monitor								X				A2.02 Ability to (a) predict the impacts of the following malfunctions or operations on the ITM system; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations: Core damage. (CFR: 41.5 / 43.5 / 45.3 / 45.5)	3.6	59 New 1067
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														

Facility: Arkansas Nuclear One Unit 1		Date of Exam: August 2016				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.	2.1.2 Knowledge of operator responsibilities during all modes of plant operation. (CFR: 41.10 / 45.13)	4.1	66 New 1083		
	2.1.	2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc. (CFR: 41.10 / 43.2)	3.3	67 838 2011		
	2.1.	2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management. (CFR: 41.1 / 43.6 / 45.6)	4.3	68 New 1084		
	Subtotal			3		
2. Equipment Control	2.2.	2.2.13 Knowledge of tagging and clearance procedures. (CFR: 41.10 / 45.13)	4.1	69 231 2007		
	2.2.	2.2.6 Knowledge of the process for making changes to procedures. (CFR: 41.10 / 43.3 / 45.13)	3.0	70 New 1082		
	Subtotal			2		
3. Radiation Control	2.3.	2.3.12 Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 45.9 / 45.10)	3.2	71 New 1081		
	2.3.	2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)	3.2	72 751 2008		
	Subtotal			2		
4. Emergency Procedures / Plan	2.4.	2.4.3 Ability to identify post-accident instrumentation. (CFR: 41.6 / 45.4)	3.7	73 242 2010		

	2.4.	2.4.12 Knowledge of general operating crew responsibilities during emergency operations. (CFR: 41.10 / 45.12)	4.0	74 51 1998		
	2.4.	2.4.25 Knowledge of fire protection procedures. (CFR: 41.10 / 43.5 / 45.13)	3.3	75 848 2011		
	Subtotal			3		
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
RO 1/1	008 AK3.01 (Q1)	This KA is for a Pressurizer Vapor Space Accident and states, "Why PZR level may come back on scale if RCS is saturated". Could not develop a question for this K/A with one correct answer and three incorrect but plausible distractors. Replaced with K/A AK3.03.
RO 1/1	025 AA1.23 (Q5)	This K/A is for monitoring/operating RHR heat exchangers as they apply to a loss of RHR. Another question relating the DH heat exchangers is being asked on another system so to remove this duplication the K/A was replaced with AA1.03.
RO 1/1	029 2.1.20 (Q7)	This K/A is on the topic of ATWS which is being evaluated on several different levels in the operating exam. Replaced with system 007 Reactor Trip, K/A 2.1.28.
RO 1/1	038 EK1.03 (Q8)	The question developed for the original K/A resulted in overlap with the SRO exam. NRC examiner comment: overlap between Q8 and Q85. Replaced with K/A EK1.02.
RO 1/1	062 AA1.03 (Q15)	ANO-1 does not use the Service Water System as a backup to CCWS. The Unit 1 equivalent of CCWS is Intermediate Cooling Water (ICW) and Service Water provides cooling to the ICW heat exchangers but it is not considered a backup system to ICW. Replaced with K/A AA1.06.
RO 1/2	003 AK1.21 (Q19)	ANO-1 equivalent of Delta Flux (DI) is Axial Power Imbalance. The Technical Specification (3.2.3) is used in conjunction with the Core Operating Limits Report (COLR). COLR Figures 6A-C, 7A-C, 8A-C give such broad limits for Axial Power Imbalance such that a single dropped control rod would have little operational implications other than performing the surveillance for TS 3.2.3. Replaced with K/A AK1.13.
RO 1/2	032 AK2.01 (Q20)	ANO-1 AOP 1203.021, Loss of Neutron Flux Indication, Section 3 contains no actions for resetting the power supplies for Source Range indication. Since this was the only K2 K/A with a rating greater than or equal to 2.5, replaced this K/A with AK3.02.
RO 1/2	E08 EK1.1 (Q27)	Found it difficult to develop a discriminating question for this K/A. Replaced with K/A 2.2.39.
RO 2/1	004 K5.32 (Q29)	This KA concerns purpose and control of heat tracing. This is NLO knowledge. Replaced with K/A K5.26.
RO 2/1	005 K1.01 (Q31)	ANO-1 equivalent of CCWS is Intermediate Cooling Water (ICW) and the ICW system has no interconnection with the RHRS equivalent, the Decay Heat System. Replaced with K/A K1.09.
RO 2/1	007 K4.01 (Q34)	This K/A concerns the design features which allow for Quench Tank cooling. This is the only K/A in this category with an importance rating greater than 2.5 and as a result this topic has been over-used in exams (2005, 2007, 2011, 2013). Changed to category K5 and replaced with K/A K5.02.
RO 2/1	008 2.2.12 (Q36)	Knowledge of surveillance procedures would best be tested via a JPM instead of the written exam, and ANO-1 does not have any surveillances for the ICW system since it is not in Tech Specs. Replaced with K/A 2.4.31.

Tier / Group	Randomly Selected K/A	Reason for Rejection
RO 2/1	022 K4.04 (Q42)	This K/A concerns Containment Cooling System design features and/or interlocks which provide for cooling of the control rod drive motors. ANO-1 does not have direct cooling of the CRDMs via the CCS, therefore no question could be developed for this K/A. Replaced with K/A K4.03.
RO 2/1	026 A1.02 (Q43)	This K/A concerns the ability to monitor containment temperature as relates to operating Containment Spray controls. ANO-1 Reactor Building Spray System is not operated based upon containment temperature but upon containment pressure. Replaced with K/A A1.03.
RO 2/1	039 K5.01 (Q44)	This K/A concerns the definition and causes of steam/water hammer. A licensed level question could not be developed for this K/A. Replaced with K/A K5.05.
RO 2/1	061 A1.03 (Q47)	This K/A concerns Emergency Feedwater System interactions with multi-units. ANO-1 does not have cross-connects with Unit 2 for the EFW system. Replaced with K/A A1.01.
RO 2/1	062 K4.06 (Q48)	This K/A concerns 6.9KV one line diagrams. A licensed level question could not be developed for this K/A. Replaced with K/A K4.03.
RO 2/2	002 K5.02 (Q57)	This K/A concerns the need for a vent path during draining. A licensed level question could not be developed for this K/A. Replaced with K/A K5.10.
RO 2/2	075 K3.07 (Q65)	This K/A concerns the connection between Circulating Water and ESFAS. ANO-1 has no connection between the two systems. A CW K/A with a rating greater than 2.5 and a lack of conflict with other questions could not be found. Replaced with system 016 and K/A K3.04.
RO 3	2.1.14 (Q66)	This K/A concerns the knowledge of things which require plant wide announcements. A licensed level question could not be developed for this K/A. Replaced with K/A 2.1.2.
RO 3	2.1.26 (Q68)	This K/A concerns the knowledge of industrial safety requirements. A licensed level question could not be developed for this K/A. Replaced with K/A 2.1.37.
RO 3	2.2.41 (Q70)	This K/A concerns the ability to obtain and interpret station electrical and mechanical drawings. This K/A can only be used to develop a system based question. Replaced with K/A 2.2.6.
RO 3	2.3.5 (Q72)	This K/A concerns the ability to use portable survey instruments, fixed radiation monitors, and alarms which would result in a radiation monitoring system question. Replaced with K/A 2.3.4.
RO 3	2.4.46 (Q75)	This K/A concerns ability to verify alarms are consistent with plant conditions. This K/A can only be used to develop a system based question. Replaced with K/A 2.4.25.

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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	4	2	6
	2												9	1	3	4
	Tier Totals												27	5	5	10
2. Plant Systems	1												28	3	2	5
	2												10	3	0	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:
- 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). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category).
 - 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.
 - Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted with justification; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
 - 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 a category other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
 - For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.
- G* Generic K/As

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3					X		EA2.39 Ability to determine or interpret the following as they apply to a small break LOCA: Adequate core cooling. (CFR 43.5 / 45.13)	4.3	76 New 1100
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4					X		AA2.02 Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Leakage of reactor coolant from RHR into closed cooling water system or into reactor building atmosphere. (CFR: 43.5 / 45.13)	3.8	77 MOD 639
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3									
000029 ATWS / 1					X		EA2.01 Ability to determine or interpret the following as they apply to a ATWS: Reactor nuclear instrumentation (CFR 43.5 / 45.13)	4.7	78 New 1085
000038 Steam Gen. Tube Rupture / 3									
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4						X	2.4.6 Knowledge of EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)	4.7	79 584 2010
000054 (CE/E06) Loss of Main Feedwater / 4									
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6						X	2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. (CFR: 41.10 / 43.2 / 45.13)	4.2	80 MOD 586

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1									
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2									
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7									
000036 (BW/A08) Fuel Handling Accident / 8						X	A08 AA2.2 Refueling Canal Level Decrease: Ability to determine and interpret the following as they apply to the (Refueling Canal Level Decrease) Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments. (CFR: 43.5 / 45.13)	4.0	82 347 2011
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid Radwaste Rel. / 9						X	2.3.11 Ability to control radiation releases. (CFR: 41.11 / 43.4 / 45.10)	4.3	83 New 1086
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant Fire On site / 8						X	2.4.25 Knowledge of fire protection procedures. (CFR: 41.10 / 43.5 / 45.13)	3.7	84 1045 NEW
000068 (BW/A06) Control Room Evac. / 8									
000069 (W/E14) Loss of CTMT Integrity / 5									
000074 (W/E06&E07) Inad. Core Cooling / 4									
000076 High Reactor Coolant Activity / 9									
W/E01 & E02 Rediagnosis & SI Termination / 3									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
W/E16 High Containment Radiation / 9									
BW/A01 Plant Runback / 1									
BW/A02&A03 Loss of NNI-X/Y / 7									
BW/A04 Turbine Trip / 4									
BW/A05 Emergency Diesel Actuation / 6									

BW/A07 Flooding / 8											
BW/E03 Inadequate Subcooling Margin / 4											
BW/E08; W/E03 LOCA Cooldown - Depress. / 4											
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4							X			2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)	4.4 85 737 2008
BW/E13&E14 EOP Rules and Enclosures											
CE/A11; W/E08 RCS Overcooling - PTS / 4											
CE/A16 Excess RCS Leakage / 2											
CE/E09 Functional Recovery											
K/A Category Point Totals:						1	3			Group Point Total:	4

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (SRO)											Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
003 Reactor Coolant Pump								X				A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Problems with RCP seals, especially rates of seal leak-off. (CFR: 41.5 / 43.5/ 45.3 / 45/13)	3.9	86 MOD 638
004 Chemical and Volume Control														
005 Residual Heat Removal														
006 Emergency Core Cooling														
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water														
010 Pressurizer Pressure Control														
012 Reactor Protection														
013 Engineered Safety Features Actuation								X				A2.05 Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; Loss of dc control power. (CFR: 41.5 / 43.5 / 45.3 / 45.13)	4.2	87 New 1052
022 Containment Cooling														
025 Ice Condenser														
026 Containment Spray														
039 Main and Reheat Steam														
059 Main Feedwater														
061 Auxiliary/Emergency Feedwater											X	2.2.37 Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)	4.6	88 740 2011

062 AC Electrical Distribution									X											A2.06 Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Keeping the safeguards buses electrically separate. (CFR: 41.5 / 43.5 / 45.3 / 45.13)	3.9	89 New 1046	
063 DC Electrical Distribution																							
064 Emergency Diesel Generator																				X	2.4.11 Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)	4.2	90 New 1047
073 Process Radiation Monitoring																							
076 Service Water																							
078 Instrument Air																							
103 Containment																							
K/A Category Point Totals:																				3	2	Group Point Total: 5	

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 2 (SRO)											Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
001 Control Rod Drive														
002 Reactor Coolant														
011 Pressurizer Level Control											X	2.2.40 Ability to apply technical specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)	4.7	91 MOD 1056
014 Rod Position Indication												(Replaced, see system 011)		
015 Nuclear Instrumentation														
016 Non-Nuclear Instrumentation														
017 In-Core Temperature Monitor														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment								X				A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the Fuel Handling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Mispositioned fuel element. (CFR: 41.5 / 43.5 / 45.3 / 45.13)	4.0	92 New 1048
035 Steam Generator														
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator														
055 Condenser Air Removal														
056 Condensate														
068 Liquid Radwaste														
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
075 Circulating Water														

Facility: Arkansas Nuclear One Unit 1		Date of Exam: August 2016				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. (CFR: 41.10 / 43.5 / 45.12)			3.9	94 MOD 1055
	2.1.35	Knowledge of the fuel-handling responsibilities of SROs. (CFR: 41.10 / 43.7)			3.9	95 846 2011
	Subtotal					2
2. Equipment Control	2.2.7	Knowledge of the process for conducting special or infrequent tests. (CFR: 41.10 / 43.3 / 45.13)			3.6	96 MOD 486
	2.2.17	Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator. (CFR: 41.10 / 43.5 / 45.13)			3.8	97 879 2014 Repeat
	Subtotal					2
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)			3.7	98 MOD 1049
	Subtotal					1
4. Emergency Procedures / Plan	2.4.29	Knowledge of the emergency plan. (CFR: 41.10 / 43.5 / 45.11)			4.4	99 New 1088
	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. (CFR: 41.10 / 43.5 / 45.11)			4.1	100 411 2011
	Subtotal					2
Tier 3 Point Total						7

Tier / Group	Randomly Selected K/A	Reason for Rejection
SRO T1G1	009 EA2.02 (Q76)	This K/A is on the topic of a Small Break LOCA and isolating possible leak paths. An SRO level question could not be developed for this K/A. Replaced with K/A EA2.39.
SRO T1G1	BW/E04 EA2.2 (Q81)	This is not a rejection, just a record of a correction. Sample plan submitted to ANO used EA2.2 from BW/E05 Excessive Heat Transfer instead of the EA2.2 for the T1G1 topic BW/E04 Inadequate Heat Transfer. Excessive Heat Transfer was already being tested in topic 000040 in T1G1. The word "Excessive" was changed to "Inadequate" and IR changed from 4.0 to 4.4.
SRO T1G2	059 AA2.02 (Q83)	This APE is titled Accidental Liquid Radioactive-Waste Release. The KA is "The permit for liquid radioactive-waste release." If it is an accidental release, then a permit is not in effect. The APE for Accidental Gaseous Radwaste Release does not have any K/As referring to release permits. After reviewing the remaining AA2 K/As for this topic, concluded that none of the K/As would produce an SRO level question. Replaced with generic K/A 2.3.11.
SRO T1G2	067 2.4.18 (Q84)	The APE is Plant Fire on Site and 2.4.18 refers to the "knowledge of specific bases for EOPs". Our Fire and Explosion AOP does not have a bases document so this would be a difficult K/A to develop a question for. Replaced with K/A 2.4.25.
SRO T2G2	014 2.1.32 (Q91)	This generic K/A concerns the explanation of system limits and precautions. An SRO level question could not be developed for this KA. Additionally, Rod Position Indication is being evaluated by a JPM so a different system had to be selected. Selected system 000011 PZR Level Control System and K/A A2.11 as a replacement.
SRO T3	2.1.40 (Q94)	This generic K/A concerns fuel handling. Randomly selected K/A 2.1.35 also concerns fuel handling. Fuel handling was randomly over sampled. Selected K/A 2.1.5 as a replacement.
SRO T3	2.3.6 (Q98)	This generic K/A concerns the ability to approve release permits. It is difficult to evaluate this K/A with a written exam question. This is best evaluated with an administrative JPM. Replaced with K/A 2.3.4.
SRO T3	2.4.9 (Q99)	This generic K/A concerns the knowledge of low power implications during accident situations. This K/A would only result in a system type question which is not desired in Tier 3. Replaced with K/A 2.4.29.

Facility: <u>ANO-1</u>		Date of Examination: <u>8/22/2016</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: <u>2016-1</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A1 Conduct of Operations KA – 2.1.5, Importance rating 2.9 (RO/SRO)	R, N	Given their work history, select the eligible operators to fill vacancy due to illness of the on watch ATC.
A2 Conduct of Operations KA- 2.1.20, Importance 4.6 RO/SRO	R, D,P	Perform calculation for makeup to the Spent Fuel Pool
A3 Equipment Control KA – 2.2.13, Importance 4.1 RO	R, N	Determine the mechanical and electrical boundary isolations for P-36B Makeup Pump seal leak. (Do not need to drain the pump)
A4 Radiation Control KA – 2.3.7, Importance 3.5 RO	R, N	Given a survey map and associated RWP, determine the entry requirements to perform a task in the P-34A Decay Heat Removal Pump Room.
Emergency Plan		Not used
NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).		
* 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>ANO-1</u>		Date of Examination: <u>8/22/2016</u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: <u>2016-1</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A5 Conduct of Operations KA – 2.1.5, Importance rating 3.9 (RO/SRO)	R, N	Given their work history, select the eligible operators to fill vacancy due to illness of the on watch ATC.
A6 Conduct of Operations KA- 2.1.20, Importance 4.6 RO/SRO	R, D,P	Perform calculation for makeup to the Spent Fuel Pool
A7 Equipment Control KA – 2.2.13, Importance 4.3 SRO	R, N	Review and approve the tagout provided for P-36B Makeup Pump seal leak. If not approved, provide the reasons why.
A8 Radiation Control KA – 2.3.4, Importance 3.7 SRO	R, N	Provided with the dose history for each individual. Determine which of the 5 are eligible for performing the task during an emergency situation.
A9 Emergency Plan KA – 2.4.44, Importance 4.4 SRO	R, D	Determine the correct PAR and evacuation/sheltering required for a given GE.
NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).		
* 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 1</u>		Date of Examination: <u>8/22/2016</u>	
Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>2016-1</u>	
Control Room Systems: 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U			
System / JPM Title	Type Code*	Safety Function	
S1 API-RPI Comparison 014 A1.02 (RO 3.2 / SRO 3.6) RO	N/S	1	
S2 Throttle HPI following ESAS Actuation 013 A4.01 (RO 4.5 / SRO 4.8) RO / SRO-U / SRO-I	A/M/EN/L/S	2	
S3 Manually Control RCS Pressure with a Pressurizer Spray Valve Failure 010 A3.02 (RO 3.6 / SRO 3.5) RO / SRO-I	A/D/S	3	
S4 Shutdown RCP P-32A at Power 003 A2.02 (RO 3.7 / SRO 3.9) RO / SRO-I	A/D/E/S	4P	
S5 Pump the Quench Tank 007 A1.01 (RO 2.9 / SRO 3.1) RO / SRO-I	D/S	5	
S6 Transfer Buses From Unit Aux Transformer to a Startup Transformer 062 A4.07 (RO 3.1 / SRO 3.1) RO / SRO-I	A/N/S	6	
S7 Remove Channel of RPS from Manual Bypass 012 A4.03 (RO 3.6 / SRO 3.6) RO / SRO-U / SRO-I	D/S	7	
S8 Shift ICW Pumps 008 A4.01 (RO 3.3 / SRO 3.1) RO / SRO-I	D/S	8	

In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
P1	Purge the Main Generator During Emergency Conditions (A1JPM-RO-GEN02) 055 EA1.04 (RO 3.5 / SRO 3.9) RO / SRO-U / SRO-I	A/M/E/L	8
P2	Respond to Control Rod Drive Stator High Temperature (A1JPM-RO-CRD04) 001 A2.01 (RO 3.1 / SRO 3.7) RO / SRO-U / SRO-I	D/E	1
P3	Align T-16A (Treated Waste Monitoring Tank) for Recirc / Sample 068 A2.02 (RO 2.7 / SRO 2.8) RO / SRO-U / SRO-I	A/N/R	9
* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five 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 (6) / 4-6 (6) / 2-3 (3) ≥ 8 (8) / ≥ 7 (7) / 2-3 (2) ≤ 9 (6) / ≤ 8 (6) / ≤ 4 (2) ≥ 1 (3) / ≥ 1 (3) / ≥ 1 (2) ≥ 1 (1) / ≥ 1 (1) / ≥ 1 (1) (control room system) ≥ 1 (2) / ≥ 1 (2) / ≥ 1 (2) ≥ 2 (5) / ≥ 2 (4) / ≥ 1 (3) ≤ 3 (0) / ≤ 3 (0) / ≤ 2 (0) (randomly selected) ≥ 1 (1) / ≥ 1 (1) / ≥ 1 (1)	

Facility: ANO-1 Scenario No.: 1 Op-Test No.: 2016-1

Examiners: _____ Operators: _____

Initial Conditions: 5% power

Turnover: 5% power, Place "A" MFW Pump in service and raise power to 10%.

P-3D Circulating Water Pump OOS for maintenance

Event No.	Position	Event Type*	Event Description
1	BOP	N	Place A MFW Pump in service
2	ATC	R	Raise power to 10%
3	ATC SRO	I TS	Pressurizer level fails high. (LT-1001)
4	BOP SRO	I TS	Inadvertent ES Digital Channel 7 Actuation
5	BOP	C	Loss of 480 V Load Center B3 with a failure of C-5B to auto start
6	ATC	C	Continuous Control Rod Motion
7		M	Pressurizer steam space leak
8	ATC	I CT	Failure of ES Channels 1 and 2 to automatically actuate
9	ATC	C CT	RPS fails to trip and ALL RX trip pushbuttons fail.
10	BOP	CT	Trip all RCPs within 2 minutes of a LOSM

*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification, (CT) Critical Task

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	2
2. Abnormal events (2-4)	4
3. Major transients (1-2)	1
4. EOPs entered/requiring substantive actions (1-2)	2
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2-3)	3

Facility: ANO-1 Scenario No.: 3 Op-Test No.: 2016

Examiners: _____ Operators: _____

Initial Conditions: 35% power

Turnover: 35% power, P-34A Surveillance in progress and ready for pump start

Pleasant Hill Line OOS, Breakers B5122 and B5148 Open to isolate the line.

Event No.	Position	Event Type*	Event Description
1	BOP CRS	N TS	Perform P-34A Surveillance, P-34A Pump Trip
2	ATC CRS	C TRM	ERV leaking
3	BOP	C	CV-4018 Temperature Control Valve Fails closed
4	BOP ATC	I	Main Turbine Controlling header pressure fails high
5	ATC	C	RCS leak requiring a down power.
6	All	M	RCS LOCA resulting in Rx trip and pressure dropping below 150 psig.
7	BOP	C / CT	CV-1400 fails to open automatically.
8	ATC	C / CT	ES Channels 5 and 6 fail to actuate
9	BOP	CT	Trip all RCPs within 2 minutes of a LOSM
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification, (CT) Critical Task			
Target Quantitative Attributes (Per Scenario; See Section D.5.d)			Actual Attributes
1.	Malfunctions after EOP entry (1-2)		2
2.	Abnormal events (2-4)		4
3.	Major transients (1-2)		1
4.	EOPs entered/requiring substantive actions (1-2)		1
5.	EOP contingencies requiring substantive actions (0-2)		1
6.	EOP based Critical tasks (2-3)		3

Facility: ANO-1 Scenario No.: 4 Op-Test No.: 2016-1

Examiners: _____ Operators: _____

Initial Conditions: 99.7% power, P-7B EFW Pump OOS

Turnover: 99.7% power, P-7B EFW Pump OOS, Group 7 rods at 95%

Event No.	Position	Event Type*	Event Description
1	ATC	R	Dilute rods in 2%
2	BOP CRS	C TS	CFT Pressure high
3	ATC BOP	I	"B" Steam Generator S/U Level Fails Low.
4	ATC	C	P-8A Trips requiring down power to 70%
5	BOP	I	Turbine stops responding to down power at 90%
6	All	C TS	RCP Seal Cooler leak
7	All	M	Condensate system leak results in a loss of all MFW and Reactor trip
8	ATC	I CT	Failure of EFIC to actuate
9	BOP	C CT	P-7A Trip resulting in transition to Overheating EOP

*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification, (CT) Critical Task

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	2
2. Abnormal events (2-4)	4
3. Major transients (1-2)	1
4. EOPs entered/requiring substantive actions (1-2)	1
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2-3)	2

Facility: ANO-1 Scenario No.: 5 Op-Test No.: 2016-1

Examiners: _____ Operators: _____

Initial Conditions: 60% power, ICS runback defeated, EH Oil Pump auto start defeated

Turnover: 60% Power, Secure #1 EDG during Surveillance Testing
P-28A – “A” MFWP Emergency Lube Oil Pump OOS.

Event No.	Position	Event Type*	Event Description
1	BOP	N	Unload and secure #2 EDG
2	ATC CRS	C TS	Dropped rod in Group 6
3	ATC	I	ICS signal to “A” MFW Pump fails low
4	BOP	I	Gland Steam Pressure Controller fails closed
5	BOP	C	EH Oil Pump trips with failure of the standby pump to auto start
6	All	C / TS	SG Tube Leak requiring shutdown
7	All	M	SG Tube Rupture
8	ATC	C / CT	2 Stuck Rods post trip
9	ATC	C / CT	TBVs close due to loss of vacuum interlock
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification, (CT) Critical Task			

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Malfunctions after EOP entry (1-2)	2
2.	Abnormal events (2-4)	3
3.	Major transients (1–2)	1
4.	EOPs entered/requiring substantive actions (1–2)	1
5.	EOP contingencies requiring substantive actions (0-2)	1
6.	EOP based Critical tasks (2–3)	2