

Facility Name:Arkansas Nuclear One Unit 2														Date of Exam:2/7/2014			
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			4	4	N/A			1	18	3	3	6
	2	2	1	2	N/A			2	1	N/A			1	9	2	2	4
	Tier Totals	6	3	5	N/A			6	5	N/A			2	27	5	5	10
2. Plant Systems	1	3	2	3	4	2	2	3	4	1	2	2	28	3	2	5	
	2	1	1	1	1	1	0	1	1	1	1	1	10	1	1	3	
	Tier Totals	4	3	4	5	3	2	4	5	2	3	3	38	5	3	8	
3. Generic Knowledge and Categories		Abilities			1	2	3	4	10				1	2	3	4	7
					3	3	2	2					2	2	1	2	

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

2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±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 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.

ES-401	PWR Examination Outline							Form ES-401-2		
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)										
Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000007 Reactor Trip / 1									1
1	CE/E02 Reactor Trip Recovery / 1	0 3						Annunciators and conditions indicating signals, and remedial actions associated with the (Reactor Trip Recovery).	3.0	
2	000008 Pressurizer Vapor Space Accident / 3					3 0		Inadequate core cooling	4.3	1
	000009 Small Break LOCA / 3									0
3	000011 Large Break LOCA / 3						01. 20	Ability to interpret and execute procedure steps.	4.6	1
4	000015 RCP Malfunctions / 4 000017 RCP Malfunctions (Loss of RC Flow) / 4	0 1						Natural circulation in a nuclear reactor power plant	4.4	1
5	000022 Loss of Rx Coolant Makeup / 2	0 3						Relationship between charging flow and PZR level	3.0	1
6	000025 Loss of RHR System / 4				0 3			LPI pumps	3.4	1
7	000026 Loss of Component Cooling Water / 8			0 2				The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS	3.6	1
8	000027 Pressurizer Pressure Control System Malfunction / 3		0 3					Controllers and positioners	2.6	1
9	000029 ATWS / 1				1 2			M/G set power supply and reactor trip breakers	4.1	1
10	000038 Steam Gen. Tube Rupture / 3				4 4			Level operating limits for S/Gs	3.4	1
	000040 Steam Line Rupture / 4									1
11	CE/E05 Excessive Steam Demand / 4					0 2		Adherence to appropriate procedures and operation within the limitations in the Facility's license and amendments.	3.4	
	000054 Loss of Main Feedwater / 4									1
12	CE/E06 Loss of Feedwater / 4		0 1					Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.3	
13	000055 Station Blackout / 6			0 2				Actions contained in EOP for loss of offsite and onsite power	4.3	1
14	000056 Loss of Off-site Power / 6					4 7		Proper operation of the ED/G load sequencer	3.8	1
15	000057 Loss of Vital AC Inst. Bus / 6					0 4		ESF system panel alarm annunciators and channel status indicators	3.7	1
16	000058 Loss of DC Power / 6				0 1			Cross-tie of the affected dc bus with the alternate supply	3.4	1
	000062 Loss of Nuclear Svc Water / 4									0
17	000065 Loss of Instrument Air / 8			0 3				Knowing effects on plant operation of isolating certain equipment from instrument air	2.9	1
18	000077 Generator Voltage and Electric Grid Disturbances / 6	0 3						Under-excitation	3.3	1
K/A Category Totals:		4	2	3	4	4	1	Group Point Total:		18



ES-401		PWR Examination Outline											Form ES-401-2		
Plant Systems - Tier 2/Group 1 (RO)															
Q#	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	#
28	003 Reactor Coolant Pump		0	2									S/G	3.5	1
29	004 Chemical and Volume Control				3	0							Relationship between temperature and pressure in CVCS components during solid plant operation	3.8	1
30/46	005 Residual Heat Removal		0	1				0	1				RHR pumps; Heatup/cooldown rates	3; 3.5	2
31/32	006 Emergency Core Cooling				0	9			1	3				3.9; 3.9	2
33	007 Pressurizer Relief/Quench Tank							0	2				Maintaining quench tank pressure	2.7	1
34/35	008 Component Cooling Water	0	5									02.44	Sources of makeup water; 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.	3; 4.2	2
36	010 Pressurizer Pressure Control						0	1					Pressure detection systems	2.7	1
37	012 Reactor Protection										0	3	Channel blocks and bypasses	3.6	1
38	013 Engineered Safety Features Actuation			0	1								Fuel	4.4	1
40	022 Containment Cooling				0	4							Cooling of control rod drive motors	2.8	1
	025 Ice Condenser														0
41/39	026 Containment Spray	0	2		0	8							Cooling water; Automatic swapper to containment sump suction for recirculation phase after LOCA (RWST low-low level alarm)	4.1; 4.1	2
51/42	039 Main and Reheat Steam							0	5		0	4	Increasing steam demand, its relationship to increases in reactor power; Emergency feedwater pump turbines	3.3; 3.8	2
43/44	059 Main Feedwater			0	3				0	7			S/Gs; Tripping of MFW pump turbine	3.5; 3	2
45	061 Auxiliary/Emergency Feedwater					0	2						Decay heat sources and magnitude	3.2	1
47/48	062 AC Electrical Distribution		0	1					1	2			Major system loads; Restoration of power to a system with a fault on it	3.3; 3.2	2
49	063 DC Electrical Distribution				0	2							Breaker interlocks, permissives, bypasses and cross-ties	2.9	1
50	064 Emergency Diesel Generator						0	8					Fuel oil storage tanks	3.2	1
52	073 Process Radiation Monitoring	0	1										Those systems served by PRMs	3.6	1
53	076 Service Water									0	2		Emergency heat loads	3.7	1
54	078 Instrument Air											01.30	Ability to locate and operate components, including local controls.	4.4	1
55	103 Containment						0	1					Containment pressure, temperature, and humidity	3.7	1
K/A Category Totals:		3	2	3	4	2	2	3	4	1	2	2	Group Point Total:	28	

ES-401		PWR Examination Outline										Form ES-401-2			
Plant Systems - Tier 2/Group 2 (RO)															
Q#	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														0
56	002 Reactor Coolant											04.11	Knowledge of abnormal condition procedures.	4.0	1
57	011 Pressurizer Level Control		02										PZR heaters	3.1	1
	014 Rod Position Indication														0
58	015 Nuclear Instrumentation					19							Heat balance	2.9	1
59	016 Non-nuclear Instrumentation		02										PZR LCS	3.4	1
	017 In-core Temperature Monitor														0
	027 Containment Iodine Removal														0
60	028 Hydrogen Recombiner and Purge Control								03				The hydrogen air concentration in excess of limit flame propagation or detonation with resulting equipment damage in containment	3.4	1
61	029 Containment Purge				03								Automatic purge isolation	3.2	1
	033 Spent Fuel Pool Cooling														0
62	034 Fuel Handling Equipment											01	Radiation levels	3.3	1
	035 Steam Generator														0
63	041 Steam Dump/Turbine Bypass Control									01			RCS T-ave. meter (cooldown rate)	3.2	1
64	045 Main Turbine Generator	06											RCS, during steam valve test	2.6	1
	055 Condenser Air Removal														0
	056 Condensate														0
	068 Liquid Radwaste														0
	071 Waste Gas Disposal														0
	072 Area Radiation Monitoring														0
	075 Circulating Water														0
	079 Station Air														0
65	086 Fire Protection							01					Fire header pressure	2.9	1
K/A Category Totals:		1	1	1	1	1	0	1	1	1	1	1	Group Point Total:		10

ES-401	PWR Examination Outline							Form ES-401-2		
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (SRO)										
Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000007 Reactor Trip / 1									0
	CE/E02 Reactor Trip Recovery / 1									
	000008 Pressurizer Vapor Space Accident / 3									0
76	000009 Small Break LOCA / 3					0 6		Whether PZR water inventory loss is imminent	4.3	1
	000011 Large Break LOCA / 3									0
	000015 RCP Malfunctions / 4 000017 RCP Malfunctions (Loss of RC Flow) / 4									0
	000022 Loss of Rx Coolant Makeup / 2									0
	000025 Loss of RHR System / 4									0
	000026 Loss of Component Cooling Water / 8									0
	000027 Pressurizer Pressure Control System Malfunction / 3									0
	000029 ATWS / 1									0
	000038 Steam Gen. Tube Rupture / 3									0
77	000040 Steam Line Rupture / 4						04. 02	Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.6	1
	CE/E05 Excessive Steam Demand / 4									
	000054 Loss of Main Feedwater / 4									0
	CE/E06 Loss of Feedwater / 4									
78	000055 Station Blackout / 6					0 1		Existing valve positioning on a loss of instrument air system	3.7	1
	000056 Loss of Off-site Power / 6									0
	000057 Loss of Vital AC Inst. Bus / 6									0
79	000058 Loss of DC Power / 6					0 3		DC loads lost; impact on to operate and monitor plant systems	3.9	1
80	000062 Loss of Nuclear Svc Water / 4						01. 32	Ability to explain and apply system limits and precautions.	4.0	1
	000065 Loss of Instrument Air / 8									0
81	000077 Generator Voltage and Electric Grid Disturbances / 6						02. 36	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	4.2	1
K/A Category Totals:		0	0	0	0	3	3	Group Point Total:		6



ES-401		PWR Examination Outline										Form ES-401-2			
Plant Systems - Tier 2/Group 1 (SRO)															
Q#	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														0
	004 Chemical and Volume Control														0
	005 Residual Heat Removal														0
	006 Emergency Core Cooling														0
	007 Pressurizer Relief/Quench Tank														0
	008 Component Cooling Water														0
	010 Pressurizer Pressure Control														0
86	012 Reactor Protection								0 3				Incorrect channel bypassing	3.7	1
87	013 Engineered Safety Features Actuation											02. 22	Knowledge of limiting conditions for operations and safety limits.	4.7	1
	022 Containment Cooling														0
	025 Ice Condenser														0
88	026 Containment Spray											01. 20	Ability to interpret and execute procedure steps.	4.6	1
	039 Main and Reheat Steam														0
	059 Main Feedwater														0
89	061 Auxiliary/Emergency Feedwater								0 4				pump failure or improper operation	3.8	1
	062 AC Electrical Distribution														0
	063 DC Electrical Distribution														0
90	064 Emergency Diesel Generator								0 1				Failure modes of water, oil, and air valves	3.3	1
	073 Process Radiation Monitoring														0
	076 Service Water														0
	078 Instrument Air														0
	103 Containment														0
K/A Category Totals:		0	0	0	0	0	0	0	3	0	0	2	Group Point Total:		5



ES-401		PWR Examination Outline											Form ES-401-2		
Plant Systems - Tier 2/Group 2 (SRO)															
Q#	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	#
91	001 Control Rod Drive								1				Incorrect rod stepping sequence	3.8	1
	002 Reactor Coolant								8						0
	011 Pressurizer Level Control														0
	014 Rod Position Indication														0
	015 Nuclear Instrumentation														0
92	016 Non-nuclear Instrumentation											01	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	1
	017 In-core Temperature Monitor										07				
	027 Containment Iodine Removal														0
	028 Hydrogen Recombiner and Purge Control														0
	029 Containment Purge														0
	033 Spent Fuel Pool Cooling														0
93	034 Fuel Handling Equipment			0									Fuel protection from binding and dropping	3.4	1
	035 Steam Generator			1											
	041 Steam Dump/Turbine Bypass Control														0
	045 Main Turbine Generator														0
	055 Condenser Air Removal														0
	056 Condensate														0
	068 Liquid Radwaste														0
	071 Waste Gas Disposal														0
	072 Area Radiation Monitoring														0
	075 Circulating Water														0
	079 Station Air														0
	086 Fire Protection														0
K/A Category Totals:		0	0	0	1	0	0	0	1	0	0	1	Group Point Total:		3

Facility Name:Arkansas Nuclear One Unit 2      Date of Exam:2/7/2014								
Q#	Category	K/A #	Topic	RO		SRO-Only		
				IR	#	IR	#	
66	1. Conduct of Operations	2.1. 05	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	2.9	1			
67		2.1. 19	Ability to use plant computers to evaluate system or component status.	3.9	1			
68		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.	3.9	1			
		2.1.						
94		2.1. 39	Knowledge of conservative decision making practices.			4.3	1	
95		2.1. 01	Knowledge of conduct of operations requirements.			4.2	1	
		Subtotal			3	2		
69	2. Equipment Control	2.2. 06	Knowledge of the process for making changes to procedures.	3.0	1			
70		2.2. 07	Knowledge of the process for conducting special or infrequent tests.	2.9	1			
71		2.2. 42	Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	3.9	1			
96		2.2. 14	Knowledge of the process for controlling equipment configuration or status.			4.3	1	
97		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.			3.8	1	
		2.2.						
		Subtotal			3	2		
72	3. Radiation Control	2.3. 11	Ability to control radiation releases.	3.8	1			
73		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.	3.4	1			
		2.3.						
98		2.3. 14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.			3.8	1	
		2.3.						
		2.3.						
		Subtotal			2	1		
74	4. Emergency Procedures / Plan	2.4. 05	Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.	3.7	1			
75		2.4. 32	Knowledge of operator response to loss of all annunciators.	3.6	1			
		2.4.						
99		2.4. 23	Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.			4.4	1	
100		2.4. 28	Knowledge of procedures relating to a security event.			4.1	1	
		2.4.						
		Subtotal			2	2		
Tier 3 Point Total					10		7	



Facility: <u>Arkansas Nuclear One Unit 2</u>		Date of Examination: <u>02/10/2014</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: <u>2014-1</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A1. Conduct of Operations 2.1.20 RO(4.6)	D/R	Determine Boric Acid and DI water volume for make up to the Spent Fuel Pool ANO-2-JPM-NRC-ADMIN-SFPMU2
A2. Conduct of Operations 2.1.23 RO (4.3)	D/P/R	Calculate Time to Boil using computer program ANO-2-JPM-NRC-ADMIN-TTBCRO
A3. Equipment Control 2.2.12 RO (3.7)	N/R	Evaluate Containment atmospheric conditions. ANO-2-JPM-NRC-ADMIN-CNTMT
A4. Radiation Control 2.3.7 RO (3.5)	D/R	Review emergency RWP and determine stay time based on rad levels ANO-2-JPM-NRC-ADMIN-RWP2
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 ( $\leq 3$ for ROs; $\leq 4$ for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		

Facility: <u>Arkansas Nuclear One Unit 2</u>		Date of Examination: <u>02/10/2014</u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: <u>2014-1</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A5. Conduct of Operations 2.1.20 SRO (4.6)	D/R	Review and approve calculation of volume needed to raise SFP level. ANO-2-JPM-NRC-ADMIN-SFPMU
A6. Conduct of Operations 2.1.40 SRO (3.9)	N/R	Determine the Shutdown Operations protection condition and if requirements are met. ANO-2-JPM-NRC-ADMIN-SOPP1
A7. Equipment Control 2.2.14 SRO (4.3)	D/P/R	Supervisory review of maintenance activities for configuration control ANO-2-JPM-NRC-ADMIN-MAINT
A8. Radiation Control 2.3.7 SRO (3.6)	M/R	Review emergency RWP and determine stay time for operators ANO-2-JPM-NRC-ADMIN-RWP3
A9. Emergency Procedures/Plan 2.4.41 SRO (4.6)	M/R	Determine EAL classification ANO-2-JPM-NRC-ADMIN-EAL13
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank ( $\leq 3$ for ROs; $\leq 4$ for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		

Facility: <u>Arkansas Nuclear One Unit 2</u>		Date of Examination: <u>02/10/2014</u>
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>2014-1</u>
Control Room Systems <sup>@</sup> (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-CNTCL 022 A4.03 RO-3.2/SRO-3.2 Actuate Containment Cooling	A/D/EN/L/S	5 Containment
S2. ANO-2-JPM-NRC-ELEC06 062 A4.01 RO-3.3/SRO-3.1 Transfer Auxiliaries from SU#2 to SU#3 for 2A-1	A/M/S	6 Electrical
S3. ANO-2-JPM-NRC-CVCS2 004 A4.07 RO-3.9/SRO3.7 Perform Emergency Boration	A/D/L/S	1 Reactivity control
S4. ANO-2-JPM-NRC-EFW01 061 A1.01 RO-3.9/SRO4.2 Shutdown an EFW train with EFAS present	D/EN/L/S	4 Heat Removal Secondary
S5. ANO-2-JPM-NRC-FWCS1 035 A4.01 RO-3.7/SRO-3.6 Place Feedwater Control system in Automatic	D/S	4 Heat Removal Primary
S6. ANO-2-JPM-NRC-CVCS12 004 A4.06 RO-3.6/SRO-3.1 Verify minimum letdown flow	N/S	2 Inventory Control
S7. ANO-2-JPM-NRC-EOP6 012 A2.06 RO-4.4/SRO-4.7 Manually trip the reactor	A/D/S	7 Instrumentation
S8. ANO-2-JPM-NRC-PZR01 010 A4.01 RO-3.7/SRO-3.5 Equalize Pressurizer Boron	D/S	3 Pressure Control
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
P1. ANO-2-JPM-NRC-PRHTR 068 AA1.07 RO-4.1/SRO-4.2 Local operation of proportional heaters	D/E/L	3 Pressure Control
P2. ANO-2-JPM-NRC-AUADV 041 A4.08 RO-3.0/SRO-3.1 Operate SDBCS valves locally	D/E/L/P	4 Heat Removal
P3. ANO-2-JPM-NRC-WGDTR 071 A2.02 RO-3.3/SRO-3.6 Perform a Waste gas tank release	A/N/R	9 Rad Control
<p><sup>@</sup> All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</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>02/10/2014</u>
Exam Level: RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>2014-1</u>
Control Room Systems <sup>@</sup> (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-CNTCL 022 A4.03 RO-3.2/SRO-3.2 Actuate Containment Cooling	A/D/EN/L/S	5 Containment
S2. ANO-2-JPM-NRC-ELEC06 062 A4.01 RO-3.3/SRO-3.1 Transfer Auxiliaries from SU#2 to SU#3 for 2A-1	A/M/S	6 Electrical
S3. ANO-2-JPM-NRC-CVCS2 004 A4.07 RO-3.9/SRO3.7 Perform Emergency Boration	A/D/L/S	1 Reactivity control
S4. ANO-2-JPM-NRC-EFW01 061 A1.01 RO-3.9/SRO4.2 Shutdown an EFW train with EFAS present	D/EN/L/S	4 Heat Removal Secondary
S5. ANO-2-JPM-NRC-FWCS1 035 A4.01 RO-3.7/SRO-3.6 Place Feedwater Control system in Automatic	D/S	4 Heat Removal Primary
S6. ANO-2-JPM-NRC-CVCS12 004 A4.06 RO-3.6/SRO-3.1 Verify minimum letdown flow	N/S	2 Inventory Control
S7. ANO-2-JPM-NRC-EOP6 012 A2.06 RO-4.4/SRO-4.7 Manually trip the reactor	A/D/S	7 Instrumentation
S8.		
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
P1. ANO-2-JPM-NRC-PRHTR 068 AA1.07 RO-4.1/SRO-4.2 Local operation of proportional heaters	D/E/L	3 Pressure Control
P2. ANO-2-JPM-NRC-AUADV 041 A4.08 RO-3.0/SRO-3.1 Operate SDBCS valves locally	D/E/L/P	4 Heat Removal
P3. ANO-2-JPM-NRC-WGDTR 071 A2.02 RO-3.3/SRO-3.6 Perform a Waste gas tank release	A/N/R	9 Rad Control
<p><sup>@</sup> All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</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>02/10/2014</u>
Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>		Operating Test No.: <u>2014-1</u>
Control Room Systems <sup>@</sup> (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-CNTCL 022 A4.03 RO-3.2/SRO-3.2 Actuate Containment Cooling	A/D/EN/L/S	5 Containment
S2. ANO-2-JPM-NRC-ELEC06 062 A4.01 RO-3.3/SRO-3.1 Transfer Auxiliaries from SU#2 to SU#3 for 2A-1	A/M/S	6 Electrical
S3.		
S4.		
S5.		
S6.		
S7.		
S8.		
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
P1. ANO-2-JPM-NRC-PRHTR 068 AA1.07 RO-4.1/SRO-4.2 Local operation of proportional heaters	D/E/L	3 Pressure Control
P2. ANO-2-JPM-NRC-AUADV 041 A4.08 RO-3.0/SRO-3.1 Operate SDBCS valves locally	D/E/L/P	4 Heat Removal
P3. ANO-2-JPM-NRC-WGDTR 071 A2.02 RO-3.3/SRO-3.6 Perform a Waste gas tank release	A/N/R	9 Rad Control
<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: Arkansas Nuclear One			Date of Exam: 2-10-14			Operating Test No.: 2014-1											
A P P L I C A N T	E V E N T  T Y P E	Scenarios												T O T A L	M I N I M U M (*)		
		1			2			3			4 (currently selected as spare)						
		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							4				3	1	1	1	0	
	NOR	1				1							2	1	1	1	
	I/C	2,3,4,5,8				2,4,5,8		3,6,7				4,8	12	4	4	2	
	MAJ	6,7				6		5				6	4	2	2	1	
	TS	2,4											2	0	2	2	
RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	RX		4										1	1	1	0	
	NOR				1				1			1	2	1	1	1	
	I/C		3,5		2,3,4,5,7,8			2,4,6				2,3,5,7	11	4	4	2	
	MAJ		6,7		6			5				6	4	2	2	1	
	TS				2,5								2	0	2	2	
RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	RX					5							1	1	1	0	
	NOR			1					1		1		2	1	1	1	
	I/C			2,4,8	3,7			2,3,4,6,7			2,3,4,5,7,8		10	4	4	2	
	MAJ			6,7	6			5			6		4	2	2	1	
	TS							2,4			2,3		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	
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: 2-10-14			Operating Test No.: 2014-1											
A P P L I C A N T	E V E N T  T Y P E	Scenarios												T O T A L	M I N I M U M (*)		
		1			2			3			4 (currently selected as spare)						
		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 (1,5) <input checked="" type="checkbox"/> X SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX	4										3		1	1	1	0
	NOR				1				1					1	1	1	1
	I/C	3,5			2,4,5,8			2,4,6				4,8		6	4	4	2
	MAJ	6,7			6			5				6		3	2	2	1
	TS													0	0	2	2
RO (2,6) <input checked="" type="checkbox"/> X SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX				5			4						1	1	1	0
	NOR		1										1	1	1	1	1
	I/C		2,4,8		3,7			3,6,7					2,3,5,7	5	4	4	2
	MAJ		6,7		6			5					6	3	2	2	1
	TS													0	0	2	2
RO (3) <input checked="" type="checkbox"/> X SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX	4											3	1	1	1	0
	NOR				1			1						1	1	1	1
	I/C	3,5			2,4,5,8			2,4,6				4,8		5	4	4	2
	MAJ	6,7			6			5				6		3	2	2	1
	TS													0	0	2	2
RO (4) <input checked="" type="checkbox"/> X SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX				5			4						1	1	1	0
	NOR		1										1	1	1	1	1
	I/C		2,4,8		3,7			3,6,7					2,3,5,7	6	4	4	2
	MAJ		6,7		6			5					6	3	2	2	1
	TS													0	0	2	2
Instructions:																	
<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ol>																	

Facility: Arkansas Nuclear One			Date of Exam: 2-10-14			Operating Test No.: 2014-1											
A P P L I C A N T	E V E N T  T Y P E	Scenarios												T O T A L	M I N I M U M (*)		
		1			2			3			4 (currently selected as spare)						
		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 (7) <input checked="" type="checkbox"/> X SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX		4			5						3		1	1	1	0
	NOR								1					1	1	1	1
	I/C		3,5			3,7			2,4,6			4,8		5	4	4	2
	MAJ		6,7			6			5			6		2	2	2	1
	TS													0	0	2	2
RO (8) <input checked="" type="checkbox"/> X SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX							4						1	1	1	0
	NOR			1		1						1		1	1	1	1
	I/C			2,4,8		2,4,5,8		3,6,7				2,3,5,7		7	4	4	2
	MAJ			6,7		6		5				6		2	2	2	1
	TS													0	0	2	2
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U (1,2) <input checked="" type="checkbox"/> X	RX													0	1	1	0
	NOR	1			1			1				1		3	1	1	1
	I/C	2,3,4,5,8			2,3,4,5,7,8			2,3,4,6,7				2,3,4,5,7,8		16	4	4	2
	MAJ	6,7			6			5				6		4	2	2	1
	TS	2,4			2,5			2,4				2,3		6	0	2	2
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U (3) <input checked="" type="checkbox"/> X	RX													0	1	1	0
	NOR	1			1			1				1		2	1	1	1
	I/C	2,3,4,5,8			2,3,4,5,7,8			2,3,4,6,7				2,3,4,5,7,8		11	4	4	2
	MAJ	6,7			6			5				6		3	2	2	1
	TS	2,4			2,5			2,4				2,3		4	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: ANO-2		Scenario No.: 1 (New)		Op-Test No.: 2014-1	
Examiners:			Operators:		
_____			_____		
_____			_____		
Initial Conditions: 100% MOL; All Engineered Safety Features systems are in standby. RED Train Maintenance Week. Loop 1 Service Water returns aligned to the Emergency Cooling Pond (ECP).					
Turnover: 100%. 260 EFPD. EOOS indicates 'Minimal Risk'. . RED Train Maintenance Week. Evolution scheduled: Shift Loop1 Service Water returns from ECP to Lake					
Event No.	Malf. No.	Event Type*	Event Description		
1		N (BOP) N (SRO)	Shift Loop 1 service water returns from ECP to Lake.		
2	CT2VSF1D	C (BOP) C (SRO)	2VSF-1D Containment cooler trips. TS for SRO.		
3	XCVLDNHXOU K12D01	I (ATC) I (SRO)	The temperature input to the letdown HX temperature controller fails Hi causing excessive cooling flow.		
4	CEA43DROP	R (ATC) C (BOP) C (SRO)	CEA 43 fully inserts due to faulty timing card. TS for SRO.		
5	RCP2P32ALOS	C (ATC) C (SRO)	'A' RCP oil leak.		
6	MSSGBLK	M (ALL)	Excess steam demand inside containment on 'B' Steam generator.		
7	EFW2P7BFLT EFW2P7ACOU	M (ALL)	2P-7B EFW pump motor fault on start, 2P-7A EFW pump coupling failure.		
8	CV0760 DO_CV_0760_1 DO_CV_0760_2 CV0761 DO_CV_0760_1 DO_CV_0760_2	C (BOP) C (SRO)	The selected AFW flow path discharge valve will trip its breaker requiring the other path to be used. If 'B' EFW header is chosen 2CV-0760 will fail and if 'A' EFW header is chosen 2CV-0761 will fail.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

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

**Scenario #1 Objectives**

- 1) Evaluate individual ability to control Service Water return valves.
- 2) Evaluate individual response to a trip of a Containment Cooling fan.
- 3) Evaluate individual response to a failure of a temperature input to the letdown heat exchanger and ability to manually control temperature.
- 4) Evaluate individual response to a CEA Malfunction.
- 5) Evaluate individual response to a Reactor Coolant pump oil leak (RCP emergencies).
- 6) Evaluate crew ability to mitigate an Excess Steam Demand.
- 7) Evaluate crew ability to mitigate a Loss of Feedwater.
- 8) Evaluate individual ability to combat events using the Functional Recovery procedure.
- 9) Evaluate individual ability to respond to a failure of an AFW pump discharge valve.

**SCENARIO #1 NARRATIVE**

Simulator session begins with the plant at 100% power steady.

When the crew has completed their control room walk down and brief, the BOP will shift the Loop 1 service water return from ECP to Lake.

When the Loop 1 service water return is aligned to the lake and cued by lead examiner, 2VSF-1D containment cooling will trip. The BOP will determine that 2VSF-1D has tripped and refer to Annunciator corrective actions. The BOP will start the idle containment cooler to maintain containment temperature and pressure in the acceptable region of operation. The SRO will enter Tech Spec 3.6.2.3 action a.

After the BOP has started the idle containment cooling fan and cued by lead examiner, the temperature input to the letdown heat exchanger temperature controller will fail high. The ATC will report that the letdown heat exchanger temperature is reading high on the hand indicating controller but the computer point and control board indication are reading lower than normal. The SRO will direct the ATC to take manual control of the Letdown heat exchanger temperature control valve and manually control temperature.

After the letdown temperature controller has been placed in manual and cued by the lead examiner, CEA 43 will drop into the core. The SRO will enter the CEA malfunction AOP, OP 2203.003. The SRO should check that less than 2 CEAs are inserted and then commence a down power within 15 minutes. The BOP should complete attachment C DNBR/LPD log. The SRO will enter Tech Specs for CEA position (3.1.3.1d) and Aztilt (3.2.3).

After the crew has completed the required reactivity manipulation, entered the appropriate tech specs, and cued by the lead examiner, 'A' RCP oil leak will start which cause oil level to lower and bearing temperatures to raise. The ATC should trip the reactor and secure the 'A' RCP. The crew may elect to secure a RCP in the 'B' S/G loop to balance flows.

**SCENARIO #1 NARRATIVE (continued)**

The Crew will implement Standard Post Trip Actions (SPTA), OP 2202.001. After the reactor trips a Main Steam line break inside containment will cause an Excess Steam Demand. Main Steam Isolation (MSIS) and Containment Spray (CSAS) will actuate tripping Main Feedwater pumps, Condensate pumps, AFW pump, closing the MSIVs and feedwater block valves. The 2P-7B EFW pump motor will fail and 2P-7A coupling will break causing a loss of feedwater event. The ATC will secure all the Reactor Coolant pumps due to the Containment Spray actuation.

The SRO will diagnose an Excess Steam Demand and Loss of Feedwater event and enter OP 2202.009, Functional Recovery. The crew will maintain post blowdown temperature and pressure of the RCS to prevent pressurized thermal shock. The BOP will steam 'A' S/G using the upstream Atmospheric Dump valve when 'B' S/G blows dry. The ATC should use Auxiliary Spray to maintain RCS pressure. The Crew will restore Feedwater from the AFW pump 2P-75 after removing the MSIS and CSAS trip. The selected feed path from AFW will trip its breaker when the valve is opened requiring use of the alternate flow path.

Facility: ANO-2		Scenario No.: 2 (New)		Op-Test No.: 2014-1	
Examiners:			Operators:		
_____			_____		
_____			_____		
Initial Conditions: ~40 % due to elevated S/G Chloride. MOL. All Engineered Safety Features systems are in standby. Hold power ~ 40 % until S/G Chloride less than 10 ppb. 'C' channel Excore has failed and PPS points 1 through 4 are in bypass. RED Train Maintenance Week.					
Turnover: RED Train Maintenance Week. 260 EFPD. EOOS indicates 'Minimal Risk'. Hold power ~ 40 % until S/G Chloride less than 10 ppb. SG blowdown ~120 gpm per SG for cleanup. Reactor Engineering is developing reactivity plan for power escalation. 'C' channel Excore has failed and PPS points 1 through 4 are in bypass and all required actions are complete. Evolution scheduled: Swap component cooling water pumps from 2P-33C to 2P-33B for maintenance on 2P-33C.					
Event No.	Malf. No.	Event Type*	Event Description		
1		N (BOP) N (SRO)	Swap running CCW pumps from 2P-33C to 2P-33B.		
2	NIBUPPER	C (BOP) C (SRO)	'B' channel Excore upper chamber fails high. TS for SRO.		
3	XRCCHBPCNT	I (ATC) I (SRO)	'B' Pressurizer control channel pressure fails high.		
4	CCW2P33BPWR CCW2P33CPWR	C (BOP) C (SRO)	2P-33B CCW pump trips and 2P-33C CCW pump fails to re-start.		
5	RCP2P32CSLK	R (ATC) C (BOP) C (SRO)	'C' RCP develops an intersystem LOCA from the RCS to CCW of 15 gpm. TS for SRO.		
6	RCP2P32CSLK ESFK202AAF ESFK202BAF	M (All)	'C' RCP intersystem LOCA degrades to 250 gpm. If crew does not isolate CCW to RCPs then when CIAS actuates CCW to RCP valves fail to close.		
7	RCSHTRON	C (ATC) C (SRO)	Pressurizer Backup Heaters fail to de-energize on low pressurizer level.		
8	CV0231	C (BOP) C (SRO)	Gland seal regulator 2PCV-0231 fails closed.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Total malfunctions. = 7, Malfunctions after EOP entry = 2, Abnormal events = 4, Major transient = 1, EOPs with substantive actions =1, EOP Contingencies = 0, Critical tasks = 3.

**Scenario #2 Objectives**

- 1) Evaluate individual ability to swap running Component Cooling water pumps.
- 2) Evaluate individual response to a failure of a Nuclear Instrument.
- 3) Evaluate individual response to a Pressurizer System Malfunction (Pressure channel failure).
- 4) Evaluate individual response to a failure of a Component Cooling water pump.
- 5) Evaluate individual response to an intersystem Loss of Coolant Accident. (LOCA)
- 6) Evaluate crew ability to mitigate an intersystem LOCA.
- 7) Evaluate individual response to failure of a gland seal regulator.
- 8) Evaluate individual response to a failure of the pressurizer backup heaters to de-energize on low level.

**SCENARIO #2 NARRATIVE**

Simulator session begins with the plant at 100% power steady.

When the crew has completed their control room walk down and brief, the BOP will swap CCW pumps placing 2P-33B in service.

When 2P-33B CCW pump has been placed in service and cued by lead examiner; Channel B Excure upper chamber will fail high. The SRO will enter the NI malfunction AOP and the crew should determine that B channel linear power is failed but log power is still function by monitoring output for the three chambers. The SRO will also enter Tech Spec 3.3.1.1 action 3 for Reactor Protection System. The BOP will trip points 1, 3, and 4 on channel 'B' by using the linear calibrate switch.

After the BOP has tripped points 1, 3, and 4, and cued by lead examiner, the 'B' pressurizer pressure control channel will fail high causing the spray valves to open and RCS pressure to lower. The CRS should enter the 2203.028 Pressurizer System malfunction AOP. The crew will place the other pressurizer pressure controller in service, verify that both spray valves close, and the pressurizer heaters restore RCS pressure. The BOP will place a maximum of one Steam Dump and Bypass Control System (SDBCS) valve permissive in manual and all other permissives to off.

When the SDBCS permissives have been aligned and cued by the lead examiner, 2P-33B will trip and 2P-33C will fail to start automatically or manually. The SRO will enter the RCP emergencies AOP, OP 2203.025. The BOP should call NLOs to investigate the CCW pump trip. The SRO should direct the BOP to start 2P-33C but it will fail to start. The SRO will then direct opening all CCW cross-tie valves and start 2P-33A.



**SCENARIO #2 NARRATIVE (continued)**

After the crew has restored CCW flow to the RCPs, and cued by the lead examiner, A 15 gpm RCS to CCW leak will start. The crew should notice that CCW Surge Tank level is rising. Also the CCW letdown radiation monitor will alarm indicating RCS to CCW leakage. The SRO will enter the Excess RCS leakage, 2203.016 and direct the board operator actions. The crew should perform leak rates, isolate letdown to verify the leak is not in letdown and determine the need for a plant shutdown using normal boration. The SRO should enter Attachment A, align the CCW surge tanks to the gas collection header and direct the AO to control surge tank level. The crew will perform a power reduction such that the plant will be taken off line. The SRO should enter Tech Spec 3.4.6.2 for RCS leakage. The ATC will borate the RCS and reduce turbine load to maintain Tave-Tref within 2°F. The BOP will make preparations to remove secondary plant equipment from service as power is reduced.

After the required reactivity manipulations are complete and cued by the lead examiner, the RCS to CCW will degrade to 250 gpm. The SRO will direct the reactor to be tripped, actuate SIAS & CCAS, secure RCPs, and isolate CCW to the RCPs. The SRO should enter and direct the actions of SPTAs.

The crew will implement Standard Post Trip Actions (SPTA), OP 2202.001. The ATC should recognize that the pressurizer backup heaters failed to de-energize on low pressurizer level. Also, the crew should place the SDBCS master controller in Auto Local and lower the set point to maintain margin to saturation.

The SRO will diagnose a LOCA and enter OP 2202.003, Loss of Coolant Accident. After the crew has entered the LOCA EOP, 2PCV-0231 gland seal pressure control valve will fail closed. The BOP will manually control 2CV-0233 gland seal bypass valve to maintain gland seal header pressure and condenser vacuum. The crew will commence a cooldown to allow depressurization and refilling the pressurizer. The BOP will restore Service Water to Component Cooling Water and Auxiliary Cooling water.

Facility: ANO-2		Scenario No.: 3 (New)		Op-Test No.: 2014-1	
Examiners:			Operators:		
Initial Conditions: 98% MOL; All Engineered Safety Features systems are in standby. RED Train Maintenance Week. Mabelvale transmission line out of service and Unit 2 output is limited to 1035 MW gross, 995 MW net.					
Turnover: 260 EFPD. 98%. Mabelvale transmission line out of service and Unit 2 output is limited to 1035 MW gross, 995 MW net. Reactor engineering is developing reactivity plans. EOOS indicates 'Minimal Risk'. RED Train Maintenance Week. Evolution scheduled: Shift running vacuum pumps.					
Event No.	Malf. No.	Event Type*	Event Description		
1		N (BOP) N (SRO)	Shift running vacuum pumps.		
2	DO_HS_8259_G CV82591 XRI2RITS8231A DO_RITS8231_10	C (BOP) C (SRO)	2RITS-8271-2 coupling fails and 2RITS-8231-1 particulate detector fails high when started. Tech Spec for SRO.		
3	XRRPZRLSP	I (ATC) I (SRO)	Reactor Reg. output to PZR level control program fails to 41%.		
4	MFWPMPBTRP	R (ATC) C (BOP) C (SRO)	'B' main feed water pump trips due to thrust bearing wear. TS (Tcold out of range high) for SRO.		
5	SGBTUBE	M (ALL)	'B' Steam Generator Tube Rupture ramps up to 300 gpm over 20 min. Manual reactor trip criteria when exceeds 44 gpm. TS for SRO		
6	ESFSIAS2 CV48211	C (ATC) C (BOP) C (SRO)	Green Train SIAS fails to actuate and letdown isolation 2CV-4821-1 fails open.		
7	CV0302 CV0303 CV0306	C (ATC) C (SRO)	Steam dump turbine bypass valve being used for the cooldown will fail closed during the RCS cooldown.		
8					
* (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 = 3.

### Scenario #3 Objectives

- 1) Evaluate individual ability to perform a vacuum pump swap.
- 2) Evaluate individual response to a failure of a Containment Air monitor.
- 3) Evaluate individual response to a failure of a Containment Air monitor radiation monitor.
- 4) Evaluate individual response to a Pressurizer system malfunction involving pressurizer level failing high.
- 5) Evaluate individual response to a failure of loss of main feedwater pump.
- 6) Evaluate crew's ability to mitigate a Steam Generator Tube Rupture.
- 7) Evaluate individual response to Green Train SIAS failure to actuate.
- 8) Evaluate individual response to a failure of letdown to automatically isolate.
- 9) Evaluate individual response to a steam dump turbine bypass valve failing closed.

### SCENARIO #3 NARRATIVE

Simulator session begins with the plant at ~98% power.

When the crew has completed their control room walk down and brief, they will shift running vacuum pumps.

When the vacuum pumps have been shifted or when cued by the lead examiner, the in-service CAMS unit coupling will fail and when the back up CAMS unit is started the particulate detector will fail high. The ATC should report the 2K-11 H10 CNTMT Air Monitor trouble alarm and refer to the ACA. The BOP should investigate and determine that 2RITS-8271-2 has low flow. When contacted, the NLO will report the coupling has failed. The BOP should use OP-2104.033 ventilation system operations to place the standby CAMS unit in service. When the standby CAMS unit is placed in service, the particulate detector will fail requiring entry into Tech Spec 3.4.6.1

When all actions due to the CAMS failure have been completed, and cued by the lead examiner, the reactor reg pressurizer level program output will fail to minimum (41%). The SRO will enter the PZR system malfunctions AOP, OP 2203.028. The ATC will take manual control of letdown to control pressurizer level. The ATC must take control of PZR heaters to control RCS pressure (All heaters will be energized) The ATC should place the PZR level controller to Auto and Local then adjust the setpoint to programmed setpoint. Then Letdown should be placed back in automatic. This failure will also prevent manual start of back up charging pumps if needed to control PZR level.

When letdown has been restored to automatic and cued by the lead examiner, or cued by lead examiner, 'B' MFWP will trip. The SRO will enter and implement Loss of Main feedwater pump AOP, 2203.027. This will result in Steam Flow exceeding Feed flow and SG levels dropping. The crew will manually and rapidly reduce turbine load, insert group 6 and group P CEAs, borate using emergency boration to the RCS until Feed flow is greater than Steam Flow. Then continue with a normal boration power reduction to less than 80%.

After the crew has restored feedwater flow greater than steam flow or cued by lead examiner, a Steam Generator Tube Rupture (SGTR) will occur on 'B' Steam Generator. The SRO will enter primary to secondary leakage AOP, OP 2203.038. The crew should determine that the leak rate is greater than 44 gpm. They will trip the reactor, actuate SIAS, and CCAS. The SRO should enter TS 3.4.6.2.

**SCENARIO #3 NARRATIVE (continued)**

The Crew will implement Standard Post Trip Actions (SPTA) EOP, 2202.001. When SIAS is actuated the green train components will fail to reposition. The crew should recognize the failure of green train SIAS to actuate. The BOP should have a NLO to check the breaker and pump motors for the green train High Pressure Safety Injection (HPSI) and Low Pressure Safety Injection pumps (LPSI) pumps. After the NLO report, the BOP should manually start 2P-89B HPSI pump and open all injection valves. Also, 2CV-4821-1 red train letdown isolation valve will fail to close leaving letdown aligned. The ATC should recognize that letdown is aligned and close a green train isolation (that failed to actuate) to help maintain RCS inventory. The crew will align service water to CCW to maintain forced circulation. The crew may lower Steam Dump master controller setpoint during SPTAs to aid in maintaining margin to saturation.

The SRO will diagnose and enter the Steam Generator Tube Rupture (SGTR) EOP. The ATC should commence cool down of the RCS to allow isolation of 'B' steam generator. The BOP will override Service Water to Auxiliary Cooling Water to maintain condenser vacuum. During the cooldown, 2CV-0303, 2CV-0302, or 2CV-0306 (depending on which is being used) will fail closed impacting the cooldown rate the ATC will notice that the cooldown has stopped and adjust the cooldown rate to ensure the steam generator is isolated within the 30 minute required time. Once  $T_{hot}$  is less than 535 degrees F, the BOP should isolate 'B' steam generator.