

Facility:		Date of Exam:																			
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												18	3	3	6					
	2												9	2	2	4					
	Tier Totals												27	5	5	10					
2. Plant Systems	1												28	2	3	5					
	2												10	0	2	3					
	Tier Totals												38	4	4	8					
3. Generic Knowledge and Abilities Categories		1		2		3		4		10		1		2		3		4		7	
												2		2		1		2			
<p>Note:</p> <ol style="list-style-type: none"> <li>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).</li> <li>2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by <math>\pm 1</math> from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.</li> <li>3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.</li> <li>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.</li> <li>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.</li> <li>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</li> <li>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.</li> <li>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.</li> <li>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.</li> </ol>																					

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / 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		<b>EA2.13 Ability to determine or interpret the following as they apply to a small break LOCA:</b>  <b>Charging Pump flow indication</b>  (CFR 43.5 / 45.13)	3.6	1
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2						X	<b>2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm.</b>  (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.3	2
000025 Loss of RHR System / 4									
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3					X		<b>AA2.11 Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions:</b>  <b>RCS Pressure</b>  (CFR: 43.5 / 45.13)	4.0	3
000029 ATWS / 1									
000038 Steam Gen. Tube Rupture / 3									
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4									
000054 (CE/E06) Loss of Main Feedwater / 4									
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6						X	<b>2.4.41 Knowledge of the emergency action level thresholds and classifications.</b>  (CFR: 41.10 / 43.5 / 45.11)	4.6	4

000057 Loss of Vital AC Inst. Bus / 6					X		AA2.14 <b>Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus:</b>  <b>That substitute power sources have come on line on a loss of initial ac.</b>  (CFR: 43.5 / 45.13)	3.6	5
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4									
000065 Loss of Instrument Air / 8									
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									
000077 Generator Voltage and Electric Grid Disturbances / 6						X	2.2.40 <b>Ability to apply Technical Specifications for a system.</b>  (CFR: 41.10 / 43.2 / 43.5 / 45.3)	4.7	6
K/A Category Totals:					3	3	Group Point Total:		6

[illegible]

W/E03 LOCA Cooldown - Depress. / 4					X		EA2.1 <b>Ability to determine and interpret the following as they apply to the (LOCA Cooldown and Depressurization)</b>  <b>Facility conditions and selection of appropriate procedures during abnormal and emergency operations.</b> (CFR: 43.5 / 45.13)	3.4	9
W/E10 Natural Circulation with Steam Void in Vessel with/without RVLIS / 4						X	2.4.46 <b>Ability to verify that the alarms are consistent with the plant conditions.</b> (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.2	10
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:					2	2	Group Point Total:		4

PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / 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														
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											X	2.4.30 <b>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.</b>  (CFR: 41.10 / 43.5 / 45.11)	4.1	11
013 Engineered Safety Features Actuation								X				A2.05 <b>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;</b>  <b>Loss of dc control power</b>  (CFR: 41.5 / 43.5 / 45.3 / 45.13)	4.2	12
022 Containment Cooling											X	2.1.32 <b>Ability to explain and apply system limits and precautions.</b>  (CFR: 41.10 / 43.2 / 45.12)	4.0	13
025 Ice Condenser														
026 Containment Spray														
039 Main and Reheat Steam														
059 Main Feedwater														
061 Auxiliary/Emergency Feedwater														
062 AC Electrical Distribution														

063 DC Electrical Distribution									X				A2.01 <b>Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:</b>  <b>Grounds</b>  (CFR: 41.5 / 43.5 / 45.3 / 45.13)	3.2	14
064 Emergency Diesel Generator															
073 Process Radiation Monitoring															
076 Service Water															
078 Instrument Air															
103 Containment												X	2.4.4 <b>Ability to recognize abnormal indications for system operating parameters that   are entry-level conditions for emergency and abnormal operating procedures.</b>  (CFR: 41.10 / 43.2 / 45.6)	4.7	15
K/A Category Point Totals:									2			3	Group Point Total:		5

[illegible]



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																		
079 Station Air																		
086 Fire Protection																		
K/A Category Point Totals:									2				1	Group Point Total:				3

Facility:		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.40	<b>Knowledge of refueling administrative requirements.</b> (CFR: 41.10 / 43.5 / 45.13)			3.9	19
	2.1.37	<b>Knowledge of procedures, guidelines, or limitations associated with reactivity management.</b> (CFR: 41.1 / 43.6 / 45.6)			4.6	20
	2.1.					
	2.1.					
	2.1.					
	2.1.					
	Subtotal					2
2. Equipment Control	2.2.6	<b>Knowledge of the process for making changes to procedures.</b> (CFR: 41.10 / 43.3 / 45.13)			3.6	21
	2.2.22	<b>Knowledge of limiting conditions for operations and safety limits.</b> (CFR: 41.5 / 43.2 / 45.2)			4.7	22
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	Subtotal					2
3. Radiation Control	2.3.13	<b>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.</b> (CFR: 41.12 / 43.4 / 45.9 / 45.10)			3.8	23
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal					1

4. Emergency Procedures / Plan	2.4.21	<b>Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.</b> (CFR: 41.7 / 43.5 / 45.12)			4.6	24
	2.4.38	<b>Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required.</b> (CFR: 41.10 / 43.5 / 45.11)			4.4	25
	2.4.					
	2.4.					
	2.4.					
	2.4.					
	Subtotal					2
Tier 3 Point Total						7

- Random Selection method was performed for re-selecting K/As using pennies with dates ending in 0-9. The pennies were drawn in sequence to designate K-1 thru A4, then drawn to pick the number of the K/A in sequence. Pennies 1-9 were drawn from, then 0-9, then 0-9 again. Generic K/A replacements were drawn from the generic section using the same number selection method. If a K/A could be selected from within the same System and K/A section (ie. A1, K2, etc.) then only the last two numbers were reselected. If a K/A could not be replaced within the same section, then a new section and K/A number were selected within the same system using the method listed above. If a no usable K/A could be selected within the system, then a new system, and K/A was selected from within the Same Tier and Group ensuring no resampling of systems within the Tier and Group unless all Systems were already sampled.

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1	000009 EA2.13	000009 EA2.26 Question #1 - Does not apply to this evolution. Random selection of new K/A with the original safety function.
1/1	000027 AA2.11	000027 AA2.12 Question #3 - Does not apply to this evolution. Random selection of new A2 K/A with the original safety function.
1/1	000077 G2.2.40	000077 G2.1.27 Question #6 - Unable to write SRO level question to meet K/A. Random selection from within Generic K/As.
1/2	000076 G2.4.11	W/E01 G2.4.11 Question #8 - Unable to write SRO level question to meet K/A. Randomly selected new safety function but maintained the same Generic K/A.
2/1	G2.4.4	G2.4.1 Question #15 – there are no immediate action steps associated with containment. Random selection from within same Generic Category 4.
2/2	G2.1.40	G2.2.39 Question #17 – One hour Technical Specification are RO knowledge. Random selection from all Generic Categories for the same system.
2/2	015 A2.04	041 A2.02 Question #18 - Previous Exam Overlap. Unable to write another question to K/A and maintain separation. Specifically this K/A was on the 2014 Audit exam. Random selection from within same Tier / Group.
3	G2.1.40	G2.1.34 Question #19 - Previous Exam Overlap. Unable to write another question to K/A and maintain separation from 2014 NRC and AUDIT exams. Random selection from within same Generic Category 1.
3	G2.2.6	G2.2.5 Question #21 - Previous Exam Overlap. Unable to write another question to K/A and maintain separation from 2014 NRC and AUDIT exams. Random selection from within same Generic Category 2.
3	G2.4.38	G2.4.22 Question #25 – Overlap with other tier 3 Category 4 with this exam (Question #24). Random selection from within same Generic Category 4.