

Facility: Vogtle 3&4													Date of Exam: March 2020				
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 and Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A			3	18	3	3	6
	2	1	1	1	N/A			2	2	N/A			2	9	2	2	4
	Tier Totals	4	4	4	N/A			5	5	N/A			5	27	5	5	10
2. Plant Systems	1	3	2	3	3	3	2	2	2	3	3	2	28	2	3	5	
	2	1	0	1	1	1	1	1	1	1	1	1	10	-	1	2	3
	Tier Totals	4	2	4	4	4	3	3	3	4	4	3	38	3	5	8	
3. Generic Knowledge and Abilities Categories				1		2		3		4		10	1	2	3	4	7
				3		3		1		3			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 outline section (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)
 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 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-401N 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-401N for the applicable K/As.
 8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' 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 above 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-401N-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

G* Generic K/As

ES-401N		AP-1000® Examination Outline						Form ES-401N-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A2	G*	K/A Topic(s)	IR	#
E-0, Reactor Trip or Safeguards Actuation / 1, 2, 3, 4		R					R: EK2.06 Unavailability of either the startup feedwater pumps or Passive Residual Heat Removal System.	3.6	
ES-0.1, Reactor Trip Response / 1, 2, 3, 4			R				R: EK3.16 Energizing the source range nuclear instrumentation	3.2	
ES-1.3, ADS Stage 1–3 Actuation Response / 3				R			R: EA1.03 Diverse Actuation System	3.4	
ES-1.4, ADS Stage 4 Actuation Response / 3					R		R: EA2.05 RNS alignment	2.9	
A-313, Uncontrolled Cooldown / 4						R	R: G2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	
A-336, Malfunction of Protection and Safety Monitoring System / 7					S		S: AA2.02 Diverse Actuation System indications	3.7	
E-1, Loss-of-Coolant Accident / 2, 3	R						R: EK1.10 Passive Containment Cooling System	3.9	
A-342, Reactor Coolant Pump Malfunction / 1, 2, 3, 4		R					R: AK2.02 Reactor coolant pump trip in mode 3, 4, or 5	3.1	
A-337, Passive RHR Heat Exchanger Leak / 4			R				R: AK3.07 Trending Passive Residual Heat Removal System inlet pressure over time	2.6	
A-343, Loss of Normal Residual Heat Removal / 4				R			R: AA1.06 Engineered Safeguards Actuation System	4.0	
A-317, Loss of Component Cooling Water / 8						S	S: G2.2.17 Knowledge of limiting conditions for operations and safety limits.	4.7	
ES-0.2, Natural Circulation Cooldown / 4					R		R: EA2.02 Reactor Coolant System temperature, pressure, and/or pressurizer level	3.4	
FR-S.1, Response to Nuclear Power Generation / 1						R	R: G2.4.9 Knowledge of operating crew responsibilities during emergency/abnormal operations.	4.0	
E-3, Steam Generator Tube Rupture / 3					S		EA2.02 Ruptured steam generator feedflow, level, and/or pressure	3.8	
E-2, Faulted Steam Generator Isolation / 4	R						R: EK1.01 Steam Generator Blowdown System	2.9	
A-301, Rapid Power Reduction / 1		R					R: AK2.04 Failure of P-10, Power Range Neutron Flux to reset	3.3	
A-307, DAS Operations at Local Cabinets / 7							NOT SELECTED		
FR-C.1, Response to Inadequate Core Cooling / 4						S	S: G2.1.19 Ability to interpret and execute procedure steps.	4.6	
A-323, Loss of 6.9-kV, 4,160-V, or 480-V Bus Power / 6					S		S: AA2.03 Standby diesel generator load	3.4	
ES-1.1, Passive Safety System Termination / 3			R				R: EK3.11 Blocking Steamline / Feedwater Isolation Actuations and/or Safeguards Actuation below P-11, Pressurizer Pressure Below 1970 psig	3.4	
A-345, Loss of Nuclear Service Water / 4				R			R: AA1.02 Compressed and Instrument Air System	2.6	
A-329, Loss of Instrument Air / 8						S	S: G2.2.30 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.	4.4	
ECA-1.1, Loss-of-Coolant Accident Outside Containment / 3					R		R: EA2.02 Plant vent radiation	3.2	

FR-H.1, Response to Loss of Heat Sink / 4						R	R: G2.4.39 Ability to verify system alarm setpoints and operate controls identified in the Alarm Response Procedure.	4.2	
SDP-1, Response to Loss of RCS Inventory During Shutdown / 2	R						R: EK1.08 Passive Residual Heat Removal System	3.4	
SDP-2 Response to Loss of RNS During Shutdown / 4							NOT SELECTED		
K/A Category Totals:	3	3	3	3	3/3	3/3	Group Point Total:		18/6

ES-401N		AP-1000® Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)						Form ES-401N-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A2	G*	K/A Topic(s)	IR	#
A-311, Rod Control System Malfunction / 1							NOT SELECTED		
A-308, Loss of Control Room AC / 8							NOT SELECTED		
A-320, Loss of Circulating Water / 8					R		R: AA1.04 Cooling tower level makeup and/or blowdown control	2.6	
A-302, Emergency Boration / 1							NOT SELECTED		
A-327, Startup Feedwater System Malfunction / 4					R		R: AA2.01 Steam generator level	2.8	
A-328, Malfunction of Feedwater Heaters and Extraction Steam / 4							NOT SELECTED		
FR-I.1 Response to High Pressurizer Level / 2							NOT SELECTED		
A-314, Fuel-Handling Incident / 8					S		S: AA2.01 Containment Bldg, fuel handling building, and/or plant vent radiation level	3.4	
A-304, Steam Generator Tube Leak / 3						R	R: G2.2.23 Knowledge of conditions and limitations in the facility license.	3.6	
A-333, Main Turbine Malfunction / 4							NOT SELECTED		
FR-Z.1, Response to High Containment Pressure / 5							NOT SELECTED		
SDP-4, Response to Rising Nuclear Flux During Shutdown / 1							NOT SELECTED		
SDP-5, Response to RCS Cold Overpressure During Shutdown / 3						S	S: G2.1.21 Ability to perform general and/or normal operating procedures during any plant condition.	4.4	
SDP-6 Response to Unexpected RCS Temperature Changes During Shutdown / 4	R						R: EK1.05 Service Water System	2.9	
A-306, Evacuation of Control Room / 8					S		S: AA2.02 Chemical and Volume Control System makeup system flows	2.9	
A-318, Condensate System Malfunctions / 4		R					R: AK2.05 Loss of cooling to gland sealing condenser	2.5	
FR-C-2, Response to Degraded Core Cooling / 4							NOT SELECTED		
FR-C.3, Response to Saturated Core Cooling / 4							NOT SELECTED		
FR-H.2, Response to Steam Generator Overpressure / 4			R				R: EK3.03 Verifying SG PORVs are not isolated	3.2	
FR-Z.2, Response to Containment Flooding / 5							NOT SELECTED		
FR-Z.3, Response to High Containment Radiation / 9							NOT SELECTED		
FR-Z.4, Response to Low Containment Pressure / 5				R			R: EA1.05 Engineering Safeguard Actuation System	2.8	
A-332, Turbine Trip Without Reactor Trip / 4					R		R: AA2.01 Reactor Coolant System temperature	3.2	
ES-1.2, Post LOCA Cooldown and Depressurization / 4							NOT SELECTED		
A-321, Loss of Data Display and Processing System / 7							NOT SELECTED		
FR-P.1, Response to Imminent Pressurized Thermal Shock Condition / 3						R	R: G2.4.16 Knowledge of the parameters and logic used to assess the status of Emergency Operating Procedures Critical Safety Functions or Shutdown Critical Safety Functions.	4.0	
A-340, Reactor Coolant Leak / 2							NOT SELECTED		

FR-I.2, Response to Low Pressurized Level / 2								NOT SELECTED		
FR-I.3, Response to Voids in Reactor Vessel / 2								NOT SELECTED		
A-326, Feedwater System Malfunctions / 4								NOT SELECTED		
A-331, Loss of Plant DC Power or Batteries / 6								NOT SELECTED		
A-348, Degraded Grid / 6							S	S: G2.4.24 Knowledge of annunciator alarms, indications, or response procedures.	4.1	
K/A Category Totals:	1	1	1	2	2/2	2/2		Group Point Total:	9/4	

ES-401N		AP-1000® Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO)											Form ES-401N-2	
System Name / Safety Function	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G*	K/A Topic(s)	IR	#
Reactor Coolant / 2, 4	R										S	R: K1.03 Component Cooling Water System S: G2.1.17 Ability to use available indications to evaluate system or component status.	3.1 3.8	
Steam Generator / 4	R	R										R: K1.16 Steam Dump Control System R: K2.11 Steam generator blowdown isolation valves	3.2 2.9	
Normal Residual Heat Removal / 4			R					S				R: K3.02 Passive Core Cooling System S: A2.08 Containment isolation valves	3.6 3.9	
Passive Residual Heat Removal /4		R		R								R: K2.01 Passive Residual Heat Removal System heat exchanger inlet isolation valves R: K4.05 Passive Residual Heat Removal System flow control	3.2 3.6	
Passive Core Cooling / 2			R		R							R: K3.02 Normal Residual Heat Removal System R: K5.05 Post accident containment pH control	3.2 3.4	
Component Cooling Water / 8				R		R						R: K4.05 Chemical and Volume Control System makeup pump protection R: K6.28 Reactor coolant pump external heat exchanger tube leak	3.0 3.2	
Pressurizer Pressure Control / 3							R					R: A1.16 Pressurizer and Reactor Coolant System boron Concentration	3.3	
Automatic Depressurization / 3								R				R: A2.02 Engineered Safeguards Actuation System	4.1	
Reactor Trip System / 7									R			R: A3.02 Power Range Neutron Flux High Positive Rate Reactor Trip	4.1	
Engineered Safeguards Actuation / 2										R	S	R: A4.07 Startup Feedwater Isolation Actuation S: G2.2.22 Ability to determine operability or availability of safety related equipment.	3.9 4.6	
Diverse Actuation / 7											R	R: G2.4.9 Knowledge of operating crew responsibilities during emergency/abnormal operations.	4.0	
Passive Containment Cooling / 5	R											R: K1.08 Fire Protection System	2.7	
Main Steam / 4					R							R: K5.03 Changing steam flow effect on reactor power	3.7	
Main and Startup Feedwater / 4			R					S				R: K3.07 Reactor Coolant System S: A2.04 Engineered Safeguards Actuation System	3.5 3.7	
AC Electrical Distribution / 6				R								R: K4.02 Back feeding buses from the grid	3.2	

Class 1E and Non 1E DC and UPS / 6						R							R: K5.02 Loss of one or more Class 1E instrument buses	3.7	
Onsite Standby Power System / 6							R						R: K6.10 Lubrication Oil System failure	3.0	
Service Water / 4								R					R: A1.04 Service Water System cooling tower basin level	2.7	
Compressed Air / 8									R				R: A2.02 Transmission Switchyard and Offsite Power System	2.7	
Containment System / 5										R		S	R: A3.01 Containment isolation	4.1	
													S: G2.4.9 Knowledge of operating crew responsibilities during emergency/abnormal operations.	4.3	
Reactor Coolant Pump / 4										R	R		R: A3.01 Reactor Coolant Pump Trip Actuation due to Engineered Safeguards Actuation	3.6	
													R: A4.02 Reactor coolant pump shutdown	2.9	
Chemical and Volume Control / 1, 2											R	R	R: A4.09 Containment Isolation Actuation	4.0	
													R: G2.1.28 Ability to explain and apply system precautions, limitations, notes, or cautions.	3.8	
K/A Category Point Totals:	3	2	3	3	3	2	2	2/2	3	3	2/3	Group Point Total:		28/5	

ES-401N	AP-1000® Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)											Form ES-401N-2		
System Name / Safety Function	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G*	K/A Topic(s)	IR	#
Digital Rod Control / 1												NOT SELECTED		
Pressurizer Level Control / 2								R				R: A2.06 Reactor Coolant System	3.2	
Rod Position Indication / 1											S	S: G2.2.19 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	4.2	
In-Core Instrument System / 7												NOT SELECTED		
Containment Air Filtration / 8									R			R: A3.02 Containment Air Filtration System Isolation Actuation	3.6	
Containment Hydrogen Control / 5										R		R: A4.01 Containment hydrogen monitor	3.6	
Main Control Room HVAC / 8											R	R: G2.1.24 Knowledge of system purpose and/or function.	3.9	
Spent Fuel Pool Cooling / 8												NOT SELECTED		
Condensate / 4	R											R: K1.11 Main and Startup Feedwater System	2.8	
Condenser Air Removal / 4							R					R: A1.01 Main condenser vacuum	3.1	
Main Turbine and Main Turbine Control / 4												NOT SELECTED		
Fuel Handling / 8												NOT SELECTED		
Gaseous Radwaste / 9								S				S: A2.10 Wetted activated carbon bed	2.6	
Radiation Monitoring / 7			R									R: K3.03 Post Accident Monitoring System	3.2	
Circulating Water / 8				R								R: K4.01 C-9, Condenser Available	3.1	
Fire Protection / 8											S	S: G2.4.7 Knowledge of how Abnormal Operating Procedures are used in conjunction with Emergency Operating Procedures.	4.5	
Steam Dump Control System / 4					R							R: K5.06 Changing steam flow effect on Reactor Coolant System temperature and/or cooldown rate	3.5	
Nuclear Instrumentation System / 7												NOT SELECTED		
Liquid Radwaste System / 9						R						R: K6.07 Waste holdup tank inputs, (such as; Containment sump, Auxiliary bldg sump, or Steam Generator blowdown)	2.6	
K/A Category Point Totals:	1	0	1	1	1	1	1	1/1	1	1	1/2	Group Point Total:	10/3	

Facility:			Date of Exam:			
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.14	Ability to use integrated control systems to operate plant systems or components.	4.0			
	2.1.38	Ability to use On-Line Power Distribution Monitoring System and/or procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, or fuel depletion.	4.1			
	2.1.19	Ability to interpret and execute procedure steps.	4.6			
	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, or overtime limitations.			3.9	
	2.1.13	Knowledge of administrative requirements for temporary management direction, such as standing orders, night orders, or operations memos.			3.4	
	Subtotal			3		2
2. Equipment Control	2.2.7	Knowledge of the process for conducting Infrequently Performed Tests or Evolutions.	2.9			
	2.2.10	Knowledge of the process for controlling equipment configuration or status.	3.9			
	2.2.16	Knowledge of pre- and post-maintenance operability requirements.	2.9			
	2.2.9	Knowledge of tagging and clearance procedures.			4.3	
	2.2.12	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	
	Subtotal			3		2
3. Radiation Control	2.3.1	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2			
	2.3.7	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, or aligning filters.			3.8	
	Subtotal			1		1
4. Emergency Procedures/Plan	2.4.15	Knowledge of the operational implications of emergency / abnormal operating procedures warnings, cautions, and notes.	3.8			
	2.4.17	Knowledge of the bases for prioritizing safety functions during abnormal / emergency operations.	3.6			
	2.4.23	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.	2.7			
	2.4.7	Knowledge of how Abnormal Operating Procedures are used in conjunction with Emergency Operating Procedures.			4.5	
	2.4.34	Knowledge of emergency communications systems and techniques.			3.8	
	Subtotal			3		2
Tier 3 Point Total			10		7	

