ES-401, Rev. 9 **PWR Examination Outline** **Form ES-401-2**

Facility: North Anna **Date of Exam:** 2010

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	3	3	3	N/A			3	3	N/A		3	18	3	3	6
	2	2	2	1				1	1			2	9	2	2	4
	Tier Totals	5	5	4				4	4			5	27	5	5	10
2. Plant Systems	1	3	3	1	3	3	3	3	2	2	2	3	28	3	2	5
	2	1	1	1	1	1	1	1	1	0	1	1	10	2 / 0	1	3
	Tier Totals	4	4	2	4	4	4	4	3	2	3	4	38	5	3	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1 / 2	3 / 4	7
		3			2			3			2			2 / 2	2 / 1	

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 KAs.
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, REV 9 | T1G1 PWR EXAMINATION OUTLINE | FORM ES-401-2

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
007EK2.02	Reactor Trip - Stabilization - Recovery / 1	2.6	2.8	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Breakers, relays and disconnects
008AK3.02	Pressurizer Vapor Space Accident / 3	3.6	4.1	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Why PORV or code safety exit temperature is below RCS or PZR temperature
009EA1.03	Small Break LOCA / 3	3.2	3.2	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Low-pressure SWS activity monitor
011EK1.01	Large Break LOCA / 3	4.1	4.4	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Natural circulation and cooling, including reflux boiling.
015AK2.08	RCP Malfunctions / 4	2.6	2.6	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	CCWS
025AK2.03	Loss of RHR System / 4	2.7	2.7	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Service water or closed cooling water pumps
026AA1.03	Loss of Component Cooling Water / 8	3.6	3.6	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	SWS as a backup to the CCWS
027AK3.01	Pressurizer Pressure Control System Malfunction / 3	3.5	3.8	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Isolation of PZR spray following loss of PZR heaters
038EA2.05	Steam Gen. Tube Rupture / 3	2.8	2.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Causes and consequences of shrink and swell in S/Gs
040AK1.04	Steam Line Rupture - Excessive Heat Transfer / 4	3.2	3.6	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Nil ductility temperature
056EK1.02	Station Blackout / 6	4.1	4.4	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Natural circulation cooling

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
056AG2.4.9	Loss of Off-site Power / 6	3.8	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.
057AG2.4.45	Loss of Vital AC Inst. Bus / 6	4.1	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to prioritize and interpret the significance of each annunciator or alarm.
062AA2.01	Loss of Nuclear Svc Water / 4	2.9	3.5	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Location of a leak in the SWS
065AG2.1.27	Loss of Instrument Air / 8	3.9	4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of system purpose and or function.
077AA1.02	Generator Voltage and Electric Grid Disturbances / 6	3.8	3.7	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Turbine / generator controls
WE05EK3.3	Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	4.0	4.1	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Manipulation of controls required to obtain desired operating results during abnormal and emergency situations.
WE11EA2.1	Loss of Emergency Coolant Recirc. / 4	3.4	4.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

ES-401, REV 9 | T1G2 PWR EXAMINATION OUTLINE | FORM ES-401-2

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
001AK1.03	Continuous Rod Withdrawal / 1	3.9	4	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Relationship of reactivity and reactor power to rod movement
032AA2.09	Loss of Source Range NI / 7	2.5	2.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Effect of improper HV setting
033AA1.01	Loss of Intermediate Range NI / 7	2.9	3.1	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Power-available indicators in cabinets or equipment drawers
036AK3.01	Fuel Handling Accident / 8	3.1	3.7	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Different inputs that will cause a reactor building evacuation
037AG2.1.19	Steam Generator Tube Leak / 3	3.9	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to use plant computer to evaluate system or component status.
074EK1.03	Inad. Core Cooling / 4	4.5	4.9	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Processes for removing decay heat from the core
WE02EK2.1	SI Termination / 3	3.4	3.9	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes and automatic and manual features.
WE15EK2.2	Containment Flooding / 5	2.7	2.9	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems and relations between the proper operation of these systems to the operation of the facility.
we16EG2.4.50	High Containment Radiation / 9	4.2	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
003K5.02	Reactor Coolant Pump	2.8	3.2	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Effects of RCP coastdown on RCS parameters
004G2.1.19	Chemical and Volume Control	3.9	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to use plant computer to evaluate system or component status.
004K6.15	Chemical and Volume Control	2.8	3.1	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Reason for venting VCT and pump casings while filling; vents must connect to LRS
005K6.03	Residual Heat Removal	2.5	2.6	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	RHR heat exchanger
006K6.18	Emergency Core Cooling	3.6	3.9	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Subcooling margin indicators
007K4.01	Pressurizer Relief/Quench Tank	2.6	2.9	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Quench tank cooling
007K5.02	Pressurizer Relief/Quench Tank	3.1	3.4	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Method of forming a steam bubble in the PZR
008A3.10	Component Cooling Water	2.9	3.0	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	CCW pump instruments and their respective sensors, including flow, pressure, oil level and discharge temperature
008G2.4.45	Component Cooling Water	4.1	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to prioritize and interpret the significance of each annunciator or alarm.
010A3.01	Pressurizer Pressure Control	3.0	3.2	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	PRT temperature and pressure during PORV testing
012K2.01	Reactor Protection	3.3	3.7	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	RPS channels, components and interconnections

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
012K5.01	Reactor Protection	3.3	3.8	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	DNB
013K2.01	Engineered Safety Features Actuation	3.6	3.8	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	ESFAS/safeguards equipment control
013K4.06	Engineered Safety Features Actuation	4.0	4.3	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Recirculation actuation system reset
022A1.01	Containment Cooling	3.6	3.7	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Containment temperature
026A2.09	Containment Spray	2.5	2.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Radiation hazard potential of BWST
039A4.01	Main and Reheat Steam	2.9	2.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Main steam supply. valves
059A1.07	Main Feedwater	2.5	2.6	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Feed Pump speed, including normal control speed for ICS
059K1.04	Main Feedwater	3.4	3.4	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	S/GS water level control system
061G2.1.23	Auxiliary/Emergency Feedwater	4.3	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to perform specific system and integrated plant procedures during all modes of plant operation.
082A1.03	AC Electrical Distribution	2.5	2.8	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Effect on instrumentation and controls of switching power supplies
062K1.04	AC Electrical Distribution	3.7	4.2	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Off-site power sources

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
063K4.04	DC Electrical Distribution	2.6	2.9	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Trips
064A4.10	Emergency Diesel Generator	3.3	3.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Need for and consequences of manually shedding (loads) safeguards bus
073A2.02	Process Radiation Monitoring	2.7	3.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Detector failure
076K1.07	Service Water	2.5	2.3	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Secondary closed cooling water
078K2.02	Instrument Air	3.3	3.5	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Emergency air compressor
103K3.03	Containment	3.7	4.1	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Loss of containment integrity under refueling operations.

ES-401, REV 9 | T2G2 PWR EXAMINATION OUTLINE | FORM ES-401-2

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
002K4.07	Reactor Coolant	3.1	3.5	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Contraction and expansion during heatup and cooldown
014A2.02	Rod Position Indication	3.1	3.6	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Loss of power to the RPIS
015K2.01	Nuclear Instrumentation	3.3	3.7	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	NIS channels, components and interconnections
017A1.01	In-core Temperature Monitor	3.7	3.9	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Core exit temperature
029K1.03	Containment Purge	3.6	3.8	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Engineered safeguards
034A4.01	Fuel Handling Equipment	3.3	3.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Radiation levels
045K3.01	Main Turbine Generator	2.9	3.2	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Remainder of the plant
055G2.4.3	Condenser Air Removal	3.7	3.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to identify post-accident instrumentation.
068K6.10	Liquid Radwaste	2.5	2.9	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Radiation monitors
086K5.03	Fire Protection	3.1	3.4	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Effect of water spray on electrical components

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.19	Conduct of operations	3.9	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to use plant computer to evaluate system or component status.
G2.1.20	Conduct of operations	4.6	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to execute procedure steps.
G2.1.9	Conduct of operations	2.9	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to direct personnel activities inside the control room.
G2.2.2	Equipment Control	4.6	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.
G2.2.37	Equipment Control	3.6	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to determine operability and/or availability of safety related equipment
G2.3.11	Radiation Control	3.8	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to control radiation releases.
G2.3.13	Radiation Control	3.4	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiological safety procedures pertaining to licensed operator duties
G2.3.4	Radiation Control	3.2	3.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiation exposure limits under normal and emergency conditions
G2.4.27	Emergency Procedures/Plans	3.4	3.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of "fire in the plant" procedures.
G2.4.4	Emergency Procedures/Plans	4.5	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
008AA2.25	Pressurizer Vapor Space Accident / 3	2.8	3.4	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Expected leak rate from open PORV or code safety
025AG2.2.36	Loss of RHR System / 4	3.1	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions of operations
058AA2.02	Loss of DC Power / 6	3.3	3.6	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	125V dc bus voltage, low/critical low, alarm
065AG2.1.19	Loss of Instrument Air / 8	3.9	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to use plant computer to evaluate system or component status.
WE04EA2.1	LOCA Outside Containment / 3	3.4	4.3	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Facility conditions and selection of appropriate procedures during abnormal and emergency operations.
we05EG2.4.2	Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	3.8	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of operational implications of EOP warnings, cautions and notes.

ES-401, REV 9 | SRO T1G2 PWR EXAMINATION OUTLINE | FORM ES-401-2

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
001AA2.03	Continuous Rod Withdrawal / 1	4.5	4.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Proper actions to be taken if automatic safety functions have not taken place
028AA2.08	Pressurizer Level Malfunction / 2	3.1	3.5	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	PZR level as a function of power level
036AG2.4.8	Fuel Handling Accident / 8	3.8	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.
068AG2.2.40	Control Room Evac. / 8	3.4	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to apply technical specifications for a system.

ES-401, REV 9 | SRO T2G1 PWR EXAMINATION OUTLINE | FORM ES-401-2

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
008G2.2.39	Emergency Core Cooling	3.9	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of less than one hour technical specification action statements for systems.
010G2.4.31	Pressurizer Pressure Control	4.2	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of annunciators alarms, indications or response procedures
026A2.09	Containment Spray	2.5	2.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Radiation hazard potential of BWST
064A2.10	Emergency Diesel Generator	2.4	2.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Unloading (reduction of generated power) in steps over a period of time
073A2.02	Process Radiation Monitoring	2.7	3.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Detector failure

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
015A2.03	Nuclear Instrumentation	3.2	3.5	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Xenon oscillations
027G2.4.30	Containment Iodine Removal	2.7	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of events related to system operations/status that must be reported to internal orginizations or outside agencies.
035A2.02	Steam Generator	4.2	4.4	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Reactor trip/turbine trip

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.31	Conduct of operations	4.6	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to locate control room switches, controls and indications and to determine that they are correctly reflecting the desired plant lineup.
G2.1.38	Conduct of operations	3.7	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the stations requirements for verbal communication when implementing procedures
G2.2.20	Equipment Control	2.6	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the process for managing troubleshooting activities.
G2.2.39	Equipment Control	3.9	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of less than one hour technical specification action statements for systems.
G2.3.14	Radiation Control	3.4	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities
G2.3.6	Radiation Control	2.0	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to aprove release permits
G2.4.28	Emergency Procedures/Plans	3.1	3.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.

Facility: **North Anna Power Station** Date of Examination: 6/21/2010

Examination Level: **Combined (*See Below*)** Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed **(KA)**
Conduct of Operations	M, R G2.1.20	Perform the calorimetric heat balance (hand calculation). **(ALL) (2.1.7, RO 4.4 / SRO 4.7)**
Conduct of Operations	D, R G2.1.25	Determine time to boil (1-GOP-13.1, Att. 1). **(ALL) (2.1.25, RO 3.9 / SRO 4.2)**
Equipment Control	M, R G2.2.40	Evaluate and apply Tech Specs and procedure requirements based on UNSAT condition of a plant component. **(SRO 2.2.37)**
Radiation Control	M, R G2.3.4	Given an attached survey, determine entry requirements and stay times associated with a given work activity. **(All) (2.3.7, RO 3.5 / SRO 3.6)**
Emergency Plan	M, R G2.4.29	Classify an emergency event (EPIP-1.01) Determine protective action recommendations (EPIP-1.06) **(SRO ONLY) (2.4.41, RO 2.9 / SRO 4.6)**
Emergency Plan	M, S, P G2.4.39	Transmit report of emergency to State and local governments. **(RO only)**

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≥ 3 for ROs; ≥ ∞ for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≥ 1; randomly selected)

Facility: **North Anna Power Station** Date of Examination: 6/21/2010

Examination Level: **Combined (*See Below*)** Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed **(KA)**
Conduct of Operations	M, R G2.1.20	Perform the calorimetric heat balance (hand calculation). **(ALL) (2.1.7, RO 4.4 / SRO 4.7)**
Conduct of Operations	D, R G2.1.25	Determine time to boil (1-GOP-13.1, Att. 1). **(ALL) (2.1.25, RO 3.9 / SRO 4.2)**
Equipment Control	M, R G2.2.40	Evaluate and apply Tech Specs and procedure requirements based on UNSAT condition of a plant component. **(SRO 2.2.37)**
Radiation Control	M, R G2.3.4	Given an attached survey, determine entry requirements and stay times associated with a given work activity. **(All) (2.3.7, RO 3.5 / SRO 3.6)**
Emergency Plan	M, R G2.4.29	Classify an emergency event (EPIP-1.01) Determine protective action recommendations (EPIP-1.06) **(SRO ONLY) (2.4.41, RO 2.9 / SRO 4.6)**
Emergency Plan	M, S, P G2.4.39	Transmit report of emergency to State and local governments. **(RO only)**

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≥ 3 for ROs; ≥ ∞ for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≥ 1; randomly selected)

Facility: North Anna Set A Date of Examination: 6/21/2010

Exam Level : RO ☒ SRO-I ☐ SRO-U ☐ Operating Test No.: 1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title (KA)	Type Code*	Safety Function
a.) 026 / Terminate quench spray (1/2-E-1). (A4.05)	C, D, E, EN, L	5
b.) 005 / Restore RHR flow (1-AP-11). (A4.01)	A, L, M, S	4 (Pri)
c.) 001 / Borate the reactor coolant system using the blender (1-OP-8.3, 1-GOP-8.3.4, 1-OP-8.3.4). (A4.02)	A, D, S	1
d.) 039/059/061 / Identify and isolate a ruptured steam generator (EA1.32)	A, M, S	4 (Sec)
e.) 062 / Reset load shed (0-AP-47). (A4.01)	C, D, E	6
f.) 073 / Restore the blowdown radiation monitors (1-E-1). (A4.02)	D, E, S	7
g.) 075 / Respond to circulating water flooding in the turbine building (0-AP-39.1). (A2.02)	A, D, E, S	8
h.) 006 / Fill the safety injection accumulators (1-OP-7.3), 1-MOP-7.3). (A4.02)	D, EN, S	3
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i.) 063 / Place a battery charger in operation on the safeguards watchstation (1-OP-26.4.1, 1-ECA-0.0). (A4.01)	D	6
j.) 003 / Isolate the reactor coolant pump seals locally (1-ECA-0.0, 1-ECA-0.2, 1-AP-33.2, B.5.b)	D, E, R	2
k.) 061 / Reset the auxiliary feedwater turbine trip and throttle valve (1/2-PT-71.1Q, 1/2-AR-F-D8, B.5.b). (A2.04)	D, E	4

@ 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.

* 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 (similar topic)	≥ 3 / ≥ 3 / ≥ 2 (randomly selected)
(R)CA	≤ 1 / ≤ 1 / ≤ 1
(S)imulator	

Facility: North Anna Set A | Date of Examination: 6/21/2010

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ | Operating Test No.: 1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title (KA)	Type Code*	Safety Function
a.) 026 / Terminate quench spray (1/2-E-1). (A4.05)	C, D, E, EN, L	5
b.) 005 / Restore RHR flow (1-AP-11). (A4.01)	A, L, M, S	4 (Pri)
c.) 001 / Borate the reactor coolant system using the blender (1-OP-8.3, 1-GOP-8.3.4, 1-OP-8.3.4). (A4.02)	A, D, S	1
d.) 039/059/061 / Identify and isolate a ruptured steam generator (EA1.32)	A, M, S	4 (Sec)
e.) 062 / Reset load shed (0-AP-47). (A4.01)	C, D, E	6
f.) 073 / Restore the blowdown radiation monitors (1-E-1). (A4.02)	D, E, S	7
g.) 075 / Respond to circulating water flooding in the turbine building (0-AP-39.1). (A2.02)	A, D, E, S	8
h.) **NOT USED FOR SRO-I**		
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i.) 063 / Place a battery charger in operation on the safeguards watchstation (1-OP-26.4.1, 1-ECA-0.0). (A4.01)	D	6
j.) 003 / Isolate the reactor coolant pump seals locally (1-ECA-0.0, 1-ECA-0.2, 1-AP-33.2, B.5.b)	D, E, R	2
k.) 061 / Reset the auxiliary feedwater turbine trip and throttle valve (1/2-PT-71.1Q, 1/2-AR-F-D8, B.5.b). (A2.04)	D, E	4

@ 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.

* Type Codes	Criteria for RO / SRO-I / SRO-U
	4-6 / 4-6 / 2-3
(A)lternate path	≥ 9 / ≥ 8 / ≥ 4
(C)ontrol room	≥ 1 / ≥ 1 / ≥ 1
(D)irect from bank	- / - / ≥ 1 (control room system)
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	≥ 2 / ≥ 2 / ≥ 1
(L)ow-Power / Shutdown	≥ 3 / ≥ 3 / ≥ 2 (randomly selected)
(N)ew or (M)odified from bank including 1(A)	≥ 1 / ≥ 1 / ≥ 1
(P)revious 2 exams (similar topic)	
(R)CA	
(S)imulator	

Facility: North Anna Set A | Date of Examination: 6/21/2010

Exam Level : RO ☐ SRO-I ☐ SRO-U ☒ | Operating Test No.: 1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title (KA)	Type Code*	Safety Function
a.) 026 / Terminate quench spray (1/2-E-1). (A4.05)	C, D, E, EN, L	5
b.) 005 / Restore RHR flow (1-AP-11). (A4.01)	A, L, M, S	4 (Pri)
c.) 001 / Borate the reactor coolant system using the blender (1-OP-8.3, 1-GOP-8.3.4, 1-OP-8.3.4). (A4.02)	A, D, S	1
d.) **NOT USED FOR SRO-U**		
e.) **NOT USED FOR SRO-U**		
f.) **NOT USED FOR SRO-U**		
g.) **NOT USED FOR SRO-U**		
h.) **NOT USED FOR SRO-U**		
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i.) 063 / Place a battery charger in operation on the safeguards watchstation (1-OP-26.4.1, 1-ECA-0.0). (A4.01)	D	6
j.) 003 / Isolate the reactor coolant pump seals locally (1-ECA-0.0, 1-ECA-0.2, 1-AP-33.2, B.5.b)	D, E, R	2
k.) **NOT USED FOR SRO-U**		

@ 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.

* 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 (similar topic)	≥ 3 / ≥ 3 / ≥ 2 (randomly selected)
(R)CA	≤ 1 / ≤ 1 / ≤ 1
(S)imulator	

Facility: North Anna Set B | Date of Examination: 6/21/2010

Exam Level : RO ☒ SRO-I ☐ SRO-U ☐ | Operating Test No.: 1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title (KA)	Type Code*	Safety Function
a.) 001 / Respond to a misaligned control rod (1-AP-1.3). (A1.02)	A, E, M, P, S	1
b.) 055 / Manually align condenser air ejector discharge to containment (1-E-3, SG Monitoring Prog.). (A4.01)	D, E, L, S	4 (Sec)
c.) 003 / Respond to a loss of reactor coolant pump seal cooling (1-AP-33.2). (AA1.22)	A, E, M, S	4 (Pri)
d.) 026 / Configure emergency bus loads to prevent emergency diesel overload (0-AP-10). (A2.05)	D, E, S	6
e.) 004 / Charging flow control valve fails closed (1-AP-49). (A4.06)	A, D, E, S	2
f.) 073 / Respond to recirculation spray heat exchanger service water radiation monitor alarm (1/2-AP-5). (A4.01)	C, D, E, P	7
g.) 006 / Transfer the safety injection system to the cold leg recirculation mode (1-ES-1.3). (A4.06)	A, D, EN, S	3
h.) 022 / Reduce containment pressure to subatmospheric (1/2-FR-Z4). (A4.04)	C, A, D, EN	5
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i.) 004 / Align a charging flowpath locally. (A2.07)	D, R	2
j.) 055 / Prepare the station blackout diesel generator for loading following an automatic start (0-OP-6.4), (EA2.03)	D, E, L	6
k.) 061 / Align both motor driven auxiliary feedwater pumps to feed the steam generator by way of the motor operated valve header (1-AP-22.1). (A2.04)	D, E, L	4 (Sec)

@ 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.

* 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 (similar topic)	≥ 3 / ≥ 3 / ≥ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: North Anna Set B | Date of Examination: 6/21/2010

Exam Level : RO ☐ SRO-I ☒ SRO-U ☐ | Operating Test No.: 1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title (KA)	Type Code*	Safety Function
a.) 001 / Respond to a misaligned control rod (1-AP-1.3). (A1.02)	A, E, M, P, S	1
b.) 055 / Manually align condenser air ejector discharge to containment (1-E-3, SG Monitoring Prog.). (A4.01)	D, E, L, S	4 (Sec)
c.) 003 / Respond to a loss of reactor coolant pump seal cooling (1-AP-33.2). (AA1.22)	A, E, M, S	4 (Pri)
d.) **NOT USED FOR SRO-I**		
e.) 004 / Charging flow control valve fails closed (1-AP-49). (A4.06)	A, D, E, S	2
f.) 073 / Respond to recirculation spray heat exchanger service water radiation monitor alarm (1/2-AP-5). (A4.01)	C, D, E, P	7
g.) 006 / Transfer the safety injection system to the cold leg recirculation mode (1-ES-1.3). (A4.06)	A, D, EN, S	3
h.) 022 / Reduce containment pressure to subatmospheric (1/2-FR-Z4). (A4.04)	C, A, D, EN	5
In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i. 004 / Align a charging flowpath locally. (A2.07)	D, R	2
j.) 055 / Prepare the station blackout diesel generator for loading following an automatic start (0-OP-6.4), (EA2.03)	D, E, L	6
k.) 061 / Align both motor driven auxiliary feedwater pumps to feed the steam generator by way of the motor operated valve header (1-AP-22.1). (A2.04)	D, E, L	4 (Sec)

@ 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.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	≥ 9 / ≥ 8 / ≥ 4
(D)irect from bank	≥ 1 / ≥ 1 / ≥ 1
(E)mergency or abnormal in-plant	- / - / ≥ 1 (control room system)
(EN)gineered safety feature	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power / Shutdown	≥ 2 / ≥ 2 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 3 / ≥ 3 / ≥ 2 (randomly selected)
(P)revious 2 exams (similar topic)	≥ 1 / ≥ 1 / ≥ 1
(R)CA	
(S)imulator	

Facility: North Anna Set B | Date of Examination: 6/21/2010

Exam Level : RO ☐ SRO-I ☐ SRO-U ☒ | Operating Test No.: 1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title (KA)	Type Code*	Safety Function
a.) **NOT USED FOR SRO-U**		
b.) **NOT USED FOR SRO-U**		
c.) 003 / Respond to a loss of reactor coolant pump seal cooling (1-AP-33.2). (AA1.22)	A, E, M, S	4 (Pri)
d.) **NOT USED FOR SRO-U**		
e.) 004 / Charging flow control valve fails closed (1-AP-49). (A4.06)	A, D, E, S	2
f.) **NOT USED FOR SRO-U**		
g.) 006 / Transfer the safety injection system to the cold leg recirculation mode (1-ES-1.3). (A4.06)	A, D, EN, S	3
h.) **NOT USED FOR SRO-U**		

In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)

i.) 004 / Align a charging flowpath locally. (A2.07)	D, R	2
j.) 055 / Prepare the station blackout diesel generator for loading following an automatic start (0-OP-6.4), (EA2.03)	D, E, L	6
k.) **NOT USED FOR SRO-U**		

@ 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.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	≥ 9 / ≥ 8 / ≥ 4
(D)irect from bank	≥ 1 / ≥ 1 / ≥ 1
(E)mergency or abnormal in-plant	- / - / ≥ 1 (control room system)
(EN)gineered safety feature	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power / Shutdown	≥ 2 / ≥ 2 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 3 / ≥ 3 / ≥ 2 (randomly selected)
(P)revious 2 exams (similar topic)	≥ 1 / ≥ 1 / ≥ 1
(R)CA	
(S)imulator	