

Facility:		LOC27 NRC Written Exam Outline										Date of Exam:		08/17/15							
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 & Plant Evolutions	1	3	4	3				3	3			4	20	3		4		7			
	2	1	1	1				1	1			2	7	2		1		3			
	Tier Totals	4	5	4				4	4			6	27	5		5		10			
2. Plant Systems	1	2	2	2	3	2	2	3	3	3	2	2	26	3		2		5			
	2	1	1	2	1	1	1	1	1	1	1	12	0	1	2		3				
	Tier Totals	3	3	4	4	3	3	4	4	4	3	3	38	4		4		8			
3. Generic Knowledge & Abilities Categories				1		2		3		4		10	1		2		3		4		7
				2		2		3		3			2		2		1		2		
<p>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).</p> <p>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.</p> <p>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 elimination of inappropriate K/A statements.</p> <p>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.</p> <p>5. Absent a plant specific priority, only those KAs 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.</p> <p>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</p> <p>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/A's</p> <p>8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) 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.</p> <p>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 10CFR55.43</p>																					

LOC27 NRC Written Exam Outline
Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
295006 SCRAM / 1					X		AA2.05 - Ability to determine and/or interpret the following as they apply to SCRAM : Whether a reactor SCRAM has occurred	4.6	76
295005 Main Turbine Generator Trip / 3					X		AA2.04 - Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP : Reactor pressure	3.8	77
295028 High Drywell Temperature / 5					X		EA2.03 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE : Reactor water level	3.9	78
295038 High Off-site Release Rate / 9						X	2.4.11 - Emergency Procedures / Plan: Knowledge of abnormal condition procedures.	4.2	79
700000 Generator Voltage and Electric Grid Disturbances						X	2.2.39 - Equipment Control: Knowledge of less than one hour technical specification action statements for systems.	4.5	80
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4						X	2.2.3 - Equipment Control: (multi-unit license) Knowledge of the design, procedural, and operational differences between units.	3.9	81
295004 Partial or Total Loss of DC Pwr / 6						X	2.2.44 - Equipment Control: Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives effect plant and system conditions.	4.4	82
295006 SCRAM / 1	X						AK1.02 - Knowledge of the operational implications of the following concepts as they apply to SCRAM : Shutdown margin	3.4	39
295021 Loss of Shutdown Cooling / 4	X						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to LOSS OF SHUTDOWN COOLING : Decay heat	3.6	40
295004 Partial or Total Loss of DC Pwr / 6	X						AK1.03 - Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER : Electrical bus divisional separation	2.9	41
295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown / 1		X					EK2.03 - Knowledge of the interrelations between SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN and the following: ARI/RPT/ATWS: Plant-Specific	4.1	42
295030 Low Suppression Pool Water Level / 5		X					EK2.02 - Knowledge of the interrelations between LOW SUPPRESSION POOL WATER LEVEL and the following: RCIC: Plant-Specific	3.7	43
700000 Generator Voltage and Electric Grid Disturbances		X					AK2.06 - Knowledge of the interrelations between GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES and the following: Reactor power.	3.9	44
295016 Control Room Abandonment / 7			X				AK3.01 - Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT : Reactor SCRAM	4.1	45
600000 Plant Fire On-site / 8			X				AK3.04 - Knowledge of the reasons for the following responses as they apply to PLANT FIRE ON SITE: Actions	2.8	46

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EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
							contained in the abnormal procedure for plant fire on site		
295038 High Off-site Release Rate / 9			X				EK3.02 - Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: System isolations	3.9	47
295025 High Reactor Pressure / 3				X			EA1.01 - Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE: Main steam line drains	2.9	48
295023 Refueling Acc Cooling Mode / 8				X			AA1.03 - Ability to operate and/or monitor the following as they apply to REFUELING ACCIDENTS : Fuel handling equipment	3.3	49
295005 Main Turbine Generator Trip / 3				X			AA1.01 - Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP : Recirculation system: Plant-Specific	3.1	50
295031 Reactor Low Water Level / 2					X		EA2.02 - Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL : Reactor power	4.0	51
295018 Partial or Total Loss of CCW / 8					X		AA2.03 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : Cause for partial or complete loss	3.2	52
295019 Partial or Total Loss of Inst. Air / 8					X		AA2.02 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR : Status of safety-related instrument air system loads (see AK2.1 - AK2.19)	3.6	53
295003 Partial or Complete Loss of AC / 6						X	2.4.1 - Emergency Procedures / Plan: Knowledge of EOP entry conditions and immediate action steps.	4.6	54
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4						X	2.1.32 - Conduct of Operations: Ability to explain and apply all system limits and precautions.	3.8	55
295026 Suppression Pool High Water Temp. / 5						X	2.4.20 - Emergency Procedures / Plan: Knowledge of operational implications of EOP warnings, cautions, and notes.	3.8	56
295028 High Drywell Temperature / 5		X					EK2.04 - Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following: Drywell ventilation	3.6	57
295024 High Drywell Pressure / 5						X	2.4.50 - Emergency Procedures / Plan: Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.2	58
K/A Category Totals:	3	4	3	3	3/3	4/4	Group Point Total:	20/7	

LOC27 NRC Written Exam Outline
Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
295029 High Suppression Pool Water Level / 5					X		EA2.01 - Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL WATER LEVEL : Suppression pool water level	3.9	83
295007 High Reactor Pressure / 3						X	2.4.35 - Emergency Procedures / Plan: Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.	4.0	84
295014 Inadvertent Reactivity Addition / 1					X		AA2.05 - Ability to determine and/or interpret the following as they apply to INADVERTENT REACTIVITY ADDITION : Violation of safety limits	4.6	85
295017 High Off-site Release Rate / 9	X						AK1.03 - Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE : Meteorological effects on off-site release	2.7	59
295034 Secondary Containment Ventilation High Radiation / 9		X					EK2.03 - Knowledge of the interrelations between SECONDARY CONTAINMENT VENTILATION HIGH RADIATION and the following: SBT/FRVS: Plant-Specific	4.3	60
295009 Low Reactor Water Level / 2			X				AK3.01 - Knowledge of the reasons for the following responses as they apply to LOW REACTOR WATER LEVEL : Recirculation pump run back: Plant-Specific	3.2	61
295015 Incomplete SCRAM / 1				X			AA1.01 - Ability to operate and/or monitor the following as they apply to INCOMPLETE SCRAM : CRD hydraulics	3.8	62
295029 High Suppression Pool Water Level / 5					X		EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL WATER LEVEL : Reactor pressure	3.5	63
295036 Secondary Containment High Sump/Area Water Level / 5						X	2.4.21 - Emergency Procedures / Plan: 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.	4.0	64
295010 High Drywell Pressure / 5						X	2.2.36 - Equipment Control: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	3.1	65
K/A Category Totals:	1	1	1	1	1/2	2/1	Group Point Total:	7/3	

LOC27 NRC Written Exam Outline
Written Examination Outline
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp	Q#
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215004 Source Range Monitor								X				A2.02 - Ability to (a) predict the impacts of the following on the SOURCE RANGE MONITOR (SRM) SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: SRM inop condition	3.7	86
400000 Component Cooling Water								X				A2.03 - Ability to (a) predict the impacts of the following on the CCWS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: High/low CCW temperature	3.0	87
239002 SRVs											X	2.2.42 - Equipment Control:: Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	4.6	88
218000 ADS											X	2.2.12 - Equipment Control: Knowledge of surveillance procedures.	4.1	89
215005 APRM / LPRM								X				A2.06 - Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions Recirculation flow channels upscale	3.5	90
239002 SRVs	X											K1.05 - Knowledge of the physical connections and/or cause- effect relationships between RELIEF/SAFETY VALVES and the following: Plant air systems: Plant-Specific	3.1	1
215003 IRM	X											K1.01 - Knowledge of the physical connections and/or cause- effect relationships between INTERMEDIATE RANGE MONITOR (IRM) SYSTEM and the following: RPS	3.9	2
203000 RHR/LPCI: Injection Mode		X										K2.02 - Knowledge of electrical power supplies to the following: Valves	2.5	3
400000 Component Cooling Water		X										K2.01 - Knowledge of electrical power supplies to the following: CCW pumps	2.9	4
209001 LPCS			X									K3.03 - Knowledge of the effect that a loss or malfunction of the LOW PRESSURE CORE SPRAY SYSTEM will have on following: Emergency generators	2.9	5

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Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G		Imp	Q#
211000 SLC			X									K3.02 - Knowledge of the effect that a loss or malfunction of the STANDBY LIQUID CONTROL SYSTEM will have on following: Core spray line break detection system: Plant-Specific	3.0	6
215005 APRM / LPRM				X								K4.08 - Knowledge of AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM design feature(s) and/or interlocks which provide for the following: Sampling of overall core power in each APRM (accomplished through LPRM assignments and symmetrical rod patterns)	2.7	7
215004 Source Range Monitor				X								K4.01 - Knowledge of SOURCE RANGE MONITOR (SRM) SYSTEM design feature(s) and/or interlocks which provide for the following: Rod withdrawal blocks	3.7	8
212000 RPS					X							K5.01 - Knowledge of the operational implications of the following concepts as they apply to REACTOR PROTECTION SYSTEM : Fuel thermal time constant	2.7	9
264000 EDGs					X							K5.06 - Knowledge of the operational implications of the following concepts as they apply to EMERGENCY GENERATORS (DIESEL/JET) : Load sequencing	3.4	10
218000 ADS						X						K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the AUTOMATIC DEPRESSURIZATION SYSTEM : RHR/LPCI system pressure: Plant-Specific	3.9	11
263000 DC Electrical Distribution						X						K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the D.C. ELECTRICAL DISTRIBUTION : A.C. electrical distribution	3.2	12
217000 RCIC							X					A1.07 - Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) controls including: Suppression pool level	3.3	13

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Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp	Q#
205000 Shutdown Cooling							X					A1.09 - Ability to predict and/or monitor changes in parameters associated with operating the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) controls including: SDC/RHR pump/system discharge pressure	2.8	14
259002 Reactor Water Level Control								X				A2.03 - Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of reactor water level input	3.6	15
223002 PCIS/Nuclear Steam Supply Shutoff								X				A2.07 - Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abn cond or ops. Various process instrumentation failures	2.7	16
262001 AC Electrical Distribution									X			A3.02 - Ability to monitor automatic operations of the A.C. ELECTRICAL DISTRIBUTION including: Automatic bus transfer	3.2	17
261000 SGTS									X			A3.02 - Ability to monitor automatic operations of the STANDBY GAS TREATMENT SYSTEM including: Fan start	3.2	18
206000 HPCI										X		A4.13 - Ability to manually operate and/or monitor in the control room: Turbine reset control: BWR-2,3,4	4.1	19
300000 Instrument Air										X		A4.01 - Ability to manually operate and/or monitor in the control room: Pressure gauges	2.6	20
262002 UPS (AC/DC)											X	2.4.50 - Emergency Procedures / Plan: Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.2	21
215004 Source Range Monitor											X	2.4.18 - Emergency Procedures / Plan: Knowledge of the specific bases for EOPs.	3.3	22

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Written Examination Outline
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp	Q#
400000 Component Cooling Water								X				A2.03 - Ability to (a) predict the impacts of the following on the CCWS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: High/low CCW temperature	2.9	23
264000 EDGs									X			A3.05 - Ability to monitor automatic operations of the EMERGENCY GENERATORS (DIESEL/JET) including: Load shedding and sequencing	3.4	24
262002 UPS (AC/DC)							X					A1.02 - Ability to predict and/or monitor changes in parameters associated with operating the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) controls including: Motor generator outputs	2.5	25
259002 Reactor Water Level Control				X								K4.14 - Knowledge of REACTOR WATER LEVEL CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: Selection of various instruments to provide reactor water level input	3.4	26
K/A Category Totals:	2	2	2	3	2	2	3	3/3	3	2	2/2	Group Point Total:	26/5	

LOC27 NRC Written Exam Outline
Written Examination Outline
Plant Systems – Tier 2 Group 2

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp.	Q #
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201001 CRD Hydraulic								X				A2.08 - Ability to (a) predict the impacts of the following on the CRD HYDRAULIC SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of abnormal conditions or operations: Inadequate system flow	2.8	91
230000 RHR/LPCI: Torus/Pool Spray Mode											X	2.2.40 - Equipment Control: Ability to apply technical specifications for a system.	4.7	92
290002 Reactor Vessel Internals											X	2.1.30 - Conduct of Operations: Ability to locate and operate components, including local controls.	4.0	93
290002 Reactor Vessel Internals	X											K1.04 - Knowledge of the physical connections and/or cause- effect relationships between REACTOR VESSEL INTERNALS and the following: HPCI: Plant-Specific	3.4	27
233000 Fuel Pool Cooling/Cleanup		X										K2.02 - Knowledge of electrical power supplies to the following: RHR pumps	2.8	28
201003 Control Rod and Drive Mechanism			X									K3.02 - Knowledge of the effect that a loss or malfunction of the CONTROL ROD AND DRIVE MECHANISM will have on following: Flux shaping	2.8	29
215001 Traversing In-core Probe				X								K4.01 - Knowledge of TRAVERSING IN-CORE PROBE design feature(s) and/or interlocks which provide for the following: Primary containment isolation: Mark-I&II(Not-BWR1)	3.4	30
286000 Fire Protection					X							K5.03 - Knowledge of the operational implications of the following concepts as they apply to FIRE PROTECTION SYSTEM : Effect of water spray on electrical components	3.3	31
215002 RBM						X						K6.05 - Knowledge of the effect that a loss or malfunction of the following will have on the ROD BLOCK MONITOR SYSTEM : LPRM detectors: BWR-3,4,5	2.8	32
201002 RMCS							X					A1.01 - Ability to predict and/or monitor changes in parameters associated with operating the REACTOR MANUAL CONTROL SYSTEM controls including: CRD drive water flow	2.8	33
268000 Radwaste								X				A2.01 - Ability to (a) predict the impacts of the following on the RADWASTE ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: System rupture	2.9	34

LOC27 NRC Written Exam Outline
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Plant Systems – Tier 2 Group 2

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp.	Q #
290001 Secondary CTMT									X			A3.02 - Ability to monitor automatic operations of the SECONDARY CONTAINMENT including: Normal building differential pressure: Plant-Specific	3.5	35
245000 Main Turbine Gen. / Aux.										X		A4.10 - Ability to manually operate and/or monitor in the control room: Hydrogen gas pressure	2.6	36
201001 CRD Hydraulic											X	2.2.38 - Equipment Control: Knowledge of conditions and limitations in the facility license.	3.6	37
288000 Plant Ventilation			X									K3.05 - Knowledge of the effect that a loss or malfunction of the PLANT VENTILATION SYSTEMS will have on following: Reactor building pressure: Plant-Specific	3.1	38
K/A Category Totals:	1	1	2	1	1	1	1	1/1	1	1	1/2	Group Point Total:	12/3	

Facility:	LOC27 NRC Written Exam Outline		Date:	08/17/15		
Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.13	Knowledge of facility requirements for controlling vital / controlled access.			3.2	94
	2.1.43	Ability to use procedures to determine the effects on reactivity of plant changes, such as RCS temperature, secondary plant, fuel depletion, etc.			4.3	98
	2.1.18	Ability to make accurate, clear and concise logs, records, status boards, and reports.	3.6	66		
	2.1.7	Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	67		
	Subtotal			2		2
2. Equipment Control	2.2.7	Knowledge of the process for conducting special or infrequent tests.			3.6	95
	2.2.18	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.			3.9	100
	2.2.7	Knowledge of the process for conducting special or infrequent tests.	2.9	68		
	2.2.3	(multi-unit license) Knowledge of the design, procedural, and operational differences between units.	3.8	69		
	Subtotal			2		2
3. Radiation Control	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.			2.9	96
	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	70		

	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	71		
	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personell monitoring equipment, etc.	2.9	75		
	Subtotal			3		1
4. Emergency Procedures / Plan	2.4.4	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.			4.7	97
	2.4.26	Knowledge of facility protection requirements, including fire brigade and portable fire fighting equipment usage.			3.6	99
	2.4.3	Ability to identify post-accident instrumentation.	3.7	72		
	2.4.18	Knowledge of the specific bases for EOPs.	3.3	73		
	2.4.37	Knowledge of the lines of authority during implementation of the emergency plan.	3.0	74		
Subtotal				3		2
Tier 3 Point Total				10		7

Facility: Susquehanna, LLCDate of Examination: 8/17/2015Examination Level: RO ☒ SRO ☐Operating Test Number: U01916

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations C001	R,N	Cooldown Rate Calculation (00.GO.1178.101) General K/A – 2.1.7 RO 4.4 SRO 4.7
Conduct of Operations C002	R,D	Review Failed ST and Determine Required Action (51.SO.1944.151) General K/A – 2.2.12 RO 3.7 SRO 4.1
Equipment Control EC	R,D	Blocking and Tagging (00.AD.3274.202) General K/A – 2.2.41 RO 3.5 SRO 3.9
Radiation Control		
Emergency Plan EP	S,D	Emergency Plan Communications (00.EP.1135.001) General K/A – 2.4.39 RO 3.9
NOTE: All items (five total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics (which would require all five items).		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected)		

Facility: Susquehanna, LLCDate of Examination: 8/17/2015Examination Level: RO ☐ SRO ☒Operating Test Number: U01916

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations C001	R,D	Determine NRC Notification Requirements (00.AD.1032.001) General K/A – 2.81.18 SRO 3.8
Conduct of Operations C002	R,D	Review failed ST and determine required actions (51.SO.1944.151) General K/A - 2.2.12 RO 3.7 SRO 4.1
Equipment Control EC	R,D	Blocking and Tagging (00.AD.3274.201) General K/A – 2.2.41 RO 3.5 SRO 3.9
Radiation Control RC	R,D	Calculate and Approve Emergency Exposure (00.EP.1132.185) General K/A – 2.3.4 SRO 3.7
Emergency Plan EP	S,N	Make EAL Classification (00.EP.1132.180) General K/A – 2.4.41 SRO 4.6

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

* Type Codes & Criteria:

- (C)ontrol room, (S)imulator, or Class(R)oom
- (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
- (N)ew or (M)odified from bank (≥ 1)
- (P)revious 2 exams (≤ 1 ; randomly selected)

Facility: Susquehanna, LLCDate of Examination: 8/17/2015Exam Level: RO ☒ SRO-I ☐ SRO-U ☐Operating Test Number: U01916

Control Room Systems:* 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U

System / JPM Title	Type Code*	Safety Function
a. Respond to Control Rod Drift In During Performance of Rod Exercise Test (55.ON.1998.151)	A,D,P,S	1
b. Perform Quick Recovery of the Condensate System	N,S	2
c. Quarterly Turbine Valve Cycling/241000	D,S	3
d. Core Spray System Shutdown/209001	D,S	4
e. PCIS/SDC Restoration/223002	A,D,EN,L,S	5
f. Swap RBCCW Pumps, Respond to Loss of RBCCW	A,N,S	8
g. Restore Offgas System IAW ON-143-001	D,E,S	9
h. APRM Gain Adjust/215005	D,S	7

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

i. Venting Scram Air Header During ATWS	D,R	1
j. Maintaining RCIC Suction Source During SBO	A,D,E,R	2
k. Secure Non-class 1E 250 VDC Loads IAW EO-100-030	D,E,R	6

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	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 / ≥ 1 / ≥ 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: Susquehanna, LLCDate of Examination: 8/17/2015Exam Level: RO ☐ SRO-I ☒ SRO-U ☐Operating Test Number: U01916

Control Room Systems: * 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U

System / JPM Title	Type Code*	Safety Function
a. Respond to Control Rod Drift In During Performance of Rod Exercise Test (55.ON.1998.151)	A,D,P,S	1
b. Perform Quick Recovery of the Condensate System	N,S	2
c. Quarterly Turbine Valve Cycling/241000	D,S	3
d. Core Spray System Shutdown/209001	D,S	4
e. PCIS/SDC Restoration/223002	A,D,EN,L,S	5
f. Swap RBCCW Pumps, Respond to Loss of RBCCW	A,N,S	8
g.		
h. APRM Gain Adjust/215005	D,S	7

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

i. Venting Scram Air Header During ATWS	D,R	1
j. Maintaining RCIC Suction Source During SBO	A,D,E,R	2
k. Secure Non-class 1E 250 VDC Loads IAW EO-100-030	D,E,R	6

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	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 / ≥ 1 / ≥ 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: Susquehanna, LLCDate of Examination: 8/17/2015Exam Level: RO ☐ SRO-I ☐ SRO-U ☒Operating Test Number: U01916

Control Room Systems:* 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U

System / JPM Title	Type Code*	Safety Function
a.		
b. Perform Quick Recovery of the Condensate System	N,S	2
c.		
d.		
e. PCIS/SDC Restoration/223002	A,D,EN,L,S	5
f. Swap RBCCW Pumps, Respond to Loss of RBCCW	A,N,S	8
g.		
h.		

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

i. Venting Scram Air Header During ATWS	D,R	1
j.		
k. Secure Non-class 1E 250 VDC Loads IAW EO-100-030	D,E,R	6

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	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 / ≥ 1 / ≥ 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: SSES Units 1 and 2	Scenario No.: 2	Op-Test No.: U01916
Examiners: _____	Operators: _____	
_____	_____	
_____	_____	
Initial Conditions IC-xx Reactor Approach to Run, Mode Switch in Startup		
Turnover	<ul style="list-style-type: none"> A Reactor Startup is in progress following a refueling outage. The Reactor Mode Switch is in Startup. Reactor power is approximately 3% with the IRMs on Range 9. Reactor Pressure is 940 psig with 1/2 bypass valve open. GO-100-002 is complete through step 5.59.2 RBCCW Pump "A" is OOS and is not available. Main condenser back pressure has lowered to allow placing Off Gas in service. The Off Gas system is prepared for placing SJAE in-service. The directions to the shift are to: <ul style="list-style-type: none"> - Place Off Gas in service and secure the Mechanical Vacuum Pump - Continue the reactor startup. 	

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N SRO,BOP	Place Off Gas in Service
2	N/A	R SRO,ATC	Raise Reactor Power by Withdrawing Control Rods
3	mfRD155007 mfRD155006	C TS SRO,ATC	Uncoupled Control Rod
4	mfRWM10M ALF mfJM156004	I TS SRO,ATC	Rod Worth Minimizer Failure
5	DEL mfRD155006	C SRO,ATC	Control Rod Drop
6	mfRR179003	C SRO,BOP	Fuel Failure
7	cmfAV04_ XV147	M All	SDIV Vent and Drain Valves Fail to Close

8	mfCU161007 cmfMV06_ HV144F001 cmfMV06_ HV144F004	I SRO,BOP	Reactor Water Cleanup Pipe Break Without Auto Isolation
9	cmfMV09_ HV144F001 cmfMV09_ HV144F004	C SRO,BOP	Reactor Water Cleanup Isolation Valves Fail to Close
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			
Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Scenario Events	Actual Attributes
1. Malfunctions after EOP entry (1–2)		6,8,9	3
2. Abnormal events (2–4)		3,4	2
3. Major transients (1–2)		7	1
4. EOPs entered/requiring substantive actions (1–2)		Secondary Containment Control	1
5. EOP contingencies requiring substantive actions (0–2)		Emergency Depressurization	1
6. Critical tasks (2–3)			2
CT-1	Recognize a failure to scram condition and initiate a manual scram within 60 seconds.		
CT-2	Perform Emergency Depressurization when Two Secondary Containment areas exceed maximum safe radiation levels with a Primary System discharging into Secondary Containment.		

Appendix D

Scenario Outline

Form ES-D-1

Facility: **SSES Units 1 and 2** Scenario No.: **3** Op-Test No.: **U01916**Examiners: _____ Operators: _____

_____Initial Conditions **IC-XX Unit 1 approximately 23% power during shutdown, BOL**

Turnover

- A Reactor Shutdown is in progress in preparation for a turbine outage.
- Reactor power is approximately 23%.
- GO-100-004 is complete through step 5.2.1
- RBCCW Pump "A" is OOS and is not available.
- The directions to the shift are to:
 - Reduce reactor power to 20%
 - Transfer the auxiliary busses to the startup transformer


Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R SRO,ATC	Lower Reactor Power by Inserting Control Rods
2	N/A	N SRO,BOP	Transfer Auxiliary Busses
3	cmfTD04_PD TC321N004	I TS SRO,BOP	Narrow Range Instrument Failure
4	mfDS003007 cmfBR03_ 1A10204	C TS All	Loss of Auxiliary Bus 11B
5	mfMC143001	C ALL	Loss of Vacuum
6	mfRP158007 cmfRL01_ 63X114	M All	ATWS due to RPS and ARI Failing to Actuate
7	mfSL153001	C SRO,BOP	SBLC Fails to Inject
8	mfRD155002	C SRO,BOP	CRD Pump Trip and Flow Control Valve Failure

*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Scenario Events	Actual Attributes
1. Malfunctions after EOP entry (1–2)	7,8	2
2. Abnormal events (2–4)	3,4,5,	3
3. Major transients (1–2)	6	1
4. EOPs entered/requiring substantive actions (1–2)	RPV Control	1
5. EOP contingencies requiring substantive actions (0–2)	Level/Power Control	1
6. Critical tasks (2–3)		2
CT-1 Lowers RPV level to < -60" but > -179"		
CT-2 Inserts control rods IAW EO-000-113 Sht. 2		

Facility:	SSES Units 1 and 2	Scenario No.:	4	Op-Test No.:	U01916
Examiners:	_____	Operators:	_____	_____	_____
Initial Conditions	Unit 1 approximately 11% power during startup, BOL				
Turnover	Continue power ascension by withdrawing control rods; complete the next four control rod movement steps in the startup sequence. Then, place Feedwater pump 1A in the flow control mode per OP-145-001 section 2.10. Start at step 2.10.8.				

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R SRO,ATC	Raise Reactor Power with Control Rods
2	N/A	N SRO,ATC	Place First Feedwater Pump in Flow Control Mode
3	mfNM17800 7A	I TS SRO,ATC	APRM Fails Upscale
4	cmfEB01_1 A201	C ALL	Electrical Fault on ESS Bus 1A (1A201)
5	mfHP15200 4	C TS SRO,BOP	Inadvertent HPCI Initiation
6	mfMS18300 8	M ALL	Main Steam Leak into Turbine Building
7	cmfAV06_H V141F028D cmfAV06_H V141F022D	I SRO,BOP	MSIVs Fail to Automatically Close
8	mfDS00300 7 mfDS00300 8	M ALL	Loss of Offsite Power
9	mfDG02400 8C mfDG02400 1B(D)	C SRO,BOP	EDG C Fails to Start, EDGs B and D Fail to Auto-Start

10	mfRC15000 1 diHS15012 CB	C ALL	HPCI and RCIC Fail to Auto-Initiate and Initiation Pushbuttons Fail to ARM
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			
Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Scenario Events	Actual Attributes
1. Malfunctions after EOP entry (1–2)		7,9,10	3
2. Abnormal events (2–4)		4,5	2
3. Major transients (1–2)		6,8	2
4. EOPs entered/requiring substantive actions (1–2)		RPV Control	1
5. EOP contingencies requiring substantive actions (0–2)		-	0
6. Critical tasks (2–3)			2
CT-1	Manually isolate a Main Steam Line break.		
CT-2	Restore power to an ESS Bus by manually starting an emergency diesel generator.		