

Facility: SSES Unit 1 And 2 Scenario No.: 1 Op-Test No.: LOC28

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
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Initial Conditions: Unit 1 is at 95 % power for a rod control pattern adjustment at EOL. HPCI is out of service. The 'E' EDG is substituted for 'A' EDG.

Turnover: Swap 'A' RFP main lube oil pumps . RFP lube oil conditioner swapped from 'A' to 'B' last shift. Severe thunderstorm watch is in effect for Luzerne County.

Event No.	Mal. No.	Event Type*	Event Description
1	N/A	N SRO,BOP	Swap 'A' RFP main lube oil pumps (OP-145-003)
2	N/A	R SRO, ATC	Withdraw control rods to raise reactor power 3 percent. (OP-AD-338, GO-100-012)
3	mfFW145 007B	N/A	'B' RFPT trips on high vibration, Recirc LIM2 runback, Setup for event 4 (AR-101-A16, ON-164-002)
4	cmfTR03_ FTB31 1N014C	I (TS) SRO,ATC	APRM 2 and 3 'A' Recirc Loop drive flow fails high during LIM2 runback (TS 3.3.1.1)
5	cmfAV04_ TV11028	C (TS) SRO,BOP	RBCCW TCV fails, ESW placed in-service to restore RBCCW cooling (ON-RBCCW-101), ESW loop declared inoperable when aligned to RBCCW (TS 3.7.2)
6	mfRW1140 01 f:20	C SRO,ATC	RBCCW rupture on the common discharge header. 'A' RRP temperature rises rapidly requiring a manual Scram
7	mfRD155 017	M All	Hydraulic-block ATWS (EO-100-113, OP-145-005, ES-158-002)
8	cmfPM03_ 1P208A cmfPM03_ 1P208B	C SRO,BOP	SLC pump trips after start, standby SLC pump successfully injects boron (OP-153-001)
9	cmfTR01_ LT14201A	I SRO,ATC	Wide Range level instrument fails, RFP flow must be raised to maintain reactor level in ATWS band
10	mfFW148 002	C All	In-service RFPT trips after first scram, RCIC restored to maintain RPV level while standby RFPT placed in-service

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

## Appendix D

## Scenario Outline

Form ES-D-1

Facility: SSES Units 1 and 2 Scenario No.: 3 Op-Test No.: LOC28

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
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Initial Conditions: Unit 1 is at 33% power shutting down for Drywell RCS leakage at EOL.Turnover: Insert Control Rods and test Turbine Bypass valve #3 for valve functional testing.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N SRO,BOP	Test turbine bypass valve #3 (SO-182-001)
2	N/A	R SRO,ATC	Insert control rods (OP-156-001, OP-AD-338)
3	cmfHX02_1E102C	C (TS) SRO,BOP	FW heater 2C tube leak (AR-120-C10, D10), Isolate FW heater extraction steam (ON-147-002), TS MCPR limits not applicable (TS 3.2.2)
4	cmfEB01_1A203 mfRR164010	I (TS) SRO,ATC	ESS Bus 1C lockout, Drywell leak severity rises, reactor scram required (ON-4KV-101, TS 3.8.7)
5	mfRP158003	C All	Electrical ATWS (EO-000-113) ARI inserts control rods
6	cmfMV06_HV149F013	I SRO,BOP	RCIC injection valve fails to auto open on initiation (OP-150-001)
7	mfRR179003	C All	Fuel failure with high MSL radiation, MSIV isolation required (AR-103-D01, AR-104-D01)
8	cmfMV01_HV155F002 cmfMV07_HV155F003	I SRO,BOP	HPCI steam isolation valves fail to automatically close (AR-114-F04, F05), manual isolation successful after reactor pressure reduced
9	mfRC150004	M All	Unisolable RCS leak into Secondary Contrainment, 2 areas above Max Safe Temp (EO-000-104)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

## Appendix D

## Scenario Outline

Form ES-D-1

Facility: SSES Units 1 and 2Scenario No.: 4Op-Test No.: LOC28

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
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Initial Conditions: Unit 1 is at 90% power. RCIC is out of Service. OBE in Lehigh Valley. ON-NATPHENOM-001 is complete. Unit 2 is at rated power.

Turnover: Shutdown the 'B' EDG, the 15-min run at 1000KW is complete. Raise power 5% with Recirc flow IAW the RMR.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N SRO,BOP	Secure 'B' EDG (SO-024-001B)
2	N/A	R C(TS) SRO,ATC	Raise Reactor Power 5% using Recirc flow, RRP runaway
3	mfRD155 0085023 0055023	C (TS) SRO,ATC	Control rod drift in/out (TS 3.1.3)
4	mfDS003 008	C (TS) SRO,BOP	Startup Transformer 20 lockout (TS 3.8.1)
5	mfMS183 007	M All	Small RCS steam leak in the Drywell
6	Various	I SRO,BOP	HPCI fails to automatically initiate on high Drywell pressure, all other high-pressure injection lost
7	mfRH149 011A(B)	C SRO,BOP	Stem-to-disk separation of RHR F016 Drywell Spray valve
8	Various	M All	Loss of reactor level indication – RPV Flooding (EO-000-114)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: <u>Susquehanna</u>		Date of Examination: <u>11/14/2016</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO		Operating Test Number: <u>U01931</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D,R	Complete Aborted Evolution Log
Conduct of Operations	D,R	Perform LPRM Upscale Alarm Tracking
Equipment Control	R,N	Perform Jet Pump Operability Check
Radiation Control		
Emergency Plan	S,D	Activate Fire Brigade
NOTE: All items (five total) are required for SROs. RO applicants require only four 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 ( $\leq 3$ for ROs; $\leq 4$ for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		

Facility: <u>Susquehanna</u>		Date of Examination: <u>11/14/2016</u>
Examination Level: RO	SRO <input checked="" type="checkbox"/>	Operating Test Number: <u>U01931</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,M	Validate Heat Balance
Conduct of Operations	R,D	Perform LPRM Upscale Alarm Operability Tracking and Determine Required Actions
Equipment Control	R,D	Determine Operability of MSIV Isolation Actuation
Radiation Control	R,D	Determine LCO Applicability and Ability to Bypass Secondary Containment Zone 2 Isolation
Emergency Plan	R,N	Classify an Emergency Condition and Complete Emergency Notification Report
<p>NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).</p>		
<p>* Type Codes &amp; Criteria: (C)ontrol room, (S)imulator, or Class(R)oom          (D)irect from bank (<math>\leq 3</math> for ROs; <math>\leq 4</math> for SROs &amp; RO retakes)          (N)ew or (M)odified from bank (<math>\geq 1</math>)          (P)revious 2 exams (<math>\leq 1</math>; randomly selected)</p>		

Facility: SusquehannaDate of Examination: 11/14/2016Exam Level: RO X

SRO-I

SRO-U

Operating Test No.: UO1931

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

System / JPM Title	Type Code*	Safety Function
a. Reset Recirc Lim 2 Runback	M,S	1
b. Reactor Feed Pump Post Scram Recovery	L,M,S	2
c. Open MSIVs during Reactor S/U (All rods in)	D,EN,L,S	3
d. Shutdown Cooling Temperature Control	A,M,L,S,P	4
e. Re-establish RBHVAC IAW ES-134-003	A,D,EN,L,S	5
f. Energize Dead 4KV ESS Bus 2D	A,D,S	6
g. APRM Gain Adjust	D,P,S	7
h. Place Alternate TBCCW Pump I/S	A,D,P,S	8

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

i. Hydraulically Remove HCU from Service	D,R	1
j. Start RPS MG Set 2S237A Locally	D,R	7
k. Place RHR in SPC at RSDP	D,E,R	5

\* 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	$\leq 9 / \leq 8 / \leq 4$
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$
(EN)gineered safety feature	$\geq 1 / \geq 1 / \geq 1$ (control room system)
(L)ow-Power / Shutdown	$\geq 1 / \geq 1 / \geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)
(R)CA	$\geq 1 / \geq 1 / \geq 1$
(S)imulator	

Facility: <u>Susquehanna</u>		Date of Examination: <u>11/14/2016</u>
Exam Level: RO	SRO-I <input checked="" type="checkbox"/> SRO-U	Operating Test No.: <u>UO1931</u>
Control Room Systems: * 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U		
System / JPM Title	Type Code*	Safety Function
a. Reset Recirc Lim 2 Runback	M,S	1
b. Reactor Feed Pump Post Scram Recovery	L,M,S	2
c. Open MSIVs during Reactor S/U (All rods in)	D,EN,L,S	3
d. Shutdown Cooling Temperature Control	A,M,L,S,P	4
e. Re-establish RBHVAC IAW ES-134-003	A,D,EN,L,S	5
f. Energize Dead 4KV ESS Bus 2D	A,D,S	6
g.		
h. Place Alternate TBCCW Pump I/S	A,D,P,S	8
In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. Hydraulically Remove HCU from Service	D,R	1
j. Start RPS MG Set 2S237A Locally	D,R	7
k. Place RHR in SPC at RSDP	D,E,R	5
<p>* 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.</p>		
* Type Codes	Criteria for RO / SRO-I / SRO-U	
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ $\geq 1 / \geq 1 / \geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$	

Facility:		SSES LOC28 NRC		Date of Exam:		November 2016															
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	4			3	20	3	4	7					
	2	1	2	1				1	1			1	7	2	1	3					
	Tier Totals	4	6	4				4	5			4	27	5	5	10					
2. Plant Systems	1	3	2	3	2	2	2	3	2	2	2	3	26	3	2	5					
	2	1	0	2	2	1	1	1	1	1	1	1	12	0	1	3					
	Tier Totals	4	2	5	4	3	3	4	3	3	3	4	38	4	4	8					
3. Generic Knowledge & Abilities Categories				1		2		3		4		10	1		2		3		4		7
				2		3		3		2			2		2		1				
<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). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category.)</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 <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.</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 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-401 for guidance regarding the 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 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.</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/As.</p> <p>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 a category 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 10 CFR 55.43.</p>																					
G*		Generic K/As																			



**SSS LOC28 NRC**  
**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#
295030 Low Suppression Pool Water Level / 5					X		EA2.02 - Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: Suppression pool temperature	3.9	76
295006 SCRAM / 1					X		AA2.01 - Ability to determine and/or interpret the following as they apply to SCRAM: Reactor power	4.6	77
295004 Partial or Complete Loss of DC Power / 6					X		AA2.01 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Cause of partial or complete loss of D.C. power	3.6	78
295038 High Off-site Release Rate / 9						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 affect plant and system conditions.	4.4	79
295025 High Reactor Pressure / 3						X	2.4.9 - Emergency Procedures / Plan: Knowledge of low power / shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	80
295026 Suppression Pool High Water Temperature / 5						X	2.2.22 - Equipment Control: Knowledge of limiting conditions for operations and safety limits.	4.7	81
295018 Partial or Complete Loss of CCW / 8						X	2.4.47 - Emergency Procedures / Plan: Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	4.2	82
700000 Generator Voltage and Electric Grid Disturbances	X						AK1.02 - Knowledge of the operational implications of the following concepts as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES and the following: Over-excitation.	3.3	39
295031 Reactor Low Water Level / 2	X						EK1.02 - Knowledge of the operational implications of the following concepts as they apply to REACTOR LOW WATER LEVEL: Natural circulation: Plant-Specific	3.8	40
295038 High Off-site Release Rate / 9	X						EK1.03 - Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE: Meteorological effects on off-site release.	2.8	41
295018 Partial or Complete Loss of CCW / 8		X					AK2.01 - Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER and the following: System loads	3.3	42
295016 Control Room Abandonment / 7		X					AK2.01 - Knowledge of the interrelations between CONTROL ROOM ABANDONMENT and the following: Remote shutdown panel: Plant-Specific	4.4	43
600000 Plant Fire On-site / 8		X					AK2.04 - Knowledge of the interrelations between PLANT FIRE ON SITE and the following: Breakers, relays, and	2.5	44

**SSS LOC28 NRC**  
**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#
							disconnects		
295005 Main Turbine Generator Trip / 3			X				AK3.04 - Knowledge of the reasons for the following responses as they apply to MAIN TURBINE GENERATOR TRIP: Main generator trip	3.2	45
295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown / 1			X				EK3.03 - Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Lowering reactor water level	4.1	46
295019 Partial or Complete Loss of Instrument Air / 8			X				AK3.01 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Backup air system supply: Plant-Specific	3.3	47
295003 Partial or Complete Loss of AC / 6				X			AA1.03 - Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: Systems necessary to assure safe plant shutdown	4.4	48
295025 High Reactor Pressure / 3				X			EA1.07 - Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE: ARI/RPT/ATWS: Plant-Specific	4.1	49
295004 Partial or Complete Loss of DC Power / 6				X			AA1.03 - Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: A.C. electrical distribution	3.4	50
295028 High Drywell Temperature / 5					X		EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE: Reactor pressure	3.8	51
295006 SCRAM / 1					X		AA2.04 - Ability to determine and/or interpret the following as they apply to SCRAM: Reactor pressure	4.1	52
295021 Loss of Shutdown Cooling / 4					X		AA2.01 - Ability to determine and/or interpret the following as they apply to LOSS OF SHUTDOWN COOLING: Reactor water heatup/cooldown rate	3.5	53
295023 Refueling Accidents / 8						X	2.2.22 - Equipment Control: Knowledge of limiting conditions for operations and safety limits.	4.0	54
295030 Low Suppression Pool Water Level / 5						X	2.1.23 - Conduct of Operations: Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	55
295026 Suppression Pool High Water Temperature / 5						X	2.2.12 - Equipment Control: Knowledge of surveillance procedures.	3.7	56
295024 High Drywell Pressure / 5		X					EK2.11 - Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Drywell spray (RHR) logic: Mark-I&II	4.2	57
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4					X		AA2.04 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Individual jet pump flows: Not-BWR-1&2	3.0	58
K/A Category Totals:	3	4	3	3	4/3	3/4	Group Point Total:	20/7	

**SSS LOC28 NRC**  
**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#
500000 High Containment Hydrogen Concentration / 5					X		EA2.04 - Ability to determine and/or interpret the following as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS: Combustible limits for wetwell	3.3	83
295002 Loss of Main Condenser Vacuum / 3						X	2.1.7 - Conduct of Operations: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	84
295035 Secondary Containment High Differential Pressure / 5					X		EA2.02 - Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE: Off-site release rate: Plant-Specific	4.1	85
295014 Inadvertent Reactivity Addition	X						AK1.05 - Knowledge of the operational implications of the following concepts as they apply to INADVERTENT REACTIVITY ADDITION: Fuel thermal limits	3.7	59
295010 High Drywell Pressure / 5		X					AK2.05 - Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Drywell cooling and ventilation	3.7	60
295007 High Reactor Pressure / 3			X				AK3.03 - Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE: RCIC operation: Plant-Specific	3.4	61
295033 High Secondary Containment Area Radiation Levels / 9				X			EA1.03 - Ability to operate and/or monitor the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS: Secondary containment ventilation	3.8	62
295032 High Secondary Containment Area Temperature / 5					X		EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Equipment operability	3.3	63
295035 Secondary Containment High Differential Pressure / 5						X	2.4.1 - Emergency Procedures / Plan: Knowledge of EOP entry conditions and immediate action steps.	4.6	64
295020 Inadvertent Containment Isolation / 5 & 7		X					AK2.01 - Knowledge of the interrelations between INADVERTENT CONTAINMENT ISOLATION and the following: Main steam system	3.6	65
K/A Category Totals:	1	2	1	1	1/2	1/1	Group Point Total:	7/3	

**SSES LOC28 NRC**  
**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#
300000 Instrument Air								X				A2.01 - Ability to (a) predict the impacts of the following on the INSTRUMENT AIR SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Air dryer and filter malfunctions	2.8	86
209001 LPCS								X				A2.09 - Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low suppression pool level	3.3	87
211000 SLC											X	2.4.6 - Emergency Procedures / Plan: Knowledge of EOP mitigation strategies.	4.7	88
217000 RCIC											X	2.1.25 - Conduct of Operations: Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	89
206000 HPCI								X				A2.09 - Ability to (a) predict the impacts of the following on the HIGH PRESSURE COOLANT INJECTION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low condensate storage tank level: BWR-2,3,4	3.7	90
264000 EDGs	X											K1.04 - Knowledge of the physical connections and/or cause-effect relationships between EMERGENCY GENERATORS (DIESEL/JET) and the following: Emergency generator cooling water system	3.2	1
206000 HPCI	X											K1.09 - Knowledge of the physical connections and/or cause-effect relationships between HIGH PRESSURE COOLANT INJECTION SYSTEM and the following: ECCS keep fill system: BWR-2,3,4(P-Spec)	4.0	2
203000 RHR/LPCI: Injection Mode		X										K2.01 - Knowledge of electrical power supplies to the following: Pumps	3.5	3
215004 Source Range Monitor		X										K2.01 - Knowledge of electrical power supplies to the following: SRM channels/detectors	2.6	4

**SSES LOC28 NRC**  
**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	A 2	A 3	A 4	G	Imp.	Q#
223002 PCIS/Nuclear Steam Supply Shutoff			X									3.6	5
205000 Shutdown Cooling			X									3.2	6
239002 SRVs				X								3.6	7
259002 Reactor Water Level Control				X								3.4	8
209001 LPCS					X							2.8	9
262001 AC Electrical Distribution					X							2.6	10
300000 Instrument Air						X						2.7	11
262002 UPS (AC/DC)						X						2.7	12
261000 SGTS							X					3.1	13

**SSES LOC28 NRC**  
**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#
211000 SLC							X					A1.09 - Ability to predict and/or monitor changes in parameters associated with operating the STANDBY LIQUID CONTROL SYSTEM controls including: SBLC system lineup	4.0	14
263000 DC Electrical Distribution								X				A2.02 - Ability to (a) predict the impacts of the following on the D.C. ELECTRICAL DISTRIBUTION; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of ventilation during charging	2.6	15
215003 IRM								X				A2.01 - Ability to (a) predict the impacts of the following on the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Power supply degraded	2.8	16
217000 RCIC									X			A3.03 - Ability to monitor automatic operations of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) including: System pressure	3.7	17
215005 APRM / LPRM									X			A3.05 - Ability to monitor automatic operations of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM including: Flow converter/comparator alarms	3.3	18
212000 RPS										X		A4.11 - Ability to manually operate and/or monitor in the control room: Scram air header pressure	3.7	19
400000 Component Cooling Water										X		A4.01 - Ability to manually operate and/or monitor in the control room: CCW indications and control	3.1	20
218000 ADS											X	2.1.27 - Conduct of Operations: Knowledge of system purpose and / or function.	3.9	21
300000 Instrument Air											X	2.4.35 - Emergency Procedures / Plan: Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	3.8	22

**SSES LOC28 NRC**  
**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#
259002 Reactor Water Level Control							X					A1.05 - Ability to predict and/or monitor changes in parameters associated with operating the REACTOR WATER LEVEL CONTROL SYSTEM controls including: FWRV/startup level control position: Plant-Specific	2.9	23
215003 IRM	X											K1.07 - Knowledge of the physical connections and/or cause-effect relationships between INTERMEDIATE RANGE MONITOR (IRM) SYSTEM and the following: Reactor vessel	3.0	24
262001 AC Electrical Distribution			X									K3.01 - Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following: Major system loads	3.5	25
262002 UPS (AC/DC)											X	2.1.28 – Conduct of Operations: Knowledge of the purpose and function of major system components and controls.	4.1	26
K/A Category Totals:	3	2	3	2	2	2	3	2/3	2	2	3/2	Group Point Total:	26/5	

SSES LOC28 NRC  
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#
215002 RBM								X				A2.03 - Ability to (a) predict the impacts of the following on the ROD BLOCK MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of associated reference APRM channel: BWR-3,4,5	3.3	91
288000 Plant Ventilation											X	2.4.8 - Emergency Procedures / Plan: Knowledge of how abnormal operating procedures are used in conjunction with EOP's.	4.5	92
272000 Radiation Monitoring											X	2.2.38 - Equipment Control: Knowledge of conditions and limitations in the facility license.	4.5	93
245000 Main Turbine Generator and Auxiliary Systems	X											K1.02 - Knowledge of the physical connections and/or cause-effect relationships between MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS and the following: Condensate system	2.5	27
230000 RHR/LPCI: Torus/Pool Spray Mode				X								K4.09 - Knowledge of RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE design feature(s) and/or interlocks which provide for the following: Spray flow cooling.	3.0	28
201002 RMCS			X									K3.02 - Knowledge of the effect that a loss or malfunction of the REACTOR MANUAL CONTROL SYSTEM will have on following: Rod block monitor: Plant-Specific	2.9	29
219000 RHR/LPCI: Torus/Pool Cooling Mode				X								K4.05 - Knowledge of RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE design feature(s) and/or interlocks which provide for the following: Pump minimum flow protection	3.0	30
234000 Fuel Handling Equipment					X							K5.02 - Knowledge of the operational implications of the following concepts as they apply to FUEL HANDLING EQUIPMENT: Fuel handling equipment interlocks	3.1	31
214000 RPIS						X						K6.02 - Knowledge of the effect that a loss or malfunction of the following will have on the ROD POSITION INFORMATION SYSTEM: Position indication probe	2.7	32



SSES LOC28 NRC  
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#
241000 Reactor/Turbine Pressure Regulator							X					A1.24 - Ability to predict and/or monitor changes in parameters associated with operating the REACTOR/TURBINE PRESSURE REGULATING SYSTEM controls including: Main turbine eccentricity	2.6	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
288000 Plant Ventilation									X			A3.01 - Ability to monitor automatic operations of the PLANT VENTILATION SYSTEMS including: Isolation/initiation signals	3.8	35
204000 RWCU										X		A4.07 - Ability to manually operate and/or monitor in the control room: System temperature	3.1	36
201003 Control Rod and Drive Mechanism											X	2.4.31 – Emergency Procedures / Plan: Knowledge of annunciator alarms, indications, or response procedures.	4.2	37
290002 Reactor Vessel Internals			X									K3.06 - Knowledge of the effect that a loss or malfunction of the REACTOR VESSEL INTERNALS will have on following: PCIS/NSSSS	3.1	38
K/A Category Totals:	1	0	2	2	1	1	1	1/1	1	1	1/2	Group Point Total:	12/3	

Facility:		SSES LOC28 NRC		Date:		November 2016	
Category	K/A #	Topic	RO		SRO-Only		
			IR	Q#	IR	Q#	
1. Conduct of Operations	2.1.42	Knowledge of new and spent fuel movement procedures.			3.4	94	
	2.1.13	Knowledge of facility requirements for controlling vital / controlled access.			3.2	99	
	2.1.41	Knowledge of the refueling process.	2.8	66			
	2.1.26	Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).	3.4	67			
	Subtotal			2		2	
2. Equipment Control	2.2.20	Knowledge of the process for managing troubleshooting activities.			3.8	95	
	2.2.6	Knowledge of the process for making changes to procedures.			3.6	98	
	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.	4.6	68			
	2.2.39	Knowledge of less than or equal to one hour Technical Specification action statements for systems.	3.9	69			
	2.2.13	Knowledge of tagging and clearance procedures.	4.1	74			
Subtotal			3		2		
3. Radiation Control	2.3.11	Ability to control radiation releases.			4.3	96	
	2.3.14	Knowledge of radiation or containment hazards that may arise during normal, abnormal, or emergency conditions or activities.			3.8	100	
	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	70			
	2.3.14	Knowledge of radiation or containment hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	71			
	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	75			
Subtotal			3		2		

4. Emergency Procedures / Plan	2.4.16	Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, AOPs and SAMGs.			4.4	97
	2.4.37	Knowledge of the lines of authority during implementation of the emergency plan.	3.0	72		
	2.4.17	Knowledge of EOP terms and definitions.	3.9	73		
	Subtotal			2		1
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
The following topics / K/As were excluded from the systematic and random sampling process:		
1 / 1	295027 High Containment Temperature	This topic applies to plants with Mark III containments only. The facility has a Mark II containment.
1 / 2	295011 High Containment Temperature	This topic applies to plants with Mark III containments only. The facility has a Mark II containment.
2 / 1	207000 Isolation (Emergency) Condenser	This system is not installed at the facility.
2 / 1	209002 HPCS	This system is not installed at the facility.
2 / 2	201004 RSCS	This system is no longer installed at the facility.
2 / 2	201005 RCIS	This system is not installed at the facility.
2 / 2	239003 MSIV Leakage Control	This system is no longer installed at the facility.

The following K/As were rejected following the systematic and random sampling process:		
1 / 1	<p>Question 57</p> <p>295024 High Drywell Pressure</p> <p>EK2.14 - Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Containment pressure: Mark-III</p>	<p>The facility has a Mark-II containment, not a Mark-III.</p> <p>Randomly resampled K/A 295024 High Drywell Pressure EK2.11 Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Drywell spray (RHR) logic: Mark-I&amp;II.</p>
1 / 2	<p>Question 60</p> <p>295010 High Drywell Pressure</p> <p>AK2.03 - Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Drywell/containment differential pressure: Mark-III</p>	<p>The facility has a Mark-II containment, not a Mark-III.</p> <p>Randomly resampled K/A 295010 High Drywell Pressure AK2.05 - Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Drywell cooling and ventilation.</p>
1 / 2	<p>Question 61</p> <p>295007 High Reactor Pressure</p> <p>AK3.01 - Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE: Isolation condenser operation: Plant-Specific</p>	<p>The facility does not have Isolation Condensers.</p> <p>Randomly resampled K/A 295007 High Reactor Pressure AK3.03 - Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE: RCIC operation: Plant-Specific.</p>
1 / 1	<p>Question 76</p> <p>295030 Low Suppression Pool Water Level</p> <p>EA2.04 - Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: Drywell/ suppression chamber differential pressure: Mark-I&amp;II</p>	<p>An acceptable question could not be written at the SRO level for the randomly sampled K/A due to lack of relevant use of Drywell / Suppression Chamber differential pressure in the facility's procedures and Technical Specifications.</p> <p>Randomly resampled K/A 295030 Low Suppression Pool Water Level EA2.02 - Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: Suppression pool temperature.</p>

1 / 2	<p>Question 84</p> <p>295002 Loss of Main Condenser Vacuum</p> <p>2.1.32 - Ability to explain and apply all system limits and precautions.</p>	<p>An acceptable question could not be written at the SRO level for the randomly sampled K/A due to lack of applicable system limits and precautions related to Loss of Main Condenser Vacuum.</p> <p>Randomly resampled K/A 295002 Loss of Main Condenser Vacuum 2.1.7 - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.</p>
2 / 1	<p>Question 88</p> <p>211000 SLC</p> <p>2.4.20 - Knowledge of operational implications of EOP warnings, cautions, and notes.</p>	<p>An acceptable question could not be written at the SRO level for the randomly sampled K/A due to lack of applicable EOP warnings, cautions, and notes related to SLC.</p> <p>Randomly resampled K/A 211000 SLC 2.4.6 - Knowledge of EOP mitigation strategies.</p>
3	<p>Question 94</p> <p>2.1.45 - Ability to identify and interpret diverse indications to validate the response of another indicator.</p>	<p>The randomly sampled K/A is thoroughly and more appropriately tested on the operating exam.</p> <p>Randomly resampled K/A 2.1.42 - Knowledge of new and spent fuel movement procedures.</p>
2 / 1	<p>Question 22</p> <p>300000 Instrument Air</p> <p>2.4.41 - Knowledge of the emergency action level thresholds and classifications.</p>	<p>An acceptable question could not be written at the RO level for the randomly sampled generic K/A with the given Tier 2 system.</p> <p>Randomly resampled K/A 300000 Instrument Air 2.4.35 - Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.</p>
2 / 1	<p>Question 26</p> <p>262002 UPS (AC/DC)</p> <p>2.2.39 - Knowledge of less than one hour technical specification action statements for systems.</p>	<p>An acceptable question could not be written at the RO level for the randomly sampled generic K/A with the given Tier 2 system due to lack of appropriate less than one hour Technical Specification action statements for UPS.</p> <p>Randomly resampled K/A 262002 UPS (AC/DC) 2.1.28 - Knowledge of the purpose and function of major system components and controls.</p>

1 / 1	<p>Question 41</p> <p>295038 High Off-site Release Rate</p> <p>EK1.01 - Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE: Biological effects of radioisotope ingestion</p>	<p>An acceptable question could not be written for the randomly sampled K/A without testing GET / GFE knowledge.</p> <p>Randomly resampled K/A 295038 High Off-site Release Rate EK1.03 - Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE: Meteorological effects on off-site release.</p>
1 / 1	<p>Question 47</p> <p>295019 Partial or Complete Loss of Instrument Air</p> <p>AK3.03 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Service air isolations: Plant-Specific</p>	<p>An acceptable question could not be written for the randomly sampled K/A due to lack of Service Air isolations related to loss of Instrument Air at this facility.</p> <p>Randomly resampled K/A 295019 Partial or Complete Loss of Instrument Air AK3.03 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Backup air system supply: Plant-Specific.</p>
1 / 2	<p>Question 59</p> <p>295013 High Suppression Pool Temperature</p> <p>AK1.01 - Knowledge of the operational implications of the following concepts as they apply to HIGH SUPPRESSION POOL TEMPERATURE: Pool stratification</p>	<p>An acceptable question could not be written for the randomly sampled generic K/A due to lack of procedural guidance regarding Suppression Pool stratification. Additionally, Suppression Pool temperature concepts are already sampled in Questions 56, 76, and 81.</p> <p>Randomly resampled K/A 295014 Inadvertent Reactivity Addition AK1.05 - Knowledge of the operational implications of the following concepts as they apply to INADVERTENT REACTIVITY ADDITION: Fuel thermal limits.</p>
3	<p>Question 67</p> <p>2.1.31 - Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.</p>	<p>The randomly sampled generic K/A is testing extensively on, and better suited for, the operating exam.</p> <p>Randomly resampled K/A 2.1.26 - Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).</p>

3	<p>Question 69</p> <p>2.2.12 - Knowledge of surveillance procedures.</p>	<p>The randomly sampled generic K/A is already sampled on the RO exam in Question 69.</p> <p>Randomly resampled K/A 2.2.39 - Knowledge of less than or equal to one hour Technical Specification action statements for systems.</p>
3	<p>Question 70</p> <p>2.3.11 - Ability to control radiation releases.</p>	<p>An acceptable question could not be written for the randomly sampled generic K/A without overlapping other questions on this exam or previous 2 NRC exams. Additionally, the randomly sampled generic K/A is already sampled in Question 96.</p> <p>Randomly resampled K/A 2.3.4 - Knowledge of radiation exposure limits under normal or emergency conditions.</p>
3	<p>Question 74</p> <p>2.2.43 - Knowledge of the process used to track inoperable alarms.</p>	<p>An acceptable question could not be written without having too much question overlap with the last two NRC exams.</p> <p>Randomly resampled K/A 2.2.13 - Knowledge of tagging and clearance procedures.</p>