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10 CFR 55.40

SUSQUEHANNA STEAM ELECTRIC STATION
LOC 29 NRC INITIAL OPERATING EXAMINATION SUBMITTAL
UNIT 1 LICENSE NO. NPF-14 **Docket No. 50-387**
UNIT 2 LICENSE NO. NPF-22 **50-388**
PLA-7642

Enclosed are the examination outlines, supporting the Initial License Examination scheduled for the weeks of March 5 and 12, 2018 at Susquehanna Steam Electric Station.

This submittal includes all appropriate Examination Standard forms and outlines in accordance with NUREG-1021, "Operator Licensing Examination Standards," Revision 11.

In accordance with NUREG-1021, Revision 11, Section ES-201, "Initial Operator Licensing Examination Process," please ensure that these materials are withheld from public disclosure until after the examinations are complete.

Should you have any questions regarding this submittal, please contact Mr. Jason Jennings, Manager – Nuclear Regulatory Affairs at (570) 542-3155.

This letter contains no new regulatory commitments.

M. Sivaraman

Enclosures to this letter contain confidential information to be withheld from public disclosure under 10 CFR 2.390

Enclosures:

Enclosure 1 - Examination Security Agreements (Form ES-201-3)
Enclosure 2 - Administrative Topics Outline(s) (Form ES-301-1)
Enclosure 3 - Control Room/In-Plant Systems Outline (Form ES-301-2)
Enclosure 4 - BWR Examination Outline (Form ES-401-1)
Enclosure 5 - Generic Knowledge and Abilities Outline (Tier 3) (Form ES-401-3)
Enclosure 6 - Scenario Outlines (Form ES-D-1)
Enclosure 7 - Record of Rejected K/As (Form ES-401-4)
Enclosure 8 - Examination Outline Quality Checklist (Form ES-201-2)
Enclosure 9 - Transient and Event Checklist (Form ES-301-5)

Copy: (without attachments)
NRC Document Control Desk
L. Micewski, NRC Senior Resident Inspector
T. E Hood, NRC Project Manager

Enclosures to this letter contain confidential information to be withheld from public disclosure under 10 CFR 2.390

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Facility: SSES Date of Examination: MARCH 2018

Item	Task Description	Initials a	Initials b*	Initials c**
1. WRITTEN	a. Verify that the outline(s) fit(s) the appropriate model in accordance with ES-401 or ES-401N.	W	[illegible]	[illegible]
	b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 or ES-401N and whether all K/A categories are appropriately sampled.	W	[illegible]	[illegible]
	c. Assess whether the outline overemphasizes any systems, evolutions, or generic topics.	W	[illegible]	[illegible]
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.	W	[illegible]	[illegible]
2. SIMULATOR	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, technical specifications, and major transients.	W	[illegible]	[illegible]
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity, and ensure that each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s), and that scenarios will not be repeated on subsequent days.	W	[illegible]	[illegible]
	c. To the extent possible, assess whether the outline(s) conforms with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D and in Section D.5, "Specific Instructions for the 'Simulator Operating Test,'" of ES-301 (including overlap).	W	[illegible]	[illegible]
3. WALKTHROUGH	a. Verify that the systems walkthrough outline meets the criteria specified on Form ES-301-2: (1) The outline(s) contains the required number of control room and in-plant tasks distributed among the safety functions as specified on the form. (2) Task repetition from the last two NRC examinations is within the limits specified on the form. (3) No tasks are duplicated from the applicant's audit test(s). (4) The number of new or modified tasks meets or exceeds the minimums specified on the form. (5) The number of alternate-path, low-power, emergency, and radiologically controlled area tasks meets the criteria on the form.	W	[illegible]	[illegible]
	b. Verify that the administrative outline meets the criteria specified on Form ES-301-1: (1) The tasks are distributed among the topics as specified on the form. (2) At least one task is new or significantly modified. (3) No more than one task is repeated from the last two NRC licensing examinations.	W	[illegible]	[illegible]
	c. Determine whether there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on subsequent days.	W	[illegible]	[illegible]
4. GENERAL	a. Assess whether plant-specific priorities (including probabilistic risk assessment and individual plant examination insights) are covered in the appropriate exam sections.	W	[illegible]	[illegible]
	b. Assess whether the 10 CFR 55.41, 55.43, and 55.45 sampling is appropriate.	W	[illegible]	[illegible]
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	W	[illegible]	[illegible]
	d. Check for duplication and overlap among exam sections and the last two NRC exams.	W	[illegible]	[illegible]
	e. Check the entire exam for balance of coverage.	W	[illegible]	[illegible]
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	W	[illegible]	[illegible]

	Printed Name/Signature	Date
a. Author	Michael Wilcox / [signature]	2-19-18
b. Facility Reviewer (*)	Collin Bickman / [signature]	2/19/18
c. NRC's Chief Examiner (#)	Peter Presby / [signature]	2/23/18
d. NRC Supervisor	Donald Jackson / [signature]	2/23/18

* Not applicable for NRC-prepared examination outlines.
# The independent NRC reviewer initials items in column "c"; the chief examiner's concurrence is required.

Facility: **SSES Units 1 and 2** Date of Examination: **March 2018**

Examination Level: RO ☒ SRO ☐ Operating Test Number: **LOC29 NRC**

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D, S	Implement On-Site Class 1E Operability Test for Inoperable Diesel Generator (24.SO.1475.202) SO-024-013, KA 2.1.31 (4.6)
Conduct of Operations	D, P, R 2016 NRC	Complete Aborted Evolution Log OP-133-001, KA 2.1.20 (4.6)
Equipment Control	D, R	Describe Reactor Protection System Response to APRM Voter #1 Upscale Vote Using Prints M1-C72-22, K/A 2.2.41 (3.5)
Radiation Control	N, R	Determine Radiological and Heat Stress Requirements – Steam Leak in RCIC Room NDAP-QA-0626, SP-00-305, K/A 2.3.7 (3.5)
Emergency Plan		

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

Facility: **SSES Units 1 and 2** Date of Examination: **March 2018**

Examination Level: RO ☐ SRO ☒ Operating Test Number: **LOC29 NRC**

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D, S	Implement On-Site Class 1E Operability Test for Inoperable Diesel Generator (24.SO.1475.202) SO-024-013, KA 2.1.31 (4.3)
Conduct of Operations	D, R	Authorize Bypassing Rod Block Monitor NDAP-QA-0338, KA 2.1.37 (4.6)
Equipment Control	D, R	Describe Reactor Protection System Response to APRM Voter #1 Upscale Vote Using Prints M1-C72-22, K/A 2.2.41 (3.9)
Radiation Control	N, R	Determine Radiological and Heat Stress Requirements – Steam Leak in RCIC Room NDAP-QA-0626, SP-00-305, K/A 2.3.7 (3.6)
Emergency Plan	D, P, R 2016 NRC	Classify an Emergency Condition and Complete Emergency Notification Report EP-PS-100, EP-RM-004, KA 2.4.41 (4.6)

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

Facility: SSES Units 1 and 2	Date of Examination: March 2018
Exam Level: RO ☒ SRO-I ☒ SRO-U ☐	Operating Test Number: LOC29 NRC

Control Room Systems:* 8 for RO, 7 for SRO-I

System/JPM Title	Type Code*	Safety Function
a. Drain MSIV Leakage to Main Condenser Post-LOCA KA 239003 A4.01 (3.2/3.2), OP-184-001	D, S	9
b. Swap Feedwater Level Input (RO ONLY) KA 259002 A4.01 (3.8/3.6), OP-145-001	D, S	2
c. Establish and Maintain Reactor Pressure with SRVs from RSP KA 295016 AA1.08 (4.0/4.0), ON-CREVAC-101	D, EN, S	3
d. Start RCIC in Pressure Control Mode; Auto Isolation Signal Fails KA 217000 A4.04 (3.6/3.6), OP-150-001	M,A,L,EN,S	4
e. Re-Establish RB HVAC KA295032 EA1.03 (3.7/3.7), ES-134-003	P, D, A, L, EN, S 2016 NRC	5
f. Synchronize the Main Generator; Auto Synchronization Fails KA 262001 A4.04 (3.6/3.7), OP-198-001	D, A, S	6
g. Perform Weekly RPS Surveillance KA 212000 A4.02 (3.6/3.7), SO-158-001, ON-CRD-101	N, A, S	7
h. Perform RBCCW System Flush, RBCCW Pump Trips KA 400000 A2.01 (3.3/3.4), OP-114-001, GO-100-014	D, A, S	8
In-Plant Systems:* 3 for RO, 3 for SRO-I		
i. Shift CRD Flow Stations from A to B 201001 A2.07 (3.2/3.1), OP-155-001	D, R	1
j. Place RHR in Suppression Pool Cooling at RSDP KA 219000 A2.13 (3.5/3.7), OP-249-005	P, D, E, R 2016 NRC	5
k. Transfer of DG 'E' for DG 'C' KA 264000 A2.09 (3.7/4.1), OP-024-004	D, E	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, and in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for R /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	

Appendix D	Scenario Outline	Form ES-D-1

Facility: **SSES Units 1 and 2** Scenario No.: **NRC-2** Op-Test No.: **LOC29**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: The plant is operating at approximately 100% power. IAC B and SLC pump B are out of service for maintenance.

Turnover: Start TBCCW pump B and secure TBCCW pump A per OP-115-001 section 2.2.

Critical Tasks: **See Page 2**

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Swap TBCCW Pumps OP-115-001
2	cmfMV05_HV10242A	C – BOP, SRO R – ATC	Loss of Extraction Steam to Feedwater Heating ON-FWHTG-101, Technical Specifications
3	cmfTR02_PT14201A	I – SRO	Turbine First Stage Pressure Instrument Failure AR- Technical Specifications
4	fx1RRPA_1RRPASTD.OUT	I – ATC, SRO	Recirculation Pump Speed Rises ON-PWR-101
5	mfRR179003	C – BOP, SRO R – ATC	Fuel Failure ON-MSLRAD-101, ON-SCRAM-101, EO-000-102
6	mfMS183008	M – All	Main Steam Leak into Turbine Building EO-000-102, EO-000-105
7	cmfAV06_HV141F022A(B)(C)(D) cmfAV06_HV141F028A(B)(C)(D)	C – All	MSIVs Fail Open EO-000-105
8	cmfPM03_1V104A(B)	C – All	Turbine Building HVAC Trips EO-000-105, EO-000-112

* (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.: **NRC-2**	Op-Test No.: **LOC29**
1. Malfunctions after EOP entry (1-2) **Events 7, 8**	2	
2. Abnormal events (2-4) **Events 2, 4 , 5**	3	
3. Major transients (1-2) **Event 6**	1	
4. EOPs entered/requiring substantive actions (1-2) **EO-000-102, EO-000-105**	2	
5. EOP contingencies requiring substantive actions (0-2) **EO-000-112**	1	
6. Preidentfied Critical tasks (≥ 2)	2	
CRITICAL TASK DESCRIPTIONS:		**CRITICAL TASK JUSTIFICATION:**
CT-1.0: Given a fuel failure causing Main Steam Line radiation levels to rise, manually scram the Reactor when Main Steam Line Hi Hi Rad setpoint is approached or exceeded.		Manually scramming the Reactor when Main Steam Line radiation levels approach or exceed predetermined values is necessary to limit the production and release of fission products outside of the Reactor coolant system and Primary Containment. Continued Reactor operation with fuel damage causing high Main Steam Line radiation levels will result in increased production and release of fission products. Plant release rates will rise, resulting in an elevated dose to the public.
CT-2.0: Given a radiological release, perform a Emergency Depressurization prior to EPB projected dose / dose rates reaching General Emergency declaration criteria.		In order to minimize radiation exposure to the public, Emergency Depressurization of RPV is required if a primary system is discharging and the radioactivity release rate cannot be controlled below release rate that requires a General Emergency.

SCENARIO SUMMARY

The crew assumes the shift with the plant operating at approximately 100% power. IAC B and SLC pump B are out of service for maintenance.

The crew will begin by starting TBCCW pump B and securing TBCCW pump A per OP-115-001. During this evolution, extraction steam to Feedwater Heater 5A will isolate. The loss of Feedwater heating will cause Reactor power to rise. The crew will respond per ON-FWHTG-101, Feedwater Heating Off Normal Operation, and multiple other off-normal procedures. The crew will be required to reduce Reactor power to ≤71%. They will initiate a Recirculation runback to limiter #2. The crew will then isolate Feedwater Heater string A. The SRO will determine the Technical Specification impact.

Next, a failure of the Turbine First Stage Pressure instrumentation will occur. The SRO will determine the Technical Specification impact.

Recirculation pump A speed will rise over approximately 5 minutes. Reactor power will rise to a maximum of approximately 104% if nothing is done. The crew will enter ON-PWR-101, Reactor Power. The crew will perform the immediate operator actions to lock Recirculation pump A scoop tube and lower Reactor power to below the license limit. The crew may dispatch an operator to manually control Recirculation pump A scoop tube.

The reactivity excursion will cause fuel damage. Off-gas and Main Steam Line radiation levels will rise. The crew will execute ON-MSLRAD-101, Rising Offgas MSL Rad Levels. The crew will lower Reactor power in an attempt to reduce radiation levels. The crew will eventually scram the Reactor and attempt to isolate the MSIVs. The MSIVs will stick in mid-position.

After the scram, a Main Steam Line break will develop in the Turbine Building. With the MSIVs stuck mid-position, this is an un-isolable primary system discharging outside of the primary containment. Turbine Building exhaust fan A will trip. Turbine Building exhaust fan B will trip approximately 1 minute after being started. The loss of Turbine Building HVAC will lead to an un-monitored release from the Turbine Building. The crew will execute EO-000-105, Radioactivity Release Control. Off-site dose assessment will report dose rates approaching the General Emergency level. The crew will execute EO-000-112, Emergency Depressurization, and open all ADS valves. The crew will control Reactor injection to restore / maintain Reactor water level during and after the emergency depressurization.

The scenario will be terminated when 6 SRVs are open and Reactor water level is being restored to or controlled in the assigned band above -161".

Facility: **SSES Units 1 and 2** Scenario No.: **NRC-3** Op-Test No.: **LOC29**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: The plant is operating at approximately 45-46% power. IAC B and SLC pump B are out of service for maintenance.

Turnover: Insert control rods to lower the rod line below 60% per the Reactivity Manipulation Package, OP-156-001, and GO-100-012. Then, remove Recirculation pump B from service per OP-164-001 section 2.6.

Critical Tasks: **See Page 2**

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – ATC, SRO	Lower Reactor Power with Control Rod Insertion OP-156-001, GO-100-012
2	N/A	N – ATC, SRO	Remove Recirculation Pump B from Service OP-164-001, Technical Specifications
3	cmfRD02_RED121N015A	I – SRO	Refuel Floor High Exhaust Radiation Monitor Fails Downscale AR-112-G02, Technical Specifications
4	cmfPM03_1P132A mfRD1550193431	C – BOP, SRO	CRD Pump A Trip with One Inoperable CRD Accumulator ON-CRD-101, Technical Specifications
5	Override aiHS10001	C – ATC, SRO	Main Generator Auto Voltage Regulator Failure ON-GENGRID-101
6	cmfCN02_TIC10955	C – BOP, SRO	Main Turbine Lube Oil Controller Fails to Minimum Cooling in Auto AR-123-H05
7	mfTU193007D mfTU193008D	C – All	Main Turbine Bearing #4 High Temperature and Vibration AR-105-C05, AR-105-E05, ON-SCRAM-101
8	mfRD155017	M – All	Hydraulic ATWS EO-000-102, EO-000-113
9	cmfPM02_1P208A	C – All	SLC Pump Trip EO-000-113

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

Facility: **SSES Units 1 and 2**	Scenario No.: **NRC-3**	Op-Test No.: **LOC29**
1. Malfunctions after EOP entry (1-2) **Event 9**	1	
2. Abnormal events (2-4) **Events 4, 5, 6, 7**	4	
3. Major transients (1-2) **Event 8**	1	
4. EOPs entered/requiring substantive actions (1-2) **EO-000-102, EO-000-103**	2	
5. EOP contingencies requiring substantive actions (0-2) **EO-000-113**	1	
6. Preidentfied Critical tasks (≥ 2)	2	
CRITICAL TASK DESCRIPTIONS:		**CRITICAL TASK JUSTIFICATION:**
CT-1.0: Given a failure of the reactor to scram with power >5%, Lower RPV level less than -60" but greater than -161" to reduce power IAW EO-000-113, Level/Power Control.		High Reactor power after a scram is attempted indicates a challenge to nuclear fuel and to plant heat sinks. In the event of a loss of the normal heat sink, this may result in adding heat to the Suppression Pool and challenging the Primary Containment. Lowering Reactor power reduces these challenges.
CT-2.0: Given a failure of the reactor to scram, reduce reactor power by inserting control rods or injecting Boron IAW EO-100-113		Inserting control rods lowers Reactor power, which reduces challenges to the plant during a failure to scram. Additionally, inserting control rods ultimately provides a long-term, stable core shutdown. Boron injection will lower power rapidly, however, alone may not provide a stable shutdown condition.

SCENARIO SUMMARY

The crew assumes the shift with the plant operating at approximately 45-46% power. IAC B and SLC pump B are out of service for maintenance.

The crew will begin by lowering Reactor power with control rod insertion. The crew will insert control rods to lower rod line below 60% for securing Recirculation pump B. Then, the crew will secure Recirculation pump B per OP-164-001. The crew will establish single loop operation and the SRO will determine the Technical Specification requirements.

At the end of this evolution, Refuel Floor High exhaust radiation monitor A will fail downscale. The SRO will determine the Technical Specification impact.

Next, CRD pump A will trip. The crew will respond per ON-CRD-101 by placing the CRD flow control valve in manual and fully closing it. Then the crew will start CRD pump B, open the CRD flow control valve, and place the valve back in automatic. One CRD accumulator will alarm with low nitrogen pressure. The low nitrogen pressure condition will continue even after other CRD parameters are restored. The SRO will determine the Technical Specification impact of the inoperable accumulator.

The Main Generator voltage regulator will fail to maximum demand while in automatic. The crew will respond per ON-GENGRID-101. The crew may attempt to fix the automatic voltage regulator demand signal, but will eventually place the manual voltage regulator in service and lower reactive load.

The Main Turbine Lube Oil temperature controller will fail to minimum cooling while in automatic. The crew will respond by placing the temperature controller in manual and lowering oil temperature. Main Turbine bearing #4 temperature and vibration will continue to rise even after cooling is restored, indicating bearing damage from the initial temperature transient. Damage to Main Turbine seals will result in rising Main Condenser air in-leakage. Bearing temperature will eventually require the crew to insert a manual Reactor scram.

A hydraulic failure to scram will occur. The crew will execute EO-000-113, Level/Power Control, to control Reactor power, level, and pressure. The crew will attempt to inject SLC, but SLC pump A will trip after ~30 seconds and SLC pump B is out of service for maintenance. The crew will lower Reactor water level. The crew will be able to insert control rods using RMCS and by repeated manual scrams. If all control rods are inserted during the scenario, the crew will restore and maintain Reactor water level to the normal level control band.

The scenario will be terminated when control rod insertion is in progress or when all control rods are inserted and Reactor water level is being restored to or controlled in the assigned band above -161".

Facility: **SSES Units 1 and 2** Scenario No.: **NRC 4** Op-Test No.: **LOC29**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: The plant is operating at approximately 100% power. IAC B and SLC pump B are out of service for maintenance.

Turnover: Reduce reactor power to 95% using Recirc Flow. Then perform RCIC valve exercising per SO-150-004. The procedure is in progress up to step 5.1.8.

Critical Tasks: **See Page 2**

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – ATC, SRO	Lower Reactor Power Using Recirc Flow
2	N/A	N – BOP, SRO	Perform Quarterly RCIC Valve Exercising SO-150-004
3	diHS14959A	C – BOP, SRO	RCIC Turbine Exhaust to Suppression Pool Valve Fails to Re-Open SO-150-004, Technical Specifications
4	rfDC102114	C – BOP, SRO	Loss of Power to Instrument Bus 1Y125 ON-YPNL-101, Technical Specifications
5	cmfEB01_1A201	C – All	Electrical Fault on ESS Bus 1A (1A201) ON-4KV-101, Technical Specifications
6	mfMS183007	M – All	Steam Leak in Drywell ON-DWLEAK-101, ON-SCRAM-101, EO-000-102, EO-000-103
7	mfHP152015	C - All	HPCI Trips EO-000-102
8	cmfPM03_1P202B(D)	C – All	RHR Pumps B and D Trip EO-000-103, OP-116-001
9	cmfAV04_PSV15704B1(2)	C – All	Failed Open Suppression Chamber to Drywell Vacuum Breaker EO-000-103, EO-000-112

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

Facility: **SSES Units 1 and 2**	Scenario No.: **NRC-4**	Op-Test No.: **LOC29**
1. Malfunctions after EOP entry (1-2) **Events 6, 7, 8**	3	
2. Abnormal events (2-4) **Events 2, 3, 4**	3	
3. Major transients (1-2) **Event 5**	1	
4. EOPs entered/requiring substantive actions (1-2) **EO-000-102, EO-000-103**	2	
5. EOP contingencies requiring substantive actions (0-2) **EO-000-112**	1	
6. Preidentfied Critical tasks (≥ 2)	2	
CRITICAL TASK DESCRIPTIONS:		**CRITICAL TASK JUSTIFICATION:**
CT-1.0: Spray the Drywell with RHRSW when Suppression Chamber pressure exceeds 13 psig.		Initiating Containment Sprays reduces Primary Containment pressure. This reduces stresses on the Drywell and Suppression Chamber, assists in avoiding "chugging" that may cause fatigue failure of the LOCA downcomers, and avoids the need for a blowdown. These benefits reduce challenges to the fuel cladding, the RPV, and the Primary Containment.
CT-2.0: Perform Emergency Depressurization when Suppression Chamber Pressure cannot be maintained below the Pressure Suppression Limit.		A Blowdown is required to limit further release of energy into the Primary Containment and to ensure that the RPV is depressurized while pressure suppression capability is still available. This protects the integrity of the Primary Containment.

SCENARIO SUMMARY

The crew assumes the shift with the plant operating at approximately 100% power. IAC B and SLC pump B are out of service for maintenance.

The crew will begin by lowering reactor power using recirc flow, then performing quarterly RCIC valve exercising per SO-150-004. The second valve to be exercised will be the Turbine Exhaust to Suppression Pool Isolation Valve. This valve will close, but fail to re-open. The surveillance will be placed on hold and the SRO will determine the Technical Specification impact.

Next, power will be lost to Instrument Bus 1Y125. This bus supplies power to multiple Reactor and ECCS indicators. The SRO will determine the Technical Specification impact. The crew will respond per ON-YPNL-101, Loss of Instrument Bus, and restore power to the various instruments from the alternate supply.

Then, an electrical fault will cause ESS Bus 1A to de-energize. This results in the loss of Core Spray pump A, RHR pump A, and RHR loop A Containment Spray ability. The crew will respond per ON-4KV-101, Loss of 4KV ESS Bus, and multiple other off-normal procedures. The crew will cross-tie Instrument Air to Containment Instrument Gas, place RPS Bus A on the alternate supply, reset a half scram and half isolation, and start the 1B CRD pump. The SRO will determine the Technical Specification impact.

A steam leak will develop inside the Primary Containment. The crew will execute ON-SCRAM-101, Reactor Scram, EO-000-102, RPV Control, and EO-000-103, Primary Containment Control. The crew will scram the Reactor, initiate Suppression Chamber spray, and attempt to initiate Drywell spray. HPCI will trip upon start, requiring use of other systems for Reactor water level control.

When Drywell spray is initiated, RHR pumps B and D will trip. RHR loop A is unavailable for Drywell spray due to earlier electrical losses. The crew will then place alternate Containment Spray in service using RHRSW.

Once alternate spray is in service, a Suppression Chamber to Drywell vacuum breaker will stick open and the steam leak will worsen. Containment pressure will rise and the Pressure Suppression Limit will be violated. The crew will execute EO-000-112, Emergency Depressurization, and open 6 ADS valves.

The scenario will be terminated when 6 SRVs are open, RHRSW is spraying the Drywell, and Reactor water level is being restored to or controlled in the assigned band above -161".

Facility: **Susquehanna Units 1 & 2** Date of Exam: **03/15/2018**

Tier	Group	RO K/A Category Points												SRO-Only Points						
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2		G*		Total		
1. Emergency and Abnormal Plant Evolutions	1	3	4	4	N/A			3	3	N/A		3	20	3		4		7		
	2	2	1	1				1	1			1	7	2		1		3		
	Tier Totals	5	5	5				4	4			4	27	5		5		10		
2. Plant Systems	1	2	3	2	3	3	2	2	2	3	1	3	26	3		2		5		
	2	1	0	1	1	2	1	1	1	1	2	1	12	0	2	1		3		
	Tier Totals	3	3	3	4	5	3	3	3	4	3	4	38	5		3		8		
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7		
		2			3			2			3			1	2	2	2			

Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)

2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points, and the SRO-only exam must total 25 points.

3. Systems/evolutions within each group are identified on the outline. Systems or evolutions that do not apply at the facility should be deleted with justification. Operationally important, site-specific systems/evolutions that are not included on the outline should be added, Refer to Section D.1.b of ES-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. 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 K/As.

8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' IRs for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. If fuel-handling equipment is sampled in 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.

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.

G* Generic K/As

* These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.

** These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/**SRO**)							Form ES-401-1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
295001 (APE 1) Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4						X	G2.2.22, Knowledge of limiting conditions for operations and safety limits.	4.0	1
295003 (APE 3) Partial or Complete Loss of AC Power / 6		X					AK2.04, Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF A.C. POWER and the following: A.C. electrical loads	3.4	2
295004 (APE 4) Partial or Complete Loss of DC Power / 6	X						AK1.05, Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Loss of breaker protection	3.3	3
295005 (APE 5) Main Turbine Generator Trip / 3		X					AK2.04, Knowledge of the interrelations between MAIN TURBINE GENERATOR TRIP and the following: Main generator protection	3.3	4
295006 (APE 6) Scram / 1						X	G2.4.6, Knowledge of EOP mitigation strategies.	3.7	5
					X		**AA2.04, Ability to determine and/or interpret the following as they apply to SCRAM: Reactor pressure**	**4.1**	**76**
295016 (APE 16) Control Room Abandonment / 7					X		AA2.03, Ability to determine and/or interpret the following as they apply to CONTROL ROOM ABANDONMENT: Reactor pressure	4.3	6
					X		**AA2.02, Ability to determine and/or interpret the following as they apply to CONTROL ROOM ABANDONMENT: Reactor water level**	**4.3**	**77**
295018 (APE 18) Partial or Complete Loss of CCW / 8	X						AK1.01, Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: Effects on component/system operations	3.5	7
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8				X			AA1.04, Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Service air isolations valves: Plant-Specific	3.3	8
295021 (APE 21) Loss of Shutdown Cooling / 4				X			AA1.03, Ability to operate and/or monitor the following as they apply to LOSS OF SHUTDOWN COOLING: Component cooling water systems: Plant-Specific	3.1	9
						X	**G2.4.31, Knowledge of annunciator alarms, indications, or response procedures.**	**4.1**	**78**
295023 (APE 23) Refueling Accidents / 8		X					AK2.02, Knowledge of the interrelations between REFUELING ACCIDENTS and the following: Fuel pool cooling and cleanup system	2.9	10
					X		**AA2.04, Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS: Occurrence of fuel handling accident**	**4.1**	**79**

295024 High Drywell Pressure / 5	X						EK1.01, Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE: Drywell integrity: Plant-Specific	4.1	11
295025 (EPE 2) High Reactor Pressure / 3			X				EK3.03, Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE: HPCI operation: Plant-Specific	3.8	12
						X	**G2.1.7, Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.**	**4.7**	**80**
295026 (EPE 3) Suppression Pool High Water Temperature / 5			X				EK3.02, Knowledge of the reasons for the following responses as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Suppression pool cooling	3.9	13
295028 (EPE 5) High Drywell Temperature (Mark I and Mark II only) / 5					X		EA2.06, Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE: Torus/suppression chamber air space temperature: Plant-Specific	3.4	14
295030 (EPE 7) Low Suppression Pool Water Level / 5				X			EA1.01, Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: ECCS systems (NPSH considerations): Plant-Specific	3.6	15
						X	**G2.4.47, Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.**	**4.2**	**81**
295031 (EPE 8) Reactor Low Water Level / 2					X		EA2.03, Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Reactor pressure	4.2	16
295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1		X					EK2.09, Knowledge of the interrelations between SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN and the following: Reactor water level	**4.0**	17
						X	**G2.4.34, Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.**	**4.1**	**82**
295038 (EPE 15) High Offsite Radioactivity Release Rate / 9			X				EK3.03, Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: Control room ventilation isolation: Plant-Specific	3.7	18
600000 (APE 24) 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 contained in the abnormal procedure for plant fire on site	2.8	19
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6						X	G2.4.8, Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	3.8	20
K/A Category Totals:	3	4	4	3	**3/3**	**3/4**	RO/**SRO** Group Point Total:		**20/7**

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/**SRO**)							Form ES-401-1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
295002 (APE 2) Loss of Main Condenser Vacuum / 3					X		AA2.01, Ability to determine and/or interpret the following as they apply to LOSS OF MAIN CONDENSER VACUUM: Condenser vacuum/absolute pressure	2.9	21
295007 (APE 7) High Reactor Pressure / 3		X					AK2.04, Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following: LPCS	3.2	22
295008 (APE 8) High Reactor Water Level / 2					X		**AA2.01, Ability to determine and/or interpret the following as they apply to HIGH REACTOR WATER LEVEL: Reactor water level**	**3.9**	**83**
295012 (APE 12) High Drywell Temperature / 5				X			AA1.02, Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell cooling system	3.8	23
295013 (APE 13) High Suppression Pool Temperature. / 5	X						AK1.04, Knowledge of the operational implications of the following concepts as they apply to HIGH SUPPRESSION POOL TEMPERATURE: Complete condensation	2.9	24
295017 (APE 17) High Offsite Release Rate / 9					X		**AA2.05, Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Meteorological data**	**3.8**	**84**
295020 (APE 20) Inadvertent Containment Isolation / 5 & 7						**X**	**G2.1.20, Ability to interpret and execute procedure steps.**	**4.6**	**85**
295029 (EPE 6) High Suppression Pool Water Level / 5			X				EK3.03, Knowledge of the reasons for the following responses as they apply to HIGH SUPPRESSION POOL WATER LEVEL: Reactor SCRAM	3.4	25
295034 (EPE 11) Secondary Containment Ventilation High Radiation / 9	X						EK1.01, Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION: Personnel protection	3.8	26
500000 (EPE 16) High Containment Hydrogen Concentration / 5						X	G2.4.18 Knowledge of the specific bases for EOPs	3.3	27
K/A Category Point Totals:	2	1	1	1	**1/2**	**1/1**	RO/**SRO** Group Point Total:		**7/3**

ES-401	BWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/**SRO**)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	K/A Topic(s)	IR	Q#
203000 (SF2, SF4 RHR/LPCI) RHR/LPCI: Injection Mode			X									K3.02, Knowledge of the effect that a loss or malfunction of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) will have on following: Suppression pool level	3.5	28
205000 (SF4 SCS) Shutdown Cooling											X	G2.1.27, Knowledge of system purpose and/or function.	3.9	29
			X									K3.05, Knowledge of the effect that a loss or malfunction of the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) will have on following: Fuel pool cooling assist: Plant-Specific	2.6	30
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection							X					A1.05, Ability to predict and/or monitor changes in parameters associated with operating the HIGH PRESSURE COOLANT INJECTION SYSTEM controls including: Suppression pool temperature: BWR-2,3,4	4.1	31
					X							K5.08, Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE COOLANT INJECTION SYSTEM: Vacuum breaker operation: BWR-2,3,4	3.0	32
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray									X			A3.06, Ability to monitor automatic operations of the LOW PRESSURE CORE SPRAY SYSTEM including: Lights and alarms	3.6	33
											X	**G2.4.50, Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.**	**4.0**	**86**
211000 (SF1 SLCS) Standby Liquid Control											X	G2.1.28, Knowledge of the purpose and function of major system components and controls.	4.1	34
212000 (SF7 RPS) Reactor Protection System				X								K4.12, Knowledge of REACTOR PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Bypassing of selected SCRAM signals (manually and automatically): Plant-Specific	3.9	35
					X							K5.02, Knowledge of the operational implications of the following concepts as they apply to REACTOR PROTECTION SYSTEM: Specific logic arrangements	3.3	36
215003 (SF7 IRM) Intermediate-Range Monitor						X						K6.02, Knowledge of the effect that a loss or malfunction of the following will have on the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM: 24/48 volt D.C. power: Plant-Specific	3.6	37

215004 (SF7 SRMS) 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	3.4	38
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor					X						K5.04, Knowledge of the operational implications of the following concepts as they apply to AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM: LPRM detector location and core symmetry	2.9	39
							X				**A2.03, 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 or operations: Inoperative trip (all causes)**	**3.8**	**87**
217000 (SF2, SF4 RCIC) Reactor Core Isolation Cooling				X							K4.04, Knowledge of REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) design feature(s) and/or interlocks which provide for the following: Prevents turbine damage: Plant-Specific	3.0	40
218000 (SF3 ADS) Automatic Depressurization System									X		A4.08, Ability to manually operate and/or monitor in the control room: Suppression pool level	3.7	41
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff								X			A3.01, Ability to monitor automatic operations of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF including: System indicating lights and alarms	3.4	42
							X				**A2.06, 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 abnormal conditions or operations: Containment instrumentation failures**	**3.2**	**88**
239002 (SF3 SRV) Safety Relief Valves		X									K2.01, Knowledge of electrical power supplies to the following: SRV solenoids	2.8	43
						X					K6.02, Knowledge of the effect that a loss or malfunction of the following will have on the RELIEF/SAFETY VALVES: Air (Nitrogen) supply: Plant-Specific	3.4	44

259002 (SF2 RWLCS) Reactor Water Level Control							X					A1.03, Ability to predict and/or monitor changes in parameters associated with operating the REACTOR WATER LEVEL CONTROL SYSTEM controls including: Reactor power	3.8	45
								X				**A2.02, 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 any number of reactor feedwater flow inputs**	**3.4**	**89**
261000 (SF9 SGTS) Standby Gas Treatment	X											K1.01, Knowledge of the physical connections and/or cause-effect relationships between STANDBY GAS TREATMENT SYSTEM and the following: Reactor building ventilation system	3.4	46
262001 (SF6 AC) AC Electrical Distribution								X				A2.10, Ability to (a) predict the impacts of the following on the A.C. ELECTRICAL DISTRIBUTION; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Exceeding current limitations	2.9	47
											X	**G2.2.36, Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.**	**4.2**	**90**
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)									X			A3.01, Ability to monitor automatic operations of the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) including: Transfer from preferred to alternate source	2.8	48
											X	G2.1.23, Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	49
263000 (SF6 DC) DC Electrical Distribution		X										K2.01, Knowledge of electrical power supplies to the following: Major D.C. loads	3.1	50
264000 (SF6 EGE) Emergency Generators (Diesel/Jet)	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	51
300000 (SF8 IA) Instrument Air				X								K4.03, Knowledge of INSTRUMENT AIR SYSTEM design feature(s) and or interlocks which provide for the following: Securing of IAS upon loss of cooling water	2.8	52
400000 (SF8 CCS) Component Cooling Water		X										K2.02, Knowledge of electrical power supplies to the following: CCW valves	2.9	53
K/A Category Point Totals:	2	3	2	3	3	2	2	2/ **3**	3	1	3/ **2**	RO/**SRO** Group Point Total:		26/**5**

ES-401	BWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/**SRO**)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	Q#
201001 (SF1 CRDH) CRD Hydraulic							X					A1.09, Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROD DRIVE HYDRAULIC SYSTEM controls including: CRD drive water flow	2.9	54
201002 (SF1 RMCS) Reactor Manual Control											X	G2.4.49, Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	55
201003 (SF1 CRDM) Control Rod and Drive Mechanism					X							K5.01, Knowledge of the operational implications of the following concepts as they apply to CONTROL ROD AND DRIVE MECHANISM: Hydraulics	2.6	56
202001 (SF1, SF4 RS) Recirculation System											X	**G2.1.7, Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.**	**4.7**	**91**
202002 (SF1 RSCTL) Recirculation Flow Control System										X		A4.03, Ability to manually operate and/or monitor in the control room: Lights and alarms.	3.1	57
215001 (SF7 TIP) Traversing In-Core Probe						X						K6.04, Knowledge of the effect that a loss or malfunction of the following will have on the TRAVERSING IN-CORE PROBE: Primary containment isolation system: Mark-I&II (Not-BWR1)	3.1	58
215002 (SF7 RBMS) Rod Block Monitor					X							K5.01, Knowledge of the operational implications of the following concepts as they apply to ROD BLOCK MONITOR SYSTEM: Trip reference selection: Plant-Specific	2.6	59
223001 (SF5 PCS) Primary Containment and Auxiliaries								X				A2.08, Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Compressor trips (loss of air): Plant-Specific	3.1	60
234000 (SF8 FH) Fuel-Handling Equipment										X		A4.01, Ability to manually operate and/or monitor in the control room: Neutron monitoring system	3.7	61
241000 (SF3 RTPRS) Reactor/Turbine Pressure Regulating System			X									K3.08, Knowledge of the effect that a loss or malfunction of the REACTOR/TURBINE PRESSURE REGULATING SYSTEM will have on following: Control/governor valves	3.7	62

259001 (SF2 FWS) Reactor Feedwater System								X			A3.06, Ability to monitor automatic operations of the REACTOR FEEDWATER SYSTEM including: Pump discharge pressure	3.1	63
271000 (SF9 OG) Offgas							**X**				**A2.04, Ability to (a) predict the impacts of the following on the OFFGAS SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Offgas system high radiation**	**4.1**	**92**
272000 (SF7, SF9 RMS) Radiation Monitoring	X										K1.08, Knowledge of the physical connections and/or cause-effect relationships between RADIATION MONITORING SYSTEM and the following: Reactor protection system	3.6	64
286000 (SF8 FPS) Fire Protection				X							K4.03, Knowledge of FIRE PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Maintenance of fire header pressure	3.3	65
290001 (SF5 SC) Secondary Containment							**X**				**A2.03, Ability to (a) predict the impacts of the following on the SECONDARY CONTAINMENT; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High area radiation**	**3.6**	**93**
K/A Category Point Totals:	1	0	1	1	2	1	1	1/ **2**	1	2	1/ **1**	RO/**SRO** Group Point Total:	12/**3**

Facility: **Susquehanna Units 1 & 2** Date of Exam: **03/15/2018**

Category	K/A #	Topic	RO		SRO-only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.29	Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.	4.1	66		
	2.1.39	**Knowledge of conservative decision making practices.**			**4.3**	**94**
	2.1.3	Knowledge of shift or short-term relief turnover practices	3.7	67		
	Subtotal			2		**1**
2. Equipment Control	**2.2.12**	**Knowledge of surveillance procedures**			**4.1**	**95**
	2.2.17	**Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator.**			**3.8**	**96**
	2.2.35	Ability to determine Technical Specification Mode of Operation.	3.6	68		
	2.2.13	Knowledge of tagging and clearance procedures.	4.1	69		
	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings.	3.5	70		
	Subtotal			3		**2**
3. Radiation Control	**2.3.4**	**Knowledge of radiation exposure limits under normal or emergency conditions.**			**3.7**	**97**
	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	71		
	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	72		
	2.3.14	**Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.**			**3.8**	**98**
	Subtotal			2		**2**
4. Emergency Procedures/Plan	2.4.4	Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5	73		
	2.4.30	**Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.**			**4.1**	**99**
	2.4.19	Knowledge of EOP layout, symbols, and icons.	3.4	74		
	2.4.40	**Knowledge of SRO responsibilities in emergency plan implementation.**			**4.5**	**100**
	2.4.50	Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.2	75		

	Subtotal		3		**2**
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	Question 6 295016 Control Room Abandonment AA2.07 - Ability to determine and/or interpret the following as they apply to CONTROL ROOM ABANDONMENT: Suppression chamber pressure	An acceptable question could not be developed for the randomly sampled K/A due to lack of procedural guidance for control or monitoring of Suppression Chamber pressure relative to a Control Room Abandonment and lack of installed instrumentation at the Remote Shutdown Panel. Randomly resampled K/A 295016 Control Room Abandonment AA2.03 - Ability to determine and/or interpret the following as they apply to CONTROL ROOM ABANDONMENT: Reactor pressure.

2 / 1	Question 29 205000 Shutdown Cooling 2.4.18 - Knowledge of the specific bases for EOPs.	An acceptable question could not be developed for the randomly sampled K/A due to limited EOP bases related to Shutdown Cooling. Randomly resampled K/A 205000 Shutdown Cooling 2.1.27 - Knowledge of system purpose and/or function.
2 / 1	Question 36 212000 RPS K5.01 - Knowledge of the operational implications of the following concepts as they apply to REACTOR PROTECTION SYSTEM: Fuel thermal time constant	An acceptable question could not be developed for the randomly sampled K/A Randomly resampled K/A 212000 RPS K5.02 - Knowledge of the operational implications of the following concepts as they apply to REACTOR PROTECTION SYSTEM: Specific logic arrangements.
2 / 1	Question 49 262002 Uninterruptable Power Supply (AC/DC) 2.1.19 - Ability to use plant computers to evaluate system or component status.	An acceptable question could not be developed for the randomly sampled K/A due to lack of indications on the plant computer for UPS. Randomly resampled K/A 262002 Uninterruptable Power Supply (AC/DC) 2.1.23 - Ability to perform specific system and integrated plant procedures during all modes of plant operation.

2 / 2	Question 57 202002 Recirculation Flow Control System K2.02 - Knowledge of electrical power supplies to the following: Hydraulic power unit: Plant-Specific	An acceptable question could not be developed for the randomly sampled K/A because the facility does not have Hydraulic power units in the Recirculation Flow Control System. Randomly resampled K/A 202002 Recirculation Flow Control System A4.03 - Ability to manually operate and/or monitor in the control room: Lights and alarms.
3	Question 67 2.1.42 - Knowledge of new and spent fuel movement procedures.	An acceptable question could not be developed for the randomly sampled K/A at the RO license level because this is an SRO area of responsibility (10CFR55.43(b)(7)). Randomly resampled K/A 2.1.3 - Knowledge of shift or short-term relief turnover practices.
3	Question 69 2.2.37 - Ability to determine operability and/or availability of safety related equipment.	An acceptable Tier 3 question could not be developed for the randomly sampled K/A at the RO license level because this is an SRO area of responsibility. Randomly resampled K/A 2.2.13 - Knowledge of tagging and clearance procedures.
3	Question 74 2.4.32 - Knowledge of operator response to loss of all annunciators.	An acceptable question could not be developed for the randomly sampled K/A due to lack of specific procedural guidance for a loss of all annunciators at the facility. Randomly resampled K/A 2.4.19 - Knowledge of EOP layout, symbols, and icons.

1 / 2	Question 83 295008 High Reactor Water Level AA2.04 - Ability to determine and/or interpret the following as they apply to HIGH REACTOR WATER LEVEL: Heatup rate: Plant-Specific	An acceptable question could not be developed for the randomly sampled K/A due to lack of a plant specific link between the evolution and heatup rate. Randomly resampled K/A 295008 High Reactor Water Level AA2.01 - Ability to determine and/or interpret the following as they apply to HIGH REACTOR WATER LEVEL: Reactor water level.
1 / 2	Question 85 295020 Inadvertent Containment Isolation 2.4.50 - Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	An acceptable question could not be developed for the randomly sampled K/A due to lack of sufficient alarm response manual guidance for an SRO level question for this evolution. Randomly resampled K/A 295020 Inadvertent Containment Isolation 2.1.20 - Ability to interpret and execute procedure steps.
2 / 1	Question 90 262001 A.C. Electrical Distribution 2.4.1 - Knowledge of EOP entry conditions and immediate action steps.	An acceptable question could not be developed for the randomly sampled K/A at the SRO level due to lack of suitable EOP entry conditions and immediate action steps related to the system. Randomly resampled K/A 262001 A.C. Electrical Distribution 2.2.36 - Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.

2 / 2	Question 92 271000 Offgas A2.01 - Ability to (a) predict the impacts of the following on the OFFGAS SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low condenser vacuum	An acceptable question could not be developed for the randomly sampled K/A at the SRO level without overlapping Question 21. Randomly resampled K/A 271000 Offgas A2.04 - Ability to (a) predict the impacts of the following on the OFFGAS SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Offgas system high radiation.
3	Question 95 2.2.15 - Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc.	An acceptable question could not be developed for the randomly sampled K/A at the SRO level and is better suited to testing on the operating exam. Randomly resampled K/A 2.2.12 - Knowledge of surveillance procedures.