February 7, 2013

Mr. John Caruso
USNRC Chief Examiner
USNRC Region 1
2100 Renaissance Blvd, Suite 100
King of Prussia, PA 19406-2713

Susquehanna Steam Electric Station Units 1 and 2
Facility Operating Licenses NPF-14, NPF-22
NRC Docket Numbers 50-387, 50-388

LOC 25 NRC Initial Operator
Licensing Examination Outline
PLA 006970

RECRG102 08'13 AM08:10

Dear Mr. Caruso:

Enclosed are the examination outlines, supporting the LOC25 NRC Initial License Examination scheduled for the weeks of May 13 through May 20, 2013 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 9, Supplement 1.

In accordance with NUREG 1021, Revision 9, Supplement 1, Section ES-201, "Initial Operator Licensing Examination Process," please ensure that these materials are withheld from public disclosure until after the examinations are complete. Additionally, SSES requests that the examination outlines be withheld from public disclosure for two years after the administration of the exams to allow reuse of the examination materials in future initial licensing classes.

Should you have any questions concerning this letter, please contact the Operations Training Manager at 570-542-3677. For questions concerning examination materials, please contact Robert Thompson at 570-542-3710.

Sincerely,

Lonnie Crawford
Assistant Operations Manager, Shift
Facility Representative

Response: No

Enclosures:

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

cc: (without Attachments)
Chief, NRC Operator Licensing Branch
NRC Senior Resident Inspector Pat Finney, SSES

bcc: Site Vice President
Plant General Manager
General Manager, Operations
Manager, Training
Manager, Operations
Manager, Regulatory Affairs
Ops Electronic Letter File
Nuclear Records - NUCPT

LC post-exam memo pla 006970

LC/RAT/vah

2/22/13

EXAM OUTLINE REVIEW COMMENTS

No comments on the JPM sets.

Scenario 1: Event 7 – Change credit to just BOP and SRO not "ALL". Delete Event 8 – redundant to Event 7 i.e., event 8 is the required action for event 7.

Scenario 2: Note: Event 5 – Susq. can't simulate a seal failure so licensee revised the draft event that I reviewed to the current high temp. Malfunction. Event 10 change from "All" to credit for only the SRO and BOP also change to an Instrument malfunction.

Scenario 3: Events 8 and 9 as written are set-up items i.e., no actions can be taken by the crew to mitigate the failures. The licensee plans to revise one or both of these malfunctions to setup as sequential failures so initial actions can be taken by the crews to mitigate the failures. Also need to change credit from "All" to credit for only the SRO and BOP.

Scenario 5: Event 9 change credit from "All" to credit for only the SRO and BOP.

Written Outline: Cautioned that the following Q topics may not meet SRO only level Qs if the Qs are written literally to match the K/A topics selected: 77, 77, 78, 79, 80, 81, 82, 83, 85, 88, 89, 90, 92, 93, 96 and 100.

I also took the opportunity to discuss with the exam rep (Andy Thompson) preps for validation week.

Facility:	SSES 2013 #1	Date of Exam:	08/20/12

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	5	3				3	3			3	20	4	3	7
	2	1	2	1				1	1			1	7	2	1	3
	Tier Totals	4	7	4				4	4			4	27	6	4	10
2. Plant Systems	1	4	2	3	2	1	2	2	3	3	2	2	26	2	3	5
	2	1	1	1	1	1	1	2	1	1	1	1	12	0 1	2	3
	Tier Totals	5	3	4	3	2	3	4	4	4	3	3	38	3	5	8

3. Generic Knowledge & Abilities Categories											
	1		2		3		4	10	1	2	3	4	7
	2		3		2		3		2	2	1	2	

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to section D.1.b of ES-401, for guidance regarding 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 KAs having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
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/A's
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. If fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A Catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10CFR55.43

SSES 2013 #1
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#
295003 Partial or Total Loss of A.C.. Pwr / 6					X		AA2.04 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : System lineups	3.7	76
295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown / 1					X		EA2.06 - Ability to determine and/or interpret the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN : Reactor pressure	4.1	77
295031 Reactor Low Water Level / 2					X		EA2.04 - Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Adequate core cooling	4.8	78
295023 Refueling Accidents / 8						X	2.1.23 - Conduct of Operations: Ability to perform specific and integrated plant procedures	4.4	79
295028 High Drywell Temperature / 5						X	2.1.25 - Conduct of Operations: Ability to interpret reference materials such as graphs, curves, tables, etc.	4.2	80
295019 Partial or Total Loss of Inst. Air / 8						X	2.4.6 - Emergency Procedures / Plan: Knowledge of EOP mitigation strategies.	4.7	81
295025 High Reactor Pressure / 3					X		EA2.02 – Ability to determine and/or interpret the following as they applies to HIGH REACTOR PRESSURE: Reactor power	4.2	82
295030 Low Suppression Pool Water Level / 5	X						EK1.03 - Knowledge of the operational implications of the following concepts as they apply to LOW SUPPRESSION POOL WATER LEVEL: Heat capacity	3.8	39
295025 High Reactor Pressure / 3	X						EK1.01 - Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE : Pressure effects on reactor power	3.9	40
295006 SCRAM / 1	X						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to SCRAM : Decay heat generation and removal	3.7	41
295019 Partial or Total Loss of Inst. Air / 8		X					AK2.03 - Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR and the following: Reactor feedwater	3.2	42
600000 Plant Fire On-site / 8		X					AK2.01 - Knowledge of the interrelations between PLANT FIRE ON SITE and the following: Sensors, detectors and valves	2.6	43
295018 Partial or Total 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	44
295016 Control Room Abandonment / 7			X				AK3.03 - Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT : Disabling control room controls	3.5	45

SSES 2013 #1
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#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4			X				AK3.01 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : Reactor water level response	3.4	46
295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown/ 1			X				EK3.06 - Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN : Maintaining heat sinks external to the containment	3.8	47
295004 Partial or Total Loss of DC Pwr / 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	48
295028 High Drywell Temperature / 5				X			EA1.04 - Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE : Drywell pressure	3.9	49
295026 Suppression Pool High Water Temp. / 5				X			EA1.03 - Ability to operate and/or monitor the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Temperature monitoring	3.9	50
295003 Partial or Complete Loss of AC / 6					X		AA2.04 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : System lineups	3.5	51
295021 Loss of Shutdown Cooling / 4					X		AA2.02 - Ability to determine and/or interpret the following as they apply to LOSS OF SHUTDOWN COOLING : RHR/shutdown cooling system flow	3.4	52
295038 High Off-site Release Rate / 9		X					EK2.09 - Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following:: Post accident sample system (PASS): Plant-Specific..	2.9	53
295024 High Drywell Pressure / 5						X	2.4.6 - Emergency Procedures / Plan: Knowledge of EOP mitigation strategies.	3.7	54
295005 Main Turbine Generator Trip / 3						X	2.2.22 – Equipment Control: Knowledge of limiting conditions for operations and safety limits.	4.0	55
700000 Generator Voltage and Electric Grid Disturbances						X	2.1.19 - Conduct of Operations: Ability to use plant computers to evaluate system or component status.	3.9	56
295023 Refueling Acc Cooling Mode / 8		X					AK2.04 - Knowledge of the interrelations between REFUELING ACCIDENTS and the following: RMCS/Rod control and information system	3.2	57
295031 Reactor Low Water Level / 2					X		EA2.01 - Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL : Reactor water level	4.6	58
K/A Category Totals:	3	5	3	3	3/4	3/3	Group Point Total:		20/7

SSES 2013 #1
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#
295002 Loss of Main Condenser Vac / 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	3.1	83
295035 Secondary Containment High Differential Pressure / 5						X	2.4.30 - Emergency Procedures / Plan; 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	84
295033 High Secondary Containment Area Radiation Levels / 9					X		EA2.01 - Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : Area radiation levels	3..9	85
295034 Secondary Containment Ventilation High Radiation / 9	X						EK1.02 - Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION : Radiation releases	4.1	59
295008 High Reactor Water Level / 2		X					AK2.08 - Knowledge of the interrelations between HIGH REACTOR WATER LEVEL and the following: Main turbine: Plant-Specific	3.4	60
295032 High Secondary Containment Area Temperature/ 5			X				EK3.01 - Knowledge of the reasons for the following responses as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE : Emergency/normal depressurization	3.5	61
295007 High Reactor Pressure / 3				X			AA1.03 - Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE : RCIC: Plant-Specific	3.4	62
295029 High Suppression Pool Water Level / 5					X		EA2.01 - Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL WATER LEVEL : Suppression pool water level	3.9	63
295009 Low Reactor Water Level / 2						X	2.4.35 - Emergency Procedures / Plan: Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.	3.8	64
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	65
K/A Category Totals:	1	2	1	1	1/2	1/1	Group Point Total:		7/3

SSES 2013 #1
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				A2.07 - 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 comparator bias signal	2.5	86
205000 Shutdown Cooling								X				A2.09 - Ability to (a) predict the impacts of the following on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions Reactor low water level	3.8	87
262001 AC Electrical Distribution											X	2.4.11 - Emergency Procedures / Plan: Knowledge of abnormal condition procedures.	4.2	88
261000 SGTS											X	2.1.20 - Conduct of Operations: Ability to interpret and execute procedure steps.	4.6	89
400000 Component Cooling Water											X	2.2.42 - Equipment Control : Ability to recognize system parameters that are entry-level conditions for Technical Specifications	4.6	90
215004 Source Range Monitor	X											K1.02 - Knowledge of the physical connections and/or cause- effect relationships between SOURCE RANGE MONITOR (SRM) SYSTEM and the following: Reactor manual control	3.4	1
259002 Reactor Water Level Control	X											K1.08 - Knowledge of the physical connections and/or cause- effect relationships between REACTOR WATER LEVEL CONTROL SYSTEM and the following: Recirculation system: Plant-Specific	3.2	2
262001 AC Electrical Distribution		X										K2.01 - Knowledge of electrical power supplies to the following: Off-site sources of power	3.3	3
209001 LPCS		X										K2.03 - Knowledge of electrical power supplies to the following: Initation Logic	2.9	4
215005 APRM / LPRM			X									K3.03 - Knowledge of the effect that a loss or malfunction of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM will have on following: Reactor manual control system: Plant-Specific	3.3	5

SSES 2013 #1
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#
264000 EDGs			X									K3.02 - Knowledge of the effect that a loss or malfunction of the EMERGENCY GENERATORS (DIESEL/JET) will have on following: A.C. electrical distribution	3.9	6
218000 ADS				X								K4.02 - Knowledge of AUTOMATIC DEPRESSURIZATION SYSTEM design feature(s) and/or interlocks which provide for the following: Allows manual initiation of ADS logic	3.8	7
217000 RCIC				X								K4.06 - Knowledge of REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) design feature(s) and/or interlocks which provide for the following: Manual initiation	3.5	8
263000 DC Electrical Distribution	X											K1.02 - Knowledge of the physical connections and/or cause- effect relationships between D.C. ELECTRICAL DIATRIBUTION and the following: Battery charger and battery	3.2	9
300000 Instrument Air					X							K5.01 - Knowledge of the operational implications of the following concepts as they apply to the INSTRUMENT AIR SYSTEM: Air compressors	2.5	10
205000 Shutdown Cooling						X						K6.02 - Knowledge of the effect that a loss or malfunction of the following will have on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) : D.C. electrical power	2.7	11
239002 SRVs						X						K6.05 - Knowledge of the effect that a loss or malfunction of the following will have on the RELIEF/SAFETY VALVES : Discharge line vacuum breaker	3.0	12
400000 Component Cooling Water							X					A1.02 - Ability to predict and / or monitor changes in parameters associated with operating the CCWS controls including: CCW temperature	2.8	13
223002 PCIS/Nuclear Steam Supply Shutoff							X					A1.02 - Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF controls including: Valve closures	3.7	14

SSES 2013 #1
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#
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	15
206000 HPCI								X				A2.17 - 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: HPCI inadvertent initiation: BWR-2,3,4	3.9	16
261000 SGTS									X			A3.03 - Ability to monitor automatic operations of the STANDBY GAS TREATMENT SYSTEM including: Valve operation	3.0	17
212000 RPS									X			A3.07 - Ability to monitor automatic operations of the REACTOR PROTECTION SYSTEM including: SCRAM air header pressure	3.6	18
211000 SLC										X		A4.08 - Ability to manually operate and/or monitor in the control room: System initiation: Plant-Specific	4.2	19
203000 RHR/LPCI: Injection Mode										X		A4.09 - Ability to manually operate and/or monitor in the control room: System flow	4.1	20
262002 UPS (AC/DC)											X	2.1.32 - Conduct of Operations: Ability to explain and apply all system limits and precautions.	3.8	21
215004 Source Range Monitor											X	2.1.28 - Knowledge of the purpose and function of major system components and controls.	4.1	22
209001 LPCS									X			A3.02 - Ability to monitor automatic operations of the LOW PRESSURE CORE SPRAY SYSTEM including: Pump start	3.8	23
211000 SLC	X											K1.02 - Knowledge of the physical connections and/or cause- effect relationships between STANDBY LIQUID CONTROL SYSTEM and the following: Core plate differential pressure indication	2.7	24

SSES 2013 #1
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#
262001 AC Electrical Distribution			X									K3.06 Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following: Reactor protection system	3.8	25
239002 SRVs								X				A2.03 Ability to (a) predict the impacts of the following on the RELIEF/SAFETY VALVES ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Stuck open SRV	4.1	26
K/A Category Totals:	4	2	3	2	1	2	2	3/2	3	2	2/3	Group Point Total:		26/5

SSES 2013 #1
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 #
245000 Main Turbine Gen. / Aux.								X				A2.09 - Ability to (a) predict the impacts of the following on the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Turbine vibration	2.8	91
215002 RBM											X	2.2.12 – Knowledge of surveillance procedures	4.1	92
286000 Fire Protection											X	2.4.31 - Emergency Procedures / Plan: Knowledge of annunciator alarms, indications or response procedures	4.1	93
202002 Recirculation Flow Control	X											K1.03 - Knowledge of the physical connections and/or cause- effect relationships between RECIRCULATION FLOW CONTROL SYSTEM and the following: Reactor core flow	3.7	27
201001 CRD Hydraulic		X										K2.05 - Knowledge of electrical power supplies to the following: Alternate rod insertion valve solenoids: Plant-Specific	4.5	28
215002 RBM			X									K3.01 - Knowledge of the effect that a loss or malfunction of the ROD BLOCK MONITOR SYSTEM will have on following: Reactor manual control system: BWR-3,4,5	3.3	29
202001 Recirculation				X								K4.05 - Knowledge of RECIRCULATION System design feature(s) and/or interlocks which provide for the following: Seal cooling	2.9	30
219000 RHR/LPCI: Torus/Pool Cooling Mode					X							K5.04 - Knowledge of the operational implications of the following concepts as they apply to RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE : Heat exchanger operation	2.9	31
290003 Control Room HVAC						X						K6.02 - Knowledge of the effect that a loss or malfunction of the following will have on the CONTROL ROOM HVAC : Component cooling water systems	2.7	32
268000 Radwaste							X					A1.02 - Ability to predict and/or monitor changes in parameters associated with operating the RADWASTE controls including: Off-site release	2.6	33

SSES 2013 #1
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 #
271000 Off-gas								X				A2.10 - 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 flow	3.1	34
201002 RMCS									X			A3.03 - Ability to monitor automatic operations of the REACTOR MANUAL CONTROL SYSTEM including: Rod drift alarm	3.2	35
259001 Reactor Feedwater										X		A4.06 - Ability to manually operate and/or monitor in the control room: Feedwater inlet temperature	3.4	36
272000 Radiation Monitoring											X	2.4.49 – Emergency Procedures / Plan: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	37
201003 Control Rod and Drive Mechanism							X					A1.02 - Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROD AND DRIVE MECHANISM controls including: CRD drive pressure	2.8	38
K/A Category Totals:	1	1	1	1	1	1	2	1/1	1	1	1/2	Group Point Total:		12/3

Facility:	SSES 2013 #1		Date: 08/20/12			
Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.39	Knowledge of conservative decision making practices.			4.3	94
	2.1.35	Knowledge of the fuel-handling responsibilities of SRO's.			3.9	99
	2.1.1	Knowledge of Conduct of Operations requirements	3.8	66		
	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management.	4.3	67		
	Subtotal			2		2
2. Equipment Control	2.2.14	Knowledge of the process for controlling equipment configuration or status.			4.3	95
	2.2.40	Ability to apply technical specifications for a system.			4.7	98
	2.2.35	Ability to determine Technical Specification Mode of Operation.	3.6	68		
	2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.2	69		
	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels	4.6	75		
	Subtotal			3		2
3. Radiation Control	2.3.5	Knowledge of radiation monitoring systems such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.			2.9	96
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, potable survey instruments, personnel monitoring equipment, etc.	2.9	70		

	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	71		
	Subtotal			2		1
4. Emergency Procedures / Plan	2.4.37	Knowledge of the lines of authority during emergency plan implementation			4.1	97
	2.4.20	Knowledge of operational implications of EOP warnings, cautions, and notes.	S207		4.3	100
	2.4.1	Knowledge of EOP entry conditions and immediate action steps.	4.6	72		
	2.4.29	Knowledge of the emergency plan.	3.1	73		
	2.4.4	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.5	74		
	Subtotal			3		2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
2 / 1	209001 / K2.02	(#4) K2.02 - Knowledge of electrical power supplies to the following: Valve power. Low discriminatory value. Randomly selected 209001 / K2.03 - Knowledge of electrical power supplies to the following: Initiation Logic
2 / 1	263000 / K5.01	(#9) K5.01 - Knowledge of the operational implications of the following concepts as they apply to D.C. ELECTRICAL DISTRIBUTION : Hydrogen generation during battery charging. Low discriminatory value. Randomly selected 263000 K1.02 - Knowledge of the physical connections and/or cause- effect relationships between D.C. ELECTRICAL DIATRIBUTION and the following: Battery charger and battery
2 / 1	300000 / K5.13	(#10) K5.13 - Knowledge of the operational implications of the following concepts as they apply to the INSTRUMENT AIR SYSTEM: Filters. Same KA randomly selected on 2010 NRC exam. Randomly selected 300000 / K5.01 - Knowledge of the operational implications of the following concepts as they apply to the INSTRUMENT AIR SYSTEM: Air Compressors
2 / 1	261000 / A3.02	(#17) A3.02 - Ability to monitor automatic operations of the STANDBY GAS TREATMENT SYSTEM including: Fan start Same KA randomly selected on 2011 NRC exam. Randomly selected 261000 / A3.03 - Ability to monitor automatic operations of the STANDBY GAS TREATMENT SYSTEM including: Valve operation
2 / 1	215004 / 2.2.36	(#22) 2.2.36 - Equipment Control: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. This is an SRO function. Randomly selected 215004 / 2.1.28 - Knowledge of the purpose and function of major system components and controls.

2 / 1	262001 / K3.04	(#25) K3.04 - Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following: Uninterruptible power supply. UPS/Battery topic oversampled. Randomly selected 262001 / K3.06 Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following: Reactor protection system
2 / 1	239002 / 2.4.35	(#26) 2.4.35 - Emergency Procedures / Plan: Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects. (low reactor water level) Remote panel functions oversampled (#64 & #45) Randomly selected 239002 / A2.03 Ability to (a) predict the impacts of the following on the RELIEF/SAFETY VALVES ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Stuck open SRV
2 / 1	272000 / 2.2.39	(#37) 2.2.39 - Equipment Control: Knowledge of less than one hour technical specification action statements for systems. There are NO 1 hour or less TS for this system. Randomly selected 2.4.49 - Ability to perform without reference to procedures those actions that require immediate operation of system components and controls
2 / 2	201003 / A3.01	(#38) A3.01 - Ability to monitor automatic operations of the CONTROL ROD AND DRIVE MECHANISM including: Control rod position. System/concept oversampled. Randomly selected 201003 / A1.02 - Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROD AND DRIVE MECHANISM controls including: CRD drive pressure
1 / 1	295038 / EA2.02	(#53) EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE : Total number of curies released This is a Rad Pro function. Randomly selected 295038 / EK2.09 - Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following:: Post accident sample system (PASS): Plant-Specific.

1 / 1	295005 / 2.4.30	(#55) 2.4.30 - Emergency Procedures / Plan; 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. SRO level function. Randomly selected 295005 / 2.2.22 - Knowledge limiting conditions for operations and safety limits.
1 / 1	700000 / 2.2.12	(#56) 700000 / 2.2.12 - Equipment Control: Knowledge of surveillance procedures. No surveillance procedures associated with Grid Disturbance. Randomly selected 700000 / 2.1.19 – Conduct of Operations: Ability to use plant computers to evaluate system or component status.
3 / 1	2.1.31	(#66) 2.1.31 - Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. This concept is significantly tested in the operating portion of the exam. Randomly selected 2.1.1 - Knowledge of Conduct of Operations requirements
3 / 3	2.3.12	(#70) 2.3.12 – 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. Very similar to #71 Randomly selected – 2.3.15 - Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, potable survey instruments, personnel monitoring equipment, etc.
3 / 2	2.2.4	(#75) 2.2.4 - (multi-unit license) Ability to explain the variations in control board layouts, systems, instrumentation and procedural actions between units at a facility. Same K/A used on previous exam. Randomly selected 2.2.2 – Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels

1 / 1	295016 / AA2.05	(#78) AA2.05 - Ability to determine and/or interpret the following as they apply to CONTROL ROOM ABANDONMENT : Drywell pressure. No specific procedural reference to develop a discriminating SRO level question. APE also tested in #45 Randomly selected 295031 EA2.04 - Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Adequate core cooling
1 / 1	295023 / 2.1.27	(#79) 2.1.27 - Conduct of Operations: Knowledge of system purpose and / or function. Not discriminatory at the SRO level. Randomly selected 2.1.23 – Ability to perform specific and integrated plant procedures during all modes of operation
1 / 1	295028 / 2.1.31	(#80) 2.1.31 - Conduct of Operations: Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. This concept is significantly tested in the operating portion of the exam. Randomly selected 2.1.25 - Ability to interpret reference materials such as graphs, curves, tables, etc. (High drywell temperature)
1 / 1	295025 / 2.2.12	(#82) 2.2.12 - Equipment Control: Knowledge of surveillance procedures. No surveillance procedure associated with this EPE. Randomly selected EA2.02 – Ability to determine and/or interpret the following as they applies to HIGH REACTOR PRESSURE: Reactor power
1 / 2	295033 / EA2.02	(#85) EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : Equipment operability. Same general EOP topic/area covered in #61 Randomly selected EA2.01 - Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : Area radiation levels

3 / 4	2.4.41	(#97) 2.4.41 - Knowledge of the emergency action level thresholds and classifications. Oversample (see #81 and #85) Randomly selected 2.4.37 - Knowledge of the lines of authority during emergency plan implementation.
2 / 2	201002 / 2.2.25	(#92) 2.2.25 - Equipment Control: Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. The RMCS is not referenced in Tech Specs, the TRM or in LCOs and Safety Limits. Also, 2.2.25 used on #69 Randomly selected 215002 2.2.12 – Knowledge of surveillance procedures.
2 / 2	400000 / 2.1.28	(#90) 2.1.28 - Conduct of Operations: Knowledge of the purpose and function of major system components and controls. Not discriminating at the SRO level Randomly selected 2.2.42 - Equipment Control : Ability to recognize system parameters that are entry-level conditions for Technical Specifications

Facility: Susquehanna	Date of Examination: May 2013
Examination Level: SRO	Operating Test Number: 2013

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M, R	Calculate Drywell Leakage and Determine Technical Specification Impact SO-100-006, K/A 2.1.7 (4.7)
Conduct of Operations	M, R	Determine Work Hour Controls NDAP-QA-0025, K/A 2.1.5 (3.9)
Equipment Control	P, D, R NRC 2/2011	Perform LPRM Upscale Alarm Operability Tracking and Determine Required Actions OI-078-001, K/A 2.2.14 (4.3)
Radiation Control	D, R	Determine Ability to Bypass Secondary Containment Zone 2 Isolation OP-234-002, K/A 2.3.13 (3.8)
Emergency Procedures/Plan	M, R	Classify Emergency Conditions and Make Notification EP-PS-100, K/A 2.4.41 (4.6)

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

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

JPM Descriptions

COO1 – The candidate will be given the previous 12 hours' surveillance for Drywell leakage, as well as the raw data needed for calculating the current 12 hours' surveillance. The candidate will complete calculations on two forms. The candidate will determine that total leak rate is above the allowed 25 gpm. The candidate will additionally be required to determine the Technical Specification implications of this condition.

COO2 – The candidate will be given work hour history for three Reactor Operators and told that a Reactor Operator has called in sick. The candidate will be required to review the data and determine which Reactor Operator(s) is(are) eligible to cover the shift without exceeding limits. Only one Reactor Operator will be within limits. One Reactor Operator would exceed working 72 hours in the last 7 days. One Reactor Operator would not have at least a 34 hour break in the last 9 days. The candidate will additionally be required to complete waiver request paperwork for one of the Reactor Operators that does NOT meet work hour limits.

EC – The candidate will be given previously filled out LPRM tracking attachments and told that a new LPRM has failed. The candidate will be required to complete new LPRM tracking attachments. The candidate will determine that Zone 8 has less than 50% operable LPRMs, APRM channel 1 is NOT operable due to less than 3 operable A level LPRMs, and the associated OPRM remains operable. The candidate will additionally be required to determine the Technical Specification implications of these conditions.

RC – The candidate will be given plant conditions and be required to determine ability to bypass Secondary Containment Zone 2 isolation. The candidate will review an administrative procedure and two Technical Specifications. The candidate will determine that plant conditions allow bypassing the isolation. The candidate will be required to describe the actions required to bypass the isolation.

EP – The candidate will be given plant conditions including an earthquake, loss of offsite power with degraded EDG availability, and a loss of coolant accident on Unit 1. The candidate will be required to classify and declare the appropriate General Emergency within 15 minutes of JPM start. The candidate will then be required to notify state and county officials within 15 minutes of declaration. This notification will include determination that a release is in progress due to containment venting and determination of PARs.

ES-301	Administrative Topics Outline	Form ES-301-1

Facility: Susquehanna — Date of Examination: May 2013
Examination Level: RO — Operating Test Number: 2013

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M, R	Calculate Drywell Leakage SO-100-006, K/A 2.1.7 (4.4)
Conduct of Operations	M, R	Determine Work Hour Controls NDAP-QA-0025, K/A 2.1.5 (2.9)
Equipment Control	D, R	Perform Jet Pump Operability Check SO-100-007, K/A 2.2.12 (3.7)
Radiation Control		
Emergency Procedures/Plan	D, S	Activate Fire Brigade ON-013-001 Attachment L, K/A 2.4.27 (3.4)

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

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

JPM Descriptions

COO1 – The candidate will be given the previous 12 hours' surveillance for Drywell leakage, as well as the raw data needed for calculating the current 12 hours' surveillance. The candidate will complete calculations on two forms. The candidate will determine that total leak rate is above the allowed 25 gpm.

COO2 – The candidate will be given work hour history for three Reactor Operators and told that a Reactor Operator has called in sick. The candidate will be required to review the data and determine which Reactor Operator(s) is(are) eligible to cover the shift without exceeding limits. Only one Reactor Operator will be within limits. One Reactor Operator would exceed working 72 hours in the last 7 days. One Reactor Operator would not have at least a 34 hour break in the last 9 days.

EC – The candidate will be given Recirculation system parameters and directed to perform the associated surveillance test. From the initial data set, the candidate will determine that loop drive flow versus total core flow is not within limits. This requires additional surveillance items to be performed. The candidate will then be given additional jet pump data to perform the additional section of the surveillance. From this data, the candidate will determine that jet pumps are not operable.

EP – The candidate will be given a fire alarm and a print out from the SIMPLEX panel. The candidate will be required to determine the appropriate pre-fire plan for fighting the fire based on the indicated area. Then the candidate will be required to perform actions for activating the fire response. The candidate will call the Fire Brigade Leader and dispatch them to the location. The candidate will sound the plant fire alarm and evacuate personnel from the area. The candidate will activate Fire Brigade Member pagers and then relay information from the Fire Brigade Leader to the Fire Brigade Members to initiate their response. The candidate will inform Security of the fire event.

Facility: Susquehanna	Date of Examination: May 2013
Exam Level: RO	Operating Test No.: 2013

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. Synchronize Diesel Generator D; Voltage Regulator Failure K/A 264000 A4.04 (3.7/3.7), SO-024-001D	D, A, EN, S	6
b. Lineup RHRSW to the Spent Fuel Pool K/A 233000 A2.02 (3.1/3.3), ON-135-001	P, D, S 2011 NRC	9
c. Swap Core Spray Loops K/A 209001 A4.01 (3.8/3.6), OP-151-001	N, EN, L, S	2
d. Reset Recirc Runback; Pump Speed Oscillates K/A 202002 A4.07 (3.3/3.2), ON-164-002	M, A, S	1
e. Main Steam Line Isolation Recovery K/A 239001 A4.01 (4.2/4.0), ON-184-001	D, L, S	3
f. Start HPCI in Pressure Control Mode; Steam Leak Develops K/A 206000 A4.13 (4.1/4.0), OP-152-001	M, A, EN, S	4
g. Perform Control Room Evacuation Immediate Actions; Mode Switch Fails to Insert Rods, RPS Pushbuttons Work K/A 212000 A4.01 (4.6/4.6), ON-100-109	M, A, EN, S	7
h. Vent the Drywell (RO Only) K/A 223001 A2.07 (4.2/4.3), OP-173-003	D, EN, S	5
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. Pull Scram Fuses; Vent Scram Air Header K/A 295037 EA1.01 (4.6/4.6), ES-158-001, EO-100-113	M, A, E, R	7
j. Start Containment Hydrogen Recombiner K/A 223001 A2.01 (4.3/4.4), OP-173-001	D, E, L	5
k. Lineup Fire Protection System to RHRSW to Inject Into the RPV K/A 295031 EA1.08 (3.8/3.9), ES-013-001	D, E, L, R	8

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

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

Simulator Pairings:
A then B
D then H
F then E
C alone
G alone

JPM Descriptions

A. The candidate will perform a surveillance test to start a Diesel Generator and synchronize it to a bus. The candidate will then load the Diesel Generator to the appropriate levels for the surveillance. A fault will develop which causes the Diesel Generator output breaker to open and output voltage to lower. The Candidate will respond per the alarm response and shutdown the Diesel Generator.

B. The candidate will perform an off-normal procedure section to raise Spent Fuel Pool water level using RHR Service Water. The candidate will align valves within RHR to prevent diversion of water to other loads. The candidate will then align RHR Service Water to the Spent Fuel Pool and start an RHR Service Water pump.

C. The candidate will start with one loop of Core Spray injecting to the Reactor to maintain Reactor water level under LOCA conditions. The candidate will be required to start the alternate loop of Core Spray and begin injection to the Reactor. The candidate will then secure injection from the original loop of Core Spray and shutdown the pumps in that loop. The candidate will need to adjust injection with the new loop of Core Spray to maintain Reactor water level in the assigned band.

D. The candidate will start with both Recirculation pumps in a runback condition due to trip of a Circulating water pump. The candidate will be directed to reset the runback on Recirculation pump A per the off-normal procedure. The candidate will verify control of Recirculation pump speed and then reset the runback. When the runback is reset, a fault will cause the Recirculation pump speed to rise and then oscillate. The candidate will be required to either lock the scoop tube or trip the Recirculation pump per immediate actions of the off-normal procedures.

E. The candidate will perform an off-normal procedure to re-open MSIVs following inadvertent closure. The downstream piping will be depressurized, requiring pressurization to allow opening MSIVs without receiving an automatic isolation on high flow. The candidate will align auxiliary steam loads to allow pressurizing the steam piping and then open valves to start steam piping pressurization. The candidate will monitor MSIV differential pressure. Once pressure requirements are met, the candidate will re-open the MSIVs.

F. The candidate will be placed in a post-scram situation requiring HPCI in pressure control mode. The candidate will align HPCI for start, control the HPCI flow controller in manual, accelerate the HPCI turbine, and establish proper flows. Once HPCI flow exceeds 2000 gpm, a steam leak will develop in the HPCI room and HPCI will not automatically isolate. The candidate will manually isolate HPCI.

G. The candidate will be directed to perform a Control Room Evacuation with the plant at approximately 100% power. The candidate will place the mode switch in shutdown and all control rods will fail to insert. The candidate will perform immediate action to insert rods by either arming and depressing the manual scram pushbuttons or arming and depressing ARI pushbuttons. All control rods will then insert. The candidate will continue by taking multiple pre-evacuation actions, including closing MSIVS, tripping Feedwater pumps, aligning Condensate, isolating RWCU, and ensuring HPCI and RCIC are in proper alignment.

H. The candidate will be directed to lower Drywell pressure by venting with the plant at approximately 100% power. The candidate will start Standby Gas Treatment System by

opening a damper and starting a fan. Then the candidate will align Drywell venting dampers to create a flow path from the Drywell to Standby Gas Treatment.

I. The candidate will be presented with ATWS conditions and directed to pull RPS fuses. The first set of fuses will be pulled. When the candidate attempts to pull the second set of fuses, they will be informed that the cabinet cannot be accessed. They will be required to perform alternate actions outside the control room to insert control rods. They will proceed to the Reactor Building and vent the scram air header.

J. The candidate will be presented with post-LOCA conditions requiring start of a Hydrogen Recombiner. The candidate will adjust Recombiner controls for start. The candidate will then start the Recombiner. The candidate will adjust Recombiner temperature controls to achieve proper operation.

K. The candidate will be presented with LOCA and station blackout conditions and directed to lineup Fire Protection water to inject into the Reactor through RHRSW and RHR. This will require coordinating with another Operator in the screen house and aligning numerous valves in the Unit 1 and Unit 2 Reactor Buildings.

Facility: Susquehanna	Date of Examination: May 2013
Exam Level: SROI	Operating Test No.: 2013

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

System / JPM Title	Type Code*	Safety Function
a. Synchronize Diesel Generator D; Voltage Regulator Failure K/A 264000 A4.04 (3.7/3.7), SO-024-001D	D, A, EN, S	6
b. Lineup RHRSW to the Spent Fuel Pool K/A 233000 A2.02 (3.1/3.3), ON-135-001	P, D, S 2011 NRC	9
c. Swap Core Spray Loops K/A 209001 A4.01 (3.8/3.6), OP-151-001	N, EN, L, S	2
d. Reset Recirc Runback; Pump Speed Oscillates K/A 202002 A4.07 (3.3/3.2), ON-164-002	M, A, S	1
e. Main Steam Line Isolation Recovery K/A 239001 A4.01 (4.2/4.0), ON-184-001	D, L, S	3
f. Start HPCI in Pressure Control Mode; Steam Leak Develops K/A 206000 A4.13 (4.1/4.0), OP-152-001	M, A, EN, S	4
g. Perform Control Room Evacuation Immediate Actions; Mode Switch Fails to Insert Rods, RPS Pushbuttons Work K/A 212000 A4.01 (4.6/4.6), ON-100-109	M, A, EN, S	7

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

i. Pull Scram Fuses; Vent Scram Air Header K/A 295037 EA1.01 (4.6/4.6), ES-158-001, EO-100-113	M, A, E, R	7
j. Start Containment Hydrogen Recombiner K/A 223001 A2.01 (4.3/4.4), OP-173-001	D, E, L	5
k. Lineup Fire Protection System to RHRSW to Inject Into the RPV K/A 295031 EA1.08 (3.8/3.9), ES-013-001	D, E, L, R	8

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

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

Simulator Pairings:
A then B
D then H
F then E
C alone
G alone

JPM Descriptions

A. The candidate will perform a surveillance test to start a Diesel Generator and synchronize it to a bus. The candidate will then load the Diesel Generator to the appropriate levels for the surveillance. A fault will develop which causes the Diesel Generator output breaker to open and output voltage to lower. The Candidate will respond per the alarm response and shutdown the Diesel Generator.

B. The candidate will perform an off-normal procedure section to raise Spent Fuel Pool water level using RHR Service Water. The candidate will align valves within RHR to prevent diversion of water to other loads. The candidate will then align RHR Service Water to the Spent Fuel Pool and start an RHR Service Water pump.

C. The candidate will start with one loop of Core Spray injecting to the Reactor to maintain Reactor water level under LOCA conditions. The candidate will be required to start the alternate loop of Core Spray and begin injection to the Reactor. The candidate will then secure injection from the original loop of Core Spray and shutdown the pumps in that loop. The candidate will need to adjust injection with the new loop of Core Spray to maintain Reactor water level in the assigned band.

D. The candidate will start with both Recirculation pumps in a runback condition due to trip of a Circulating water pump. The candidate will be directed to reset the runback on Recirculation pump A per the off-normal procedure. The candidate will verify control of Recirculation pump speed and then reset the runback. When the runback is reset, a fault will cause the Recirculation pump speed to rise and then oscillate. The candidate will be required to either lock the scoop tube or trip the Recirculation pump per immediate actions of the off-normal procedures.

E. The candidate will perform an off-normal procedure to re-open MSIVs following inadvertent closure. The downstream piping will be depressurized, requiring pressurization to allow opening MSIVs without receiving an automatic isolation on high flow. The candidate will align auxiliary steam loads to allow pressurizing the steam piping and then open valves to start steam piping pressurization. The candidate will monitor MSIV differential pressure. Once pressure requirements are met, the candidate will re-open the MSIVs.

F. The candidate will be placed in a post-scram situation requiring HPCI in pressure control mode. The candidate will align HPCI for start, control the HPCI flow controller in manual, accelerate the HPCI turbine, and establish proper flows. Once HPCI flow exceeds 2000 gpm, a steam leak will develop in the HPCI room and HPCI will not automatically isolate. The candidate will manually isolate HPCI.

G. The candidate will be directed to perform a Control Room Evacuation with the plant at approximately 100% power. The candidate will place the mode switch in shutdown and all control rods will fail to insert. The candidate will perform immediate action to insert rods by either arming and depressing the manual scram pushbuttons or arming and depressing ARI pushbuttons. All control rods will then insert. The candidate will continue by taking multiple pre-evacuation actions, including closing MSIVS, tripping Feedwater pumps, aligning Condensate, isolating RWCU, and ensuring HPCI and RCIC are in proper alignment.

I. The candidate will be presented with ATWS conditions and directed to pull RPS fuses. The first set of fuses will be pulled. When the candidate attempts to pull the second set of fuses, they will be informed that the cabinet cannot be accessed. They will be required to perform alternate actions outside the control room to insert control rods. They will proceed to the Reactor Building and vent the scram air header.

J. The candidate will be presented with post-LOCA conditions requiring start of a Hydrogen Recombiner. The candidate will adjust Recombiner controls for start. The candidate will then start the Recombiner. The candidate will adjust Recombiner temperature controls to achieve proper operation.

K. The candidate will be presented with LOCA and station blackout conditions and directed to lineup Fire Protection water to inject into the Reactor through RHRSW and RHR. This will require coordinating with another Operator in the screen house and aligning numerous valves in the Unit 1 and Unit 2 Reactor Buildings.

Facility: Susquehanna	Date of Examination: May 2013
Exam Level: SROU	Operating Test No.: 2013

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

System / JPM Title	Type Code*	Safety Function
a. Synchronize Diesel Generator D; Voltage Regulator Failure K/A 264000 A4.04 (3.7/3.7), SO-024-001D	D, A, EN, S	6
c. Swap Core Spray Loops K/A 209001 A4.01 (3.8/3.6), OP-151-001	N, EN, L, S	2
f. Start HPCI in Pressure Control Mode; Steam Leak Develops K/A 206000 A4.13 (4.1/4.0), OP-152-001	M, A, EN, S	4

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

i. Pull Scram Fuses; Vent Scram Air Header K/A 295037 EA1.01 (4.6/4.6), ES-158-001, EO-100-113	M, A, E, R	7
k. Lineup Fire Protection System to RHRSW to Inject Into the RPV K/A 295031 EA1.08 (3.8/3.9), ES-013-001	D, E, L, R	8

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U

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

Simulator Pairings:
A then B
D then H
F then E
C alone
G alone

JPM Descriptions

A. The candidate will perform a surveillance test to start a Diesel Generator and synchronize it to a bus. The candidate will then load the Diesel Generator to the appropriate levels for the surveillance. A fault will develop which causes the Diesel Generator output breaker to open and output voltage to lower. The Candidate will respond per the alarm response and shutdown the Diesel Generator.

C. The candidate will start with one loop of Core Spray injecting to the Reactor to maintain Reactor water level under LOCA conditions. The candidate will be required to start the alternate loop of Core Spray and begin injection to the Reactor. The candidate will then secure injection from the original loop of Core Spray and shutdown the pumps in that loop. The candidate will need to adjust injection with the new loop of Core Spray to maintain Reactor water level in the assigned band.

F. The candidate will be placed in a post-scram situation requiring HPCI in pressure control mode. The candidate will align HPCI for start, control the HPCI flow controller in manual, accelerate the HPCI turbine, and establish proper flows. Once HPCI flow exceeds 2000 gpm, a steam leak will develop in the HPCI room and HPCI will not automatically isolate. The candidate will manually isolate HPCI.

I. The candidate will be presented with ATWS conditions and directed to pull RPS fuses. The first set of fuses will be pulled. When the candidate attempts to pull the second set of fuses, they will be informed that the cabinet cannot be accessed. They will be required to perform alternate actions outside the control room to insert control rods. They will proceed to the Reactor Building and vent the scram air header.

K. The candidate will be presented with LOCA and station blackout conditions and directed to lineup Fire Protection water to inject into the Reactor through RHRSW and RHR. This will require coordinating with another Operator in the screen house and aligning numerous valves in the Unit 1 and Unit 2 Reactor Buildings.

Appendix D **Scenario Outline** **Form ES-D-1**

Facility: Susquehanna Scenario No.: NRC-1 Op-Test No.: 2013

Examiners: _____ Operators: _____

Initial Conditions: The plant is operating at approximately 100% power. EHC pump A is out of service for maintenance. RCIC is out of service for maintenance.

Turnover: Transfer Bus 1A202 to the alternate supply per OP-104-001 section 2.1.4. Then lower Reactor power with Recirculation flow to approximately 92% per GO-100-012 section 5.3 and Reactivity Manipulation Package.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Transfer Bus 1A202 to the Alternate Supply OP-104-001
2	N/A	R – ATC, SRO	Lower Reactor Power with Recirculation Flow to 92% GO-100-012
3	cmfTR02_LT00812A	I – SRO	Condensate Storage Tank A Level Instrument Fails High AR-016-001 (D07), Technical Specifications
4	mfFW145007A	C – All	Feedwater Pump A High Vibrations with Delayed Pump Trip AR-101-001 (A16), OP-145-001, ON-164-002
5	cmfRL02_E111K11A mfRH149004B	C – BOP, SRO	RHR Pump B Spurious Start and Suction Flange Leak into Reactor Building ON-169-002, EO-000-104, Technical Specifications
6	mfHP152009 mfHP152003	M – All	HPCI Steam Leak into Reactor Building EO-000-104, ON-100-101, EO-000-102
7	cmfMV06_HV155F002 cmfMV06_HV155F003	SRO I – ~~All~~ BOP only	HPCI Fails to Automatically Isolate EO-000-104
8	cmfMV09_HV155F002 cmfMV09_HV155F003	~~C – All~~	HPCI Isolation Valves Stick Mid-Position When Manually Closed EO-000-104, EO-000-112
9	mfRD155006 cmfSC04	C – All	Multiple Control Rods Fail to Insert EO-000-102, EO-000-113

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

Set up for part of MT

Facility: **Susquehanna**	Scenario No.: **NRC-1**	Op-Test No.: **2013**
1. Total malfunctions (5-8) **Events 3, 4, 5, 6, 7, 8, 9**	7	
2. Malfunctions after EOP entry (1-2) **Events 7, 8, 9**	3	
3. Abnormal events (2-4) **Events 3, 4, 5**	3	
4. Major transients (1-2) **Event 6**	1	
5. EOPs entered/requiring substantive actions (1-2) **EO-000-102, EO-000-104**	2	
6. EOP contingencies requiring substantive actions (0-2) **EO-000-112, EO-000-113**	2	
7. Critical tasks (2-3)	4	
CRITICAL TASK DESCRIPTIONS: **CT-1 – Manually scram the reactor when any Secondary Containment Area temperature approaches or exceeds Max Safe temperature.** **CT-2 – Rapidly depressurize the reactor when two Secondary Containment Areas exceed Max Safe Temperature levels.** **CT-3 – Insert control rods IAW EO-000-113, Sheet 2, Control Rod Insertion.** **CT-4 – Stop and prevent injection except from CRD and SLC.**		

SCENARIO SUMMARY

The crew assumes the shift with the plant operating at approximately 100% power. EHC pump A is out of service for maintenance. RCIC is out of service for maintenance.

The crew will begin by transferring Bus 1A202 to the alternate supply per OP-104-001 section 2.1.4. Then, the crew will lower Reactor power with Recirculation flow to approximately 92% per GO-100-012 section 5.3 and Reactivity Manipulation Package.

Once the Reactor power reduction is in progress or completed, the level instrument for Condensate Storage Tank A will fail high. This instrument impacts RCIC and HPCI operability. With RCIC already inoperable, there will be no further impact on that system. The SRO will review Technical Specifications and determine the required actions for HPCI.

Next, Feedwater pump turbine A will develop high vibrations. The crew will respond per AR-016-001 (D07) and lower load on the Feedwater pump either manually or by lowering Reactor power. The crew may trip the Feedwater pump as vibration levels approach the 5 mil automatic trip setpoint. Eventually, the Feedwater pump will automatically trip if the crew does not remove the pump from service. An automatic Recirc run back to the 48% limiter will be received. The crew will execute ON-162-001 due to lowering Recirculation flow. Reactor power will be approximately 65% following this transient.

Once the crew stabilizes the plant, RHR pump B will spuriously start. After a short delay, a leak will develop on the pump suction flange. RHR pump room water level will rise and Suppression Pool level will lower. The crew will secure the pump and isolate the leak by closing the suction valve. The crew will enter ON-169-002 due to flooding in the Reactor Building, EO-000-104 due to high Reactor Building area water level, and possibly EO-000-103 due to low Suppression Pool level. The SRO will review Technical Specifications and determine the impact.

Next, a steam leak will develop in the HPCI equipment room. HPCI will fail to automatically isolate. When the crew attempts to manually isolate the leak, both HPCI steam isolation valves will fail mid-position. The crew will enter re-EO-000-104, Secondary Containment Control. With an un-isolable primary system discharging into the Reactor Building and one area temperature approaching or exceeding the maximum safe value, the crew will insert a manual Reactor scram. Ten control rods will fail to insert on the scram. Five of these control rods will be able to be inserted using RMCS and five of these control rods will remain stuck for the rest of the scenario. The crew will enter EO-000-113, Level/Power Control, and take actions for the failure to scram. A second steam leak will develop from the HPCI steam isolation valves in the HPCI pipe routing area. This will lead to a second area temperature exceeding the maximum safe value. The crew will perform a rapid depressurization of the Reactor per EO-000-112.

The scenario will be terminated when the ADS valves are open, control rod insertion is in progress or completed for all rods that can be inserted, and Reactor water level is being controlled in the assigned band above -161".

Facility: Susquehanna Scenario No.: NRC-2 Op-Test No.: 2013

Examiners: _____ Operators: _____

Initial Conditions: The plant is operating at approximately 100% power. EHC pump A is out of service for maintenance. RCIC is out of service for maintenance.

Turnover: Perform half scram testing for RPS scram channel A1 per SO-158-001.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Perform Half Scram Testing SO-158-001
2	rfDB105 101	C - All	MCC 1B217 De-Energizes, Loss of Power to Drywell Spray Valves, Loss of RPS Bus A ON-158-001, Technical Specifications
3	Report	R – ATC, SRO	Power Reduction Due to Minimum Generation Emergency Notification OI-AD-029, GO-100-012
4	mfHP1520 04	I – BOP, SRO	HPCI Inadvertent Initiation ON-156-001, Technical Specifications
5	cmfTH02_ TE14357A 1A2	C – All	Recirculation Pump A High Temperature AR-102-001 (G03), ON-164-002, Technical Specifications
6	cmfBR03_ 1A10201 cmfBR03_ 1A10204	C – All	Electrical Fault on Bus 11B ON-103-003, ON-100-101, EO-000-102
7	mfRR1640 11A	M – All	Reactor Coolant Leak in Drywell EO-000-102, EO-000-103
8	mfFW1440 03A(C)	C – All	Trip of Condensate Pumps 1A and 1C EO-000-102
9	mfHP1520 15	C – All	HPCI Trip EO-000-102, EO-000-112
10	mfAD1830 01	~~I~~ C – All BOP	ADS Fails to Automatically Initiate EO-000-102, EO-000-112

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

Facility: **Susquehanna**	Scenario No.: **NRC-2**	Op-Test No.: **2013**
1. Total malfunctions (5-8) **Events 2, 3, 4, 5, 6, 7, 8, 9, 10**	9	
2. Malfunctions after EOP entry (1-2) **Events 8, 9, 10**	3	
3. Abnormal events (2-4) **Events 2, 3, 4, 5, 6**	5	
4. Major transients (1-2) **Event 7**	1	
5. EOPs entered/requiring substantive actions (1-2) **EO-000-102, EO-000-103**	2	
6. EOP contingencies requiring substantive actions (0-2) **EO-000-102 Alt Level Leg, EO-000-112**	2	
7. Critical tasks (2-3)	2	
CRITICAL TASK DESCRIPTIONS: **CT-1 – Spray the Drywell when Suppression Chamber exceeds 13 psig.** **CT-2 – Perform Rapid Depressurization when RPV level drops to -161".**		

SCENARIO SUMMARY

The crew assumes the shift with the plant operating at approximately 100% power. EHC pump A is out of service for maintenance. RCIC is out of service for maintenance.

The crew will begin by performing half scram surveillance testing for Reactor Scram Instrument Channel A1 SO-158-001. When the crew resets the half scram, MCC 1B217 will de-energize. This results in a loss of RPS bus A, as well as power to Drywell spray valves on RHR A. The crew will execute ON-158-001, Loss of RPS, to restore power to RPS bus A. The crew will reset the half scram, reset NSSSS logic, and recover the RBCW isolation.

Next, the crew will be notified that a Minimum Generation Emergency has been declared and that a 50 MWe reduction on Unit 1 is requested ASAP. The crew will reduce power in accordance with OI-AD-029, Emergency Load Control, and GO-100-012, Power Maneuvers.

Next, HPCI will spuriously start. HPCI will inject into the Reactor and Reactor power will rise. The crew will take action to override HPCI injection per OP-152-001. The crew will also execute ON-156-001, Unanticipated Reactivity Change. HPCI will be inoperable but available for the remainder of the scenario. The SRO will determine that with RCIC already out of service, this requires the plant to be taken to Mode 3 within 12 hours.

A high temperature condition will develop on Recirculation pump A lower guide bearing. The crew will respond per AR-102-001 (G03) and trip the pump once limits are exceeded. The crew will also execute ON-164-002, Loss of Recirculation Flow, and the SRO will determine the impact of single loop operations in Technical Specifications.

Next, a fault will occur on Auxiliary Bus 11B. This will lead to loss of two Condensate pumps, two Service Water pumps, two Circulating Water pumps, and the only operating Recirculation pump. The crew will scram the Reactor due to the loss of all Recirculation pumps. The crew will execute ON-100-101, Scram, Scram Imminent, ON-103-003, 13.8 KV Bus 11A Loss, and EO-000-102, RPV Control.

Next, the two remaining Condensate pumps will trip and a Reactor coolant leak will develop inside the Drywell. The crew will enter EO-000-103, Primary Containment Control. The crew will transition to HPCI to maintain Reactor water level, spray the Suppression Chamber, and then spray the Drywell. Sprays will be successful in lowering Containment pressures.

HPCI will trip and the Reactor coolant leak will worsen. ADS will fail to automatically initiate. Reactor water level will lower below the top of active fuel and the crew will execute EO-000-112, Rapid Depressurization. The crew will open the ADS valves to lower Reactor pressure and then restore and maintain Reactor water level with low pressure injection systems.

The scenario will be terminated when the ADS valves are open, Reactor water level is being controlled in the assigned band above -161", and Containment parameters are being controlled per EO-000-103.

Facility: Susquehanna Scenario No.: NRC-3 Op-Test No.: 2013

Examiners: _____ Operators: _____

Initial Conditions: The plant is operating at approximately 90% power. Core Spray pump A is out of service for maintenance.

Turnover: Swap EHC pumps per OP-193-003 section 2.9. Then raise Reactor power with Recirculation flow per GO-100-012 section 5.4 and Reactivity Manipulation Package.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Swap EHC Pumps OP-193-003
2	N/A	R – ATC, SRO	Raise Reactor Power with Recirculation Flow GO-100-012
3	mfTC193003	C – ATC, SRO	EHC Oscillations ON-193-001
4	cmfRV04_PSV141F13K	C – BOP, SRO	SRV Inadvertently Opens ON-183-001, Technical Specifications
5	cmfMV01_HV151F024A(B)	C – BOP, SRO	Suppression Pool Cooling Valve Breaker Trip OP-149-005, Technical Specifications
6	mfMS183010K mfMS183013K	C – All	SRV Leaks with Cracked Tailpipe ON-100-101, EO-000-102, EO-000-103
7	mfRP158004A(B)(C)(D)	M – All	Electrical ATWS EO-000-102, EO-000-113
8	cmfAV06_FV146F002A(B)	C – All	CRD Flow Control Valves Fail As-Is EO-000-113
9	mfSL153001A(B)	C ~~– All~~ BOP	SLC Squib Valves Fail to Open EO-000-113

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

Facility: **Susquehanna**	Scenario No.: **NRC-3**	Op-Test No.: **2013**
1. Total malfunctions (5-8) **Events 3, 4, 5, 6, 7, 8, 9**	7	
2. Malfunctions after EOP entry (1-2) **Events 8 & 9**	2	
3. Abnormal events (2-4) **Events 3, 4, 5, 6**	4	
4. Major transients (1-2) **Event 7**	1	
5. EOPs entered/requiring substantive actions (1-2) **EO-000-102**	1	
6. EOP contingencies requiring substantive actions (0-2) **EO-000-113**	1	
7. Critical tasks (2-3)	3	
CRITICAL TASK DESCRIPTIONS: **CT-1 – Closes the spuriously open SRV or initiates a manual Reactor scram before Suppression Pool water temperature reaches 110°F.** **CT-2 – Lowers RPV level less than -60" but greater than -161".** **CT-3 – Inserts control rods IAW EO-100-113, Sheet 2, Control Rod Insertion.**		

SCENARIO SUMMARY

The crew assumes the shift with the plant operating at approximately 90% power. Core Spray pump A is out of service.

The crew will begin by starting EHC pump B and placing EHC pump A in standby per OP-193-003. Then the crew will begin raising Reactor power with Recirculation flow.

During the power ascension, the Reactor pressure regulator will begin to oscillate. Reactor power and pressure will oscillate. The crew will execute ON-156-001, Unanticipated Reactivity Change, ON-178-002, Core Flux Oscillations, and ON-193-001, Turbine EHC System Malfunction. The crew will lower Reactor power. This will suppress the oscillations some. The crew will then lower the load limit and swap pressure regulators to eliminate the oscillations.

Next, SRV K will spuriously open. The crew will execute ON-183-001, Stuck Open Safety Relief Valve. The SRV control switch will not close the valve, however pulling fuses will. Once the valve is closed, the crew will attempt to place Suppression Pool cooling in service. The Suppression Pool cooling valve breaker will trip immediately upon trying to open the valve on the first RHR loop attempted. The SRO will determine the Technical Specification impact. The crew will be able to place Suppression Pool cooling in service with the second loop of RHR.

SRV K will continue to have significant leak-by even once the fuses are pulled. Additionally, the SRV tailpipe is cracked and will continue to degrade. This results in rising Suppression Pool water temperature, air temperature, and pressure. Eventually, vacuum breakers will cycle, causing Drywell temperature and pressure to rise. The crew will execute ON-100-101, Scram, Scram Imminent, to lower Reactor power and attempt a manual scram prior to Drywell pressure exceeding 1.72 psig. Later in the scenario, the crew will mitigate degraded Containment parameters with Suppression Chamber sprays per EO-000-103, Primary Containment Control.

When the crew attempts to scram the Reactor, RPS will fail to de-energize and ARI will fail to function. The crew will enter EO-000-102, RPV Control, and transition to EO-000-113, Level/ Power Control. The crew will lower Reactor power by lowering Recirculation flow, tripping Recirculation pumps, lowering Reactor water level, attempting SLC injection, and inserting control rods. The response will be complicated by failure of the SLC pumps to inject boron into the Reactor and failure of the CRD flow control valve to fully open.

The crew will be able to insert all control rods by either venting the scram air header or pulling RPS fuses. If the Main Generator is tripped with Drywell pressure above 1.72 psig, load shedding will cause a loss of all Condensate pumps unless the crew has taken action to reset the Main Generator lock-outs. The crew will take action to establish Reactor water level control with RCIC and/or HPCI.

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

Appendix D **Scenario Outline** **Form ES-D-1**

Facility: Susquehanna Scenario No.: NRC-4 Op-Test No.: 2013

Examiners: _____ Operators: _____

Initial Conditions: The plant is operating at approximately 70% power. Core Spray pump A is out of service for maintenance. Circulating Water pump A is out of service and ready to be returned to service.

Turnover: Start Circulating Water pump A per OP-142-001 section 2.13 starting at step 2.13.5.d. Then perform a control rod pattern adjustment per the Reactivity Manipulation Package, OP-156-001, and GO-100-012.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Start Circulating Water pump A OP-142-001
2	cmfRD02_RED121N015A	I – SRO	Refuel Floor High Exhaust Radiation Monitor Fails Downscale AR-112-G02, Technical Specifications
3	N/A	R – ATC, SRO	Perform Control Rod Pattern Adjustment OP-156-001, GO-100-012
4	cmfPM03_1P132A mfRD1550193431	C – BOP, SRO	CRD Pump A Trip with One Inoperable CRD Accumulator ON-155-007, Technical Specifications
5	Override aiHS10001	C – ATC, SRO	Main Generator Auto Voltage Regulator Failure ON-198-001
6	mfDB117004 cmfPM04_0P162A	C – BOP, SRO	Loss of Instrument Bus 1Y226, Control Structure Chiller Fails to Auto-Start ON-117-001, Technical Specifications
7	mfMS183008	M – All	Main Steam Leak into Turbine Building ON-100-101, EO-000-102
8	mfRP158007B	I – ATC, SRO	RPS B Fails to Scram ON-100-101, EO-000-102
9	cmfAV06_HV141F028D cmfAV06_HV141F022D	C – BOP, SRO	MSIVs Fail to Automatically Close EO-000-102

10	mfHP152015 mfRC150001 diHS15012CB	C – All	HPCI Trips, RCIC Fails to Auto-Initiate, RCIC Initiation Pushbutton Fails to ARM EO-000-102
11	mfRC150011	C - All	RCIC Trips EO-000-102

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

Facility: **Susquehanna**	Scenario No.: **NRC-4**	Op-Test No.: **2013**
1. Total malfunctions (5-8) **Events 2, 4, 5, 6, 7, 8, 9, 10, 11**	9	
2. Malfunctions after EOP entry (1-2) **Events 8, 9, 10, 11**	4	
3. Abnormal events (2-4) **Events 4, 5 & 6**	3	
4. Major transients (1-2) **Event 7**	1	
5. EOPs entered/requiring substantive actions (1-2) **EO-000-102**	1	
6. EOP contingencies requiring substantive actions (0-2)	0	
7. Critical tasks (2-3)	2	
CRITICAL TASK DESCRIPTIONS: **CT-1 – Manually initiate ARI.** **CT-2 – Manually isolate a Steam Line break.**		

SCENARIO SUMMARY

The crew assumes the shift with the plant operating at approximately 70% power. Core Spray pump A is out of service. Circulating Water pump A is out of service and ready to be started.

The crew will begin by starting Circulating Water pump A per OP-142-001. At the end of this evolution, Refuel Floor High exhaust radiation monitor A will fail downscale. The SRO will determine the Technical Specification impact. Then the crew will perform a control rod pattern adjustment.

During the control rod pattern adjustment, CRD pump A will trip. The crew will respond per ON-155-007 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-198-001. 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.

Next, Instrument Bus 1Y226 will de-energize. This will cause a loss of multiple control room indications, Instrument Air compressors, and the running Control Structure Chiller. The standby Control Structure Chiller will fail to auto-start. The crew will take action to start the standby Control Structure Chiller. The SRO will determine the Technical Specification impact.

Next, a leak will develop from the Main Steam lines into the Turbine Building. The crew will lower Reactor power as time allows and attempt a manual Reactor scram. RPS channel B will fail to scram. The crew will insert control rods by manually initiating ARI. An MSIV isolation will be received on high temperature, however Main Steam Line D will fail to isolate. The crew will manually isolate Main Steam Line D by closing at least one of the two MSIVs.

Once the MSIVs are closed, the crew will lose the normal post-scram level and pressure control systems, Feedwater and Turbine Bypass Valves, respectively. HPCI may be started for level control, but will immediately trip. RCIC will fail to start on an automatic start signal. The crew will be able to manually start RCIC to restore and maintain Reactor water level and assist in controlling Reactor pressure. The RCIC initiation pushbutton will fail to arm, requiring manual component by component startup of RCIC. SRVs will also initially be required to control Reactor pressure. Steam flow through the SRVs will exceed RCIC makeup capability for a period of time following the scram. The crew will maximize other injection sources. After a period of time, lowering decay heat will allow RCIC to turn Reactor water level, avoiding the need for more drastic Reactor water level control actions. RCIC will eventually trip, requiring the crew to lower Reactor pressure and utilize Condensate pumps for Reactor injection.

The scenario will be terminated when all control rods are inserted, the Main Steam lines are isolated, Reactor water level is being restored to or controlled in the assigned band above -161", and Reactor pressure is being controlled in the assigned band below 1087 psig.

Appendix D **Scenario Outline** **Form ES-D-1**

Facility: Susquehanna Scenario No.: NRC-5 (XTRA) Op-Test No.: 2013

Examiners: _____ Operators: _____

Initial Conditions: The plant is operating at approximately 8-9% power during a startup. APRM 1 is bypassed due to spiking.

Turnover: Continue to raise Reactor power by withdrawing control rods. Complete the next four control rod movement steps in the startup sequence. Then place the Mode Switch in RUN and withdraw IRMs per GO-100-002 step 5.63.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – ATC, SRO	Raise Reactor Power with Control Rods OP-156-001, GO-100-002
2	N/A	N – ATC, SRO	Place Mode Switch in RUN and Withdraw IRMs GO-100-002
3	cmfRL02_C721K11A(B)	I – SRO	MSIV Closure Bypass Annunciator Does Not Clear AR-104-D03, Technical Specifications
4	diHS00051C cmfPM03_0P504C mfDG024010C	C – BOP, SRO	Spurious EDG C Start, ESW Pump C Trip, EDG C Jacket Water TCV Fails Closed OP-024-001, ON-054-001, Technical Specifications
5	cmfTH02_TE10901A rfSW111004	C – BOP, SRO	Service Water Pump A High Temperature and Degraded Performance ON-111-001, OP-111-001
6	mfEN099001D mfIA118002	C – All	Seismic Event and Instrument Air Leak ON-000-002, ON-118-001, ON-100-101, EO-000-102
7	mfCS151002 mfRH149004A	M – All	Seismic Event, Un-isolable Suppression Pool Break, and Small Steam Leak in Drywell ON-000-002, EO-000-103, EO-000-102, EO-000-112
8	cmfPM03_0P155A cmfPM05_0P155B	C – All	Condensate Transfer Pump A Trips Upon Makeup to Suppression Pool, Condensate Transfer Pump B Shaft Shear, HPCI and RCIC Minimum Flow Valves Fail to Open OP-159-001, EO-000-103, EO-000-112
9	diHS14113K(L)(M)3	SRO C – All BOP	Three ADS Valves Fail to Open EO-000-112

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

Facility: **Susquehanna**	Scenario No.: **NRC-5**	Op-Test No.: **2013**
1. Total malfunctions (5-8) **Events 3, 4, 5, 6, 7, 8, 9**	7	
2. Malfunctions after EOP entry (1-2) **Events 8 & 9**	2	
3. Abnormal events (2-4) **Events 4, 5, 6**	3	
4. Major transients (1-2) **Event 7**	1	
5. EOPs entered/requiring substantive actions (1-2) **EO-000-102, EO-000-103**	2	
6. EOP contingencies requiring substantive actions (0-2) **EO-000-112**	1	
7. Critical tasks (2-3)	2	
CRITICAL TASK DESCRIPTIONS: **CT-1 – Isolate HPCI when Suppression Pool level cannot be maintained above 17 feet.** **CT-2 – Rapidly depressurize the reactor when Suppression Pool level cannot be maintained above 12 feet.**		

SCENARIO SUMMARY

The crew assumes the shift with the plant operating at approximately 8-9% power during a plant startup. APRM 1 is bypassed due to spiking.

The crew will begin by raising Reactor power by withdrawing control rods. The crew will complete the current rod group. Then the crew will place the Mode Switch in RUN per GO-100-002, Plant Startup, Heatup, and Power Operation. When the Mode Switch is placed in RUN, Annunciator AR-104-001 (D03), MSIV CLOSURE BYPASS, will not clear as required. The SRO will place the startup on hold and determine the Technical Specification impact.

Next, EDG C will spuriously start. ESW pump C will start and then trip after a short time delay. The crew will enter ON-054-001, Loss of Emergency Service Water, and restore ESW flow. EDG C will experience high jacket water and lube oil temperatures due to failure of the jacket water temperature control valve. The crew will secure EDG C due to the high temperatures. The SRO will determine the Technical Specification impact of ESW pump C and EDG C inoperability.

Service Water pump A will develop a high bearing temperature. After a short period of time, discharge pressure from Service Water pump A will begin to degrade. The crew may enter ON-111-001, Loss of Service Water. The crew will take action to start an alternate Service Water pump and secure Service Water pump A.

Next, a seismic event will occur and cause a rupture in Instrument Air piping. The crew will enter ON-118-001, Loss of Instrument Air. The crew will insert a manual Reactor scram and execute ON-100-101, Scram, Scram Imminent. The MSIVs will close due to low Instrument Air pressure, resulting is loss of Feedwater pumps and Turbine Bypass Valves for Reactor water level and pressure control, respectively. The crew will use alternate systems for Reactor water level and pressure control, and stabilize the plant as Instrument Air pressure continues to degrade.

A second seismic event will occur and cause a break between the Suppression Pool and both the Core Spray A and RHR A rooms. Additionally, a small steam leak will develop in the Drywell. Suppression Pool level will lower and the crew will enter EO-000-103, Primary Containment Control. The crew may attempt to isolate Core Spray A and RHR A suction lines, but the respective suction valves will fail to close. The crew will lineup Suppression Pool makeup from Condensate Transfer, the Condensate Storage Tanks, HPCI, and/or RCIC. The running Condensate Transfer pump will trip upon initiation of makeup. The crew will be able to start the alternate Condensate Transfer pump, but it will fail to produce normal discharge pressure due to a shaft shear. HPCI and RCIC minimum flow valves will also fail to open. These failures will limit the sources of Suppression Pool makeup.

As Suppression Pool level continues to lower, the crew will isolate HPCI and then enter EO-000-112, Rapid Depressurization. The crew will attempt to open all 6 ADS valves, however only 3 will open. The crew will open 3 other SRVs. The crew will control Reactor injection to restore / maintain Reactor water level during and after the rapid 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".