

Facility Name: <i>Three Mile Island</i> Date of Exam: <i>April 2014</i>																	
Tier	Group	RO K/A Category Points											SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total	
1. Emergency & Abnormal Plant Evolutions	1	3	3	3				3	3			3	18	3	3	6	
	2	2	2	1	N/A			2	1	N/A		1	9	2	2	4	
	Tier Totals	5	5	4				5	4			4	27	5	5	10	
2. Plant Systems	1	3	2	3	3	3	2	3	3	2	2	2	28	3	2	5	
	2	1	1	1	1	1	1	1	1	1	1	0	10	0	2	3	
	Tier Totals	4	3	4	4	4	3	4	4	3	3	2	38	5	3	8	
3. Generic Knowledge and Categories	Abilities			1		2		3		4		10	1	2	3	4	7
				3		3		2		2			2	2	2	1	

- 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 the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
- 7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401		PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)										
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
000007 Reactor Trip - Stabilization - Recovery / 1		0 2					Knowledge of the inter-relations between a reactor trip and the following: Breakers, relays and disconnects	2.6	1	
BW/E02 Vital System Status Verification / 1										
BW/E10 Post Trip Stabilization / 1										
000008 Pressurizer Vapor Space Accident / 3			0 1				Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: Why PZR level may come back on scale if RCS is saturated	3.7	1	
000009 Small Break LOCA / 3					0 5		Ability to determine or interpret the following as they apply to a small break LOCA: The time available for action before PZR is empty, given the rate of decrease of PZR level	3.4	1	
000011 Large Break LOCA / 3									0	
000015 RCP Malfunctions / 4 000017 RCP Malfunctions (Loss of RC Flow) / 4	0 4						Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow): Basic steady state thermodynamic relationship between RCS loops and S/Gs resulting from unbalanced RCS flow	2.9	1	
000022 Loss of Rx Coolant Makeup / 2					0 1		Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: Whether charging line leak exists	3.2	1	
000025 Loss of RHR System / 4		0 2					Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: LPI or Decay Heat Removal/RHR pumps	3.2	1	
000026 Loss of Component Cooling Water / 8				0 3			Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: SWS as a backup to the CCWS	3.6	1	
000027 Pressurizer Pressure Control System Malfunction / 3	0 2						Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: Expansion of liquids as temperature increases	2.8	1	
000029 ATWS / 1						04 21	Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	4	1	
000038 Steam Gen. Tube Rupture / 3					0 9		Ability to determine or interpret the following as they apply to a SGTR: Existence of natural circulation, using plant parameters	4.2	1	
000040 Steam Line Rupture - Excessive Heat Transfer / 4		0 2					Knowledge of the interrelations between the Steam Line Rupture and the following: Sensors and detectors	2.6	1	
BW/E05 Excessive Heat Transfer / 4										
000054 Loss of Main Feedwater / 4									0	
000055 Station Blackout / 6				0 7			Ability to operate and monitor the following as they apply to a Station Blackout: Restoration of power from offsite	4.3	1	
000056 Loss of Off-site Power / 6				0 3			Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: Adjustment of ED/G load by selectively energizing PZR backup heaters	3.2	1	
000057 Loss of Vital AC Inst. Bus / 6			0 1				Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital ac electrical instrument bus	4.1	1	
000058 Loss of DC Power / 6	0 1						Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: Battery charger equipment and instrumentation	2.8	1	
000062 Loss of Nuclear Svc Water / 4									0	
000065 Loss of Instrument Air / 8						04 45	Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	1	
BW/E04 Inadequate Heat Transfer / 4			0 3				Knowledge of the reasons for the following responses as they apply to the (Inadequate Heat Transfer): Manipulation of controls required to obtain desired operating results during abnormal and emergency situations	4.2	1	
000077 Generator Voltage and Electric Grid Disturbances / 6						04 18	Knowledge of the specific bases for EOPs.	3.3	1	
K/A Category Totals:	3	3	3	3	3	3	Group Point Total:		18	

ES-401		PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)										
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
000001 Continuous Rod Withdrawal / 1									0	
000003 Dropped Control Rod / 1									0	
000005 Inoperable/Stuck Control Rod / 1		01					Knowledge of the interrelations between the Inoperable / Stuck Control Rod and the following: Controllers and positioners	2.5	1	
000024 Emergency Boration / 1									0	
000028 Pressurizer Level Malfunction / 2						04. 06	Knowledge of EOP mitigation strategies.	3.7	1	
000032 Loss of Source Range NI / 7	01						Knowledge of the operational implications of the following concepts as they apply to Loss of Source Range Nuclear Instrumentation: Effects of voltage changes on performance	2.5	1	
000033 Loss of Intermediate Range NI / 7									0	
000036 Fuel Handling Accident / 8									0	
BW/A08 Refueling Canal Level Decrease / 8									0	
000037 Steam Generator Tube Leak / 3									0	
000051 Loss of Condenser Vacuum / 4									0	
000059 Accidental Liquid RadWaste Rel. / 9									0	
000060 Accidental Gaseous Radwaste Rel. / 9									0	
000061 ARM System Alarms / 7									0	
000067 Plant Fire On-site / 9 8				01			Ability to operate and / or monitor the following as they apply to the Plant Fire on Site: Respirator air pack	3.6	1	
000068 Control Room Evac. / 8			01				Knowledge of the reasons for the following responses as they apply to the Control Room Evacuation: System response to reactor trip	3.9	1	
BW/A06 Shutdown Outside Control Room / 8									0	
000069 Loss of CTMT Integrity / 5									0	
000074 Inad. Core Cooling / 4									0	
000076 High Reactor Coolant Activity / 9									0	
BW/A01 Plant Runback / 1									0	
BW/A02 Loss of NNI-X / 7									1	
BW/A03 Loss of NNI-Y / 7	02						Knowledge of the operational implications of the following concepts as they apply to the (Loss of NNI-Y): Normal, abnormal and emergency operating procedures associated with (Loss of NNI-Y).	3	0	
BW/A04 Turbine Trip / 4									0	
BW/A05 Emergency Diesel Actuation / 6		01					Knowledge of the interrelations between the (Emergency Diesel Actuation) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	4	1	
BW/A07 Flooding / 8									0	
BW/E03 Inadequate Subcooling Margin / 4									0	
BW/E08 LOCA Cooldown / 4									1	
BW/E09 Natural Circulation Cooldown / 4					02		Ability to determine and interpret the following as they apply to the (Natural Circulation Cooldown): Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.5	1	
BW/E13 EOP Rules				02			Ability to operate and / or monitor the following as they apply to the (EOP Rules): Operating behavior characteristics of the facility.	2.8	1	
BW/E14 EOP Enclosures										
K/A Category Totals:	2	2	1	2	1	1	Group Point Total:		9	

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)											Form ES-401-2	
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	#
003 Reactor Coolant Pump				0 4		0 2						Knowledge of RCPS design feature(s) and/or interlock(s) which provide for the following: Adequate cooling of RCP motor and seals; Knowledge of the effect of a loss or malfunction on the following will have on the RCPS: RCP seals and seal water supply	2.8; 2.7	2
004 Chemical and Volume Control				0 5							04, 11	Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following: Interrelationships and design basis, including fluid flow splits in branching networks (e.g., charging and seal injection flow); Knowledge of abnormal condition procedures.	3.3; 4	2
005 Residual Heat Removal			0 5									Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: ECCS	3.7	1
006 Emergency Core Cooling					0 9							Knowledge of the operational implications of the following concepts as they apply to the ECCS: Thermodynamics of water and steam, including subcooled margin, superheat, and saturation	3.3	1
007 Pressurizer Relief/Quench Tank				0 1								Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: Quench tank cooling	2.6	1
008 Component Cooling Water								0 8				Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Effects of shutting (automatically or otherwise) the isolation valves of the letdown cooler	2.5	1
010 Pressurizer Pressure Control			0 1									Knowledge of the effect that a loss or malfunction of the PZR PCS will have on the following: RCS	3.8	1
012 Reactor Protection					0 1							Knowledge of the operational implications of the following concepts as they apply to the RPS: DNB	3.3	1
013 Engineered Safety Features Actuation		0 1									02, 40	Knowledge of bus power supplies to the following: ESFAS/safeguards equipment control; Ability to apply Technical Specifications for a system.	3.6; 3.4	2
022 Containment Cooling		0 2							0 1			Knowledge of power supplies to the following: Chillers; Ability to monitor automatic operation of the CCS, including: Initiation of safeguards mode of operation	2.5; 4.1	2
025 Ice Condenser														0
026 Containment Spray	0 2									0 5		Knowledge of the physical connections and/or cause-effect relationships between the CSS and the following systems: Cooling water; Ability to manually operate and/or monitor in the control room: Containment spray reset	4.1; 3.5	2
039 Main and Reheat Steam					0 8				0 2			Knowledge of the operational implications of the following concepts as they apply to the MRSS: Effect of steam removal on reactivity; Ability to monitor automatic operation of the MRSS, including: Isolation of the MRSS	3.6; 3.1	2
059 Main Feedwater	0 4											Knowledge of the physical connections and/or cause-effect relationships between the MFW and the following systems S/GS water level control system	3.4	1
061 Auxiliary/Emergency Feedwater			0 1									Knowledge of the effect that a loss or malfunction of the AFW will have on the following: RCS	4.4	1
062 AC Electrical Distribution							0 1	0 3				Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ac distribution system controls including: Significance of D/G load limits; Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Consequences of improper sequencing when transferring to or from an inverter	3.4; 2.9	2
063 DC Electrical Distribution								0 1				Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Grounds	2.5	1
064 Emergency Diesel Generator						0 8						Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Fuel oil storage tanks	3.2	1
073 Process Radiation Monitoring										0 2		Ability to manually operate and/or monitor in the control room: Radiation monitoring system control panel	3.7	1
076 Service Water							0 2					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: Reactor and turbine building closed cooling water temperatures	2.6	1
078 Instrument Air	0 4											Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: Cooling water to compressor	2.6	1
103 Containment							0 1					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: Containment pressure, temperature, and humidity	3.7	1
K/A Category Totals:	3	2	3	3	3	2	3	3	2	2	2	Group Point Total:		28

ES-401		PWR Examination Outline										Form ES-401-2		
Plant Systems - Tier 2/Group 2 (RO)														
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	#
001 Control Rod Drive					6 5							Knowledge of the following operational implications as they apply to the CRDS: CRDS circuitry, including effects of primary/secondary power mismatch on rod motion	3.2	1
002 Reactor Coolant														0
011 Pressurizer Level Control										0 1		Ability to manually operate and/or monitor in the control room: Charging pump and flow controls	3.5	1
014 Rod Position Indication														0
015 Nuclear Instrumentation		0 1										Knowledge of bus power supplies to the following: NIS channels, components, and interconnections	3.3	1
016 Non-nuclear Instrumentation														0
017 In-core Temperature Monitor														0
027 Containment Iodine Removal								0 1				Ability to (a) predict the impacts of the following malfunctions or operations on the CIRS; and (b) based on those predictions, use Procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High temperature in the filter system	3	1
028 Hydrogen Recombiner and Purge Control														0
029 Containment Purge														0
033 Spent Fuel Pool Cooling														0
034 Fuel Handling Equipment							0 2					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Fuel Handling System controls including: Water level in the refueling canal	2.9	1
035 Steam Generator														0
041 Steam Dump/Turbine Bypass Control						0 3						Knowledge of the effect of a loss or malfunction on the following will have on the SDS: Controller and positioners, including ICS, S/G, CRDS	2.7	1
045 Main Turbine Generator														0
055 Condenser Air Removal			0 1									Knowledge of the effect that a loss or malfunction of the CARS will have on the following: Main condenser	2.5	1
056 Condensate														0
068 Liquid Radwaste									0 2			Ability to monitor automatic operation of the Liquid Radwaste System including: Automatic isolation	3.6	1
071 Waste Gas Disposal				0 4								Knowledge of design feature(s) and/or interlock(s) which provide for the following: Isolation of waste gas release tanks	2.9	1
072 Area Radiation Monitoring	0 3											Knowledge of the physical connections and/or cause-effect relationships between the ARM system and the following systems: Fuel building isolation	3.6	1
075 Circulating Water														0
079 Station Air														0
086 Fire Protection														0
K/A Category Totals:	1	1	1	1	1	1	1	1	1	1	0	Group Point Total:		10

ES-401		PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (SRO)										
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
000007 Reactor Trip - Stabilization - Recovery / 1										
BW/E02 Vital System Status Verification / 1					0 1		Ability to determine and interpret the following as they apply to the (Vital System Status Verification): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4	1	
BW/E10 Post Trip Stabilization / 1										
000008 Pressurizer Vapor Space Accident / 3									0	
000009 Small Break LOCA / 3									0	
000011 Large Break LOCA / 3						04, 20	Knowledge of the operational implications of EOP warnings, cautions, and notes.	4.3	1	
000015 RCP Malfunctions / 4									0	
000017 RCP Malfunctions (Loss of RC Flow) / 4									0	
000022 Loss of Rx Coolant Makeup / 2									0	
000025 Loss of RHR System / 4									0	
000026 Loss of Component Cooling Water / 8									0	
000027 Pressurizer Pressure Control System Malfunction / 3									0	
000029 ATWS / 1									0	
000038 Steam Gen. Tube Rupture / 3									0	
000040 Steam Line Rupture - Excessive Heat Transfer / 4										
BW/E05 Excessive Heat Transfer / 4						02, 44	Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.4	1	
000054 Loss of Main Feedwater / 4					0 5		Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): Status of MFW pumps, regulating and stop valves	3.7	1	
000055 Station Blackout / 6									0	
000056 Loss of Off-site Power / 6						04, 18	Knowledge of the specific bases for EOPs.	4	1	
000057 Loss of Vital AC Inst. Bus / 6									0	
000058 Loss of DC Power / 6									0	
000062 Loss of Nuclear Svc Water / 4					0 5		Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: The normal values for SWS-header flow rate and the flow rates to the components cooled by the SWS	2.5	1	
000065 Loss of Instrument Air / 8									0	
BW/E04 Inadequate Heat Transfer / 4									0	
000077 Generator Voltage and Electric Grid Disturbances / 6									0	
K/A Category Totals:	0	0	0	0	3	3	Group Point Total:		6	

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Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (SRO)										
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
000001 Continuous Rod Withdrawal / 1									0	
000003 Dropped Control Rod / 1									0	
000005 Inoperable/Stuck Control Rod / 1									0	
000024 Emergency Boration / 1									0	
000028 Pressurizer Level Malfunction / 2									0	
000032 Loss of Source Range NI / 7									0	
000033 Loss of Intermediate Range NI / 7									0	
000036 Fuel Handling Accident / 8									1	
BW/A08 Refueling Canal Level Decrease / 8					01		Ability to determine and interpret the following as they apply to the (Refueling Canal Level Decrease): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4		
000037 Steam Generator Tube Leak / 3									0	
000051 Loss of Condenser Vacuum / 4									0	
000059 Accidental Liquid RadWaste Rel. / 9									0	
000060 Accidental Gaseous Radwaste Rel. / 9						04. 47	Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	4.2	1	
000061 ARM System Alarms / 7									0	
000067 Plant Fire On-site / 9 8									0	
000068 Control Room Evac. / 8						01. 23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.4	1	
BW/A06 Shutdown Outside Control Room / 8										
000069 Loss of CTMT Integrity / 5									0	
000074 Inad. Core Cooling / 4									0	
000076 High Reactor Coolant Activity / 9									0	
BW/A01 Plant Runback / 1									0	
BW/A02 Loss of NNI-X / 7									0	
BW/A03 Loss of NNI-Y / 7									0	
BW/A04 Turbine Trip / 4									0	
BW/A05 Emergency Diesel Actuation / 6									0	
BW/A07 Flooding / 8									0	
BW/E03 Inadequate Subcooling Margin / 4									0	
BW/E08 LOCA Cooldown / 4									0	
BW/E09 Natural Circulation Cooldown / 4									0	
BW/E13 EOP Rules					01		Ability to determine and interpret the following as they apply to the (EOP Rules): Facility conditions and selection of appropriate procedures during abnormal and emergency	4	1	
BW/E14 EOP Enclosures										
K/A Category Totals:	0	0	0	0	2	2	Group Point Total:		4	

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1 (SRC)										Form ES-401-2		
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	#
003 Reactor Coolant Pump														0
004 Chemical and Volume Control														0
005 Residual Heat Removal														0
006 Emergency Core Cooling														0
007 Pressurizer Relief/Quench Tank												02.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	4.2	1
008 Component Cooling Water														0
010 Pressurizer Pressure Control														0
012 Reactor Protection								03				Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Incorrect channel bypassing	3.7	1
013 Engineered Safety Features Actuation														0
022 Containment Cooling														0
025 Ice Condenser														0
026 Containment Spray														0
039 Main and Reheat Steam								05				Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Increasing steam demand, its relationship to increases in reactor power	3.6	1
059 Main Feedwater														0
061 Auxiliary/Emergency Feedwater														0
062 AC Electrical Distribution														0
063 DC Electrical Distribution												02.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	4.2	1
064 Emergency Diesel Generator														0
073 Process Radiation Monitoring														0
076 Service Water								02				Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Service water header pressure	3.1	1
078 Instrument Air														0
103 Containment														0
K/A Category Totals:	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:		5

ES-401		PWR Examination Outline												Form ES-401-2	
Plant Systems - Tier 2/Group 2 (SRC)															
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	#	
001 Control Rod Drive														0	
002 Reactor Coolant														0	
011 Pressurizer Level Control														0	
014 Rod Position Indication														0	
015 Nuclear Instrumentation								0 2				Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Faulty or erratic operation of detectors or compensating components	3.5	1	
016 Non-nuclear Instrumentation								0 1				Ability to (a) predict the impacts of the following malfunctions or operations on the NNIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Detector failure	3.1	1	
017 In-core Temperature Monitor														0	
027 Containment Iodine Removal														0	
028 Hydrogen Recombiner and Purge Control														0	
029 Containment Purge														0	
033 Spent Fuel Pool Cooling														0	
034 Fuel Handling Equipment														0	
035 Steam Generator														0	
041 Steam Dump/Turbine Bypass Control														0	
045 Main Turbine Generator														0	
055 Condenser Air Removal														0	
056 Condensate														0	
068 Liquid Radwaste														0	
071 Waste Gas Disposal														0	
072 Area Radiation Monitoring														0	
075 Circulating Water														0	
079 Station Air														0	
086 Fire Protection												04 47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	4.2	1	
K/A Category Totals:	0	0	0	0	0	0	0	0	2	0	0	1	Group Point Total:	3	

Facility Name:		Date of Exam:					
Category	K/A #	Topic	RO		SRO-Only		
			IR	#	IR	#	
1. Conduct of Operations	2.1. 20	Ability to interpret and execute procedure steps.	4.6	1	4.6		
	2.1. 36	Knowledge of procedures and limitations involved in core alterations.	3	1	4.1		
	2.1. 42	Knowledge of new and spent fuel movement procedures.	2.5	1	3.4		
	2.1. 34	Knowledge of primary and secondary plant chemistry limits.	2.7		3.5	1	
	2.1. 41	Knowledge of the refueling process.	2.8		3.7	1	
	2.1.						
	Subtotal			3		2	
2. Equipment Control	2.2. 01	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	4.5	1	4.4		
	2.2. 13	Knowledge of tagging and clearance procedures.	4.1	1	4.3		
	2.2. 22	Knowledge of limiting conditions for operations and safety limits.	4	1	4.7		
	2.2. 36	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	3.1		4.2	1	
	2.2. 44	Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.2		4.4	1	
	2.2.						
	Subtotal			3		2	
3. Radiation Control	2.3. 11	Ability to control radiation releases.	3.8	1	4.3		
	2.3. 15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	1	3.1		
	2.3. 04	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2		3.7	1	
	2.3. 14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4		3.8	1	
	2.3.						
	2.3.						
	Subtotal			2		2	
4. Emergency Procedures / Plan	2.4. 03	Ability to identify post-accident instrumentation.	3.7	1	3.9		
	2.4. 17	Knowledge of EOP terms and definitions.	3.9	1	4.3		
	2.4. 40	Knowledge of SRO responsibilities in emergency plan implementation.	2.7		4.5	1	
	2.4.						
	2.4.						
	2.4.						
	Subtotal			2		1	
Tier 3 Point Total				10		7	

Tier / Group	Randomly Selected KA	Reason for Rejection
1 / 2	001 / AK1.19 replaced by A03 / AK1.2	The subject K/A isn't relevant at the subject facility.
2 / 1	006 / K6.19 replaced by 064 / K6.08	Topic oversampled. 006/K6.19 overlaps with K/A 005 / K3.05 on the Written Exam.
2 / 1	073 / A4.01 replaced by 004 / K4.05	Topic oversampled. 073/A4.01 overlaps with K/A 057 / AK3.03 and 068 / A3.02 on the Written Exam.
2 / 1	078 / A3.01 replaced by 039 / A3.02	Topic oversampled. 078 / A3.01 overlaps with K/A 065 / 2.4.45 and 078 / K1.04 on the Written Exam.
2 / 1	003 / 2.2.37 replaced by 061 / 2.4.30	The subject K/A isn't relevant at the subject facility.
2 / 1	061 / 2.4.30 replaced by 062 / A1.01	Question could not be written at the RO level.
2 / 2	017 / K3.01 replaced by 055 / K3.01	Topic oversampled. 017 / K3.01 overlaps with 038 / EA2.09 on the Written Exam.
2 / 2	079 / 2.2.39 replaced by 015 / K2.01	The subject K/A isn't relevant at the subject facility.
2 / 1 SRO	008 / 2.4.9 replaced by 063 / 2.2.25	Topic oversampled. 008 / 2.4.9 overlaps with 026 / AA1.03, 008 / A2.08, 013 / K2.01 and 026 / K1.02 on the Written Exam.
2 / 1 SRO	010 / A2.01 replaced by 012 / A2.03	Topic oversampled. 010 / A2.01 overlaps with 056 / AA1.03, 016 / A2.01, and 028 / 2.4.6 on the Written Exam.
2 / 2 SRO	034 / K5.03 replaced by 016 / A2.01	Topic oversampled. 034 / K5.03 overlaps with 025 / AK2.02, and G 2.1.36 on the Written Exam.

Facility: <u>Three Mile Island</u>		Date of Examination: <u>April 2014</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: <u>289-2014-301</u>

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M/R	Calculate an Estimated Critical Boron Concentration in accordance with 1103-15B, ESTIMATED CRITICAL CONDITIONS. 2.1.25 (3.9): Ability to interpret station reference materials such as graphs, curves, tables, etc.
Conduct of Operations	M/R	Perform OP-TM-300-202, QUADRANT POWER TILT AND CORE IMBALANCE USING THE OUT-OF-CORE DETECTOR SYSTEM, and compare to COLR limits. 2.1.37 (4.3): Knowledge of procedures, guidelines, or limitations associated with reactivity management.
Equipment Control	N/R	Reactor Coolant Pump electrical print reading to determine pump operation. 2.2.41 (3.5): Ability to obtain and interpret station electrical and mechanical drawings.
Radiation Control		Category not selected for RO applicants.
Emergency Procedures/Plan	M/S	ERO Notification 2.4.39 (3.9): Knowledge of RO responsibilities in emergency plan implementation.

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

2014 TMI RO NRC EXAMINATION

CONDUCT OF OPERATIONS: Given a set of plant conditions, calculate the Estimated Critical Boron Concentration for reactor startup. Modified Bank JPM.

CONDUCT OF OPERATIONS: Given a failed computer, perform OP-TM-300-202, QUADRANT POWER TILT AND CORE IMBALANCE USING THE OUT-OF-CORE DETECTOR SYSTEM, and compare to COLR limits. Modified Bank JPM. Calculation is RO/SRO common.

EQUIPMENT CONTROL: Given a set of conditions and Reactor Coolant Pump electrical prints, determine if and where the Reactor Coolant Pump can be operated. New JPM.

EMERGENCY PROCEDURES/PLAN: Given a General Emergency declaration and a failure of the ERO Notification using the World Wide Web, initiate activation of the ERO using the Live Everbridge Agent. Modified Bank JPM.

Facility: <u>Three Mile Island</u>		Date of Examination: <u>April 2014</u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: <u>289-2014-301</u>

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M/R	Review and Approve an Estimated Critical Boron Concentration. 2.1.25 (4.2): Ability to interpret station reference materials such as graphs, curves, tables, etc.
Conduct of Operations	M/R	Review OP-TM-300-202, QUADRANT POWER TILT AND CORE IMBALANCE USING THE OUT-OF-CORE DETECTOR SYSTEM, and compare to COLR limits. 2.1.37 (4.6): Knowledge of procedures, guidelines, or limitations associated with reactivity management.
Equipment Control	N/R	Reactor Coolant Pump electrical print reading to determine pump operation and Tech Spec implications. 2.2.41 (3.9): Ability to obtain and interpret station electrical and mechanical drawings.
Radiation Control	M/R	Implement the Requirements of ODCM for RMS Operability. 2.3.15 (3.1) Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.
Emergency Procedures/Plan	N/R	Emergency Action Level Identification, Event Declaration, and Protective Action Recommendation. 2.4.44 (4.4): Knowledge of emergency plan protective action recommendations.

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

2014 TMI SRO NRC EXAMINATION

CONDUCT OF OPERATIONS: Review and approve an Estimated Critical Boron Concentration calculation with multiple errors. Modified Bank JPM.

CONDUCT OF OPERATIONS: Given a failed computer, perform OP-TM-300-202, QUADRANT POWER TILT AND CORE IMBALANCE USING THE OUT-OF-CORE DETECTOR SYSTEM, and compare to COLR limits. Modified Bank JPM. Calculation is RO/SRO common.

EQUIPMENT CONTROL: Given a set of conditions and Reactor Coolant Pump electrical prints, determine if and where the Reactor Coolant Pump can be operated and any Tech Spec implications. New JPM.

RADIATION CONTROL: Given a set of conditions with a gas release in progress and various RMS components out of service, determine the actions to be taken IAW facility procedures. Modified Bank JPM

EMERGENCY PROCEDURES/PLAN: Given a set of conditions, determine and declare the appropriate Emergency Action Level and make a Protective Action Recommendation IAW with the TMI Emergency Plan. New JPM.

Facility: <u>Three Mile Island</u>		Date of Examination: <u>APR 2014</u>	
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test Number: <u>289-2014-301</u>	
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. Feed from the "C" RCBT and the BAMT (001 A4.02)	N/S	1	
b. Manually Initiate ESAS (006 A2.12)	D/A/S	2	
c. Restore Seal Injection with a Loss of ICCW (003 K6.02)	N/A/S	4P	
d. Transfer Feedwater Pump From ICS to the Motor Speed Changer (Sys 059 A2.11)	D/S	4S	
e. Perform Emergency Operations of Reactor Building Emergency Cooling Water (Sys 022) A4.04	M/A/S	5	
f. Return 1C 480V Bus to the Normal Power Supply (Sys 062) A4.01	N/S	6	
g. Respond IAW OP-TM-MAP-C0101 with Failure (Sys 072) A3.01	A/P/S	7	
h. Initiate and Isolate a Reactor Building Purge (Sys 029 K1.01)	D/L/A/S	8	
In-Plant Systems® (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
i. Return a Battery Charger to Service (AP 058) AA1.03	D	6	
j. Locally/Manually Operate a Turbine Bypass Valve (Sys 041) A4.08	D/E	4S	
k. Pressurize the Core Flood Tanks (Sys 006) A1.13	D/R	2	
@ 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			

Facility: <u>Three Mile Island</u>		Date of Examination: <u>APR 2014</u>	
Exam Level: RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test Number: <u>289-2014-301</u>	
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.			
b. Manually Initiate ESAS (006 A2.12)	D/A/S	2	
c. Restore Seal Injection with a Loss of ICCW (003 K6.02)	N/A/S	4P	
d. Transfer Feedwater Pump From ICS to the Motor Speed Changer (Sys 059 A2.11)	D/S	4S	
e. Perform Emergency Operations of Reactor Building Emergency Cooling Water (Sys 022) A4.04	M/A/S	5	
f. Return 1C 480V Bus to the Normal Power Supply (Sys 062) A4.01	N/S	6	
g. Respond IAW OP-TM-MAP-C0101 with Failure (Sys 072) A3.01	A/P/S	7	
h. Initiate and Isolate a Reactor Building Purge (Sys 029 K1.01)	D/L/A/S	8	
In-Plant Systems® (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
i. Return a Battery Charger to Service (AP 058) AA1.03	D	6	
j. Locally/Manually Operate a Turbine Bypass Valve (Sys 041) A4.08	D/E	4S	
k. Pressurize the Core Flood Tanks (Sys 006) A1.13	D/R	2	
@ 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			

Facility:	Three Mile Island	Scenario No.:	1	Op Test No.:	289-2014-301
Examiners:			Operators:		
Initial Conditions:					
	<ul style="list-style-type: none"> (Temporary IC-241) 100% Power, MOL SBO OOS For Maintenance, expected to return to service in 10 hours Crane work is occurring on the West side of the Plant to stage new piping. NRC Authorization Code for today is AB12. 				
Turnover: Maintain 100% Reactor Power					
Critical Tasks:					
	<ul style="list-style-type: none"> Minimize SCM (CT-7) Limit Uncontrolled Radiation Release (CT-21) Reduce Steaming/Isolate Affected SGs (CT-22) 				
Event No.	Malf. No.	Event Type*	Event Description		
1	MSR01	C CRS C URO C ARO	MSIV Inadvertent Closure, entry into OP-TM-PPC-L2204. (URO: Lowers power in ICS Auto, ARO: Opens MS-V-1A)		
2	RW02C	TS CRS C ARO	NR-P-1C Trips, NR-P-1B Fails to Auto-Start, entry into OP-TM-MAP-B0105, and OP-TM-MAP-B0205 (ARO: Starts NR-P-1B from CR)		
3	MU19D	C CRS C URO C ARO	Reactor Coolant Pump Seal Leakage, entry into OP-TM-AOP-040. (URO: Lower Reactor Power, ARO: Manually Control Feedwater Pumps)		
4	ED09D	TS CRS C ARO	Loss of Vital Bus D, entry into OP-TM-AOP-018 (ARO: Restore Control Building Ventilation)		
5	IC20	I CRS I URO I ARO	Total FW Demand Fails to Zero Volts, ICS Transient, entry into OP-TM-AOP-070. (URO/ARO: Coordinate to stabilize plant in ICS HAND control)		
6	TH17B	TS CRS R URO N ARO	~30 gpm "B" OTSG Tube Leak (TS), entry into OP-TM-EOP-005 (URO: Guide 9)		
7	RC39A TH16B	M CRS M URO M ARO	RC-P-1B Trip, Reactor Trip, ~500 gpm "B" OTSG Tube Rupture with an elevated offsite dose, entry into OP-TM-EOP-005		
8	MUR67 MUR94	C CRS C URO	MU-V-36 Fails to Open (URO: Maintains HPI flow greater than 115 GPM)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Scenario Event Description

NRC Scenario 2

Facility:	Three Mile Island	Scenario No.:	2	Op Test No.:	12-01 NRC
Examiners:			Operators:		
Initial Conditions:					
	<ul style="list-style-type: none"> (Temporary IC-242) 100% Power, MOL SBO OOS For Maintenance, expected to return to service in 10 hours Crane work is occurring on the West side of the Plant to stage new piping. NRC Authorization Code for today is AB12. 				
Turnover:	Maintain 100% Power Operations				
Critical Tasks:	<ul style="list-style-type: none"> Isolate Possible RCS Leak Paths (CT-3) Natural Circulation RCS Flow (CT-12) Turbine Trip (CT-18) 				
Event No.	Malf. No.	Event Type*	Event Description		
1	DHR32	TS CRS	BWST level lowers, entry into OP-TM-MAP-E0204		
2	MS19A	C CRS C ARO	Isolable Steam Leak in Turbine Bldg, entry into OP-TM-AOP-051. (ARO: Isolate Steam Leak)		
3	IC23	I CRS I URO I ARO	SG/RX Demand Station fails to 0 Volts, Entry into OP-TM-AOP-070 (URO/ARO: Coordinate to stabilize plant in ICS HAND control)		
4	TU01D	N CRS R URO N ARO	High Vibrations on Main Turbine, entry into OP-TM-MAP-K0201 and 1102-4. (URO/ARO: Power reduction with ICS in Manual)		
5	ZDIPB1 RCA	TS CRS I URO I ARO	Inadvertent 1600# ESAS Signal, entry into OP-TM-AOP-046. (URO: Immediate Manual Actions, ARO: Restores Letdown)		
6	ED05D	TS CRS C ARO	Loss of 1D 4Kv Bus, entry into OP-TM-AOP-013. (ARO: Places LO-P-6 in PTL)		
7	EG04A EG04B	I CRS I URO	Loss of Stator Coolant Pumps, Main Turbine fails to automatically runback and trip (URO: Trip Reactor, ARO: Adjust Main Feedwater)		
8	ED01	M CRS M URO M ARO	Loss of Offsite Power, entry into OP-TM-AOP-020.		
9	EG07A	C CRS C URO	EG-Y-1B Trips, Station Blackout (URO: Isolates Cooling paths to RCP's)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Facility:	Three Mile Island	Scenario No.:	4	Op Test No.:	289-2014-301
Examiners:			Operators:		
Initial Conditions:	<ul style="list-style-type: none"> (Temporary IC-244) 85% Power, MOL I&C Maintenance is occurring on HSPS, Train B, currently testing EF-V-30B. SBO OOS for Maintenance, expected to return to service in 10 hours. Crane work is occurring on the West side of the Plant to stage new piping. NRC Authorization Code for today is AB12. 				
Turnover:	Maintain 85% Reactor Power				
Critical Tasks:	<ul style="list-style-type: none"> PORV Control for Heat Transfer (CT-13) (If conditions are met) Shutdown Reactor - ATWS (CT-24) Restore Feed to a Dry OTSG (CT-26) 				
Event No.	Malf. No.	Event Type*	Event Description		
1	IA08	TS CRS C ARO	Instrument Air Leak Requiring Isolation of "A" Side 2-Hour Air and "A" EFW Valves, entry into OP-TM-AOP-028 (ARO:Start IA-P-1A/B)		
2	IC38B	C CRS C ARO	Invalid "B" OTSG Low Level, "B" EFW inadvertent actuation. (ARO: defeats invalid signal, secures EF-P-2B)		
3	RD10B	I CRS I URO I ARO	Uncontrolled Inward Rod Motion. (URO: Assumes Manual Control of Control Rods)		
4		TS CRS C URO	MU-V-18 Fails Closed, entry into Guide 9. (URO: Controls Pressurizer Level with HPI valve)		
5	FW15A	C CRS R URO N ARO	"A" Main Feed Pump Trips, Manual runback required. (URO: Runback in Manual, ARO: Runback in Manual)		
6	TH18B	C CRS C URO C ARO	Sheared Shaft on RC-P-1B (URO: Secures RC-P-1B, ARO: re-ratios Main Feedwater)		
7	RD28 RD32	M CRS M URO M ARO	"B" Main Feed Pump Runs to 0 rpm, ATWS, Lack of Primary to Secondary Heat Transfer.		
8		C CRS C ARO	EFW Control Valves fail to operate, EF-V-52A-D Closed (ARO: Establish PSHT via Condensate Booster Pump flow)		
9		C CRS C URO	MU-P-1A/C will not start, MU-P-1B trips. (URO: Establish PORV control for Heat Transfer)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					