

Facility: Millstone Unit 3														Date of Exam: December 4, 2017					
Tier	Group	RO K/A Category Points												SRO-Only Points					
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2		G*		Total	
1. Emergency and Abnormal Plant Evolutions	1	3	3	3	N/A				3	3	N/A		3	18	3		3		6
	2	1	1	2					2	2			1	9	2		2		4
	Tier Totals	4	4	5					5	5			4	27	5		5		10
2. Plant Systems	1	2	3	2	3	3	2	3	3	1	3	3	28	3		2		5	
	2	1	1	0	1	1	1	1	1	1	1	1	10	2		1		3	
	Tier Totals	3	4	2	4	4	3	4	4	2	4	4	38	5		3		8	
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7	
					3		2		2		3			1	2	2	2		

- Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ± 1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points, and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the outline. Systems or evolutions that do not apply at the facility should be deleted with justification. Operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible. Sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher 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' IRs for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. If fuel-handling equipment is sampled in a category other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2. (Note 1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

G* Generic K/As

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

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

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000007 (EPE 7; BW E02&E10; CE E02) Reactor Trip, Stabilization, Recovery / 1	5						Decay power as a function of time	3.3/3.8	1
000008 (APE 8) Pressurizer Vapor Space Accident / 3				8			PRT level pressure and temperature	3.8/3.8	2
000009 (EPE 9) Small Break LOCA / 3			3				Reactor trip and safety initiation	4.1/4.4	3
000011 (EPE 11) Large Break LOCA / 3					11		Conditions for throttling or stopping HPI	3.9/4.3	4
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4					1		Cause of RCP failure	3.0/3.5	5
000022 (APE 22) Loss of Reactor Coolant Makeup / 2	4						Reason for changing from manual to automatic control of charging flow valve controller	2.9/3.0	6
000025 (APE 25) Loss of Residual Heat Removal System / 4				3			LPI pumps	3.4/3.3	7
000026 (APE 26) Loss of Component Cooling Water / 8						2.1.27	Knowledge of system purpose and or function.	3.9/4.0	8
000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3		3					Controllers and positioners	2.6/2.8	9
000029 (EPE 29) Anticipated Transient Without Scram / 1		6					Breakers, relays, and disconnects.	2.9/3.1	10
000038 (EPE 38) Steam Generator Tube Rupture / 3	2						Leak rate vs. pressure drop	3.2/3.5	11
000054 (APE 54; CE E06) Loss of Main Feedwater / 4			4				Actions contained in EOPs for loss of MFW	4.4/4.6	12
000056 (APE 56) Loss of Offsite Power / 6					20		AFW flow indicator	3.9/4.1	13
000057 (APE 57) Loss of Vital AC Instrument Bus / 6						2.2.37	Ability to determine operability and/or availability of safety related equipment.	3.6/4.6	14
000062 (APE 62) Loss of Nuclear Service Water / 4			1				The conditions that will initiate the automatic opening and closing of the SWS isolation valves to the nuclear service water coolers	3.2/3.5	15
000065 (APE 65) Loss of Instrument Air / 8				4			Emergency air compressor	3.5/3.4	16
(BW E04; W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4		2					Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems and relations between the proper operation of these systems to the operation of the facility.	3.9/4.2	17
000040 (APE 40; BW E05; CE E05; W E12) Steam Line Rupture—Excessive Heat Transfer / 4						2.4.3	Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects	3.8/4.0	18
000008 (APE 8) Pressurizer Vapor Space Accident / 3						2.4.46	Ability to verify that the alarms are consistent with the plant conditions.	4.2	76
000025 (APE 25) Loss of Residual Heat Removal System / 4					4		Location and isolability of leaks	3.6	77
000056 (APE 56) Loss of Offsite Power / 6						2.4.50	Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.0	78
000065 (APE 65) Loss of Instrument Air / 8					2		Relationship of flow readings to system operation	2.6	79
(W E04) LOCA Outside Containment / 3						2.4.20.	Knowledge of operational implications of EOP warnings, cautions and notes.	4.3	80

(BW E04; W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4					1		Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.4	81
K/A Category Totals:	3	3	3	3	3/3	3/3	Group Point Total:		18/6

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
AOP 3571, Instrument Failure Response				2			Ability to operate and/or monitor the following as they apply to an instrument failure response: operating behavior characteristics of the facility	3.3/3.6	19
000036 (APE 36; BW/A08) Fuel-Handling Incidents / 8			3				Guidance contained in EOP for fuel handling incident	3.7/4.1	20
000059 (APE 59) Accidental Liquid Radwaste Release / 9						2.1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior and instrument interpretation.	4.4/4.7	21
AOP 3550, Turbine Trip				2			Ability to operate and/or monitor the following as they apply to a turbine trip: operating behavior characteristics of the facility.	3.3/3.6	22
(W E01 & E02) Rediagnosis & SI Termination / 3		1					Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes and automatic and manual features.	3.4/3.9	23
(BW E08; W E03) LOCA Cooldown—Depressurization / 4					2		Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.5/4.1	24
(W E13) Steam Generator Overpressure / 4			2				Normal, abnormal and emergency operating procedures associated with (Steam Generator Overpressure).	2.9/3.3	25
000069 (APE 69; W E14) Loss of Containment Integrity / 5	1						Components, capacity, and function of emergency systems.	3.3/3.6	26
(W E16) High Containment Radiation / 9					2		Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.0/3.3	27
000001 (APE 1) Continuous Rod Withdrawal / 1					2		Position of emergency boration valve	4.2	82
000076 (APE 76) High Reactor Coolant Activity / 9						2.4.41	Knowledge of the emergency action level thresholds and classifications.	4.6	83
(BW E08; W E03) LOCA Cooldown—Depressurization / 4					1		Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.2	84
000069 (APE 69; W E14) Loss of Containment Integrity / 5						2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions	4.6	85
K/A Category Point Totals:	1	1	2	2	2/2	1/2	Group Point Total:		9/4

PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO)														Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#	
003 (SF4P RCP) Reactor Coolant Pump							7					RCS temperature and pressure	3.4/3.4	28	
003 (SF4P RCP) Reactor Coolant Pump					3							Effects of RCP shutdown on T-ave., including the reason for the unreliability of T-ave. in the shutdown loop	3.1/3.5	29	
004 (SF1; SF2 CVCS) Chemical and Volume Control					31							Purpose of flow path around boric acid storage tank	3.0/3.4	30	
005 (SF4P RHR) Residual Heat Removal				1								Overpressure mitigation system	3.0/3.2	31	
006 (SF2; SF3 ECCS) Emergency Core Cooling		2										Valve operators for accumulators	2.5/2.9	32	
007 (SF5 PRTS) Pressurizer Relief/Quench Tank				1								Quench tank cooling	2.6/2.9	33	
008 (SF8 CCW) Component Cooling Water											2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3/4.4	34	
008 (SF8 CCW) Component Cooling Water											2.1.31	Ability to locate control room switches, controls and indications and to determine that they are correctly reflecting the desired plant lineup.	4.6/4.3	35	
010 (SF3 PZR PCS) Pressurizer Pressure Control		2										Controller for PZR spray valve	2.5/2.7	36	
012 (SF7 RPS) Reactor Protection							1					Trip setpoint adjustment	2.9/3.4	37	
012 (SF7 RPS) Reactor Protection					1							DNB	3.3/3.8	38	
013 (SF2 ESFAS) Engineered Safety Features Actuation		1										ESFAS/safeguards equipment control	3.6/3.8	39	
013 (SF2 ESFAS) Engineered Safety Features Actuation						1						Sensors and detectors	2.7/3.1	40	
022 (SF5 CCS) Containment Cooling			1									Containment equipment subject to damage by high or low temperature, humidity and pressure	2.9/3.2	41	
026 (SF5 CSS) Containment Spray										5		Containment spray reset switches	3.5/3.5	42	
039 (SF4S MSS) Main and Reheat Steam								5				Increasing steam demand, its relationship to increases in reactor power	3.3/3.6	43	
039 (SF4S MSS) Main and Reheat Steam				7								Reactor building isolation	3.4/3.7	44	
059 (SF4S MFW) Main Feedwater							7					Feed Pump speed, including normal control speed for ICS	2.5/2.6	45	
061 (SF4S AFW) Auxiliary/Emergency Feedwater						1						Controllers and positioners	2.5/2.8	46	
062 (SF6 ED AC) AC Electrical Distribution										4		Local operation of breakers	2.6/2.7	47	
062 (SF6 ED AC) AC Electrical Distribution	2											ED/G	4.1/4.4	48	
063 (SF6 ED DC) DC Electrical Distribution	2											AC electrical system	2.7/3.2	49	
064 (SF6 EDG) Emergency Diesel Generator										4		Remote operation of the air compressor switch (different modes)	3.2/3.2	50	

073 (SF7 PRM) Process Radiation Monitoring									2				Detector failure	2.7/3.2	51
076 (SF4S SW) Service Water												2.2.37	Ability to determine operability and/or availability of safety related equipment	3.6/4.6	52
078 (SF8 IAS) Instrument Air										1			Air pressure	3.1/3.2	53
103 (SF5 CNT) Containment									5				Emergency containment entry	2.9/3.9	54
103 (SF5 CNT) Containment			2										Loss of containment integrity under normal operations	3.8/4.2	55
005 (SF4P RHR) Residual Heat Removal									2				Pressure transient protection during cold shutdown	3.7	86
008 (SF8 CCW) Component Cooling Water												2.1.30	Ability to locate and operate components, including local controls.	4.0	87
039 (SF4S MSS) Main and Reheat Steam									1				Flow paths of steam during a LOCA	3.2	88
062 (SF6 ED AC) AC Electrical Distribution									15				Consequence of paralleling out-of-phase/mismatch in volts	3.2	89
063 (SF6 ED DC) DC Electrical Distribution												2.4.20	Knowledge of operational implications of EOP warnings, cautions and notes.	4.3	90
K/A Category Point Totals:	2	3	2	3	3	2	3	3/3	1	3	3/2		Group Point Total:		28/5

ES-401		PWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)											Form ES-401-2		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#	
002 (SF2; SF4P RCS) Reactor Coolant						7						Pumps	2.5/2.8	56	
015 (SF7 NI) Nuclear Instrumentation		1										NIS channels, components and interconnections	3.3/3.7	57	
016 (SF7 NNI) Nonnuclear Instrumentation					1							Separation of control and protection circuits	2.7/2.8	58	
033 (SF8 SFPCS) Spent Fuel Pool Cooling							2					Radiation monitoring systems	2.8/3.3	59	
034 (SF8 FHS) Fuel-Handling Equipment										1		Radiation levels	3.3/3.7	60	
035 (SF 4P SG) Steam Generator									2			MAD valves	3.7/3.5	61	
071 (SF9 WGS) Waste Gas Disposal											2.4.46	Ability to verify that the alarms are consistent with the plant conditions.	4.2/4.2	62	
072 (SF7 ARM) Area Radiation Monitoring				1								Containment ventilation isolation	3.3/3.6	63	
079 (SF8 SAS**) Station Air	1											IAS	3.0/3.1	64	
086 Fire Protection								2				Low FPS header pressure	3.0/3.3	65	
028 (SF5 HRPS) Hydrogen Recombiner and Purge Control											2.4.30	Knowledge of events related to system operations/status that must be reported to internal organizations or outside agencies.	4.1	91	
071 (SF9 WGS) Waste Gas Disposal								8				Meteorological changes	2.8	92	
079 (SF8 SAS**) Station Air								1				Cross-connection with IAS	3.2	93	
K/A Category Point Totals:	1	1	0	1	1	1	1	1/2	1	1	1/1	Group Point Total:		10/3	

Facility:		Date of Exam:				
Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.15	Knowledge of administrative requirements for temporary management directives such as standing orders, night orders, Operations memos, etc.	2.7/3.4	66		
	2.1.29	Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.	4.1/4.0	67		
	2.1.20	Ability to interpret and execute procedure steps.	4.6/4.6	68		
	2.1.38	Knowledge of the stations requirements for verbal communication when implementing procedures			3.8	94
	Subtotal			3		1
2. Equipment Control	2.2.42	Ability to recognize system parameters that are entry level conditions for Technical Specifications	3.9/4.6	69		
	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	70		
	2.2.35	Ability to determine Technical Specification Mode of Operation			4.5	95
	2.2.7	Knowledge of the process for conducting special or infrequent tests			3.6	96
	Subtotal			2		2
3. Radiation Control	2.3.11	Ability to control radiation releases.	3.8/4.3	71		
	2.3.5	Ability to use radiation monitoring systems	2.9/2.9	72		
	2.3.15	Knowledge of radiation monitoring systems			3.1	97
	2.3.5	Ability to use radiation monitoring systems			2.9	98
	Subtotal			2		2
4. Emergency Procedures/Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps.	4.6/4.8	73		
	2.4.32	Knowledge of operator response to loss of all annunciators.	3.6/4.0	74		
	2.4.4	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.5/4.7	75		
	2.4.29	Knowledge of the emergency plan.			4.4	99
	2.4.40	Knowledge of the SRO's responsibilities in emergency plan implementation.			4.5	100
	Subtotal			3		2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/2		Rejected Emergency and Abnormal Plant Evolutions associated with Babcock and Wilcox (BW) and Combustion Engineering (CE) reactors - Millstone Unit 3 is a Westinghouse design.
2/1		Rejected 025 (SF5 ICE) Ice Condenser - Millstone Unit 3 does not have an ice condenser installed.
2/1		Rejected 053 (SF1; SF4P ICS*) Integrated Control - Millstone Unit 3 does not have ICS. This topic has no operational significance but similar topics are covered in MSRs.
2/2		Rejected in part 028 (SF5 HRPS) Hydrogen Recombiner and Purge Control - Millstone Unit 3 has no hydrogen recombinder, but does have purge control.
1/1	G2.2.39 - Knowledge of less than one hour technical specification action statements for systems.	Question #14: The E/APE for this K/A statement is Loss of Vital AC Instrument Bus. There are no less than one hour technical specification actions to be taken. Randomly reselected 2.2.37.
3	G2.1.17 - Ability to make accurate, clear, and concise verbal reports.	Question #67: This K/A is considered oversampled since this will be tested extensively during the operating test. Randomly reselected 2.1.29.
3	G2.1.27 - Knowledge of system purpose and or function.	Question #68: Cannot write an operationally valid question without a specific system assigned to this K/A. Randomly reselected 2.1.20.
1/2		Question #19: The licensee requested to add 8 items to the Tier 1, Group 2 list of E/APEs to be available for random selection in accordance with ES-401 Attachment 1. AOP 3571, "Instrument Failure Response," was randomly selected as Question 19.
1/2		Question #22: The licensee added 8 items to the Tier 1, Group 2 list of E/APEs to be available for random selection in accordance with ES-401 Attachment 1. AOP 3550, "Turbine Trip," was randomly selected as Question 22.

