

Facility: Callaway		Date of Exam: 06/10/2011																
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	N/A			3	3	N/A			3	18	0	0	0	
	2	1	2	1	N/A			2	2	N/A			1	9	0	0	0	
	Tier Totals	4	5	4	N/A			5	5	N/A			4	27	0	0	0	
2. Plant Systems	1	2	2	3	3	3	2	2	3	2	3	3	28	0	0	0		
	2	0	1	1	1	1	1	1	1	1	1	1	10	0	0	0		
	Tier Totals	2	3	4	4	4	3	3	4	3	4	4	38	0	0	0		
3. Generic Knowledge and Abilities Categories				1		2		3		4		10		1	2	3	4	0
				3		2		3		2		0		0		0		

Note:

- 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).
- 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.
- 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/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.
- 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.
- 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.
- Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
- * 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.
- 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.
- 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 RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						Form ES-401-2	
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				X			EA1.08 - AFW System	4.4	1
000008 Pressurizer Vapor Space Accident / 3		X					AK2.01 – Valves	2.7*	2
000009 Small Break LOCA / 3					X		EA2.10 - Airborne activity	3.1	3
000015/17 RCP Malfunctions / 4	X						AK1.04 - Basic steady state thermodynamic relationship between RCS loops and S/Gs resulting from unbalanced RCS flow	2.9	4
000022 Loss of Rx Coolant Makeup / 2						X	2.4.11 - Knowledge abnormal condition procedures.	4.0	5
000025 Loss of RHR System / 4					X		AA2.01 - Proper amperage of running LPI/decay heat removal/RHR pump(s)	2.7	6
000026 Loss of Component Cooling Water / 8					X		AA2.06 - The length of time after the loss of CCW flow to a component before that component may be damaged	2.8*	7
000027 Pressurizer Pressure Control System Malfunction / 3			X				AK3.04 - Why, if PZR level is lost and then restored, that pressure recovers much more slowly	2.8	8
000029 ATWS / 1		X					EK2.06 - Breakers, relays, and disconnects	2.9*	9
000038 Steam Gen. Tube Rupture / 3	X						EK1.03 - Natural circulation	3.9	10
000054 (CE/E06) Loss of Main Feedwater / 4						X	2.1.31 - Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.6	11
000055 Station Blackout / 6			X				EK3.02 - Actions contained in EOP for loss of offsite and onsite power	4.3	12
000056 Loss of Off-site Power / 6	X						AK1.04 - Definition of saturation conditions, implication for the systems	3.1*	13
000057 Loss of Vital AC Inst. Bus / 6				X			AA1.04 - RWST and VCT valves	3.5	14
000058 Loss of DC Power / 6				X			AA1.01 - Cross-tie of the affected dc bus with the alternate supply	3.4*	15
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4						X	2.1.19 - Ability to use plant computers to evaluate system or component status.	3.9	16
W/E11 Loss of Emergency Coolant Recirc. / 4			X				EK3.2 - Normal, abnormal and emergency operating procedures associated with Loss of Emergency Coolant Recirculation	3.5	17
W/E12 – Steam Line Rupture – Excessive Heat Transfer / 4		X					EK2.2 - 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	3.6	18
K/A Category Totals:	3	3	3	3	3	3	Group Point Total:		18

ES-401		PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Points	
000003 Dropped Control Rod / 1	X						AK1.19 - Differential rod worth	2.8	19	
000005 Inoperable/Stuck Control Rod / 1		X					AK2.01 – Controllers and positioners	2.5	20	
000028 Pressurizer Level Malfunction / 2					X		AA2.12 - Cause for PZR level deviation alarm: controller malfunction or other instrumentation malfunction	3.1	21	
000032 Loss of Source Range NI / 7						X	2.1.43 - Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc.	4.1	22	
000051 Loss of Condenser Vacuum / 4			X				AK3.01 - Loss of steam dump capability upon loss of condenser vacuum	2.8*	23	
000059 Accidental Liquid RadWaste Rel. / 9		X					AK2.01 - Radioactive-liquid monitors	2.7	24	
W/E03 LOCA Cooldown - Depress. / 4				X			EA1.3 - Desired operating results during abnormal and emergency situations	3.7	25	
W/E07 Inad. Core Cooling / 4				X			EA1.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.6	26	
W/E16 High Containment Radiation / 9					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	2.9	27	
K/A Category Point Totals:	1	2	1	2	2	1	Group Point Total:		9	

ES-401		PWR RO Examination Outline Plant Systems - Tier 2/Group 1											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						X						K6.02 - RCP seals and seal water supply	2.7	28
004 Chemical and Volume Control					X							K5.27 - Reason for nitrogen purge of CVCS	2.6	29
005 Residual Heat Removal					X							K5.09 - Dilution and boration considerations	3.2	30
006 Emergency Core Cooling							X					A1.08 - Temperature, high motor and bearing	2.8	31
007 Pressurizer Relief/Quench Tank			X									K3.01 - Containment	3.3	32
008 Component Cooling Water									X			A3.03 - All flow rate indications and the ability to evaluate the performance of this closed-cycle cooling system	3.0	33
010 Pressurizer Pressure Control		X										K2.01 - PZR heaters	3.0	34
012 Reactor Protection				X								K4.02 - Automatic reactor trip when RPS setpoints are exceeded for each RPS function; basis for each	3.9	35
013 Engineered Safety Features Actuation				X								K4.11 - Vital power load control	3.2	36
022 Containment Cooling		X										K2.01 - Containment cooling fans	3.0*	37
028 Hydrogen Recombiner and Purge Control System						X						K6.01 - Hydrogen recombiners	2.6	38
026 Containment Spray								X				A2.04 - Failure of spray pump	3.9	39
039 Main and Reheat Steam										X		A4.01 - Main steam supply valves	2.9*	40
039 Main and Reheat Steam							X					A1.06 - Main steam pressure	3.0	41
059 Main Feedwater								X				A2.04 - Feeding a dry S/G	2.9*	42
061 Auxiliary/Emergency Feedwater					X							K5.03 - Pump head effects when control valve is shut	2.6	43
062 AC Electrical Distribution	X											K1.04 - Off-site power sources	3.7	44
063 DC Electrical Distribution											X	2.2.42 - Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	3.9	45
063 DC Electrical Distribution			X									K3.01 - ED/G	3.7*	46
064 Emergency Diesel Generator										X		A4.09 - Establishing power from the ring bus (to relieve ED/G)	3.2*	47
064 Emergency Diesel Generator				X								K4.05 - Incomplete-start relay	2.8	48
073 Process Radiation Monitoring	X											K1.01 - Those systems served by PRMs	3.6	49
073 Process Radiation Monitoring											X	2.2.23 - Ability to track Technical Specification limiting conditions for operations.	3.1	50

076 Service Water									X				A2.02 - Service water header pressure	2.7	51
076 Service Water												X	2.4.20 - Knowledge of the operational implications of EOP warnings, cautions, and notes	3.8	52
078 Instrument Air											X		A4.01 - Pressure gauges	3.1	53
078 Instrument Air										X			A3.01 - Air pressure	3.1	54
103 Containment			X										K3.02 - Loss of containment integrity under normal operations	3.8	55
K/A Category Point Totals:	2	2	3	3	3	2	2	3	2	3	3	Group Point Total:		28	

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 2											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	#
002 Reactor Coolant							X					A1.04 - Subcooling Margin	3.9	56
011 Pressurizer Level Control			X									K3.01 - CVCS	3.2*	57
015 Nuclear Instrumentation						X						K6.03 - Component interconnections	2.6	58
017 In-core Temperature Monitor								X				A2.02 - Core damage	3.6	59
033 Spent Fuel Pool Cooling System (SFPCS)									X			A3.02 - Spent fuel leak or rupture	2.9	60
035 Steam Generator	X											K1.09 - RCS	3.8	61
041 Steam Dump/Turbine Bypass Control											X	2.2.1 - Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	4.5	62
072 Area Radiation Monitoring										X		A4.01 - Alarm and interlock setpoint checks and adjustments	3.0*	63
075 Circulating Water				X								K4.01 - Heat sink	2.5	64
086 Fire Protection System					X							K5.03 - Effect of water spray on electrical components	3.1	65
K/A Category Point Totals:	1	0	1	1	1	1	1	1	1	1	1	Group Point Total:		10

Facility: My Power Unit			Date of Exam:	
Category	K/A #	Topic	Imp.	Points
1. Conduct of Operations	2.1.13	Knowledge of facility requirements for controlling vital / controlled access.	2.5	66
	2.1.20	Ability to interpret and execute procedure steps.	4.6	67
	2.1.38	Knowledge of the station's requirements for verbal communications when implementing procedures.	3.7*	68
	Category Total			
2. Equipment Control	2.2.12	Knowledge of surveillance procedures.	3.7	69
	2.2.21	Knowledge of pre- and post-maintenance operability requirements.	2.9	70
	Subtotal			
3. Radiation Control	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personal monitoring equipment, etc.	2.9	71
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	72
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	73
	Subtotal			
4. Emergency Procedures / Plan	2.4.37	Knowledge of the lines of authority during implementation of the emergency plan.	3.0	74
	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	75
	Subtotal			
Tier 3 Point Total				10

Facility: Callaway		Date of Exam: 06/10/2011																
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		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	0	0	0	N/A			0	0	N/A			0	0	3	3	6	
	2	0	0	0	N/A			0	0	N/A			0	0	2	2	4	
	Tier Totals	0	0	0	N/A			0	0	N/A			0	0	5	5	10	
2. Plant Systems	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	
	Tier Totals	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	8	
3. Generic Knowledge and Abilities Categories				1		2		3		4		0		1	2	3	4	7
				0		0		0		0		0		2	1	2	2	

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- 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.

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E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp	Points
000011 Large Break LOCA / 3					X		EA2.09 - Existence of adequate natural circulation	4.3	76
000040 Steam Line Rupture - Excessive Heat Transfer / 4					X		AA2.01 - Occurrence and location of a steam line rupture from pressure and flow indications	4.7*	77
000062 Loss of Nuclear Svc Water / 4						X	2.1.39 - Knowledge of conservative decision making practices	4.3	78
000065 Loss of Instrument Air / 8					X		AA2.04 - Typical conditions which could cause a compressor trip (e.g., high temperature)	2.7	79
000077 Generator Voltage and Electric Grid Disturbances / 6						X	2.4.5 - Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.	4.3	80
W/E04 LOCA Outside Containment / 3						X	2.4.9 - Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	81
K/A Category Totals:	0	0	0	0	3	3	Group Point Total:		6

ES-401		PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Points	
000024 Emergency Boration / 1						X	2.1.25 - Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	82	
W/E02 SI Termination / 3					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.2	83	
W/E09 Natural Circ. / 4					X		EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.8	84	
W/E15 Containment Flooding / 5						X	2.2.37 - Ability to determine operability and/or availability of safety related equipment.	4.6	85	
K/A Category Point Totals:	0	0	0	0	2	2	Group Point Total:		4	

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 1											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	#
004 Chemical and Volume Control								X				A2.15 - High or low PZR level	3.7	86
005 Residual Heat Removal											X	2.4.9 - Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies	4.2	87
006 Emergency Core Cooling								X				A2.12 - Conditions requiring actuation of ECCS	4.8	88
026 Containment Spray System											X	2.2.22 - Knowledge of limiting conditions for operations and safety limits	4.7	89
061 Auxiliary/Emergency Feedwater								X				A2.05 - Automatic control malfunction	3.4*	90
K/A Category Point Totals:	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:		5

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 2											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	#
014 Rod Position Indication								X				A2.05 - Reactor trip	4.1	91
034 Fuel Handling Equipment						X						K6.01 - Fuel handling equipment	3.0	92
045 Main Turbine Generator											X	2.4.4 - Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.7	93
K/A Category Point Totals:	0	0	0	0	0	1	0	1	0	0	1	Group Point Total:		3

Facility: My Power Unit		Date of Exam:		
Generic Category	K/A #	Topic	Imp.	Points
1. Conduct of Operations	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	94
	2.1.35	Knowledge of the fuel-handling responsibilities of SROs.	3.9	95
	Category Total			2
2. Equipment Control	2.2.7	Knowledge of the process for conducting special or infrequent tests.	3.6	96
	Subtotal			1
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.7	97
	2.3.11	Ability to control radiation releases.	4.3	98
	Subtotal			2
4. Emergency Procedures / Plan	2.4.18	Knowledge of the specific bases for EOPs.	4.0	99
	2.4.35	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	4.0	100
	Subtotal			2
Tier 3 Point Total				7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1 / 2	005AK2.01	Metroscope is not applicable to Callaway Plant (005AK2.03). Randomly reselected from within 005AK2.
2 / 1	028K6.01	Original K/A system was 025, Ice Condenser. Callaway does not have Ice Condensers. Randomly reselected from within Safety Function 5: Containment Integrity, keeping the same K/A Topic.
2 / 1	022K2.01	Original K/A Topic was K2.02, Chillers. Callaway's Containment Cooling system does not have chillers. Randomly reselected from 022 K2 section.
2 / 1	026A2.04	Original K/A Topic was A2.02, Failure of automatic recirculation transfer. There is no automatic recirculation transfer associated with containment spray at Callaway – this is a manual operation. Randomly reselected from within same topic area (A2)
2 / 2	041G2.2.1	Original K/A was G2.2.3 for a multi-unit license. Randomly reselected from within Generic Section 2.2.

