

ES-401

## PWR Examination Outline

ES-401-2 Rev 9 (Errata)

Calvert Facility: Cliffs Date of Exam: 8/25/2006																
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	0	5				4	4			2	18	2	4	6
	2	0	3	1				1	3			1	9	3	1	4
	Tier															
	Totals	3	3	6				5	7			3	27	5	5	10
2 Plant Systems	1	3	3	3	4	2	1	2	2	2	2	4	28	4	1	5
	2	2	0	1	1	1	1	1	1	1	1	0	10	2	1	3
	Tier															
	Totals	5	3	4	5	3	2	3	3	3	3	4	38	6	2	8
3 Generic Knowledge and Abilities Categories		1		2		3		4					1	2	3	4
		3		3		2		2				10	2	2	1	2
<p>Note:</p> <ol style="list-style-type: none"> <li>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).</li> <li>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 <math>\pm 1</math> 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.</li> <li>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 ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.</li> <li>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.</li> <li>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.</li> <li>6.* Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</li> <li>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.</li> <li>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</li> <li>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.</li> </ol>																

PWR Examination Outline									
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (EO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G 2	K/A Topic(s)	Imp.	#
000007 (CE/E02) Reactor Trip - Stabilization - Recovery / 1			3.01				EK3 Knowledge of the reasons for the following as they apply to a reactor trip: (CFR 41.5 / 41.10 / 45.6 / 45.13) EK3.01 Actions contained in EOP for reactor trip 4.0 4.6	4.0	38
000008 Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)				1.06			AA1 Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident: (CFR 41.7 / 45.5 / 45.6) AA1.06 Control of PZR level 3.6 3.6	3.6	39
000009 Small Break LOCA / 3					2.12		EA2 Ability to determine or interpret the following as they apply to a small break LOCA: (CFR 43.5 / 45.13) EA2.12 Charging pump ammeter 2.8 2.7	2.8	40
000011 Large Break LOCA / 3						1.3	2.1.30 Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7) 3.9/3.4	3.9	41
000015/17 RCP Malfunction / 4	1.04						AK1. Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow): (CFR 41.8 / 41.10 / 45.3) AK1.04 Basic steady state thermodynamic relationship between RCS loops and S/Gs resulting from unbalanced RCS flow 2.9 3.1*	2.9	42
000022 Loss of Reactor Coolant Makeup / 2				1.06			AA1. Ability to operate and / or monitor the following as they apply to the Loss of Reactor Coolant Pump Makeup: (CFR 41.7 / 45.5 / 45.6) AA1.06 CVCS charging pump ammeters and running indicators: 2.9 2.7	2.9	43
000025 Loss of RHR System / 4			3.02				AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: (CFR 41.5, 41.10 / 45.6 / 45.13) AK3.02 Isolation of RHR low-pressure piping prior to pressure increase above specified level: 3.3 3.7	3.3	44
000026 Loss of Component Cooling Water / 8				1.05			AA1. Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: (CFR 41.7 / 45.5 / 45.6) AA1.05 The CCWS surge tank, including level control and level alarms, and radiation alarm 3.1 3.1	3.1	45
000027 Pressurizer Pressure Control System Malfunction / 3					2.01		AA2. Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: (CFR: 43.5 / 45.13) AA2.01 Conditions which will cause an increase in PZR level 3.4 3.8	3.4	46
000029 Anticipated Transient w/o Scram / 1	1.01						EK1 Knowledge of the operational implications of the following concepts as they apply to the ATWS: (CFR 41.8 / 41.10 / 45.3) EK1.01 Reactor nucleonics and thermohydraulic behavior (2.8 3.1)	2.8	47

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000038 Steam Generator Tube Rupture / 3	1.04					EK1 Knowledge of the operational implications of the following concepts as they apply to the SGTR: (CFR 41.8 / 41.10 / 45.3) EK1.04 Reflux boiling 3.1* 3.3	3.1*	48
000054 (CE/E06) Loss of Main Feedwater / 4				2.05		AA2 Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): (CFR: 43.5 / 45.13) AA2.05 Status of MFW pumps, regulating and stop valves 3.5 3.7	3.5	49
000055 Station Blackout / 6			3.01			EK3 Knowledge of the reasons for the following responses as they apply to the Station Blackout: (CFR 41.5 / 41.10 / 45.6 / 45.13) EK3.01 Length of time for which battery capacity is designed 2.7 3.4	2.7	50
000056 Loss of Off-site Power / 6				1.10		AA1 Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: (CFR 41.7 / 45.5 / 45.6) AA1.10 Auxiliary/emergency feedwater pump (motor driven) 4.3 4.3	4.3	51
000057 Loss of Vital Ac Elec. Inst. Bus. / 6				2.13		AA2 Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: (CFR: 43.5 / 45.13) AA2.13 VCT level and pressure indicators and recorders 3.0 3.4	3.0	52
000058 Loss of DC Power / 6					4.40	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures: (CFR 41.10 / 43.2 / 45.6) 4.0/4.3	4.0	53
000062 Loss of Nuclear Service Water / 4			3.02			AK3 Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: (CFR 41.4, 41.8 / 45.7) AK3.02 The automatic actions (alignments) within the nuclear service water resulting from the actuation of the ESFAS 3.6 3.9	3.9	54
000065 Loss of Instrument Air / 8			3.08			AK3 Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: (CFR 41.5, 41.10 / 45.6 / 45.13) AK3.08 Actions contained in EOP for loss of instrument air 3.7 3.9	3.7	55
K/A Category Totals:	3	0	5	4	4	2	Group Point Total:	18

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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 2	K/A Topic(s)	Imp.	#	
000008 Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)						4.6	2.4.6 Knowledge symptom based EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13) 3.1/4.0	4.0	84	
000009 Small Break LOCA / 3					2.19		EA2 Ability to determine or interpret the following as they apply to a small break LOCA: (CFR 43.5 / 45.13) EA2.19 Containment air cooler run indication 2.7 3.1	3.1	85	
000011 Large Break LOCA / 3						1.32	2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12) 3.4/3.8	3.8	86	
000027 Pressurizer Pressure Control System Malfunction / 3						2.22	2.2.22 Knowledge of limiting conditions for operations and safety limits. (CFR: 43.2 / 45.2) 3.4/4.1	4.1	87	
000055 Station Blackout / 6					2.03		EA2 Ability to determine or interpret the following as they apply to a Station Blackout: (CFR 43.5 / 45.13) EA2.03 Actions necessary to restore power 3.9 4.7	4.7	88	
000057 Loss of Vital Ac Elec. Inst. Bus. / 6						1.32	2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12) 3.4/3.8	3.8	89	
K/A Category Totals:	0	0	0	0	2	4	Group Point Total:	6	6	



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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 2	K/A Topic(s)	Imp.	#
000001 Continuous Rod Withdrawal / 1		2.01					AK2. Knowledge of the interrelations between the Continuous Rod Withdrawal and the following: (CFR 41.7 / 45.7) AK2.01 Rod bank step counters 2.9 3.2	2.9	56
000003 Dropped Control Rod / 1									
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2									
000032 Loss of Source Range NI / 7		2.01					AK2. Knowledge of the interrelations between the Loss of Source Range Nuclear Instrumentation and the following: (CFR 41.7 / 45.7) AK2.01 Power supplies, including proper switch positions 2.7* 3.1	2.7*	57
000033 Loss of Intermediate Range NI / 7									
000036 Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3				1.06			AA1. Ability to operate and / or monitor the following as they apply to the Steam Generator Tube Leak: (CFR 41.7 / 45.5 / 45.6) AA1.06 Main steam line rad monitor meters 3.8* 3.9*	3.8*	58
000051 Loss of Condenser Vacuum / 4					2.02		AA2. Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: (CFR: 43.5 / 45.13) AA2.02 Conditions requiring reactor and/or turbine trip 3.9 4.1	3.9	59
000059 Accidental Liquid Radwaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9					4.31		2.4.31 Knowledge of annunciators alarms and indications, and use of the response instructions. (CFR: 41.10 / 45.3) 3.3/3.4	3.3	60
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 9									

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000068 Control Room Evac. / 8					2.07	AA2. Ability to determine and interpret the following as they apply to the Control Room Evacuation: (CFR: 43.5 / 45.13) AA2.07 PZR level 4.1 4.3	4.1	61
000069 Loss of CTMT Integrity / 5								
000074 Inad. Core Cooling / 4		2.09				EK2 Knowledge of the interrelations between the and the following Inadequate Core Cooling: (CFR 41.7 / 45.7) EK2.09 Controllers and positioners 2.6* 2.6*	2.6*	62
000076 High Reactor Coolant Activity / 9			3.05			AK3. Knowledge of the reasons for the following responses as they apply to the High Reactor Coolant Activity : (CFR 41.5,41.10 / 45.6 / 45.13) AK3.05 Corrective actions as a result of high fission-product radioactivity level in the RCS 2.9 3.6	2.9	63
CE/E09 Functional Recovery								
CE/A11 RCS Overcooling - PTS / 4								
CE/A13 Natural Circ. / 4								
CE/A16 Excess RCS Leakage / 2					2.2	AA2. Ability to determine and interpret the following as they apply to the (Excess RCS Leakage) (CFR: 43.5 / 45.13) AA2.2 Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments. IMPORTANCE RO 2.9 SRO 3.7	2.9	64
K/A Category Totals:	0	3	1	1	3	1	Group Point Total:	9

PWR Examination Outline									
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 2	K/A Topic(s)	Imp.	#
000005 Inoperable/Stuck Control Rod /1					2.03		AA2. Ability to determine and interpret the following as they apply to the Inoperable / Stuck Control Rod: (CFR: 43.5 / 45.13) AA2.03 Required actions if more than one rod is stuck or inoperable 3.5 4.4	4.4	90
000067 Plant Fire On-site / 9					2.22		2.2.22 Knowledge of limiting conditions for operations and safety limits. (CFR: 43.2 / 45.2) 3.4/4.1	4.1	91
CE/A11 RCS Overcooling - PTS / 4					2.1		AA2. Ability to determine and interpret the following as they apply to the (RCS Overcooling) (CFR: 43.5 / 45.13) AA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. IMPORTANCE RO 2.9 SRO 3.3	3.3	92
CE/A16 Excess RCS Leakage /2					2.1		AA2. Ability to determine and interpret the following as they apply to the (Excess RCS Leakage) (CFR: 43.5 / 45.13) AA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. IMPORTANCE RO 2.7 SRO 3.5	3.5	93
<b>K/A Category Totals:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>Group Point Total:</b>	<b>4</b>	<b>4</b>

PWR Examination Outline Plant Systems - Tier 2 Group 1 (RO)														ES-401-2 Rev 9 (Errata)	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G 2	K/A Topic(s)		Imp.	#
003 Reactor Coolant Pump										4.06		A4 Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.06 RCP parameters 2.9* 2.9		2.9*	1
004 Chemical Volume Control											1.28	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7) 3.2/3.3		3.2	2
004 Chemical Volume Control	1.29											K1 Knowledge of the physical connections and/or cause-effect relationships between the CVCS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.29 Effect and detection of leaking PORV or relief on PZR level and pressure, including VCT makeup activity in automatic mode 3.4 4.0		3.4	3
005 Residual Heat Removal		2.01										K2 Knowledge of bus power supplies to the following: (CFR: 41.7) K2.01 RHR pumps 3.0 3.2		3.0	4
006 Emergency Core Cooling			3.03									K3 Knowledge of the effect that a loss or malfunction of the ECCS will have on the following: (CFR: 41.7 / 45.6) K3.03 Containment 4.2 4.4		4.2	5
007 Pressurizer Relief/Quench Tank				4.01								K4 Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Quench tank cooling 2.6 2.9		2.6	6
007 Pressurizer Relief/Quench Tank					5.02							K5 Knowledge of the operational implications of the following concepts as they apply to PRTS: (CFR: 41.5 / 45.7) K5.02 Method of forming a steam bubble in the PZR 3.1 3.4		3.1	7
008 Component Cooling Water											1.30	2.1.30 Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7) 3.9/3.4		3.9	8
008 Component Cooling Water	1.02											K1 Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.9) K1.02 Loads cooled by CCWS 3.3 3.4		3.3	9
010 Pressurizer Pressure Control		2.03										K2 Knowledge of bus power supplies to the following: (CFR: 41.7) K2.03 Indicator for PORV position 2.8* 3.0*		2.8*	10
010 Pressurizer Pressure Control			3.02									K3 Knowledge of the effect that a loss or malfunction of the PZR PCS will have on the following: (CFR: 41.7 / 45.6) K3.02 RPS 4.0 4.1		4.0	11
012 Reactor Protection				4.06								K4 Knowledge of RPS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.06 Automatic or manual enable/disable of RPS trips 3.2 3.5		3.2	12



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013 Engineered Safety Features Actuation						5.02						K5 Knowledge of the operational implications of the following concepts as they apply to the ESFAS: (CFR: 41.5 / 45.7) K5.02 Safety system logic and reliability 2.9 3.3	2.9	13
022 Containment Cooling							1.04					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: (CFR: 41.5 / 45.5) A1.04 Cooling water flow 3.2 3.3	3.2	14
026 Containment Spray								2.05				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.02 Failure of automatic recirculation transfer 4.2* 4.4*	4.2*	15
026 Containment Spray									3.02			A3 Ability to monitor automatic operation of the CSS, including: (CFR: 41.7 / 45.5) A3.02 Verification that cooling water is supplied to the containment spray heat exchanger 3.9* 4.2*	3.9*	16
056 Condensate											1.27	2.1.27 Knowledge of system purpose and or function. (CFR: 41.7) 2.8/2.9	2.8	17
056 Condensate	1.03											K1 Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.03 MFW 2.6* 2.6	2.6*	18
059 Main Feedwater			3.02									K3 Knowledge of the effect that a loss or malfunction of the MFW will have on the following: (CFR: 41.7 / 45.6) K3.02 AFW system 3.6 3.7	3.6	19
061 Auxiliary/Emergency Feedwater		2.02										K2 Knowledge of bus power supplies to the following: (CFR: 41.7) K2.02 AFW electric drive pumps 3.7* 3.7	3.7*	20
061 Auxiliary/Emergency Feedwater				4.13								K4 Knowledge of AFW design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.13 Initiation of cooling water and lube oil 2.7 2.9	2.7	21
062 AC Electrical Distribution								1.01				A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ac distribution system controls including: (CFR: 41.5 / 45.5) A1.01 Significance of D/G load limits 3.4 3.8	3.4	22
063 DC Electrical									2.01			A2 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: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Grounds 2.5 3.2*	2.5	23

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064 Emergency Diesel Generator						6.08							K6 Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: (CFR: 41.7 / 45.7) K6.08 Fuel oil storage tanks 3.2 3.3	3.2	24
073 Process Radiation Monitoring				4.01									K4 Knowledge of PRM system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Release termination when radiation exceeds setpoint 4.0 4.3	4.0	25
076 Service Water										3.02			A3 Ability to monitor automatic operation of the SWS, including: (CFR: 41.7 / 45.5) A3.02 Emergency heat loads 3.7 3.7	3.7	26
078 Instrument Air											4.01		A4 Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.01 Pressure gauges 3.1 3.1	3.1	27
103 Containment												1.23	2.1.23 Ability to perform specific system and integrated plant. procedures during all modes of plant operation. (CFR: 45.2 / 45.6) 3.9/4.0	3.9	28
K/A Category Totals:	3	3	3	4	2	1	2	2	2	2	2	4	Group Point Total:	28	28

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Plant Systems - Tier 2 Group 1 (SRO)														
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G 2	K/A Topic(s)	Imp.	#
003 Reactor Coolant Pump												2.4.6 Knowledge of symptom based EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13) 3.1/4.0	4.0	76
005 Residual Heat Removal								2.02				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.02 Pressure transient protection during cold shutdown 3.5 3.7	3.7	77
006 Emergency Core Cooling								2.03				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 45.5) A2.03 System leakage 3.3 3.7	3.7	78
013 Engineered Safety Features Actuation								2.02				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.02 Excess steam demand 4.3 4.5	4.5	79
061 Auxiliary/Emergency Feedwater								2.01				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Startup of MFW pump during AFW operation 2.5 2.6*	2.6*	80
K/A Category Totals:	0	0	0	0	0	0	0	4	0	0	1	Group Point Total:	5	5

PWR Examination Outline Plant Systems - Tier 2 Group 2 (RO)														ES-401-2 Rev 9 (Errata)	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G 2	K/A Topic(s)		Imp.	#
001 Control Rod Drive						6.12						K6 Knowledge of the effect of a loss or malfunction on the following CRDS components: (CFR: 41.7/45.7) K6.12 Location and interpretation of CRDS ac/dc status alarms 2.9* 3.2*		2.9*	29
002 Reactor Coolant									3.02			A3 Ability to monitor automatic operation of the RCS, including: (CFR: 41.7 / 45.5) A3.02 Containment sound-monitoring system 2.6* 2.8		2.6*	30
011 Pressurizer Level Control															
014 Rod Position Indication	1.01											K1 Knowledge of the physical connections and/or cause effect relationships between the RPIS and the following systems: (CFR: 41.3 to 41.9 / 45.7 to 45.8) K1.01 CRDS 3.2* 3.6		3.2*	31
015 Nuclear Instrumentation					5.13							K5 Knowledge of the operational implications of the following concepts as they apply to the NIS: (CFR: 41.5 / 45.7) K5.13 Peaking and hot-channel factor 3.1 3.5		3.1	75
016 Non-nuclear Instrumentation															
017 In-core Temperature Monitor															
027 Containment Iodine Removal															
028 Hydrogen Recombiner and Purge Control															
029 Containment Purge															
033 Spent Fuel Pool Cooling															
034 Fuel Handling Equipment															
035 Steam Generator															

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041 Steam Dump/Turbine Bypass Control								1.02						A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including: (CFR: 41.5 / 45.5) A1.02 Steam pressure 3.1 3.2	3.1	32
045 Main Turbine Generator												4.02		A4. Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.02 T/G controls, including breakers 2.7 2.6*	2.7	33
055 Condenser Air Removal	1.06													K1 Knowledge of the physical connections and/or cause effect relationships between the CARS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.06 PRM system 2.6 2.6	2.6	34
068 Liquid Rad Waste								4.01						K4 Knowledge of design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Safety and environmental precautions for handling hot, acidic, and radioactive liquids 3.4 4.1	3.4	35
071 Waste Gas Disposal																
072 Area Radiation Monitoring														K3 Knowledge of the effect that a loss or malfunction of the ARM system will have on the following: (CFR: 41.7 / 45.6) K3.01 Containment ventilation isolation 3.2* 3.4*	3.2*	36
075 Circulating Water																
079 Station Air													2.01	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Cross-connection with IAS 2.9 3.2	2.9	37
086 Fire Protection																
K/A Category Totals:	2	0	1	1	1	1	1	1	1	1	1	1	0	Group Point Total:	10	10



PWR Examination Outline												51-2 Rev 9 (Errata)		
Plant Systems: Tier 2 Group 2 (SRO)														
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G 2	K/A Topic(s)	Imp.	#
011 Pressurizer Level Control											2.22	2.2.22 Knowledge of limiting conditions for operations and safety limits. (CFR: 43.2 / 45.2) 3.4/4.1	4.1	81
035 Steam Generator								2.02				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SGS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.5) A2.02 Reactor trip/turbine trip 4.2 4.4	4.4	82
075 Circulating Water								2.01				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the circulating water system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Loss of intake structure 3.0* 3.2	3.2	83
K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	1	Group Point Total:	3	3

Calvert Cliffs Nuclear Plant

ES-401		Generic Knowledge and Abilities Outline (Tier 3)			ES-401-2 Rev-9 (Errata)
Facility:	Calvert Cliffs	Date of Exam: 8/25/2006			Level: RO
Category	K/A #	Topic	Imp.	#	
1  Conduct of Operations	1.3	2.1.3 Knowledge of shift turnover practices. (CFR: 41.10 / 45.13) IMPORTANCE RO 3.0 SRO 3.4	3.0	65	
	1.11	2.1.11 Knowledge of less than one hour technical specification action statements for systems. (CFR: 43.2 / 45.13) IMPORTANCE RO 3.0 SRO 3.8	3.0	66	
	1.14	2.1.14 Knowledge of system status criteria which require the notification of plant personnel. (CFR: 43.5 / 45.12) IMPORTANCE RO 2.5 SRO 3.3	2.5	67	
		Subtotal	3	3	
2  Equipment Control	2.24	2.2.24 Ability to analyze the affect of maintenance activities on LCO status. (CFR: 43.2 / 45.13) IMPORTANCE RO 2.6 SRO 3.8	2.6	68	
	2.26	2.2.26 Knowledge of refueling administrative requirements. (CFR: 43.5 / 45.13) IMPORTANCE RO 2.5 SRO 3.7	2.5	69	
	2.28	2.2.28 Knowledge of new and spent fuel movement procedures. (CFR: 43.7 / 45.13) IMPORTANCE RO 2.6 SRO 3.5	2.6	70	
		Subtotal	3	3	

Calvert Cliffs Nuclear Plant

3	3.1	2.3.1 Knowledge of 10 CFR: 20 and related facility radiation control requirements. (CFR: 41.12 / 43.4. 45.9 / 45.10) IMPORTANCE RO 2.6 SRO 3.0	2.6	71
	3.4	2.3.4 Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. (CFR: 43.4 / 45.10) IMPORTANCE RO 2.5 SRO 3.1	2.5	72
		<b>Subtotal</b>	<b>2</b>	<b>2</b>
4	4.34	2.4.34 Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications. (CFR: 43.5 / 45.13) IMPORTANCE RO 3.8 SRO 3.6	3.8	73
	4.43	2.4.43 Knowledge of emergency communications systems and techniques. (CFR: 45.13) IMPORTANCE RO 2.8 SRO 3.5	2.8	74
		<b>Subtotal</b>	<b>2</b>	<b>2</b>
		<b>Tier 3 Point Total</b>	<b>10</b>	<b>10</b>

Calvert Cliffs Nuclear Plant

ES-401		Generic Knowledge and Abilities Outline (Tier 3)			ES-401-3 Rev 9	
Facility:	Calvert Cliffs	Date of Exam:			8/25/2006	Level: SRO
Category	K/A #	Topic	Imp.	#		
1  Conduct of Operations	1.12	2.1.12 Ability to apply technical specifications for a system. (CFR: 43.2 / 43.5 / 45.3) IMPORTANCE RO 2.9 SRO 4.0	4.0	98		
	1.33	2.1.33 Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications. (CFR: 43.2 / 43.3 / 45.3) IMPORTANCE RO 3.4 SRO 4.0	4.0	94		
		Subtotal	2	2		
2  Equipment Control	2.10	2.2.10 Knowledge of the process for determining if the margin of safety, as defined in the basis of any technical specification is reduced by a proposed change, test or experiment. (CFR: 43.3 / 45.13) IMPORTANCE RO 1.9 SRO 3.3	3.3	95		
	2.20	2.2.20 Knowledge of the process for managing troubleshooting activities. (CFR: 43.5 / 45.13) IMPORTANCE RO 2.2 SRO 3.3	3.3	96		

Calvert Cliffs Nuclear Plant

		<b>Subtotal</b>	<b>2</b>	<b>2</b>
<b>3</b>	3.8	2.3.8 Knowledge of the process for performing a planned gaseous radioactive release. (CFR: 43.4 / 45.10) IMPORTANCE RO 2.3 SRO 3.2	3.2	97
		<b>Subtotal</b>	<b>1</b>	<b>1</b>
<b>4</b>	4.9	2.4.9 Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies. (CFR: 41.10 / 43.5 / 45.13) IMPORTANCE RO 3.3 SRO 3.9	3.9	99
	4.30	2.4.30 Knowledge of which events related to system operations/status should be reported to outside agencies. (CFR: 43.5 / 45.11) IMPORTANCE RO 2.2 SRO 3.6	3.6	100
		<b>Subtotal</b>	<b>2</b>	<b>2</b>
		<b>Tier 3 Point Total</b>	<b>7</b>	<b>7</b>



Calvert Cliffs Nuclear Plant

Tier and Group	Randomly Selected K/A	Reason for Rejection
T1G1	000027AA2.15	This K/A is not applicable at CCN{P because CE plants do not use RCP seal injection. Randomly reselected AA2.01 <i>Conditions which will cause an increase in PZR level 3.4 3.8</i>
T1G1	000029G2.1.14	This generic K/A was already sampled in the generic section - tested in question 67 (2.1.14 Knowledge of system status criteria which require the notification of plant personnel. (CFR: 43.5 / 45.12) 2.5/3.3). The Chief Examiner directed that we shift K/As - systematically reselected EK1 <i>Knowledge of the operational implications of the following concepts as they apply to the ATWS: (CFR 41.8 / 41.10 / 45.3) EK1.01 Reactor nucleonics and thermohydraulic behavior (2.8 3.1)</i>
T1G2	000001AK2.05	The rod motion lights at CCNP have been removed from service. Randomly reselected AK2.01 <i>Knowledge of the interrelations between the Continuous Rod Withdrawal and the following: (CFR 41.7 / 45.7) AK2.01 Rod bank step counters 2.0 3.2</i>
T1G2	000005G2.4.4	Suppressed G2.4.4 <i>Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6)</i> because it was deemed to be inappropriate for SRO level questions by the Chief Examiner. Randomly reselected AA2. <i>Ability to determine and interpret the following as they apply to the Inoperable / Stuck Control Rod: (CFR: 43.5 / 45.13) AA2.03 Required actions if more than one rod is stuck or inoperable 3.5 4.4</i>
T1G2	000032AK3.01	Systematically reselected from AK3. <i>Knowledge of the reasons for the following responses as they apply to the Loss of Intermediate Range Nuclear Instrumentation: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.01 Termination of startup following loss of intermediate range instrumentation 3.2 3.6</i> because after spending the resources to develop a question for this K/A, it was subsequently determined that the question was at the SRO level. It would have been inappropriate to develop an RO question for this K/A if the SRO question was essentially on the same topic (SRO(I)s take the RO test and they would have 2 similar questions. Decided to systematically reselect AK2.01 because there were only 2 AK2s in the Tier 1 sample plan and there were 7 AK3s. AK2. <i>Knowledge of the interrelations between the Loss of Source Range Nuclear Instrumentation and the following: (CFR 41.7 / 45.7) AK2.01 Power supplies, including proper switch positions 2.7* 3.1</i>
T1G2	CE/A-16 G2.4.4	Suppressed G2.4.4 <i>Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6)</i> because it was deemed to be inappropriate for SRO level questions by the Chief Examiner. Randomly reselected AA2. <i>Ability to determine and interpret the following as they apply to the (Excess RCS Leakage) (CFR: 43.5 / 45.13) AA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. IMPORTANCE RO 2.7 SRO 3.5</i>
T2G1	003A4.07	There are no seal return valves at Calvert Cliffs. Randomly reselected A4.06 <i>"RCP parameters 2.9* 2.9"</i>
T2G1	026A2.05	There are no chemical addition tanks in the containment spray flow path - CCNP used Na304 baskets instead. Randomly reselected A2.02.
T2G1	061K2.03	There are no diesel driven AFW pumps at Calvert Cliffs. Randomly reselected K2.02.

Calvert Cliffs Nuclear Plant

Tier and Group	Randomly Selected K/A	Reason for Rejection
T2G1	073K50.2/K5.03	The process radiation monitors only measure gaseous, liquid or particulate effluents. The nature of these processes are such that they do not respond to gamma sources at various distances from the detectors. It is not possible to vary the source distance on a PRM. K5.02 was an inappropriate K/A for Calvert Cliffs. Randomly reselected K/A K5.03 <i>Relationship between radiation intensity and exposure limits 2.9* 3.4</i> - Unable to prepare a question within a reasonable amount of time - Systematically reselected K4.01 <i>Release termination when radiation exceeds setpoint 4.0 4.3</i>
T2G1	061K4.05	There is no AFW swapover between MFW and AFW for a low suction pressure condition. Unable to understand the K/A. Randomly reselected K4.13.
T2G1	068G2.1.30	There were no local controls for the liquid Rad waste system that were within the purview of operators to locate and operate. Unable to write an operationally valid question. Shifted to K4.01 <i>Knowledge of design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Safety and environmental precautions for handling hot, acidic, and radioactive liquids 3.4 4.1</i>
T3	G2.3.4	The decision was made by the Chief Examiner that 2 SRO test questions from the radiation control section constituted over-sampling GET level knowledge. Elected to use a rejected RO question (#24) that had been rejected because it was SRO-level knowledge - for the SR) exam. Shifted K/As from G2.3.4 <i>Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. (CFR: 43.4 / 45.10) IMPORTANCE RO 2.5 SRO 3.1 to G2.1.12 Ability to apply technical specifications for a system. (CFR: 43.2 / 43.5 / 45.3) IMPORTANCE RO 2.9 SRO 4.0</i>