

Final Submittal

**CATAWBA OCTOBER 2004**

**EXAM 50-413, 414/2004-301  
OCTOBER 4 - 8, 2004 &  
OCTOBER 13, 2004 (WRITTEN)**

**FINAL SAMPLE PLANS / OUTLINES**



**ES-401 PWR Examination Outline ES-401-3 draft Rev 8**

Facility: Catawba		Date of Exam: 10/13/2004																	
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	K	A	A 2	G *	Total	
1 Emergency & Abnormal Plant Evolutions	1	4	2	3				3	3				3	18	0	0	2	5	7
	2	2	1	2				2	1				1	9	0	0	2	3	5
	<b>Tier Totals</b>	6	3	5				5	4				4	27	0	0	4	8	12
2 Plant Systems	1	2	3	4	3	2	2	3	3	1	3	2	26	0	0	2	2	4	
	2	1	0	0	0	2	1	2	1	1	1	1	10	0	0	2	0	2	
	<b>Tier Totals</b>	3	3	4	3	4	3	5	4	2	4	3	36	0	0	4	2	6	
3 Generic Knowledge and Abilities Categories							1	2	3	4					1	2	3	4	
							2	3	2	3			10	2	2	1	2	7	

Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier of the RO Outline (i.e., the "Tier Totals" in each K/A category shall not be less than two). Refer to Section D.1.c for additional guidance regarding SRO sampling.

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. Select topics from many systems; avoid selecting more than two K/A topics from a system unless they relate to plant-specific priorities.

4. Systems /evolutions within each group are identified on the associated outline.

5. The shaded areas are not applicable to the category/tier.

6.\* 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. The SRO K/As must also be linked to 10 CFR 55.43 or an SRO-level learning objective.

7. On the following pages, enter the K/A numbers, a brief description of each topic, the topic's importance ratings (IR) for the applicable license level, and the point totals for each system and category. Enter the Group and Tier totals for each category in the Table above; summarize all the SRO-only knowledge and non-A2 ability categories in the columns labeled "K" and "A." Use duplicate pages for RO and SRO-only exams.

8. For Tier 3, enter the K/A numbers, descriptions, importance ratings, and point totals on Form ES-401-3.

9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.





**ES-401 PWR Examination Outline ES-401-3 Rev 9**

Facility: Catawba		Date of Exam: 10/16/2004																			
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	K	A	A 2	G *	Total			
1 Emergency & Abnormal Plant Evolutions	1	4	2	3				3	3				3	18	0	0	2	5	7		
	2	2	1	2				2	1				1	9	0	0	2	3	5		
	<b>Tier Totals</b>	6	3	5				5	4				4	27	0	0	4	8	12		
2 Plant Systems	1	2	3	4	3	2	2	3	3	1	3	2	28	0	0	2	2	4			
	2	1	0	0	0	2	1	2	1	1	1	1	10	0	0	2	0	2			
	<b>Tier Totals</b>	3	3	4	3	4	3	5	4	2	4	3	38	0	0	4	2	6			
3 Generic Knowledge and Abilities Categories		1				2				3				4				1	2	3	4
		2				3				2				3				2	2	1	2

Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier of the RO Outline (i.e., the "Tier Totals" in each K/A category shall not be less than two). Refer to Section D.1.c for additional guidance regarding SRO sampling.

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. Select topics from many systems; avoid selecting more than two K/A topics from a system unless they relate to plant-specific priorities.

4. Systems /evolutions within each group are identified on the associated outline.

5. The shaded areas are not applicable to the category/tier.

6.\* 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. The SRO K/As must also be linked to 10 CFR 55.43 or an SRO-level learning objective.

7. On the following pages, enter the K/A numbers, a brief description of each topic, the topic's importance ratings (IR) for the applicable license level, and the point totals for each system and category. Enter the Group and Tier totals for each category in the Table above; summarize all the SRO-only knowledge and non-A2 ability categories in the columns labeled "K" and "A." Use duplicate pages for RO and SRO-only exams.

8. For Tier 3, enter the K/A numbers, descriptions, importance ratings, and point totals on Form ES-401-3.

9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.

ES-401		PWR Examination Outline							ES-401-2 draft Rev 9						
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 2	K/A Topic(s)	Imp.	#						
000007 Reactor Trip - Stabilization - Recovery / 1						2.02	EA2 Ability to determine or interpret the following as they apply to a reactor trip. EA2.02 Proper actions to be taken if the automatic safety functions have not taken place 4.3 4.6 (CFR 41.7 / 45.5 / 45.6)	4.3/4.6	1136						
000008 Pressurizer Vapor Space Accident / 3					1.08		AA1. Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident: AA1.08 PRT level pressure and temperature 3.8 3.8 (CFR 41.7 / 45.5 / 45.6)	3.8/3.8	311.1						
000009 Small Break LOCA / 3					1.07		EA1 Ability to operate and monitor the following as they apply to a small break LOCA: EA1.07 CCS 3.7 3.9 (CFR 41.7 / 45.5 / 45.6)	3.7/3.9	1185						
000011 Large Break LOCA / 3					1.01		EK1 Knowledge of the operational implications of the following concepts as they apply to the Large Break LOCA: EK1.01 Natural circulation and cooling, including reflux boiling. 4.1 4.4 (CFR 41.8 / 41.10 / 45.3)	4.1/4.4	601.1						
000015/17 RCP Malfunction / 4															
000022 Loss of Reactor Coolant Makeup / 2					3.02		AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup: AK3.02 Actions contained in SDPs and EOPs for RCPs, loss of makeup, loss of charging, and abnormal charging 3.5 3.8 (CFR 41.5,41.10 / 45.6 / 45.13)	3.5/3.8	114C						
000025 Loss of RHR System / 4						2.25	2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. (CFR. 43.2)	2.5/ 3.7	1184						
000026 Loss of Component Cooling Water / 5					3.02		AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: AK3.02 The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS 3.6 3.9 (CFR 41.5,41.10 / 45.6 / 45.13)	3.6/3.9	1141						
000027 Pressurizer Pressure Control System Malfunction / 3					1.01		AK1. Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: AK1.01 Definition of saturation temperature. 3.1 3.4 (CFR 41.8 / 41.10 / 45.3)	3.1/3.4	1142						
000029 Anticipated Transient w/o Scram / 1					1.02		EK1 Knowledge of the operational implications of the following concepts as they apply to the ATWS: EK1.01 Reactor neutronics and thermo-hydraulics behavior 2.8 3.1 (CFR 41.8 / 41.10 / 45.3)	2.8/3.1	945.1						
000038 Steam Generator Tube Rupture / 3					1.02		EA1 Ability to operate and monitor the following as they apply to a SGTR: EA1.02 Steam and feedwater flow, for mismatched condition. 4.2 4.1 (CFR 41.7 / 45.5 / 45.6)	4.2/4.1	1176						
000040 Steam Line Rupture - Excessive Heat Transfer / 4					2.01		AK2. Knowledge of the interrelations between the Steam Line Rupture and the following: AK2.01 Valves 2.6* 2.5 (CFR 41.7 / 45.7)	2.6*/2.5	1211						
000054 Loss of Main Feedwater / 4						2.04	AA2. Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): AA2.04 Proper operation of AFW pumps and regulating valves 4.2 4.3 (CFR: 43.5 / 45.13)	4.2/4.3	1202						
000055 Station Blackout / 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	670.1						
000056 Loss of Off-site Power / 6						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	1210						
000057 Loss of Vital Ac Elec. Inst. Bus. / 6															
000058 Loss of DC Power / 6					1.01		AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: AK1.01 Battery charger equipment and instrumentation 2.8 3.1* (CFR 41.8 / 41.10 / 45.3)	2.5/3.1*	1212						
000062 Loss of Nuclear Service Water / 4															
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: AK3.08 Actions contained in EOP for loss of instrument air. 3.7 3.9 (CFR 41.5,41.10 / 45.6 / 45.13)	3.7/3.9	1138						
W/E04 LOCA Outside Containment / 3					2.2		EK2. Knowledge of the interrelations between the (LOCA Outside Containment) and the following: 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. IMPORTANCE RO 3.8 SRO 4.0 (CFR: 41.7 / 45.7)	3.8/4.0	912.1						
W/E11 Loss of Emergency Coolant Recirc / 4															
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4						2.2	EA2. Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink) EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments. IMPORTANCE RO 3.7 SRO 4.3 (CFR: 43.5 / 45.13)	3.7/4.3	1139						
K/A Category Totals:							4	2	3	3	3	3	Group Point Total:	18	18

ES-401		PWR Examination Outline							ES-401-2 draft Rev 9	
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										
000003 Dropped Control Rod / 1										
000005 Inoperable/Stuck Control Rod / 1	1.04						AK1. Knowledge of the operational implications of the following concepts as they apply to Inoperable / Stuck Control Rod: AK1.04 Definitions of axial imbalance, neutron error, power demand, actual power tracking mode, ICS tracking 3.0* 3.4* (CFR 41.8 / 41.10 / 45.3)	3.0*/3.4*	1144	
000024 Emergency Boration / 1		2.01					AK2. Knowledge of the interrelations between the Emergency Boration and the following: AK2.01 Valves 2.7 2.7 (CFR 41.7 / 45.7)	2.7/2.7	764	
000028 Pressurizer Level Malfunction / 2			3.02				AK3. Knowledge of the reasons for the following responses as they apply to the Pressurizer Level Control Malfunctions: AK3.02 Relationships between PZR pressure increase and reactor makeup/letdown imbalance 2.9 3.2 (CFR 41.5, 41.10 / 45.6 / 45.13)	2.9/3.2	1181	
000032 Loss of Source Range NI / 7					2.05		Loss of Source Range Nuclear Instrumentation: AA2.05 Nature of abnormality, from rapid survey of control room data 2.9* 3.2* (CFR: 43.5 / 45.13)	2.9*/3.2*	1146	
000033 Loss of Intermediate Range NI / 7				1.02			AA1. Ability to operate and / or monitor the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: AA1.02 Level trip bypass 3.0 3.1 (CFR 41.7 / 45.5 / 45.6)	3.0/3.1	926	
000036 Fuel Handling Accident / 8										
000037 Steam Generator Tube Leak / 3										
000051 Loss of Condenser Vacuum / 4										
000059 Accidental Liquid Radwaste Rel. / 9										
000060 Accidental Gaseous Radwaste Rel. / 9										
000061 ARM System Alarms / 7	1.01						AK1. Knowledge of the operational implications of the following concepts as they apply to Area Radiation Monitoring (ARM) System Alarms: AK1.01 Detector limitations 2.5* 2.9* CFR 41.8 / 41.10 / 45.3)	2.5*/2.9*	1147	
000067 Plant Fire On-site / 9										
000068 Control Room Evac. / 8										
000069 (W/E14) Loss of CTMT Integrity / 5										
000074 (W/E06&E07) Inad. Core Cooling / 4						1.27	2.1.27 Knowledge of system purpose and or function. (CFR: 41.7)	2.8/ 2.9	1201	
000076 High Reactor Coolant Activity / 9										
W/E01 & E02 Rediagnosis & SI Termination / 3										
W/E 13 Steam Generator Over-pressure / 4			3.3				EK3. Knowledge of the reasons for the following responses as they apply to the (Steam Generator Overpressure) EK3.3 Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations. IMPORTANCE RO 3.2 SRO 3.4 (CFR: 41.5 / 41.10, 45.8, 45.13)	3.2/3.4	1148.1	
W/E 15 Containment Flooding / 5										
W/E16 High Containment Radiation / 9										
W/E03 LOCA Cooldown - Depress. / 4										
W/E08 & E10 Natural Circ. / 4										
W/E08 RCS Overcooling - PTS / 4				2.1			EA2. Ability to determine and interpret the following as they apply to the (Pressurized Thermal Shock) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations IMPORTANCE RO 3.4 SRO 4.2 (CFR: 43.5 / 45.13)	3.4/4.2	1149	
K/A Category Totals:	2	1	2	2	1	1	Group Point Total:	9	9	

ES-401	PWR Examination Outline													ES-401-2 draft Rev 5			
Plant Systems - Tier 2 Group 1 (RD)																	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	A6	A7	A8	K/A Topic(s)	Imp.	#
003 Reactor Coolant Pump															2.4.50 Ability to verify system alarm setpoints and operate controls identified in the alarm response manual. (CFR: 45.3)	3.3/3.3	1163
004 Chemical Volume Control															K6 Knowledge of the effect of a loss or malfunction on the following CVCS components: KE.04 Pumps 2.8.3.1 (CFR: 41.7 / 45.7)	2.8/3.1	1204
005 Residual Heat Removal															K4 Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following: K4.02 Modes of operation 3.2.3.5* (CFR: 41.7)	3.2/3.5*	1187
006 Emergency Core Cooling															K3 Knowledge of the effect that a loss or malfunction of the ECCS will have on the following: K3.03 Containment 4.2.4.4 (CFR: 41.7 / 45.6)	4.2/4.4	1168
007 Pressurizer Relief/Quench Tank															K5 Knowledge of the operational implications of the following concepts as they apply to PRTS: K5.02 Method of forming a steam bubble in the PZR 3.1.3.4 (CFR: 41.5 / 45.7)	3.1/3.4	1169
008 Component Cooling Water															K3 Knowledge of the effect that a loss or malfunction of the COWS will have on the following: K3.03 RCP 4.1.4.2 (CFR: 41.7)	4.1/4.2	1170
010 Pressurizer Pressure Control															A4 Ability to manually operate and/or monitor in the control room: A4.01 PZR spray valve 3.7.3.5 (CFR: 41.7 / 45.5 to 45.8)	3.7/3.5	1171
010 Pressurizer Pressure Control															K1 Knowledge of the physical connections and/or cause-effect relationships between the PZR PCS and the following systems: K1.06 CVCS 2.8.3.1 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.9/3.1	1179
012 Reactor Protection															K5 Knowledge of the operational implications of the following concepts as they apply to the RPS: K5.02 Power density 3.1* 3.3* (CFR: 41.5 / 45.7)	3.1*/3.3*	1165
013 Engineered Safety Features Actuation															A4 Ability to manually operate and/or monitor in the control room: A4.02 Reset of ESFAS channels 4.3.4.4 (CFR: 41.7 / 45.5 to 45.8)	4.3/4.4	495
022 Containment Cooling															K4 Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: K4.04 Cooling of control rod drive motors 2.8.3.1 (CFR: 41.7)	2.8.3.1	805.1
022 Containment Cooling															K1 Knowledge of the physical connections and/or cause effect relationships between the CCS and the following systems: K1.01 SWS/cooling system 3.5.3.7 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.5/3.7	567.1
025 Ice Condenser															A4 Ability to manually operate and/or monitor in the control room: A4.02 Containment vent fans 2.7* 2.5* (CFR: 41.7 / 45.5 to 45.8)	2.7*/2.5*	1175
025 Ice Condenser															A1 Ability to predict and/or monitor changes in parameters associated with operating the ice condenser system controls including: A1.02 Glycol expansion tank level 2.5* 2.2* (CFR: 41.5 / 45.5)	2.5*/2.2*	806.2
026 Containment Spray															K4 Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: K4.08 Automatic swapper to containment sump suction for recirculation phase after LOCA (RWST low-low level alarm) 4.1* 4.3*	4.1*/4.3*	272.2
026 Containment Spray															K3 Knowledge of the effect that a loss or malfunction of the CSS will have on the following: K3.02 Recirculation spray system 4.2* 4.3 (CFR: 41.7 / 45.6)	4.2*/4.3	741
035 Main and Reheat Steam															K1 Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: K1.04 RCS temperature monitoring end control 3.1.3.1 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.1/3.1	1180
036 Condensate															A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.04 Loss of condensate pumps 2.6 2.8* (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.6/2.8*	1174
039 Main Feedwater															K1 Knowledge of the physical connections and/or cause effect relationships between the MFV and the following systems: K1.05 RCS 3.1* 3.2 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.1*/3.2	1173
041 Auxiliary/Emergency Feedwater															K2 Knowledge of bus power supplies to the following: K2.01 AFW system MOVs 3.2* 3.3 (CFR: 41.7)	3.2*/3.3	1164
041 Auxiliary/Emergency Feedwater															K6 Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: K6.01 Controllers and positioners 2.5 2.8* (CFR: 41.7 / 45.7)	2.5/2.8*	816.1
042 AC Electrical Distribution															2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	3.2/3.3	570.1
043 DC Electrical															K3 Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: K3.02 Components using DC control power 3.5 3.7 (CFR: 41.7 / 45.6)	3.5/3.7	1161
044 Emergency Diesel Generator															A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.07 Consequences of operating under/over-excited 2.5 2.7 (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.5/2.7	748.2
073 Process Radiation Monitoring															A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.02 Detector failure 2.7 3.2 (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.7/3.2	1189
076 Service Water															A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: A1.02 Reactor and turbine building closed cooling water temperatures 2.6* 2.6* (CFR: 41.5 / 45.5)	2.6*/2.6*	1178
076 Instrument Air															A3 Ability to monitor automatic operation of the IAS, including: A3.01 Air pressure 3.1 3.2 (CFR: 41.7 / 45.5)	3.1/3.2	282.3
103 Containment															A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: A1.5* Containment pressure, temperature, and humidity 3.7 4.1 (CFR: 41.5 / 45.5)	3.7/4.1	1180
K/A Category Totals:	2	3	4	3	2	2	3	3	1	3	2				Group Point Total:	26	26



ES-401	PWR Examination Outline													ES-401-2 draft Rev 9	
Plant Systems - Tier 2 Group 2 (RO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	G	K/A Topic(s)	kmp.	#
001 Control Rod Drive															
002 Reactor Coolant						6.07							K6 Knowledge of the effect or a loss or malfunction on the following RCS components: K6.07 Pumps 2.5 2.8 (CFR: 41.7 / 45.7)	2.5/2.8	870.1
011 Pressurizer Level Control															
014 Rod Position Indication															
015 Nuclear Instrumentation															
016 Non-nuclear Instrumentation															
017 In-core Temperature Monitor															
027 Containment Iodine Removal															
028 Hydrogen Recombiner and Purge Control	1.01												K1 Knowledge of the physical connections and/or cause effect relationships between the HRPS and the following systems: K1.01 Containment annulus ventilation system (including pressure limits) 2.5* 2.5 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.5*/2.5*	767.1
029 Containment Purge															
033 Spent Fuel Pool Cooling							1.01						A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Spent Fuel Pool Cooling System operating the controls including: A1.01 Spent fuel pool water level 2.7 3.3 (CFR: 41.5 / 45.5)	2.7/3.3	642.1
034 Fuel Handling Equipment							1.02						A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Fuel Handling System controls including: A1.02 Water level in the refueling canal 2.9 3.7 (CFR: 41.5 / 45.5)	2.9/3.7	33
035 Steam Generator								3.02					A3 Ability to monitor automatic operation of the S/G including: A3.02 MAD valves 3.7? 3.5? (CFR: 41.7 / 45.5)	3.7?3.5?	1162.1
041 Steam Dump/Turbine Bypass Control															
045 Main Turbine Generator						5.18							K5 Knowledge of the operational implications of the following concepts as they apply to the MT/B System: K5.18 Purpose of low-power reactor trips (limited to 25% power) 2.7 3.2 (CFR: 41.5 / 45.7)	2.7/3.2	1159
055 Condenser Air Removal															
068 Liquid Rad Waste						5.03							K5 Knowledge of the operational implication of the following concepts as they apply to the Liquid Radwaste System: K5.03 Units of radiation, dose, and dose rate 2.6 2.6 (CFR: 41.5 / 45.7)	2.6/2.6	1162
071 Waste Gas Disposal									4.05				A4 Ability to manually operate and/or monitor in the control room: A4.05 Gas decay tanks, including valves, indicators, and sample line 2.6* 2.6* (CFR: 41.7 / 45.5 to 45.8)	2.6*2.6*	1154
072 Area Radiation Monitoring															
075 Circulating Water							2.02						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: A2.02 Loss of circulating water pumps 2.5 2.7 (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.5/2.7	59.1
079 Station Air										1.30			2.1.30 Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)	3.9/ 3.4	1150
086 Fire Protection															
<b>K/A Category Totals:</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>		<b>Group Point Total:</b>	<b>10</b>

ES-401		Generic Knowledge and Abilities Outline (Tier 3)		ES-401-3 Rev 9	
Facility: Catawba		Date of Exam: 10/16/2004		Level: RO	
Category	K/A #	Topic	Imp.	#	
1  Conduct of Operations	2.1.7	2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 43.5 / 45.12 / 45.13) IMPORTANCE RO 3.7 SRO 4.4	3.7/4.4	526.2	
	2.1.32	2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12) IMPORTANCE RO 3.4 SRO 3.8	3.4/3.8	830.1	
			<b>Subtotal</b>	<b>2</b>	<b>2</b>
2  Equipment Control	2.2.3	2.2.3 (multi-unit) Knowledge of the design, procedural, and operational differences between units. (CFR: 41 / 43 / 45) IMPORTANCE RO 3.1 SRO 3.3	3.1/3.3	560	
	2.2.24	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	2.6/3.8	1155.1	
	2.2.34	2.2.34 Knowledge of the process for determining the internal and external effects on core reactivity. (CFR: 43.6) IMPORTANCE RO 2.8 SRO 3.2*	2.8/3.2*	887.3	
		<b>Subtotal</b>	<b>3</b>	<b>3</b>	
3  Radiation Protection	2.3.2	2.3.2 Knowledge of facility ALARA program. (CFR: 41.12 / 43.4 / 45.9 / 45.10) IMPORTANCE RO 2.5 SRO 2.9	2.5/2.9	124.2	
	2.3.4	permissible levels in excess of those authorized. (CFR: 43.4 / 45.10) IMPORTANCE RO 2.5 SRO 3.1	2.5/3.1	703.2	
		<b>Subtotal</b>	<b>2</b>	<b>2</b>	
4  Emergency Procedures and Plan	2.4.1	2.4.1 Knowledge of EOP entry conditions and immediate action steps. (CFR: 41.10 / 43.5 / 45.13) IMPORTANCE RO 4.3 SRO 4.6	4.3/4.6	1203	
	2.4.5	2.4.5 Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions. (CFR: 41.10 / 43.5 / 45.13) IMPORTANCE RO 2.9 SRO 3.6	2.9/3.6	471	
	2.4.35	2.4.35 Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications. (CFR: 43.5 / 45.13) IMPORTANCE RO 3.3 SRO 3.5	3.3/3.5	1158	
		<b>Subtotal</b>	<b>3</b>	<b>3</b>	
<b>Tier 3 Point Total</b>			<b>10</b>		

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**ES-401 PWR Examination Outline ES-401-2 draft Rev. 8**

Facility: Catawba		Date of Exam: 10/16/2004																	
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	K	A	A 2	G *	Total	
1	1	4	2	3				3	3				3	18	0	0	2	5	7
	2	2	1	2				2	1				1	9	0	0	2	3	5
	<b>Tier Totals</b>	6	3	5				5	4				4	27	0	0	4	8	12
2	1	2	3	4	3	2	2	3	3	1	3	2	28	0	0	2	2	4	
	2	1	0	0	0	2	1	2	1	1	1	1	10	0	0	2	0	2	
	<b>Tier Totals</b>	3	3	4	3	4	3	5	4	2	4	3	38	0	0	4	2	6	
3	Generic Knowledge and Abilities Categories		1		2		3		4					1	2	3	4		
			2		3		2		3				10	2	2	1	2	7	

- Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier of the RO Outline (i.e., the "Tier Totals" in each K/A category shall not be less than two). Refer to Section D.1.c for additional guidance regarding SRO sampling.
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. Select topics from many systems; avoid selecting more than two K/A topics from a system unless they relate to plant-specific priorities.
4. Systems /evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
- 6.\* 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. The SRO K/As must also be linked to 10 CFR 55.43 or an SRO-level learning objective.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topic's importance ratings (IR) for the applicable license level, and the point totals for each system and category. Enter the Group and Tier totals for each category in the Table above; summarize all the SRO-only knowledge and non-A2 ability categories in the columns labeled "K" and "A." Use duplicate pages for RO and SRO-only exams.
8. For Tier 3, enter the K/A numbers, descriptions, importance ratings, and point totals on Form ES-401-3.
9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.

ES-401		PWR Examination Outline							ES-401-2 draft Rev 9						
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)															
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G2	K/A Topic(s)	Imp.	#						
000007 Reactor Trip - Stabilization - Recovery / 1						2.02	EA2 Ability to determine or interpret the following as they apply to a reactor trip: EA2.02 Proper actions to be taken if the automatic safety functions have not taken place 4.3 4.6 (CFR 41.7 / 45.5 / 45.6)	4.3/4.6	1136						
000008 Pressurizer Vapor Space Accident / 3					1.08		AA1. Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident: AA1.08 PRT level pressure and temperature 3.8 3.8 (CFR 41.7 / 45.5 / 45.6)	3.8/3.8	1111						
000009 Small Break LOCA / 3					1.07		EA1 Ability to operate and monitor the following as they apply to a small break LOCA: EA1.07 CCS 3.7 3.9 (CFR 41.7 / 45.5 / 45.6)	3.7/3.9	1185						
000011 Large Break LOCA / 3					1.01		EK1 Knowledge of the operational implications of the following concepts as they apply to the Large Break LOCA: EK1.01 Natural circulation and cooling, including reflux boiling. 4.1 4.4 (CFR 41.8 / 41.10 / 45.3)	4.1/4.4	1101.1						
000015/17 RCP Malfunction / 4															
000022 Loss of Reactor Coolant Makeup / 2					3.02		AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup: AK3.02 Actions contained in SOPs and EOPs for RCPs, loss of makeup, loss of charging, and abnormal charging 3.5 3.6 (CFR 41.5, 41.10 / 45.6 / 45.13)	3.5/3.6	1140						
000025 Loss of RHR System / 4						2.25	2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. (CFR: 43.2)	2.5/ 3.7	1164						
000028 Loss of Component Cooling Water / 8					3.02		AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: AK3.02 The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS 3.6 3.9 (CFR 41.5, 41.10 / 45.6 / 45.13)	3.6/3.9	1141						
000027 Pressurizer Pressure Control System Malfunction / 3					1.01		AK1. Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: AK1.01 Definition of saturation temperature 3.1 3.4 (CFR 41.8 / 41.10 / 45.3)	3.1/3.4	1142						
000029 Anticipated Transient w/o Scram / 1					1.02		EK1 Knowledge of the operational implications of the following concepts as they apply to the ATWS: EK1.01 Reactor neutronics and thermo-hydraulics behavior 2.8 3.1 (CFR 41.8 / 41.10 / 45.3)	2.8/3.1	945.1						
000038 Steam Generator Tube Rupture / 3					1.02		EA1 Ability to operate and monitor the following as they apply to a SGTR: EA1.02 Steam and feedwater flow, for mismatched condition. 4.2 4.1 (CFR 41.7 / 45.5 / 45.6)	4.2/4.1	1176						
000040 Steam Line Rupture - Excessive Heat Transfer / 4					2.01		AK2. Knowledge of the interrelations between the Steam Line Rupture and the following: AK2.01 Valves 2.6* 2.5 (CFR 41.7 / 45.7)	2.6*/2.5	1211						
000054 Loss of Main Feedwater / 4						2.04	AA2. Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): AA2.04 Proper operation of AFW pumps and regulating valves 4.2 4.3 (CFR: 43.5 / 45.13)	4.2/4.3	1202						
000055 Station Blackout / 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	670.1						
000056 Loss of Off-site Power / 6						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	1210						
000057 Loss of Vital Ac Elec. Inst. Bus. / 6															
000058 Loss of DC Power / 6					1.01		AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: AK1.01 Battery charger equipment and instrumentation 2.8 3.1* (CFR 41.8 / 41.10 / 45.3)	2.8/3.1*	1212						
000062 Loss of Nuclear Service Water / 4															
000065 Loss of Instrument Air / 8					3.06		AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: AK3.08 Actions contained in EOP for loss of instrument air 3.7 3.9 (CFR 41.5, 41.10 / 45.6 / 45.13)	3.7/3.9	1138						
W/E04 LOCA Outside Containment / 3					2.2		EK2. Knowledge of the interrelations between the (LOCA Outside Containment) and the following: 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. IMPORTANCE RO 3.8 SRO 4.0 (CFR: 41.7 / 45.7)	3.8/4.0	912.1						
W/E11 Loss of Emergency Coolant Recirc / 4															
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4						2.2	EA2. Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink) EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments. IMPORTANCE RO 3.7 SRO 4.3 (CFR: 43.5 / 45.13)	3.7/4.3	1139						
K/A Category Totals:							4	2	3	3	3	3	Group Point Total:	18	18

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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									
000003 Dropped Control Rod / 1									
000005 Inoperable/Stuck Control Rod / 1	1.04						AK1. Knowledge of the operational implications of the following concepts as they apply to inoperable / Stuck Control Rod: AK1.04 Definitions of axial imbalance, neutron error, power demand, actual power tracking mode, ICS tracking 3.0* 3.4* (CFR 41.8 / 41.10 / 45.3)	3.0*/3.4*	1144
000024 Emergency Boration / 1		2.01					AK2. Knowledge of the interrelations between the Emergency Boration and the following: AK2.01 Valves 2.7 2.7 (CFR 41.7 / 45.7)	2.7/2.7	764
000028 Pressurizer Level Malfunction / 2			3.02				AK3. Knowledge of the reasons for the following responses as they apply to the Pressurizer Level Control Malfunctions: AK3.02 Relationships between PZR pressure increase and reactor makeup/letdown imbalance 2.9 3.2 (CFR 41.5, 41.10 / 45.6 / 45.13)	2.9/3.2	1181
000032 Loss of Source Range NI / 7					2.05		Loss of Source Range Nuclear Instrumentation: AA2.05 Nature of abnormality, from rapid survey of control room data 2.9* 3.2* (CFR: 43.5 / 45.13)	2.9*/3.2*	1146
000033 Loss of Intermediate Range NI / 7				1.02			AA1. Ability to operate and / or monitor the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: AA1.02 Level trip bypass 3.0 3.1 (CFR 41.7 / 45.5 / 45.6)	3.0/3.1	926
000036 Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid Radwaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7	1.01						AK1. Knowledge of the operational implications of the following concepts as they apply to Area Radiation Monitoring (ARM) System Alarms: AK1.0* Detector limitations 2.5* 2.9* CFR 41.8 / 41.10 / 45.3)	2.5*/2.9*	1147
000067 Plant Fire On-site / 9									
000068 Control Room Evac. / 8									
000069 (W/E14) Loss of CTMT Integrity / 5									
000074 (W/E06&E07) Inad. Core Cooling / 4						1.27	2.1.27 Knowledge of system purpose and or function (CFR: 41.7)	2.8/2.9	1201
000076 High Reactor Coolant Activity / 9									
W/E01 & E02 Rediagnosis & SI Termination / 3									
W/E 13 Steam Generator Over-pressure / 4			3.3				EK3. Knowledge of the reasons for the following responses as they apply to the (Steam Generator Overpressure) EK3.3 Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations. IMPORTANCE RO 3.2 SRC 3.4 (CFR: 41.5 / 41.10, 45.6, 45.13)	3.2/3.4	1148.1
W/E 15 Containment Flooding / 5									
W/E16 High Containment Radiation / 9									
W/E03 LOCA Cooldown - Depress. / 4									
W/E09 & E10 Natural Circ. / 4									
W/E08 RCS Overcooling - PTS / 4				2.1			EA2. Ability to determine and interpret the following as they apply to the (Pressurized Thermal Shock) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. IMPORTANCE RO 3.4 SRC 4.2 (CFR: 43.5 / 45.13)	3.4/4.2	1149
K/A Category Totals:	2	1	2	2	1	1		Group Point Total:	9 9

ES-401	PWR Examination Outline													ES-401-2 draft Rev 9				
Plant Systems - Tier 2 Group 1 (RO)															K/A Topic(s)	Imp.	#	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	A6	A7	A8				
003 Reactor Coolant Pump															4.50	2.4.50 Ability to verify system alarm networks and operate controls identified in the alarm response manual. (CFR: 45.3)	3.3/3.3	1183
004 Chemical Volume Control						6.04										K6 Knowledge of the effect of a loss or malfunction on the following CVCS components: K6.04 Pumps 2.8.3.1 (CFR: 41.7 / 45.7)	2.8/3.1	1204
005 Residual Heat Removal					4.02											K4 Knowledge of RHRG design feature(s) and/or interlock(s) which provide or the following: K4.02 Modes of operation 3.2.3.5* (CFR: 41.7)	3.2/3.5*	1167
006 Emergency Core Cooling					3.03											K5 Knowledge of the effect that a loss or malfunction of the ECCS will have on the following: K3.03 Containment 4.2.4.4 (CFR: 41.7 / 45.8)	4.2/4.4	1188
007 Pressurizer Relief/Quench Tank						5.02										K5 Knowledge of the operational implications of the following concepts as they apply to PRTS: K5.02 Method of forming a steam bubble in the PZR 3.1.3.4 (CFR: 41.5 / 45.7)	3.1/3.4	1169
008 Component Cooling Water					3.03											K3 Knowledge of the effect that a loss or malfunction of the CCWS will have on the following: K3.03 RCP 4.1.4.2 (CFR: 41.7)	4.1/4.2	1170
010 Pressurizer Pressure Control														4.01		A4 Ability to manually operate and/or monitor in the control room: A4.01 PZR spray valve 3.7.3.5 (CFR: 41.7 / 45.5 to 45.6)	3.7/3.5	1171
010 Pressurizer Pressure Control	1.06															K1 Knowledge of the physical connections and/or cause-effect relationships between the PZR, PCS and the following systems: K1.56 CVCS 2.9.3.1 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.9/3.1	1179
012 Reactor Protection						5.02										K5 Knowledge of the operational implications of the following concepts as they apply to the RPS: K5.02 Power density 3.1* 3.3* (CFR: 41.5 / 45.7)	3.1*/3.3*	1165
013 Engineered Safety Features Actuation														4.02		A4 Ability to manually operate and/or monitor in the control room: A4.02 Reset of ESFAS channels 4.3.4.4 (CFR: 41.7 / 45.5 to 45.8)	4.3/4.4	495
022 Containment Cooling					4.04											K4 Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: K4.04 Cooling of control rod drive motors 2.8.3.1 (CFR: 41.7)	2.8.3.1	805.1
022 Containment Cooling					1.01											K1 Knowledge of the physical connections and/or cause effect relationships between the CCS and the following systems: K1.01 SWS/cooling system 3.5.3.7 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.5/3.7	587.1
025 Ice Condenser														4.02		A4 Ability to manually operate and/or monitor in the control room: A4.02 Containment vent fans 2.7* 2.8* (CFR: 41.7 / 45.5 to 45.8)	2.7*/2.8*	1175
025 Ice Condenser														1.02		A1 Ability to predict and/or monitor changes in parameters associated with operating the ice condenser system controls including: A1.02 Glycol expansion tank level 2.5* 2.2* (CFR: 41.5 / 45.5)	2.5*/2.2*	806.2
026 Containment Spray					4.03											K4 Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: K4.08 Automatic swapper to containment sump suction for recirculation phase after LOCA (RWST low-low level alarm) 4.1* 4.3*	4.1*/4.3*	272.2
026 Containment Spray					3.02											K3 Knowledge of the effect that a loss or malfunction of the CSS will have on the following: K3.02 Recirculation spray system 4.2* 4.3 (CFR: 41.7 / 45.6)	4.2*/4.3	741
039 Main and Reheat Steam					1.04											K1 Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: K1.04 RCS temperature monitoring and control 3.1.3.1 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.1/2.1	1180
056 Condensate														2.04		A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on these predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.04 Loss of condensate pumps 2.6.2.8* (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.6/2.8*	1174
059 Main Feedwater					1.05											K1 Knowledge of the physical connections and/or cause effect relationships between the MFW and the following systems: K1.05 RCS 3.1* 3.2 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.1*/3.2	1173
061 Auxiliary/Emergency Feedwater					2.01											K2 Knowledge of bus power supplies to the following: K2.01 AFW system MOVs 3.2* 3.3 (CFR: 41.7)	3.2*/3.3	1164
061 Auxiliary/Emergency Feedwater						6.01										K6 Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: K6.01 Controllers and positioners 2.5.2.8* (CFR: 41.7 / 45.7)	2.5/2.8*	818.1
062 AC Electrical Distribution															1.26	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	3.2/3.3	570.1
063 DC Electrical					3.02											K3 Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: K3.02 Components using DC control power 3.5.3.7 (CFR: 41.7 / 45.6)	3.5/3.7	1181
064 Emergency Diesel Generator														2.07		A2 Ability to (a) predict the impacts of the following malfunctions or operations on the EDG system; and (b) based on these predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.07 Consequences of operating under/over-excited 2.5.2.7 (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.5/2.7	746.2
073 Process Radiation Monitoring														2.02		A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on these predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.02 Detector failure 2.7.3.2 (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.7/3.2	1199
076 Service Water														1.02		A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: A1.02 Reactor and turbine building closed cooling water temperatures 2.6* 2.6* (CFR: 41.5 / 45.5)	2.6*/2.6*	1170
076 Instrument Air														3.01		A3 Ability to monitor automatic operation of the IAS, including: A3.01 Air pressure 3.1.3.2 (CFR: 41.7 / 45.5)	3.1/3.2	282.3
103 Containment														1.01		A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: A1.01 Containment pressure, temperature, and humidity 3.7.4.1 (CFR: 41.5 / 45.5)	3.7/4.1	1169
K/A Category Totals:	2	3	4	3	2	2	3	3	1	3	2					Group Point Total:	28	28

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Plant Systems - Tier 2 Group 2 (RO)														
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	#
001 Control Rod Drive														
002 Reactor Coolant						6.07						K6 Knowledge of the effect or a loss or malfunction on the following RCS components: K6.07 Pumps 2.5 2.8 (CFR: 41.7 / 45.7)	2.5/2.8	870.1
011 Pressurizer Level Control														
014 Rod Position Indication														
015 Nuclear Instrumentation														
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control	1.01											K1 Knowledge of the physical connections and/or cause effect relationships between the HRPS and the following systems: K1.01 Containment annulus ventilation system (including pressure limits) 2.5* 2.5 (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.5*2.5*	767.1
029 Containment Purge														
033 Spent Fuel Pool Cooling							1.01					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Spent Fuel Pool Cooling System operating the controls including: A1.01 Spent fuel pool water level 2.7 3.3 (CFR: 41.5 / 45.5)	2.7/3.3	642.1
034 Fuel Handling Equipment							1.02					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Fuel Handling System controls including: A1.02 Water level in the refueling canal 2.9 3.7 (CFR: 41.5 / 45.5)	2.9/3.7	33
035 Steam Generator								3.02				A3 Ability to monitor automatic operation of the S/G including: A3.02 MAD valves 3.7? 3.5? (CFR: 41.7 / 45.5)	3.7?3.5?	1162.1
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator					5.18							K5 Knowledge of the operational implications of the following concepts as they apply to the MT/B System: K5.18 Purpose of low-power reactor trips (limited to 25% power) 2.7 3.2 (CFR: 41.5 / 45.7)	2.7/3.2	1159
055 Condenser Air Removal														
068 Liquid Rad Waste				5.03								K5 Knowledge of the operational implication of the following concepts as they apply to the Liquid Radwaste System: K5.03 Units of radiation, dose, and dose rate 2.6 2.6 (CFR: 41.5 / 45.7)	2.6/2.6	1182
071 Waste Gas Disposal									4.05			A4 Ability to manually operate and/or monitor in the control room: A4.05 Gas decay tanks, including valves, indicators, and sample line 2.6* 2.6* (CFR: 41.7 / 45.5 to 45.8)	2.6*2.6*	1154
072 Area Radiation Monitoring														
075 Circulating Water							2.02					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: A2.02 Loss of circulating water pumps 2.5 2.7 (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.5/2.7	59.1
079 Station Air									1.30			2.1.30 Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)	3.9/ 3.4	1150
086 Fire Protection														
<b>K/A Category Totals:</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>		<b>Group Point Total:</b>	<b>10</b>

ES-401		Generic Knowledge and Abilities Outline (Tier 3)		ES-401-3 Rev 9	
Facility: Catawba		Date of Exam:		10/16/2004	Level: RO
Category	K/A #	Topic	Imp.	#	
1  Conduct of Operations	2.1.7	2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 43.5 / 45.12 / 45.13) IMPORTANCE RO 3.7 SRO 4.4	3.7/4.4	526.2	
	2.1.32	2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12) IMPORTANCE RO 3.4 SRO 3.8	3.4/3.8	830.1	
			<b>Subtotal</b>	<b>2</b>	<b>2</b>
2  Equipment Control	2.2.3	2.2.3 (multi-unit) Knowledge of the design, procedural, and operational differences between units. (CFR: 41 / 43 / 45) IMPORTANCE RO 3.1 SRO 3.3	3.1/3.3	560	
	2.2.24	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	2.6/3.8	1155.1	
	2.2.34	2.2.34 Knowledge of the process for determining the internal and external effects on core reactivity. (CFR: 43.6) IMPORTANCE RO 2.8 SRO 3.2*	2.8/3.2*	887.3	
		<b>Subtotal</b>	<b>3</b>	<b>3</b>	
3  Radiation Protection	2.3.2	2.3.2 Knowledge of facility ALARA program. (CFR: 41.12 / 43.4 / 45.9 / 45.10) IMPORTANCE RO 2.5 SRO 2.9	2.5/2.9	124.2	
	2.3.4	permissible levels in excess of those authorized. (CFR: 43.4 / 45.10) IMPORTANCE RO 2.5 SRO 3.1	2.5/3.1	703.2	
		<b>Subtotal</b>	<b>2</b>	<b>2</b>	
4  Emergency Procedures and Plan	2.4.1	2.4.1 Knowledge of EOP entry conditions and immediate action steps. (CFR: 41.10 / 43.5 / 45.13) IMPORTANCE RO 4.3 SRO 4.6	4.3/4.6	1203	
	2.4.5	2.4.5 Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions. (CFR: 41.10 / 43.5 / 45.13) IMPORTANCE RO 2.9 SRO 3.6	2.9/3.6	471	
	2.4.35	2.4.35 Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications. (CFR: 43.5 / 45.13) IMPORTANCE RO 3.3 SRO 3.5	3.3/3.5	1158	
		<b>Subtotal</b>	<b>3</b>	<b>3</b>	
<b>Tier 3 Point Total</b>			<b>10</b>		

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