

Draft Submittal

(Pink Paper)

Browns Ferry
2007-301

DRAFT Written Exam Quality Checklist (ES-401-6)

& Written Exam Sample Plan

Facility: BFN		Date of Exam: 09/04/07 DRAFT																
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 Evolution	1	4	3	3	N/A			4	3	N/A		3	20	4	3	7		
	2	1	2	1	N/A			1	1	N/A		1	7	2	1	3		
	Tier Totals	5	5	4				5	4			4	27	6	4	10		
2. Plant Systems	1	2	3	2	2	2	3	2	2	3	3	2	26	3	2	5		
	2	1	1	1	1	1	1	1	1	1	1	2	12	2	1	3		
	Tier Totals	3	4	3	3	3	4	3	3	4	4	4	38	5	3	8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7
					3		2		2		3			2	2	2	1	

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ± 1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
- 7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
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. Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4		x					AK2.07 Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION and the following: Core flow indication	3.4	
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4						x	G2.2.3 Knowledge of the design / procedural / and operational differences between units.	3.3	
295003 Partial or Complete Loss of AC / 6					x		AA2.04 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : System lineups	3.5	
295004 Partial or Total Loss of DC Pwr / 6					x		AA2.02 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER : Extent of partial or complete loss of D.C. power	3.5	
295005 Main Turbine Generator Trip / 3				x			AA1.05 Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP: Reactor/turbine pressure regulating system	3.6	
295005 Main Turbine Generator Trip / 3					x		AA2.07 Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP : Reactor water level	3.6	
295006 SCRAM / 1						x	2.4.46 Ability to verify that the alarms are consistent with the plant conditions.	3.5	
295016 Control Room Abandonment / 7				x			AA1.07 Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT : Control room/local control transfer mechanisms	4.2	
295018 Partial or Total Loss of CCW / 8	x						AK1.01 Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : Effects on component/system operations	3.5	
295019 Partial or Total Loss of Inst. Air / 8			x				AK3.01 Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR : Backup air system supply	3.3	
295019 Partial or Total Loss of Inst. Air / 8					x		AA2.01 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Instrument air system pressure	3.6	
295021 Loss of Shutdown Cooling / 4	x						AK1.04 Knowledge of the operational implications of the following concepts as they apply to LOSS OF SHUTDOWN COOLING : Natural circulation	3.6	
295023 Refueling Acc Cooling Mode / 8	x						AK1.03 Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS : Inadvertant Criticality	3.7	
295024 High Drywell Pressure / 5			x				EK3.06 Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE : Reactor Scram	4.0	
295024 High Drywell Pressure / 5					x		EA2.06 Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE: Suppression pool temperature	4.1	
295025 High Reactor Pressure / 3		x					EK2.09 Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following: Reactor power	3.9	

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295025 High Reactor Pressure / 3						x	G2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0		
295026 Suppression Pool High Water Temp. / 5	x						EK1.02 Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE : Steam condensation	3.5		
295027 High Containment Temperature / 5										
295028 High Drywell Temperature / 5			x				EK3.05 Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL TEMPERATURE : Reactor SCRAM	3.6		
295030 Low Suppression Pool Wtr Lvl / 5				x			EA1.02 Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: RCIC	3.4		
295031 Reactor Low Water Level / 2		x					EK2.09 Knowledge of the interrelations between REACTOR LOW WATER LEVEL and the following: Recirculation system	3.3		
295031 Reactor Low Water Level / 2						x	G2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3		
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1					x		EA2.01 Ability to determine and/or interpret the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Reactor power	4.2		
295038 High Off-site Release Rate / 9						x	G2.3.2 Knowledge of facility ALARA program.	2.5		
295038 High Off-site Release Rate / 9						x	G2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7		
600000 Plant Fire On Site / 8				x			AA1.01 Ability to operate and / or monitor the following as they apply to PLANT FIRE ON SITE: Respirator air pack	3.0		
600000 Plant Fire On Site / 8					x		AA2.04 Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: The fire's extent of potential operational damage to plant equipment	3.1		
K/A Category Totals:	4	3	3	4	3	3	Group Point Total:		20/7	
					4	3				

ES-401		BWR Examination Outline							Form ES-401-1	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)										
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
295002 Loss of Main Condenser Vac / 3						x	G2.1.18 Ability to make accurate / clear and concise logs / records / status boards / and reports.	2.9		
295007 High Reactor Pressure / 3										
295008 High Reactor Water Level / 2		x					AK2.06 Knowledge of the interrelations between HIGH REACTOR WATER LEVEL and the following: RCIC	3.4		
295009 Low Reactor Water Level / 2				x			AA1.02 Ability to operate and/or monitor the following as they apply to LOW REACTOR WATER LEVEL : Reactor water level control	4.0		
295010 High Drywell Pressure / 5		x					AK2.04 Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Nitrogen makeup system	2.6		
295011 High Containment Temp / 5										
295012 High Drywell Temperature / 5						x	G2.1.23 Ability to perform specific system and integrated plant procedures during different modes of plant operation.	4.0		
295013 High Suppression Pool Temp. / 5										
295014 Inadvertent Reactivity Addition / 1										
295015 Incomplete SCRAM / 1			x				AK3.01 Knowledge of the reasons for the following responses as they apply to INCOMPLETE SCRAM : Bypassing rod insertion blocks	3.4		
295017 High Off-site Release Rate / 9					x		AA2.04 Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Source of off-site release	3.8		
295020 Inadvertent Cont. Isolation / 5 & 7										
295022 Loss of CRD Pumps / 1										
295029 High Suppression Pool Wtr Lvl / 5										
295032 High Secondary Containment Area Temperature / 5										
295033 High Secondary Containment Area Radiation Levels / 9										
295034 Secondary Containment Ventilation High Radiation / 9	x						EK1.01 Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION : Personnel protection	3.8		
295035 Secondary Containment High Differential Pressure / 5										
295036 Secondary Containment High Sump/Area Water Level / 5					x		EA2.01 Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL: Operability of components within the affected area.	3.2		
500000 High CTMT Hydrogen Conc. / 5					x		EA2.03 Ability to determine and / or interpret the following as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS: Combustible limits for drywell	3.3		
K/A Category Point Totals:	1	2	1	1	1	1	Group Point Total:		7/3	
					2	1				

ES-401

BWR Examination Outline
Plant Systems - Tier 2/Group 1 (RO / SRO)

Form ES-401-1

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	#
203000 RHR/LPCI: Injection Mode									x			A3.08 Ability to monitor automatic operations of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) including: System initiation sequence	4.1	
205000 Shutdown Cooling		x										K2.01 Knowledge of electrical power supplies to the following: Pump motors	3.1	
206000 HPCI						x						K6.06 Knowledge of the effect that a loss or malfunction of the following will have on the HIGH PRESSURE COOLANT INJECTION SYSTEM: SBGTS	3.1	
206000 HPCI										x		A4.14 Ability to manually operate and/or monitor in the control room: System auto start control	4.2	
209001 LPCS								x				A2.03 Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A.C. failures	3.4	
209001 LPCS											x	G2.3.4 Knowledge of radiation exposure limits and contamination control / including permissible levels in excess of those authorized.	3.1	
211000 SLC					x							K5.04 Knowledge of the operational implications of the following concepts as they apply to STANDBY LIQUID CONTROL SYSTEM : Explosive Valve operation	3.1	
211000 SLC											x	G2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	2.5	
212000 RPS		x										K2.02 Knowledge of electrical power supplies to the following: Analog trip system logic cabinets	2.7	
215003 IRM							x					A1.02 Ability to predict and/or monitor changes in parameters associated with operating the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM controls including: Reactor power indication response to rod position changes	3.7	
215003 IRM										x		A4.06 Ability to manually operate and/or monitor in the control room: Detector drives	3.0	
215004 Source Range Monitor	x											K1.02 Knowledge of the physical connections and/or causeeffect relationships between SOURCE RANGE MONITOR (SRM) SYSTEM and the following: Reactor Manual Control	3.4	
215005 APRM / LPRM					x							K5.05 Knowledge of the operational implications of the following concepts as they apply to AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM: Core flow effects on APRM trip setpoints	3.6	

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	#
215005 APRM / LPRM								x				A2.07 Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Recirculation flow channels flow mismatch	3.4	
217000 RCIC		x										K2.01 Knowledge of electrical power supplies to the following: Motor operated valves	2.8	
217000 RCIC											x	G2.4.7 Knowledge of event based EOP mitigation strategies.	3.8	
218000 ADS							x					A1.04 Ability to predict and/or monitor changes in parameters associated with operating the AUTOMATIC DEPRESSURIZATION SYSTEM controls including: Reactor pressure	4.1	
218000 ADS								x				A2.05 Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of A.C. or D.C. power to ADS valves	3.6	
223002 PCIS/Nuclear Steam Supply Shutoff	x											K1.20 Knowledge of the physical connections and/or causeeffect relationships between PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF and the following: AC Distribution	2.8	
239002 SRVs									x			A3.02 Ability to monitor automatic operations of the RELIEF/SAFETY VALVES including: SRV operation on high reactor pressure	4.3	
259002 Reactor Water Level Control								x				A2.06 Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of controller signal output	3.3	
259002 Reactor Water Level Control											x	G2.3.1 Knowledge of 10 CFR: 20 and related facility radiation control requirements.	2.6	
261000 SGTS			x									K3.03 Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on following: Primary containment pressure	3.2	
261000 SGTS										x		A4.02 Ability to manually operate and/or monitor in the control room: Suction valves	3.1	
262001 AC Electrical Distribution			x									K3.03 Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following: D.C. electrical distribution	2.9	

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	#
262001 AC Electrical Distribution								x				A2.03 Ability to (a) predict the impacts of the following on the A.C. ELECTRICAL DISTRIBUTION ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of off-site power	4.3	
262002 UPS (AC/DC)						x						K6.02 Knowledge of the effect that a loss or malfunction of the following will have on the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.): D.C. electrical power	2.8	
263000 DC Electrical Distribution				x								K4.02 Knowledge of D.C. ELECTRICAL DISTRIBUTION design feature(s) and/or interlocks which provide for the following: Breaker interlocks, permissives, bypasses and crossties	3.1	
264000 EDGs				x								K4.07 Knowledge of EMERGENCY GENERATORS (DIESEL/JET) design feature(s) and/or interlocks which provide for the following: Local operation and control	3.3	
300000 Instrument Air									x			A3.02 Ability to monitor automatic operations of the INSTRUMENT AIR SYSTEM including: Air temperature	2.9	
400000 Component Cooling Water						x						K6.01 Knowledge of the effect that a loss or malfunction of the following will have on the CCWS: Valves	2.7	
K/A Category Point Totals:	2	3	2	2	2	3	2	2	3	3	2	Group Point Total:		26/5

ES-401		BWR Examination Outline Plant Systems – Tier 2/Group 2 (RO / SRO)											Form ES-401-1	
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	#
201001 CRD Hydraulic						x						K6.03 Knowledge of the effect that a loss or malfunction of the following will have on the CONTROL ROD DRIVE HYDRAULIC System : Plant Air System	3.0	
201002 RMCS														
201003 Control Rod and Drive Mechanism					x							K5.03 Knowledge of the operational implications of the following concepts as they apply to CONTROL ROD AND DRIVE MECHANISM : Reactor power control	3.3	
201004 RSCS														
201005 RCIS														
201006 RWM								x				A2.06 Ability to (a) predict the impacts of the following on the ROD WORTH MINIMIZER SYSTEM (RWH) (PLANT SPECIFIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of reactor water level control input:	3.3	
202001 Recirculation														
202002 Recirculation Flow Control										x		A4.07 Ability to manually operate and/or monitor in the control room: Recirculation pump speed	3.3	
204000 RWCU														
214000 RPIS														
215001 Traversing In-core Probe											x	G2.2.13 Knowledge of tagging and clearance procedures.	3.8	
215002 RBM														
216000 Nuclear Boiler Inst.		X										K2.01 Knowledge of electrical power supplies to the following: Analog trip system	2.8	
219000 RHR/LPCI: Torus/Pool Cooling Mode	x											K1.08 Knowledge of the physical connections and/or causeeffect relationships between RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE and the following: D.C. electrical power	2.6	
223001 Primary CTMT and Aux.														
226001 RHR/LPCI: CTMT Spray Mode			x									Knowledge of the effect that a loss or malfunction of the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE will have on following: Containment/drywell/suppression chamber pressure	3.6	
230000 RHR/LPCI: Torus/Pool Spray Mode														
233000 Fuel Pool Cooling/Cleanup														
234000 Fuel Handling Equipment														

ES-401		BWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)										Form ES-401-1		
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	#
239001 Main and Reheat Steam				x								K4.02 Knowledge of MAIN AND REHEAT STEAM SYSTEM design feature(s) and/or interlocks which provide for the following: Automatic isolation and opening of drain valves:	3.1	
241000 Reactor/Turbine Pressure Regulator														
245000 Main Turbine Gen. / Aux.									x			A3.04 Ability to monitor automatic operations of the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS including: Turbine Speed	2.7	
256000 Reactor Condensate											x	G2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions including: 1. Reactivity control 2. Core cooling and heat removal 3. Reactor coolant system integrity 4. Containment conditions 5. Radioactivity release control.	3.7	
259001 Reactor Feedwater							x					A1.04 Ability to predict and/or monitor changes in parameters associated with operating the REACTOR FEEDWATER SYSTEM controls including: RFP turbine speed	2.8	
268000 Radwaste														
271000 Offgas														
272000 Radiation Monitoring								x				A2.02 Ability to (a) predict the impacts of the following on the RADIATION MONITORING SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor protection system power failure	3.3	
286000 Fire Protection								x				A2.11 Ability to (a) predict the impacts of the following on the FIRE PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Pump trips	3.2	
290002 Reactor Vessel Internals											x	2.1.23 Ability to perform specific system and integrated plant procedures during different modes of plant operation.	3.9	
K/A Category Point Totals:	1	1	1	1	1	1	1	1	2	1	1	2 1	Group Point Total:	12/3

ES-401

Generic Knowledge and Abilities Outline

Form ES-401-3

Facility: BFN

Date of Exam: 09/04/07

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.11	Knowledge of less than one hour technical specification action statements for systems.	3.0			
	2.1.32	Ability to explain and apply system limits and precautions.	3.4			
	2.1.20	Ability to execute procedure steps.	4.3			
	2.1.12	Ability to apply technical specifications for a system.			4.0	
	2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.			4.0	
	2.1.					
	Subtotal			3		2
2. Equipment Control	2.2.3	Knowledge of the design / procedural / and operational differences between units.	3.1			
	2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	2.5			
	2.2.13	Knowledge of tagging and clearance procedures.			3.8	
	2.2.24	Ability to analyze the affect of maintenance activities on LCO status.			3.8	
	2.2.					
	Subtotal			2		2
3. Radiation Control	2.3.2	Knowledge of facility ALARA program.	2.5			
	2.3.4	Knowledge of radiation exposure limits and contamination control / including permissible levels in excess of those authorized.	2.5			
	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.			3.0	
	2.3.6	Ability to control radiation releases.			3.2	
	Subtotal			2		2
4. Emergency Procedures / Plan	2.4.2	Knowledge of system set points / interlocks and automatic actions associated with EOP entry conditions.	3.9			
	2.4.12	Knowledge of general operating crew responsibilities during emergency operations.	3.4			
	2.4.31	Knowledge of annunciators alarms and indications / and use of the response instructions.	3.3			
	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.			3.6	
	2.4.					
	2.4.					
	Subtotal			3		1
Tier 3 Point Total				10		7

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				3		2		2		3			2	2	2	1	

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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. Use duplicate pages for RO and SRO-only exams.

9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4 171.007-026		x					AK2.07 Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION and the following: Core flow indication	3.4	
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4 171.007-021						x	G2.2.3 Knowledge of the design / procedural / and operational differences between units.	3.3	
295003 Partial or Complete Loss of AC / 6 171.047-032					x		AA2.04 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : System lineups	3.5	
295004 Partial or Total Loss of DC Pwr / 6 171.037-061					x		AA2.02 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER : Extent of partial or complete loss of D.C. power	3.5	
295005 Main Turbine Generator Trip / 3 171.228-012				x			AA1.05 Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP: Reactor/turbine pressure regulating system	3.6	
295005 Main Turbine Generator Trip / 3 171.010-019					x		AA2.07 Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP : Reactor water level	3.6	
295006 SCRAM / 1 171.028-177						x	2.4.46 Ability to verify that the alarms are consistent with the plant conditions.	3.5	
295016 Control Room Abandonment / 7 171.208-009				x			AA1.07 Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT : Control room/local control transfer mechanisms	4.2	
295018 Partial or Total Loss of CCW / 8 171.047-049	x						AK1.01 Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : Effects on component/system operations	3.5	
295019 Partial or Total Loss of Inst. Air / 8 171.054-052			x				AK3.01 Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR : Backup air system supply	3.3	
295019 Partial or Total Loss of Inst. Air / 8 171.054-054					x		AA2.01 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Instrument air system pressure	3.6	
295021 Loss of Shutdown Cooling / 4 171.044-093	x						AK1.04 Knowledge of the operational implications of the following concepts as they apply to LOSS OF SHUTDOWN COOLING : Natural circulation	3.6	
295023 Refueling Acc Cooling Mode / 8 171.098-007	x						AK1.03 Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS : Inadvertant Criticality	3.7	
295024 High Drywell Pressure / 5 171.028-178			x				EK3.06 Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE : Reactor Scram	4.0	
295024 High Drywell Pressure / 5 171.203-135					x		EA2.06 Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE: Suppression pool temperature	4.1	
295025 High Reactor Pressure / 3 171.009-057		x					EK2.09 Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following: Reactor power	3.9	

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
295025 High Reactor Pressure / 3 171.202-062						x	G2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0		
295026 Suppression Pool High Water Temp. / 5 171.203-017	x						EK1.02 Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE : Steam condensation	3.5		
295027 High Containment Temperature / 5										
295028 High Drywell Temperature / 5 171.203-084			x				EK3.05 Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL TEMPERATURE : Reactor SCRAM	3.6		
295030 Low Suppression Pool Wtr Lvl / 5 171.042-215				x			EA1.02 Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: RCIC	3.4		
295031 Reactor Low Water Level / 2 171.007-018		x					EK2.09 Knowledge of the interrelations between REACTOR LOW WATER LEVEL and the following: Recirculation system	3.3		
295031 Reactor Low Water Level / 2 171.098-017						x	G2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3		
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1 171.202-027					x		EA2.01 Ability to determine and/or interpret the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Reactor power	4.2		
295038 High Off-site Release Rate / 9 171.000-001						x	G2.3.2 Knowledge of facility ALARA program.	2.5		
295038 High Off-site Release Rate / 9 171.087-064						x	G2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	3.7		
600000 Plant Fire On Site / 8 171.000-002				x			AA1.01 Ability to operate and / or monitor the following as they apply to PLANT FIRE ON SITE: Respirator air pack	3.0		
600000 Plant Fire On Site / 8 171.031-084					x		AA2.04 Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: The fire's extent of potential operational damage to plant equipment	3.1		
K/A Category Totals:	4	3	3	4	3 4	3 3	Group Point Total:		20/7	

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295002 Loss of Main Condenser Vac / 3 171.030-113						x	G2.1.18 Ability to make accurate / clear and concise logs / records / status boards / and reports.	2.9	
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2 171.040-048		x					AK2.06 Knowledge of the interrelations between HIGH REACTOR WATER LEVEL and the following: RCIC	3.4	
295009 Low Reactor Water Level / 2 171.012-044				x			AA1.02 Ability to operate and/or monitor the following as they apply to LOW REACTOR WATER LEVEL : Reactor water level control	4.0	
295010 High Drywell Pressure / 5 171.017-106		x					AK2.04 Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Nitrogen makeup system	2.6	
295011 High Containment Temp / 5									
295012 High Drywell Temperature / 5 171.203-136						x	G2.1.23 Ability to perform specific system and integrated plant procedures during different modes of plant operation.	4.0	
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1									
295015 Incomplete SCRAM / 1 171.205-122			x				AK3.01 Knowledge of the reasons for the following responses as they apply to INCOMPLETE SCRAM : Bypassing rod insertion blocks	3.4	
295017 High Off-site Release Rate / 9 171.204-053					x		AA2.04 Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Source of off-site release	3.8	
295020 Inadvertent Cont. Isolation / 5 & 7									
295022 Loss of CRD Pumps / 1									
295029 High Suppression Pool Wtr Lvl / 5									
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9 171.067-043	x						EK1.01 Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION : Personnel protection	3.8	
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5					x		EA2.01 Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL: Operability of components within the affected area.	3.2	
500000 High CTMT Hydrogen Conc. / 5 171.203-034					x		EA2.03 Ability to determine and / or interpret the following as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS: Combustible limits for drywell	3.3	
K/A Category Point Totals:	1	2	1	1	1	2	Group Point Total:		7/3

ES-401		BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)											Form ES-401-1	
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	#
203000 RHR/LPCI: Injection Mode 171.044-005									x			A3.08 Ability to monitor automatic operations of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) including: System initiation sequence	4.1	
205000 Shutdown Cooling 171.044-126		x										K2.01 Knowledge of electrical power supplies to the following: Pump motors	3.1	
206000 HPCI 171.042-216						x						K6.06 Knowledge of the effect that a loss or malfunction of the following will have on the HIGH PRESSURE COOLANT INJECTION SYSTEM: SBGTS	3.1	
206000 HPCI 171.042-007										x		A4.14 Ability to manually operate and/or monitor in the control room: System auto start control	4.2	
209001 LPCS 171.045-018								x				A2.03 Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A.C. failures	3.4	
209001 LPCS 171.000-005											x	G2.3.4 Knowledge of radiation exposure limits and contamination control / including permissible levels in excess of those authorized.	3.1	
211000 SLC 171.039-017					x							K5.04 Knowledge of the operational implications of the following concepts as they apply to STANDBY LIQUID CONTROL SYSTEM : Explosive Valve operation	3.1	
211000 SLC 171.039-055											x	G2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	2.5	
212000 RPS 171.028-036		x										K2.02 Knowledge of electrical power supplies to the following: Analog trip system logic cabinets	2.7	
215003 IRM 171.020-012							x					A1.02 Ability to predict and/or monitor changes in parameters associated with operating the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM controls including: Reactor power indication response to rod position changes	3.7	
215003 IRM 171.020-018										x		A4.06 Ability to manually operate and/or monitor in the control room: Detector drives	3.0	
215004 Source Range Monitor 171.019-012	x											K1.02 Knowledge of the physical connections and/or causeeffect relationships between SOURCE RANGE MONITOR (SRM) SYSTEM and the following: Reactor Manual Control	3.4	
215005 APRM / LPRM 171.148-215					x							K5.05 Knowledge of the operational implications of the following concepts as they apply to AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM: Core flow effects on APRM trip setpoints	3.6	

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	#
215005 APRM / LPRM 171.148-009								x				A2.07 Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Recirculation flow channels flow mismatch	3.4	
217000 RCIC 171.040-034		x										K2.01 Knowledge of electrical power supplies to the following: Motor operated valves	2.8	
217000 RCIC 171.205-123											x	G2.4.7 Knowledge of event based EOP mitigation strategies.	3.8	
218000 ADS 171.043-001							x					A1.04 Ability to predict and/or monitor changes in parameters associated with operating the AUTOMATIC DEPRESSURIZATION SYSTEM controls including: Reactor pressure	4.1	
218000 ADS 171.205-124								x				A2.05 Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of A.C. or D.C. power to ADS valves	3.6	
223002 PCIS/Nuclear Steam Supply Shutoff 171.017-120	x											K1.20 Knowledge of the physical connections and/or causeeffect relationships between PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF and the following: AC Distribution	2.8	
239002 SRVs 171.009-052									x			A3.02 Ability to monitor automatic operations of the RELIEF/SAFETY VALVES including: SRV operation on high reactor pressure	4.3	
259002 Reactor Water Level Control 171.012-023								x				A2.06 Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of controller signal output	3.3	
259002 Reactor Water Level Control 171.012-086											x	G2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0	
261000 SGTS 171.018-042			x									K3.03 Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on following: Primary containment pressure	3.2	
261000 SGTS 171.018-006										x		A4.02 Ability to manually operate and/or monitor in the control room: Suction valves	3.1	
262001 AC Electrical Distribution 171.072-024			x									K3.03 Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following: D.C. electrical distribution	2.9	

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BWR Examination Outline
Plant Systems - Tier 2/Group 1 (RO / SRO)

Form ES-401-1

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	#
262001 AC Electrical Distribution 171.036-015								x				A2.03 Ability to (a) predict the impacts of the following on the A.C. ELECTRICAL DISTRIBUTION ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of off-site power	4.3	
262002 UPS (AC/DC) 171.102-055						x						K6.02 Knowledge of the effect that a loss or malfunction of the following will have on the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.): D.C. electrical power	2.8	
263000 DC Electrical Distribution 171.037-010				x								K4.02 Knowledge of D.C. ELECTRICAL DISTRIBUTION design feature(s) and/or interlocks which provide for the following: Breaker interlocks, permissives, bypasses and crossties	3.1	
264000 EDGs 171.038-264				x								K4.07 Knowledge of EMERGENCY GENERATORS (DIESEL/JET) design feature(s) and/or interlocks which provide for the following: Local operation and control	3.3	
300000 Instrument Air 171.054-053									x			A3.02 Ability to monitor automatic operations of the INSTRUMENT AIR SYSTEM including: Air temperature	2.9	
400000 Component Cooling Water 171.047-039						x						K6.01 Knowledge of the effect that a loss or malfunction of the following will have on the CCWS: Valves	2.7	
K/A Category Point Totals:	2	3	2	2	2	3	2	2	3	3	2	Group Point Total:		26/5

ES-401		BWR Examination Outline Plant Systems – Tier 2/Group 2 (RO / SRO)											Form ES-401-1	
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	#
201001 CRD Hydraulic 171.005-046						x						K6.03 Knowledge of the effect that a loss or malfunction of the following will have on the CONTROL ROD DRIVE HYDRAULIC System : Plant Air System	3.0	
201002 RMCS														
201003 Control Rod and Drive Mechanism 171.006-043					x							K5.03 Knowledge of the operational implications of the following concepts as they apply to CONTROL ROD AND DRIVE MECHANISM : Reactor power control	3.3	
201004 RSCS														
201005 RCIS														
201006 RWM 171.024-088								x				A2.06 Ability to (a) predict the impacts of the following on the ROD WORTH MINIMIZER SYSTEM (RWH) (PLANT SPECIFIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of reactor water level control input:	3.3	
202001 Recirculation														
202002 Recirculation Flow Control 171.007-020										x		A4.07 Ability to manually operate and/or monitor in the control room: Recirculation pump speed	3.3	
204000 RWCU														
214000 RPIS														
215001 Traversing In-core Probe 171.016-097											x	G2.2.13 Knowledge of tagging and clearance procedures.	3.8	
215002 RBM														
216000 Nuclear Boiler Inst. 171.003-041		X										K2.01 Knowledge of electrical power supplies to the following: Analog trip system	2.8	
219000 RHR/LPCI: Torus/Pool Cooling Mode 171.044-114	x											K1.08 Knowledge of the physical connections and/or causeeffect relationships between RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE and the following: D.C. electrical power	2.6	
223001 Primary CTMT and Aux.														
226001 RHR/LPCI: CTMT Spray Mode 171.203-134			x									K3.01 Knowledge of the effect that a loss or malfunction of the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE will have on following: Containment/drywell/suppression chamber pressure	3.6	
230000 RHR/LPCI: Torus/Pool Spray Mode														
233000 Fuel Pool Cooling/Cleanup														
234000 Fuel Handling Equipment														

ES-401		BWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)											Form ES-401-1		
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	#	
239001 Main and Reheat Steam 171.009-056				x								K4.02 Knowledge of MAIN AND REHEAT STEAM SYSTEM design feature(s) and/or interlocks which provide for the following: Automatic isolation and opening of drain valves:	3.1		
241000 Reactor/Turbine Pressure Regulator															
245000 Main Turbine Gen. / Aux. 171.228-020									x			A3.04 Ability to monitor automatic operations of the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS including: Turbine Speed	2.7		
256000 Reactor Condensate 171.201-062											x	G2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions including: 1. Reactivity control 2. Core cooling and heat removal 3. Reactor coolant system integrity 4. Containment conditions 5. Radioactivity release control.	3.7		
259001 Reactor Feedwater 171.012-085							x					A1.04 Ability to predict and/or monitor changes in parameters associated with operating the REACTOR FEEDWATER SYSTEM controls including: RFP turbine speed	2.8		
268000 Radwaste															
271000 Offgas															
272000 Radiation Monitoring 171.033-060								x				A2.02 Ability to (a) predict the impacts of the following on the RADIATION MONITORING SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor protection system power failure	3.3		
286000 Fire Protection 171.049-025								x				A2.11 Ability to (a) predict the impacts of the following on the FIRE PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Pump trips	3.2		
290002 Reactor Vessel Internals 171.044-052											x	2.1.23 Ability to perform specific system and integrated plant procedures during different modes of plant operation.	3.9		
K/A Category Point Totals:	1	1	1	1	1	1	1	1	2	1	1	2	Group Point Total:	12/3	

ES-401

Generic Knowledge and Abilities Outline

Form ES-401-3

Facility: BFN

Date of Exam: 09/04/07

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.11	Knowledge of less than one hour technical specification action statements for systems. 171.028-179	3.0			
	2.1.32	Ability to explain and apply system limits and precautions. 171.007-192	3.4			
	2.1.20	Ability to execute procedure steps. 171.042-217	4.3			
	2.1.12	Ability to apply technical specifications for a system. 171.018-122			4.0	
	2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications. 171.016-105			4.0	
	2.1.					
	Subtotal			3		2
2. Equipment Control	2.2.3	Knowledge of the design / procedural / and operational differences between units. 171.026-053	3.1			
	2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. 171.087-063	2.5			
	2.2.13	Knowledge of tagging and clearance procedures. 171.086-004			3.8	
	2.2.24	Ability to analyze the affect of maintenance activities on LCO status. 171.046-032			3.8	
	2.2.					
	Subtotal			2		2
3. Radiation Control	2.3.2	Knowledge of facility ALARA program. 171.000-003	2.5			
	2.3.4	Knowledge of radiation exposure limits and contamination control / including permissible levels in excess of those authorized. 171.000-004	2.5			
	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements. 171.000-006			3.0	
	2.3.11	Ability to control radiation releases. 171.033-014			3.2	
	Subtotal			2		2
4. Emergency Procedures / Plan	2.4.2	Knowledge of system set points / interlocks and automatic actions associated with EOP entry conditions. 171.044-264	3.9			
	2.4.12	Knowledge of general operating crew responsibilities during emergency operations. 171.075-001	3.4			
	2.4.31	Knowledge of annunciators alarms and indications / and use of the response instructions. 171.018-043	3.3			
	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm. 171.033-019			3.6	
	2.4.					
	2.4.					
	Subtotal			3		1
Tier 3 Point Total				10		7

