

Facility: Cooper													
Date of Exam: ??/??/01													
Exam Level: RO													
Tier	Group	K/A Category Points											Point Total
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G *	
1. Emergency & Abnormal Plant Evolutions	1	1	2	2				3	3			2	13
	2	2	5	4				3	2			3	19
	3	0	1	1				1	0			1	4
	Tier Totals	3	8	7				7	5			6	36
2. Plant Systems	1	3	1	3	3	1	1	4	3	3	2	4	28
	2	3	1	2	2	1	1	1	3	2	1	2	19
	3	1	0	1	0	0	0	0	0	1	1	0	4
	Tier Totals	7	2	6	5	2	2	5	6	6	4	6	51
3. Generic Knowledge and Abilities				Cat 1		Cat 2		Cat 3		Cat 4		13	
				5		3		2		3			
<p>Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).</p> <p>2. Actual point totals must match those specified in the table.</p> <p>3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.</p> <p>4. Systems/evolutions within each group are identified on the associated outline.</p> <p>5. The shaded areas are not applicable to the category/tier.</p> <p>6.* The generic 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.</p> <p>7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.</p>													

ES-401		BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						Form ES-401-2	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295005 Main Turbine Generator Trip / 3					X		AA2.03 – Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP: Turbine Valve Position	3.1	1
295006 SCRAM / 1 (PRA: ATWS)			X				AK3.01 – Knowledge of the reasons for the following responses as they apply to SCRAM: Reactor Water Level Response	3.8	1
295007 High Reactor Pressure / 3				X			AA1.05 – Ability to operate and monitor the following as they apply to HIGH REACTOR PRESSURE: Reactor/turbine pressure regulating system	3.7	1
295009 Low Reactor Water Level / 2		X					AK2.02 – Knowledge of the interrelations between LOW REACTOR WATER LEVEL and the following: Reactor water level control	3.9	1
295009 Low Reactor Water Level / 2					X		AA2.01 – Ability to determine and/or interpret the following as they apply to LOW REACTOR WATER LEVEL: Reactor Water Level	4.2	1
295010 High Drywell Pressure / 5	X						AK1.01 – Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE: Downcomer Submergence: Mark I&II	3.0	1
295014 Inadvertent Reactivity Addition / 1		X					AK2.06 – Knowledge of the interrelations between INADVERTENT REACTIVITY ADDITION and the following: Moderator temperature	3.4	1
295015 Incomplete SCRAM / 1 (PRA: ATWS)				X			AA1.07 – Ability to operate and or monitor the following as they apply to INCOMPLETE SCRAM: Neutron Monitoring System	3.6	1
295024 High Drywell Pressure / 5						X	2.4.6 – Knowledge of symptom based EOP mitigation strategies	3.1	1
295025 High Reactor Pressure / 3			X				EK3.09 – Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE: Low-Low Set initiation	3.7	1
295031 Reactor Low Water Level / 2 (PRA: Loss of coolant accident with failure to inject)				X			EA1.08 – Ability to operate and/or monitor the following as they apply to REACTOR LOW WATER LEVEL: Alternate Injection Systems	3.8	1
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1						X	2.4.20 – Knowledge of operational implications of EOP warnings/cautions and notes	3.3	1
500000 High Containment Hydrogen Conc. / 5					X		EA2.03 – Ability to determine and/or interpret the following concepts as they apply to HIGH CONTAINMENT HYDROGEN CONCENTRATIONS: Combustible Limits for Drywell	3.3	1
K/A Category Totals:	1	2	2	3	3	2	Group Point Total:		13

<div>ES-401</div> <div>BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2</div> <div>Form ES-401-2</div>									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4			X				AK3.04 – Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Reactor SCRAM	3.4	1
295002 Loss of Main Condenser Vacuum / 3		X					AK2.07 – Knowledge of the interrelations between LOSS OF MAIN CONDENSER VACUUM and the following: Offgas System	3.1	1
295003 Partial or Complete Loss of AC Power / 6 (PRA: Station Blackout)	X						AK1.03 – Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: Under voltage/degraded voltage effects on electrical loads	2.9	1
295004 Partial or Complete Loss of DC Power / 6				X			AA1.02 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF DC POWER: Systems necessary to assure safe plant shutdown	3.8	1
295008 High Reactor Water Level / 2			X				AK3.08 – Knowledge of the reasons for the following responses as they apply to HIGH REACTOR WATER LEVEL: RCIC steam supply valve closure	3.4	1
295012 High Drywell Temperature / 5					X		AA2.02 – Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell pressure	3.9	1
295013 High Suppression Pool Temp. / 5 (PRA: Loss of Containment heat sink)						X	2.4.18 – Knowledge of the specific bases for EOPs	2.7	1
295016 Control Room Abandonment / 7						X	2.4.2 – Knowledge of system setpoints/ interlocks and automatic actions associated with EOP entry conditions.	3.9	1
295017 High Off-site Release Rate / 9			X				AK3.01 – Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: System isolations	3.6	1
295018 Partial or Complete Loss of CCW / 8						X	2.4.24 – Knowledge of loss of cooling water procedures.	3.3	1
295019 Part. Or Comp. Loss of Inst. Air / 8				X			AA1.01 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Backup air supply	3.5	1
295020 Inadvertent Cont. Isolation / 5 & 7		X					AK2.06 – Knowledge of the interrelations between INADVERTENT CONTAINMENT ISOLATION and the following: HPCI	3.8	1
295026 High Suppression Pool Water Temperature / 5		X					EK2.03 – Knowledge of the interrelations between SUPPRESSION POOL HIGH WATER TEMPERATURE and the following: Suppression chamber pressure: Mark I&II	3.2	1
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	1

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BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2									
Form ES-401-2									
295029 High Suppression Pool Water Level / 5		X					EK2.01 – Knowledge of the interrelations between HIGH SUPPRESSION POOL WATER LEVEL and the following: RHR/LPCI	3.0	1
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295033 High Sec. Cont. Area Rad. Levels / 9	X						EK1.02 – Knowledge of the operational implications of the following concepts as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS: Personnel protection	3.9	1
295034 Sec. Cont. Ventilation High Rad. / 9				X			EA1.04 – Ability to operate and/or monitor the following as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION: SBTG/FRVS	4.1	1
295038 High Off-site Release Rate / 9		X					EK2.06 – Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following: Process liquid radiation monitoring system	3.4	1
600000 Plant Fire On Site / 8					X		AA2.2.03 – Ability to operate determine and interpret the following as they apply to PLANT FIRE ON SITE: Fire alarm	2.8	1
K/A Category Point Totals:	2	5	4	3	2	3	Group Point Total:		19

<div>ES-401</div> <div>BWR RO Examination Outline</div> <div>Emergency and Abnormal Plant Evolutions - Tier 1/Group 3</div> <div>Form ES-401-2</div>									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295021 Loss of Shutdown Cooling / 4 (PRA: Loss of Low Pressure injection)			X				AK3.05 – Knowledge of the reasons for the following responses as they apply to LOSS OF SHUTDOWN COOLING: Establishing alternate heat removal flow paths	3.7	1
295023 Refueling Accidents / 8						X	2.2.27 – Knowledge of the refueling process	2.6	1
295032 High Secondary Containment Area Temperature / 5				X			EA1.01 – Ability to operate and/or monitor the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Area temperature monitoring system	3.6	1
295036 Secondary Containment High Sump/Area Water Level / 5		X					EK2.03 – Knowledge of the interrelations between SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL and the following: Radwaste	2.8	1
K/A Category Point Totals:	0	1	1	1	0	1	Group Point Total:		4

ES-401													BWR RO Examination Outline Plant Systems – Tier 2/Group 1		Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points		
201001 CRD Hydraulic System						X						K6.05 – Knowledge of the effect that a loss or malfunction of the following will have on the CONTROL ROD DRIVE HYDRAULIC SYSTEM: A.C. Power	3.3	1		
201002 RMCS											X	2.1.32 – Ability to explain and apply system limits and precautions	3.4	1		
202002 Recirculation Flow Control							X					A1.07 – Ability to predict and/or monitor changes in parameters associated with operating the RECIRCULATION FLOW CONTROL SYSTEM controls including: Recirculation loop flow	3.1	1		
203000 RHR/LPCI: Injection Mode	X											K1.17 – Knowledge of the physical connections and/or cause-effect relationships between RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) Reactor pressure	4.0	1		
206000 HPCI								X				A2.09 – Ability to (a) predict the impacts of the following on the HIGH PRESSURE COOLANT INJECTION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low condensate storage tank level: BWR-2,3,4	3.5	1		
209001 LPCS										X		A4.11 – Ability to manually operate and/or monitor in the control room: System flow	3.7	1		
211000 SLC			X									K3.02 – Knowledge of the of the effect that a loss or malfunction of the STANDBY LIQUID CONTROL SYSTEM will have on following: Core plate differential pressure indication: Plant Specific	2.6	1		
211000 SLC									X			A3.07 – Ability to monitor automatic operations of the STANDBY LIQUID CONTROL SYSTEM including: Lights and alarms: Plant-Specific	3.7	1		
212000 RPS							X					A1.07 – Ability to predict and/or monitor changes in parameters associated with operating the REACTOR PROTECTION SYSTEM controls including: Reactor power	4.2	1		
215003 IRM			X									K3.05 – Knowledge of the effect that a loss or malfunction of the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM will have on following: APRM: Plant Specific	3.7	1		

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System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		Imp.	Points										
215004 SRM											X	2.2.2 – Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels		4.0	1										
215005 APRM/LPRM											X	2.1.25 – Ability to obtain and interpret station reference materials such as graphs/monographs/and tables which contain performance data		2.8	1										
215005 APRM/LPRM								X				A2.02 – Ability to predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/ LOCAL POWER RANGE MONITOR SYSTEM; and based on those predictions, use procedures to correct control or mitigate the consequences of those abnormal conditions or operations: Upscale or downscale trips		3.6	1										
216000 Nuclear Boiler Instrumentation							X					A1.07 – Ability to predict and/or monitor changes in parameters associated with operating the NUCLEAR BOILER controls including: Removing or returning a sensor (transmitter) to service		3.4	1										
216000 Nuclear Boiler Instrumentation										X		A4.03 – Ability to manually operate and/or monitor in the control room: Process Computer		3.0	1										
217000 RCIC (PRA: Loss of High Pressure injection)		X										K2.02 – Knowledge of electrical power supplies to the following: RCIC initiation signals (logic)		2.8	1										
217000 RCIC (PRA: Loss of High Pressure injection)				X								K4.02 – Knowledge of REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) design feature(s) and/or interlocks which provide for the following: Prevent turbine damage		3.0	1										
218000 ADS					X							K5.01 – Knowledge of the operational implications of the following concepts as they apply to AUTOMATIC DEPRESSURIZATION SYSTEM: ADS logic operation		3.8	1										
223001 Primary CTMT and Auxiliaries											X	2.1.12 – Ability to apply technical specifications for a system		2.9	1										

BWR RO Examination Outline Plant Systems – Tier 2/Group 1													Form ES-401-2	
223002 PCIS/Nuclear Steam Supply Shutoff			X									K3.09 – Knowledge of the effect that a loss or malfunction of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUTOFF will have on following: Main steam system	3.4	1
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
239002 SRVs	X											K1.05 - Knowledge of the physical connections and/or cause-effect relationships between SAFETY/RELIEF VALVES and the following: Plant air systems: Plant-Specific	3.1	1
241000 Reactor/Turbine Pressure Regulator									X			A3.17 – Ability to monitor automatic operations of the REACTOR/TURBINE PRESSURE REGULATING SYSTEM including: Turbine runback	3.3	1
241000 Reactor/Turbine Pressure Regulator				X								K4.06 – Knowledge of REACTOR/TURBINE PRESSURE REGULATING SYSTEM design feature(s) and/or interlocks which provide for the following: Turbine trip	3.6	1
259001 Reactor Feedwater								X				A2.03 – Ability to (a) predict the impacts of the following on the REACTOR FEEDWATER SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of condensate pump(s)	3.6	1
259002 Reactor Water Level Control									X			A3.03 – Ability to monitor automatic operations of the REACTOR WATER LEVEL CONTROL SYSTEM including: Changes in main steam flow	3.2	1
261000 SGTS				X								K4.01 – Knowledge of STANDBY GAS TREATMENT SYSTEM design feature(s) and/or interlocks which provide for the following: Automatic system initiation	3.7	1
264000 EDGs (PRA: Station Blackout)	X											K1.04 Knowledge of the physical connections and/or cause-effect relationships between EMERGENCY GENERATORS (DIESEL/Jet) INCLUDING: Emergency generator cooling water system	3.2	1
264000 EDGs (PRA: Station Blackout)							X					A1.03 – Ability to predict and/or monitor changes in parameters associated with operating the EMERGENCY GENERATORS (DIESEL/ JET) controls including: Operating voltages, currents, and temperatures	2.8	1

ES-401		BWR RO Examination Outline Plant Systems – Tier 2/Group 1										Form ES-401-2	
K/A Category Point Totals:	3	1	3	3	1	1	4	3	3	2	4	Group Point Total:	28

ES-401		BWR RO Examination Outline Plant Systems - Tier 2/Group 2										Form ES-401-2		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201003 Control Rod and Drive Mechanism								X				A2.05 – Ability to (a) predict the impacts of the following on the CONTROL ROD AND DRIVE MECHANISM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor scram	4.1	1
201006 RWM			X									K3.01 – Knowledge of the effect that a loss or malfunction of the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) will have on the following: Reactor manual control system	3.2	1
202001 Recirculation	X											K1. 18 – Knowledge of the physical connections and/or cause-effect relationships between RECIRCULATION SYSTEM and the following: RHR shutdown cooling mode	3.3	1
204000 RWCS									X			A3.03 – Ability to monitor automatic operations of the REACTOR WATER CLEANUP SYSTEM including: Response to system isolations	3.6	1
214000 RPIS					X							K5.01 – Knowledge of the operational implications of the following concepts as they apply to ROD POSITION INFORMATION SYSTEM: Reed switches	2.7	1
219000 RHR/LPCI: Torus/Pool Cooling Mode								X				A2.05 – Ability to (a) predict the impacts of the following on: RHR/LPCI: TORUS/ SUPPRESSION POOL COOLING MODE and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A.C. electrical failures	3.3	1
226001 RHR/LPCI Containment Spray System Mode						X						K6.05 - Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE: Suppression pool (temperature level and pressure)	3.4	1
239001 Main and Reheat Steam			X									K3.08 – Knowledge of the effect that a loss of the MAIN AND REHEAT STEAM SYSTEM will have on the following: Decay heat removal	3.4	1

ES-401													BWR RO Examination Outline Plant Systems - Tier 2/Group 2		Form ES-401-2	
245000 Main Turbine Gen. And Auxiliaries								X					A2.02 - Ability to (a) predict the impacts of the following on MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of lube oil	3.3	1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G		K/A Topic(s)	Imp.	Points	
256000 Reactor Condensate	X												K1.06 – Knowledge of the physical connections and/or cause-effect relationships between REACTOR CONDENSATE SYSTEM and the following: Extraction steam system	2.7	1	
262001 AC Electrical Distribution							X						A1.05 – Ability to predict and monitor changes in parameters associated with operating the ELECTRICAL DISTRIBUTION controls including: Breaker lineups	3.2	1	
262002 UPS (AC/DC)											X		2.1.31 – Ability to locate control room switches/ controls and indications and to determine that they are correctly reflecting the desired plant lineup.	4.2	1	
263000 DC Electrical Distribution				X									K4.01 – Knowledge of D.C. ELECTRICAL DISTRIBUTION design feature(s) and/or interlocks which provide for the following: Manual/automatic transfers of control: Plant-Specific	3.1	1	
271000 Offgas									X				A3.07 – Ability to monitor automatic operations of the OFFGAS SYSTEM including: Process radiation monitoring system indications	3.4	1	
286000 Fire Protection	X												K1.06 – Knowledge of the physical connections and/or cause-effect relationships between FIRE PROTECTION SYSTEM and the following: Emergency generator rooms: Plant-Specific	3.2	1	
290001 Secondary CTMT										X			A4.10 – Ability to manually operate and/or monitor in the control room: System lineups	3.4	1	
290003 Control Room HVAC				X									K4.01 – Knowledge CONTROL ROOM HVAC design feature(s) and/or interlocks which provide for the following: System initiations/reconfiguration: Plant-Specific	3.1	1	
300000 Instrument Air											X		2.4.11 – Knowledge of abnormal condition procedures	3.4	1	

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400000 Component Cooling Water		X										K2.01 – Knowledge of electrical power supplies to the following: CCW pumps	2.9	1
K/A Category Point Totals:	3	1	2	2	1	1	1	3	2	1	2	Group Point Total: 19		

BWR RO Examination Outline Plant Systems - Tier 2/Group 3													Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
215001 Traversing In-Core Probe										X		A4.03 – Ability to manually operate and/or monitor in the control room: Isolation valves Mark I&II(Not BWR1)	3.3	1
233000 Fuel Pool Cooling and Cleanup	X											K1.02 – Knowledge of the physical connections and/or cause-effect relationships between FUEL POOL COOLING AND CLEAN-UP and the following: Residual heat removal system: Plant-Specific	2.9	1
288000 Plant Ventilation									X			A3.01 – Ability to monitor automatic operations of the PLANT VENTILATION SYSTEMS including: Isolation/initiation signals	3.8	1
290002 Reactor Vessel Internals			X									K3.03 – Knowledge of the effect that a loss or malfunction of the REACTOR VESSEL INTERNALS will have on the following: Reactor power	3.3	1
K/A Category Point Totals:	1	0	1	0	0	0	0	0	1	1	0	Group Point Total:	4	
Plant-Specific Priorities														
System / Topic							Recommended Replacement for...					Reason		Points
Plant-Specific Priorities coincided with randomly selected KA's.														
Plant-Specific Priority Total: (limit 10)														

Category	K/A#	Topic	Imp.	Points
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements.	3.7	1
	2.1.3	Knowledge of shift turnover practices.	3.0	1
	2.1.12	Ability to apply technical specifications for a system.	2.9	1
	2.1.29	Knowledge of how to conduct and verify valve lineups.	3.4	1
	2.1.32	Ability to explain and apply system limits and precautions	3.4	1
	Total			5
Equipment Control	2.2.12	Knowledge of surveillance procedures.	3.0	1
	2.2.22	Knowledge of limiting conditions for operations and safety limits	3.4	1
	2.2.34	Knowledge of the process for determining the internal and external effects on core reactivity.	2.8	1
	Total			3
Radiation Control	2.3.4	Knowledge of radiation exposure limits and contamination control / including permissible levels in excess of those authorized.	2.5	1
	2.3.10	Ability to control radiation releases.	2.9	1
	Total			2
Emergency Procedures/Plan	2.4.3	Ability to determine post-accident instrumentation.	3.5	1
	2.4.10	Knowledge of annunciator response procedures.	3.0	1
	2.4.21	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	1
	Total			3
Tier 3 Point Total (RO/SRO)				13