

Facility: Cooper Nuclear Station      Date of Exam: August 5, 2002      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	2	2	2				3	2			2	13
	2	3	2	4				4	3			3	19
	3	0	1	1				1	0			1	4
	Tier Totals	5	5	7				8	5			6	36
2. Plant Systems	1	3	2	3	3	2	2	3	3	2	3	2	28
	2	2	1	2	2	1	1	2	2	2	2	2	19
	3	1	0	1	0	0	1	0	0	1	0	0	4
	Tier Totals	6	3	6	5	3	4	5	5	5	5	4	51
3. Generic Knowledge and Abilities				Cat 1		Cat 2		Cat 3		Cat 4		13	
				4		3		2		4			
<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. 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 <math>\pm 1</math> from that specified in the table based on NRC revisions. The final exam must total 100 points.</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			AA1.07 - Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP: A.C. electrical distribution.	3.3	1
295006 SCRAM / 1			X				AK3.05 - Knowledge of the reasons for the following responses as they apply to SCRAM: Direct turbine generator trip: Plant-Specific.	3.8	1
295007 High Reactor Pressure / 3		X					AK2.01 - Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following: Reactor/turbine pressure regulating system	3.5	1
295007 High Reactor Pressure / 3	X						AK1.03 - Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE: Pressure effects on reactor power.	3.8	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			AA1.05 - Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE: Drywell/suppression vent and purge.	3.1	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	X						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to INCOMPLETE SCRAM: Shutdown margin.	3.6	1
295024 High Drywell Pressure / 5			X				EK3.04 - Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE: Emergency depressurization.	3.7	1
295025 High Reactor Pressure / 3						X	2.4.11 - Knowledge of abnormal condition procedures.	3.4	1
295031 Reactor Low Water Level / 2 16481					X		EA2.04 - Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Adequate core cooling.	4.6	1
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1 PRA: ATWS						X	2.4.8 - Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs.	3.0	1
500000 High Containment Hydrogen Conc. / 5				X			EA1.02 - Ability to operate and monitor the following as they apply to HIGH CONTAINMENT HYDROGEN CONTROL: Primary containment oxygen instrumentation.	3.3	1
K/A Category Totals:	2	2	2	3	2	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			AA1.01 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Recirculation system.	3.5	1
295002 Loss of Main Condenser Vacuum / 3			X				AK3.01 – Knowledge of the reasons for the following responses as they apply to LOSS OF MAIN CONDENSER VACUUM: Reactor SCRAM: Plant-specific.	3.7	1
295003 Partial or Complete Loss of AC Power / 6	X						AK1.06 – Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: Station blackout: Plant-specific.	3.8	1
295004 Partial or Complete Loss of DC Power / 6						X	2.4.48 – Ability to interpret control room indications to verify the status and operation of system /and understand how operator actions and directives affect plant and system conditions.	3.5	1
295008 High Reactor Water Level / 2					X		AA2.02 – Ability to determine and/or interpret the following as they apply to HIGH REACTOR WATER LEVEL: Steam flow/feedflow mismatch.	3.4	1
295012 High Drywell Temperature / 5		X					AK2.02 – Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following: Drywell cooling.	3.6	1
295013 High Suppression Pool Temp. / 5					X		AA2.01 – Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL TEMPERATURE: Suppression pool temperature.	3.8	1
295016 Control Room Abandonment / 7				X			AA1.06 – Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT: Reactor water level.	4.0	1
295018 Partial or Complete Loss of CCW / 8				X			AA1.01 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: Backup systems.	3.3	1
295019 Part. Or Comp. Loss of Inst. Air / 8						X	2.4.31 – Knowledge of annunciators alarms and indications / and use of the response instructions.	3.3	1
295020 Inadvertent Cont. Isolation / 5 & 7			X				AK3.04 – Knowledge of the reasons for the following responses as they apply to INADVERTENT CONTAINMENT ISOLATION: Reactor pressure response.	4.1	1
295026 High Suppression Pool Water Temperature / 5			X				EK3.05 – Knowledge of the reasons for the following responses as apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Reactor scram.	3.6	1

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295028 High Drywell Temperature / 5	X						EK1.01 – Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE: Reactor water level measurement.	3.5	1
295029 High Suppression Pool Water Level / 5						X	2.4.6 – Knowledge of symptom-based EOP mitigation strategies.	3.1	1
295030 Low Suppression Pool Water Level / 5			X				EK3.02 – Knowledge of the reasons for the following responses as they apply to LOW SUPPRESSION POOL WATER LEVEL: HPCI operation: Plant-specific.	3.5	1
295033 High Sec. Cont. Area Rad. Levels / 9 10688	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 Secondary Containment Ventilation High Radiation / 9 17856		X					EK2.04 – Knowledge of the interrelations between SECONDARY CONTAINMENT VENTILATION HIGH RADIATION and the following: Secondary containment ventilation.	3.9	1
295038 High Off-site Release Rate / 9 1644				X			EA1.07 – Ability to operate and/or monitor the following as they apply to HIGH OFF-SITE RELEASE RATE: Control room ventilation: Plant-specific.	3.6	1
600000 Plant Fire On Site / 8 16490					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.	2.8	1
K/A Category Point Totals:	3	2	4	4	3	3	Group Point Total:		19

ES-401		BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3							Form ES-401-2	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points	
295021 Loss of Shutdown Cooling / 4			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.	3.6	1	
295032 High Secondary Containment Area Temperature / 5		X					EK2.02 – Knowledge of the interrelations between HIGH SECONDARY CONTAINMENT AREA TEMPERATURE and the following: Secondary containment ventilation.	3.6	1	
295035 Secondary Containment High Differential Pressure / 5				X			EA1.01– Ability to determine and/or monitor the following as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE: Secondary containment ventilation system.	3.6	1	
295036 Secondary Containment High Sump/Area Water Level / 5						X	2.4.11 – Knowledge of abnormal condition procedures.	3.4	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								X				A2.12 – Ability to (a) predict the impacts of the following on the CONTROL ROD DRIVE HYDRAULIC SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High cooling water flow.	2.8	1
201002 RMCS							X					A1.02 – Ability to predict and/or monitor changes in parameters associated with operating the REACTOR MANUAL CONTROL SYSTEM controls including: control rod position.	3.4	1
202002 Recirculation Flow Control	X											K1.05 – Knowledge of the physical connections and/ cause-effect relationships between RECIRCULATION FLOW CONTROL SYSTEM and the following: Recirculation MG set: Plant-specific.	3.5	1
202002 Recirculation Flow Control											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
203000 RHR/LPCI: Injection Mode		X										K2.01 – Knowledge of electrical power supplies to the following: pumps.	3.5	1
206000 HPCI				X								K4.07 – Knowledge of HIGH PRESSURE COOLANT INJECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Automatic system initiation: BWR-2,3,4.	4.3	1
209001 LPCS										X		A4.11 – Ability to manually operate and/or monitor in the control room: System flow.	3.7	1
211000 Standby Liquid Control System					X							K5.04 – Knowledge of the operational implications of the following concepts as they apply to STANDBYLIQUID CONTROL SYSTEM: Explosive valve operation.	3.1	1
212000 RPS						X						K6.04 – Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR PROTECTION SYSTEM: D.C. electrical distribution.	2.8	1

BWR RO Examination Outline Plant Systems – Tier 2/Group 1													Form ES-401-2	
212000 RPS								X				A2.21 – Ability to (a) predict the impacts of the following on the REACTOR PROTECTION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: failure of individual relays to reposition: Plant-specific.	3.6	1
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
215003 IRM			X									K3.02 – Knowledge of the effect that a loss or malfunction of the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM will have on the following: reactor manual control.	3.6	1
215004 SRM									X			A3.04 – Ability to monitor automatic operations of the SOURCE RANGE MONITOR (SRM) SYSTEM including: control rod block status.	3.6	1
215005 APRM/LPRM	X											K1.16 – Knowledge of the physical connections and/or cause-effect relationships between AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM and the following: Flow converter/comparator network: Plant-Specific.	3.3	1
215005 APRM/LPRM		X										K2.02 – Knowledge of electrical power supplies to the following: APRM channels.	2.6	1
216000 Nuclear Boiler Instrumentation					X							K5.12 – Knowledge of the operational implications of the following concepts as they apply to NUCLEAR BOILER INSTRUMENTATION: Effects on level indication due to rapid changes in void fraction.	3.2	1
217000 RCIC							X					A1.01 – Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) controls including: RCIC flow.	3.7	1
218000 ADS										X		A4.06 – Ability to manually operate and/or monitor in the control room: ADS valve tail pipe temperature.	3.5	1
223001 Primary CTMT and Auxiliaries											X	2.1.12 – Ability to apply technical specifications for a system.	2.9	1
223001 Primary CTMT and Auxiliaries				X								K4.05– Knowledge of PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES design feature(s) and/or interlocks which provide for the following: Maintains proper suppression pool to drywell differential pressure.	2.9	1

ES-401		BWR RO Examination Outline Plant Systems – Tier 2/Group 1										Form ES-401-2		
223002 PCIS/Nuclear Steam Supply Shutoff										X		A4.03 – Ability to manually operate and/or monitor in the control room: Reset system isolations.	3.6	1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
223002 PCIS/Nuclear Steam Supply Shutoff	X											K1.08 – Knowledge of the physical connections and/or cause-effect relationships between PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF and the following: Shutdown cooling system/RHR.	3.4	1
239002 SRVs								X				A2.02 – Ability to (a) predict the impacts of the following on the RELIEF/SAFETY VALVES; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Leaky SRV.	3.1	1
241000 Reactor/Turbine Pressure Regulator			X									K3.25 – Knowledge of the effect that a loss or malfunction of the REACTOR/TURBINE PRESSURE REGULATING SYSTEM will have on the following: Reactor cooldown.	3.3	1
259001 Reactor Feedwater						X						K6.03 – Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR FEEDWATER SYSTEM: A.C. electrical power.	2.9	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
259002 Reactor Water Level Control							X					A1.01 – Ability to predict and/or monitor changes in parameters associated with operating the REACTOR WATER LEVEL CONTROL SYSTEM controls including: Reactor water level.	3.8	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 <i>PRA: Station blackout</i>			X									K3.02 – Knowledge of the effect that a loss or malfunction of the EMERGENCY GENERATORS (DIESEL/JET) will have on the following: A.C. electrical distribution.	3.9	1
K/A Category Point Totals:	3	2	3	3	2	2	3	3	2	3	2	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					A1.01 – Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROD AND DRIVE MECHANISM controls including: Reactor power.	3.7	1
201006 RWM				X								K4.01 – Knowledge of ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following: Insert blocks/errors: Plant specific (not BWR6).	3.4	1
202001 Recirculation										X		A4.11 – Ability to manually operate and/or monitor in the control room: Seal pressures: Plant-specific.	3.2	1
204000 RWCU			X									K3.02 – Knowledge of the effect that a loss of the REACTOR WATER CLEANUP SYSTEM will have on the following: Reactor water level.	3.1	1
205000 Shutdown Cooling					X							K5.03 – Knowledge of the operational implications of the following concepts as they apply to SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE): Heat removal mechanisms.	2.8	1
214000 RPIS	X											K1.05 - Knowledge of the physical connections and/ cause-effect relationships between ROD POSITION INFORMATION SYSTEM and the following: Full core display: Plant-specific.	3.3	1
215002 RBM									X			A3.02 – Ability to monitor automatic operations of the ROD BLOCK MONITOR SYSTEM including: meters and recorders: BWR-3,4,5.	3.1	1
219000 RHR/LPCI: Torus/Pool Cooling Mode											X	2.1.32 – Ability to explain and apply system limits and precautions.	3.4	1
226001 RHR/LPCI: CTMT Spray Mode							X					A1.05 – Ability to predict and/or monitor changes in parameters associated with the RHR/LPCI CONTAINMENT SPRAY SYSTEM MODE controls including: System lineup.	3.1	1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
230000 RHR/LPCI: Torus/Pool Spray Mode						X						K6.09 – Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: TORUS/ SUPPRESSION POOL SPRAY MODE: Reactor building to suppression pool vacuum breakers.	3.5	1
239001 Main and Reheat Steam										X		A4.04 – Ability to manually operate and/or monitor in the control room: System pressure.	3.8	1
245000 Main Turbine Generator and Auxiliary Systems	X											K1.09 – Knowledge of the physical connections and/or cause-effect relationships between MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS and the following: D.C. electrical distribution.	2.7	1
262001 AC Electrical Distribution								X				A2.10 – 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: exceeding current limitations.	2.9	1
263000 DC Electrical Distribution			X									K3.03 – Knowledge of the effect that a loss or malfunction of the D.C. ELECTRICAL DISTRIBUTION will have on the following: Systems with D.C. components (i.e. valves, motors, solenoids, etc.).	3.4	1
271000 Offgas System									X			A3.05 – Ability to monitor automatic operations of the OFFGAS SYSTEM including: system indicating lights and alarms.	2.9	1
272000 Radiation Monitoring System				X								K4.02 – Knowledge of RADIATION MONITORING System design feature(s) and/or interlocks which provide for the following: Automatic actions to contain the radioactive release in the event that the predetermined release rates are exceeded.	3.7	1
286000 Fire Protection		X										K2.02– Knowledge of electrical power supplies to the following: Pumps.	2.9	1
290001 Secondary CTMT								X				A2.03– Ability to (a) predict the impacts of the following on: SECONDARY CONTAINMENT and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High area radiation.	3.4	1
400000 Component Cooling Water											X	2.4.31 – Knowledge of annunciators alarms and indications, and use of the response instructions.	3.3	1
K/A Category Point Totals:	2	1	2	2	1	1	2	2	2	2	2	Group Point Total:	19	



ES-401		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						K6.04 – Knowledge of the effect that a loss or malfunction of the following will have on the TRAVERSING IN-CORE PROBE: Primary containment isolation system: Mark-I&II (not BWR1).	3.1	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 operation of the PLANT VENTILATION SYSTEMS including: Isolation/initiation signals.	3.8	1
290002 Reactor Vessel Internals			X									K3.07 – Knowledge of the effect that a loss of malfunction of the REACTOR VESSEL INTERNALS will have on the following: Nuclear boiler instrumentation.	3.1	1
K/A Category Point Totals:	1	0	1	0	1	1	0	0	0	0	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
	2.1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	3.7	1
	2.1.20	Ability to execute procedure steps.	4.3	1
	2.1.29	Knowledge of how to conduct and verify valve lineups.	3.4	1
	Total			4
Equipment Control	2.2.11	Knowledge of the process for controlling temporary changes.	2.5	1
	2.2.12	Knowledge of surveillance procedures.	3.0	1
	2.2.30	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.5	1
	Total			3
Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	2.6	1
	2.3.11	Ability to control radiation releases.	2.7	1
	Total			2
Emergency Procedures/Plan	2.4.12	Knowledge of general operating crew responsibilities during emergency operations..	3.4	1
	2.4.18	Knowledge of the specific bases for EOPs.	2.7	1
	2.4.27	Knowledge of fire in the plant procedure.	3.0	1
	2.4.29	Knowledge of the emergency plan.	2.6	1
	Total			4
Tier 3 Point Total (RO/SRO)				13

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		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G *	
1. Emergency & Abnormal Plant Evolutions	1	5	4	4				5	5			3	26
	2	2	3	3				3	3			3	17
	Tier Totals	7	7	7				8	8			6	43
2. Plant Systems	1	3	2	1	2	2	1	3	3	1	3	2	23
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E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295003 Partial or Complete Loss of AC Power / 6	X						AK1.06 – Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: Station blackout: Plant-specific.	4.0*	1
295003 Partial or Complete Loss of AC Power / 6	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.	3.2	1
295006 SCRAM / 1			X				AK3.05 – Knowledge of the reasons for the following responses as they apply to SCRAM: Direct turbine generator trip: Plant-specific.	4.0	1
295007 High Reactor Pressure / 3		X					AK2.01 – Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following: Reactor turbine pressure regulating system.	3.7	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			AA1.05 – Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE: Drywell/suppression vent and purge.	3.4	1
295013 High Suppression Pool Temp. / 5					X		AA2.01 – Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL TEMP: Suppression pool temperature.	4.0	1
295014 Inadvertent Reactivity Addition / 1		X					AK2.06 – Knowledge of the interrelations between INADVERTENT REACTIVITY ADDITION and the following: Moderator temperature.	3.5	1
295015 Incomplete SCRAM / 1	X						AK1.01 – Knowledge of the operational implications of the following concepts as they apply to INCOMPLETE SCRAM: Shutdown margin.	3.9*	1
295016 Control Room Abandonment / 7				X			AA1.06 – Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT: Reactor water level.	4.1	1
295017 High Off-site Release Rate / 9						X	2.4.48 – Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions.	3.8	1
295023 Refueling Accidents / 8	X						AK1.03 – Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS: Inadvertent criticality.	4.0	1
295024 High Drywell Pressure / 5			X				EK3.04 – Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE: Emergency depressurization.	4.1	1
295025 High Reactor Pressure / 3						X	2.4.11 – Knowledge of abnormal condition procedures.	3.6	1
295026 High Suppression Pool Water Temp. / 5	X						EK1.01 – Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Pump NPSH.	3.4	1
295026 High Suppression Pool Water Temp. / 5		X					EK2.02 – Knowledge of the interrelations between SUPPRESSION POOL HIGH WATER TEMPERATURE and the following: Suppression pool spray: Plant-specific.	3.8	1

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295030 Low Suppression Pool Water Level / 5			X				EK3.02 – Knowledge of the reasons for the following responses as they apply to LOW SUPPRESSION POOL WATER LEVEL: HPCI operation: Plant-specific.	3.7	1
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295030 Low Suppression Pool Water Level / 5					X		EA2.01– Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: Suppression pool level.	4.2	1
295031 Reactor Low Water Level / 2					X		EA2.04 – Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Adequate core cooling.	4.8*	1
295031 Reactor Low Water Level / 2				X			EA1.13– Ability to determine and/or monitor the following as they apply to REACTOR LOW WATER LEVEL: Reactor Water Level control	4.4*	1
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1 <b>PRA: ATWS</b>						X	2.4.8 – Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs.	3.7	1
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1 <b>PRA: ATWS</b>			X				EK3.02 - – Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: SBLC injection.	4.5*	1
295038 High Off-site Release Rate / 9				X			EA1.07 – Ability to operate and/or monitor the following as they apply to HIGH OFF-SITE RELEASE RATE: Control room ventilation: Plant-specific.	3.8	1
295038 High Off-site Release Rate / 9		X					EK2.05 – Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following: Site emergency plan.	4.7*	1
500000 High Containment Hydrogen Conc. / 5				X			EA1.02 – Ability to operate and monitor the following as they apply to HIGH CONTAINMENT HYDROGEN CONTROL: Primary containment oxygen instrumentation.	3.2	1
500000 High Containment 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	1
K/A Category Totals:	5	4	4	5	5	3	Group Point Total:		26

<div>ES-401</div> <div>BWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2</div> <div>Form ES-401-1</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	2.1.7 – Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	1	
295002 Loss of Main Condenser Vacuum / 3			X				AK3.01 – Knowledge of the reasons for the following responses as they apply to LOSS OF MAIN CONDENSER VACUUM: Reactor SCRAM: Plant-specific.	3.8	1	
295004 Partial or Complete Loss of DC Power / 6	X						AK1.06 – Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Prevention of inadvertent system(s) actuation upon restoration of D.C. POWER.	3.6	1	
295005 Main Turbine Generator Trip / 3				X			AA1.07 – Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP: A.C. electrical distribution.	3.3	1	
295008 High Reactor Water Level / 2					X		AA2.02 – Ability to determine and/or interpret the following as they apply to HIGH REACTOR WATER LEVEL: Steam flow/feedflow mismatch.	3.4	1	
295012 High Drywell Temperature / 5		X					AK2.02 – Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following: Drywell cooling.	3.7	1	
295018 Partial or Complete Loss of CCW / 8				X			AA1.01 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: Backup systems.	3.4	1	
295019 Part. Or Comp. Loss of Inst. Air / 8						X	2.4.31 – Knowledge of annunciators alarms and indications, and use of the response instructions.	3.4	1	
295020 Inadvertent Cont. Isolation / 5 & 7			X				AK3.04 – Knowledge of the reasons for the following responses as they apply to INADVERTENT CONTAINMENT ISOLATION: Reactor pressure response.	4.1	1	
295021 Loss of Shutdown Cooling / 4			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.	3.8	1	
295028 High Drywell Temperature / 5	X						EK1.01 – Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE: Reactor water level measurement.	3.7	1	
295029 High Suppression Pool Water Level / 5		X					EK2.05 – Knowledge of the interrelations between HIGH SUPPRESSION POOL WATER LEVEL and the following: Containment/drywell vacuum breakers.	3.3	1	
295032 High Secondary Containment Area Temperature / 5						X	2.4.27 – Knowledge of fire in the plant procedure.	3.5	1	

ES-401							BWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2		Form ES-401-1	
295033 High Sec. Cont. Area Rad. Levels / 9					X		EA2.03 – Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS: Cause of high area radiation.	4.2	1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points	
295034 Sec. Cont. Ventilation High Rad. / 9		X					EK2.04 – Knowledge of the interrelations between SECONDARY CONTAINMENT VENTILATION HIGH RADIATION and the following: Secondary containment ventilation.	3.9	1	
295035 Sec. Cont. High Differential Pressure / 5				X			EA1.01 – Ability to operate and/or monitor the following as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE: Secondary containment ventilation system.	3.6	1	
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	1	
K/A Category Point Totals:	2	3	3	3	3	3	Group Point Total:		17	

ES-401		BWR SRO Examination Outline Plant Systems – Tier 2/Group 1										Form ES-401-1		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
202002 Recirculation Flow Control	X											K1.05 – Knowledge of the physical connections and/or cause-effect relationships between RECIRCULATION FLOW CONTROL SYSTEM and the following: Recirculation MG set: Plant-Specific.	3.5	1
202002 Recirculation Flow Control								X				A2.04 - Ability to (a) predict the impacts of the following on the RECIRCULATION FLOW CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Recirculation pump speed mismatch between loops: Plant-Specific.	3.2	1
203000 RHR/LPCI: Injection Mode		X										K2.01 – Knowledge of electrical power supplies to the following: Pumps.	3.5*	1
206000 HPCI				X								K4.07 – Knowledge of HIGH PRESSURE COOLANT INJECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Automatic system initiation: BWR-2,3,4.	4.3	1
209001 LPCS										X		A4.11 – Ability to manually operate and/or monitor in the control room: System flow.	3.6	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.	3.2	1
212000 RPS										X		A4.07 – Ability to manually operate and/or monitor in the control room: System status lights and alarms.	3.9*	1
215004 SRM									X			A3.04 - Ability to monitor automatic operations of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM including: Annunciators and alarm signals.	3.6	1
215005 APRM/LPRM	X											K1.16 – Knowledge of the physical connections and/or cause-effect relationships between AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM and the following: Flow converter/comparator network: Plant-Specific.	3.4	1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
215005 APRM/LPRM		X										K2.02-Knowledge of electrical power supplies to the following: APRM channels.	2.8	1
216000 Nuclear Boiler Instrumentation					X							K5.12 – Knowledge of the operational implications of the following concepts as they apply to NUCLEAR BOILER INSTRUMENTATION: Effects on level indication due to rapid changes in void fraction.	3.3	1
217000 RCIC							X					A1.01 – Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) controls including: RCIC flow.	3.7	1
218000 ADS										X		A4.06 – Ability to manually operate and/or monitor in the control room: ADS valve tail pipe temperature.	3.6	1
223001 Primary CTMT and Auxiliaries											X	2.1.2 – Knowledge of operator responsibilities during modes of plant operation.	4.0	1
223002 PCIS/Nuclear Steam Supply Shutoff	X											K1.08 – Knowledge of the physical connections and/or cause-effect relationships between PRIMARY CONTAINMENT ISOLATION SYSTEM/ NUCLEAR STEAM SUPPLY SHUT-OFF and the following: Shutdown cooling system/RHR.	3.5	1
226001 RHR/LPCI Containment Spray Mode							X					A1.05 – Ability to predict and/or monitor changes in parameters associated with the RHR/LPCI CONTAINMENT SPRAY SYSTEM MODE controls including: System lineup.	3.4	1
239002 SRVs								X				A2.02 – Ability to (a) predict the impacts of the following on the RELIEF/SAFETY VALVES; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Leaky SRV.	3.2	1
241000 Reactor/Turbine Pressure Regulator											X	2.2.22 – Knowledge of limiting conditions for operations and safety limits.	4.1	1
259002 Reactor Water Level Control							X					A1.01 – Ability to predict and/or monitor changes in parameters associated with operating the REACTOR WATER LEVEL CONTROL SYSTEM controls including: Reactor water level.	3.1	1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
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.	3.8	1
262001 AC Electrical Distribution						X						K6.03 – Knowledge of the effect that a loss or malfunction of the following will have on the A.C. ELECTRICAL DISTRIBUTION: Generator Trip.	3.7	1
264000 EDGs			X									K3.02 – Knowledge of the effect that a loss or malfunction of the EMERGENCY GENERATORS (DIESEL/JET) will have on the following: A.C. electrical distribution.	4.0	1
290001 Secondary CTMT								X				A2.03 – Ability to (a) predict the impacts of the following on the SECONDARY CONTAINMENT; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High area radiation.	3.6	1
K/A Category Point Totals:	3	2	1	2	2	1	3	3	1	3	2	Group Point Total:		23

ES-401		BWR SRO Examination Outline Plant Systems - Tier 2/Group 2										Form ES-401-1		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201001 CRD Hydraulic								X				A2.12 – Ability to (a) predict the impacts of the following on the CONTROL ROD DRIVE HYDRAULIC SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High cooling water flow.	2.9	1
201002 RMCS							X					A1.02 – Ability to predict and/or monitor changes in parameters associated with operating the REACTOR MANUAL CONTROL SYSTEM controls including: Control rod position.	3.3	1
201006 RWM				X								K4.01 – Knowledge of ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following: Insert blocks/errors: Plant specific (not BWR6).	3.5	1
202001 Recirculation										X		A4.11 – Ability to manually operate and/or monitor in the control room: Seal pressures: Plant-specific.	3.3	1
204000 RWCU			X									K3.02 - Knowledge of the effect that a loss or malfunction of the REACTOR WATER CLEANUP SYSTEM will have on the following: Reactor water level.	3.1	1
205000 Shutdown Cooling					X							K5.03 - Knowledge of the operational implications of the following concepts as they apply to SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE): Heat removal mechanisms.	3.1	1
215002 RBM									X			A3.02 – Ability to monitor automatic operations of the ROD BLOCK MONITOR SYSTEM including: Meters and recorders: BWR-3,4,5.	3.0	1
230000 RHR/LPCI: Torus/Pool Spray Mode						X						K6.09 - Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI TORUS/SUPPRESSION POOL SPRAY MODE: Reactor building to suppression pool vacuum breakers.	3.8	1
234000 Fuel Handling Equipment											X	2.4.24 – Ability to analyze the effect of maintenance activities on LCO status.	3.8	1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
245000 Main Turbine Generator and Auxiliaries	X											K1.09 – Knowledge of the physical connections and/or cause/effect relationships between MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS and the following: D.C. electrical distribution.	2.7	1
271000 Offgas									X			A3.05 – Ability to monitor automatic operations of the OFFGaS SYSTEM including: System indicating lights and alarms.	2.9	1
286000 Fire Protection		X										K2.02– Knowledge of electrical power supplies to the following: Pumps.	3.1	1
400000 Component Cooling Water											X	2.4.31 – Knowledge of annunciators alarms and indications, and use of the response instructions	3.4	1
K/A Category Point Totals:	1	1	1	1	1	1	1	1	2	1	2	Group Point Total:		13

ES-401		BWR SRO Examination Outline Plant Systems - Tier 2/Group 3										Form ES-401-1		
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					A1.01 – Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROD AND DRIVE MECHANISM controls including: Reactor Power.	3.8	1
215001 Traversing In-Core Probe						X						K6.04 – Knowledge of the effect that a loss or malfunction of the following will have on the TRAVERSING IN-CORE PROBE: Primary containment isolation system Mark I&II (Not BWR1).	3.4	1
288000 Plant Ventilation									X			A3.01 – Ability to monitor automatic operation of the PLANT VENTILATION SYSTEMS including: Isolation/initiation signals.	3.8	1
290002 Reactor Vessel Internals			X									K3.07 – Knowledge of the effect that a loss or malfunction of the REACTOR VESSEL INTERNALS will have on the following: Nuclear boiler instrumentation.	3.1	1
K/A Category Point Totals:	0	0	1	0	1	1	1	0	0	0	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.	3.8	1
	2.1.10	Knowledge of conditions and limitations in the facility license.	3.9	1
	2.1.12	Ability to apply technical specifications for a system.	4.0	1
	2.1.29	Knowledge of how to conduct and verify valve lineups.	3.3	1
	2.1.33	Ability to recognize indications for system operating parameters that are entry-level conditions for technical specifications.	4.0	1
	TOTAL			5
Equipment Control	2.2.11	Knowledge of the process for controlling temporary changes.	3.4	1
	2.2.12	Knowledge of surveillance procedures.	3.4	1
	2.2.26	Knowledge of refueling administrative requirements.	3.7	1
	2.2.28	Knowledge of SRO fuel handling responsibilities.	3.8	1
	TOTAL			4
Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	3.0	1
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personal exposure.	3.3	1
	2.3.11	Ability to control radiation releases.	3.2	1
	TOTAL			3

Category	K/A#	Topic	Imp.	Points
Emergency Procedures/Plan	2.4.6	Knowledge symptom based EOP mitigation strategies	4.0	1
	2.4.12	Knowledge of general operating crew responsibilities during emergency operations.	3.6	1
	2.4.18	Knowledge of the specific bases for EOPs.	3.5	1
	2.4.27	Knowledge of fire in the plant procedure.	4.0	1
	2.4.29	Knowledge of the emergency plan.	4.0	1
	TOTAL			5
Tier 3 Point Total (RO/SRO)				17