ES-401 **BWR RO Examination Outline** Printed: 01/04/2002

Facility: Dresden Form ES-401-2

Exam Date: 05/27/2002 **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	4	3	3				2	1			0	13
	2	4	4	3				4	3			1	19
	3	0	0	1				2	0			1	4
	Totals Tier	8	7	7				8	4			2	36
2. Plant Systems	1	2	3	3	3	2	2	2	3	3	3	2	28
	2	1	2	2	2	3	2	2	2	2	1	0	19
	3	0	0	0	0	0	0	0	2	1	0	1	4
	Tier Totals	3	5	5	5	5	4	4	7	6	4	3	51
3. Generic Knowledge And Abilities		Cat 1			Cat 2			Cat 3			Cat 4		
		3			3			4			3		13

Note:

1. Attempt to distribute topics among all K/A Categories; select at least one topic from every K/A category within each tier.
2. Actual point totals must match those specified in the table.
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.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category tier.

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Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1 **Form ES-401-2**

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295005	Main Turbine Generator Trip / 3				X			AA1.04 - Main generator controls	2.7	1
295005	Main Turbine Generator Trip / 3	X						AK1.02 - †Core thermal limit considerations	3.2	1
295014	Inadvertent Reactivity Addition / 1		X					AK2.01 - RPS	3.9	1
295014	Inadvertent Reactivity Addition / 1			X				AK3.02 - Control rod blocks	3.7	1
295015	Incomplete SCRAM / 1	X						AK1.04 - Reactor pressure: Plant-Specific	3.8	1
295024	High Drywell Pressure / 5	X						EK1.01 - Drywell integrity: Plant-Specific	4.1	1
295025	High Reactor Pressure / 3			X				EK3.04 - Isolation condenser initiation: Plant-Specific	4.5*	1
295031	Reactor Low Water Level / 2		X					EK2.16 - Reactor water level control	4.1*	1
295031	Reactor Low Water Level / 2					X		EA2.01 - Reactor water level	4.6*	1
295037	SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1	X						EK1.02 - Reactor water level effects on reactor power	4.1*	1
295037	SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1				X			EA1.04 - SBLC	4.5*	1
500000	High Containment Hydrogen Concentration / 5		X					EK2.09 - Drywell nitrogen purge system	3.0	1
500000	High Containment Hydrogen Concentration / 5			X				EK3.01 - Initiation of containment atmosphere control system	2.9	1

K/A Category Totals: 4 3 3 2 1 0 **Group Point Total:** 13

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Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2 **Form ES-401-2**

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295002	Loss of Main Condenser Vacuum / 3		X					AK2.04 - Reactor/turbine pressure regulating system	3.2	1
295003	Partial or Complete Loss of A.C. Power / 6		X					AK2.03 - A.C. electrical distribution system	3.7	1
295003	Partial or Complete Loss of A.C. Power / 6				X			AA1.03 - Systems necessary to assure safe plant shutdown	4.4*	1
295004	Partial or Complete Loss of D.C. Power / 6			X				AK3.02 - Ground isolation/fault determination	2.9	1
295008	High Reactor Water Level / 2			X				AK3.04 - Reactor feed pump trip: Plant-Specific	3.3	1
295013	High Suppression Pool Temperature / 5					X		AA2.01 - Suppression pool temperature	3.8	1
295016	Control Room Abandonment / 7				X			AA1.04 - A.C. electrical distribution	3.1	1
295017	High Off-Site Release Rate / 9		X					AK2.04 - Plant ventilation systems	3.1	1
295017	High Off-Site Release Rate / 9			X				AK3.03 - †Implementation of site emergency plan	3.3	1
295018	Partial or Complete Loss of Component Cooling Water / 8						X	2.1.14 - Knowledge of system status criteria which require the notification of plant personnel.	2.5	1
295019	Partial or Complete Loss of Instrument Air / 8		X					AK2.17 - High pressure coolant injection: Plant-Specific	2.7	1
295020	Inadvertent Containment Isolation / 5					X		AA2.01 - Drywell/containment pressure	3.6	1
295028	High Drywell Temperature / 5	X						EK1.02 - Equipment environmental qualification	2.9	1
295029	High Suppression Pool Water Level / 5					X		EA2.02 - Reactor pressure	3.5	1

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Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

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E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295033	High Secondary Containment Area Radiation Levels / 9				X			EA1.01 - Area radiation monitoring system	3.9	1
295034	Secondary Containment Ventilation High Radiation / 9	X						EK1.01 - Personnel protection	3.8	1
295038	High Off-Site Release Rate / 9	X						EK1.03 - †Meteorological effects on off-site release	2.8	1
295038	High Off-Site Release Rate / 9				X			EA1.03 - Process liquid radiation monitoring system	3.7	1
600000	Plant Fire On Site / 8	X						AK1.02 - Fire Fighting	2.9	1

K/A Category Totals: 4 4 3 4 3 1

Group Point Total: 19

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Emergency and Abnormal Plant Evolutions - Tier 1 / Group 3

Form ES-401-2

E/APE #	E/APE Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
295023	Refueling Accidents / 8				X			AA1.03 - Fuel handling equipment	3.3	1
295023	Refueling Accidents / 8						X	2.1.14 - Knowledge of system status criteria which require the notification of plant personnel.	2.5	1
295032	High Secondary Containment Area Temperature / 5				X			EA1.03 - Secondary containment ventilation	3.7	1
295035	Secondary Containment High Differential Pressure / 5			X				EK3.02 - Secondary containment ventilation response	3.3	1

K/A Category Totals: 0 0 1 2 0 1

Group Point Total: 4

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Plant Systems - Tier 2 / Group 1

Form ES-401-2

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
201001	Control Rod Drive Hydraulic System / 1		X										K2.05 - Alternate rod insertion valve solenoids: Plant-Specific	4.5*	1
202002	Recirculation Flow Control System / 1				X								K4.05 - Limiting recirculation pump speed mismatch: Plant-Specific	3.1	1
202002	Recirculation Flow Control System / 1					X							K5.01 - Fluid coupling: BWR-3, 4	2.8	1
206000	High Pressure Coolant Injection System / 2						X						K6.09 - Condensate storage and transfer system: BWR-2, 3, 4	3.5	1
206000	High Pressure Coolant Injection System / 2							X					A1.06 - System flow: BWR-2, 3, 4	3.8	1
207000	Isolation (Emergency) Condenser / 4			X									K3.02 - †Reactor water level (EPG's address the isolation condenser as a water source): BWR-2, 3	3.8*	1
209001	Low Pressure Core Spray System / 2	X											K1.10 - Emergency generator	3.7	1
209001	Low Pressure Core Spray System / 2			X									K3.03 - Emergency generators	2.9	1
211000	Standby Liquid Control System / 1		X										K2.02 - Explosive valves	3.1*	1
212000	Reactor Protection System / 7		X										K2.01 - RPS motor-generator sets	3.2	1
212000	Reactor Protection System / 7										X		A4.06 - Control rod position	4.2*	1

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ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-2**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
215004	Source Range Monitor (SRM) System / 7										X		A4.04 - SRM drive control switches	3.2	1
215005	Average Power Range Monitor/Local Power Range Monitor System / 7									X			A3.07 - RPS status	3.8	1
215005	Average Power Range Monitor/Local Power Range Monitor System / 7					X							K5.06 - Assignment of LPRM's to specific APRM channels	2.5*	1
216000	Nuclear Boiler Instrumentation / 7						X						K6.01 - A.C. electrical distribution	3.1	1
216000	Nuclear Boiler Instrumentation / 7				X								K4.01 - Reading of nuclear boiler parameters outside the control room	3.6	1
218000	Automatic Depressurization System / 3			X									K3.01 - Restoration of reactor water level after a break that does not depressurize the reactor when required	4.4*	1
218000	Automatic Depressurization System / 3				X								K4.01 - Prevent inadvertent initiatior of ADS logic	3.7	1
223001	Primary Containment System and Auxiliaries / 5									X			A3.02 - Vacuum breaker/relief valve operation	3.4	1
223002	Primary Containment Isolation System/Nuclear Steam Supply Shut-Off / 5	X											K1.19 - Component cooling water systems	2.7	1

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ES - 401 Plant Systems - Tier 2 / Group 1 Form ES-401-2

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
241000	Reactor/Turbine Pressure Regulating System / 3											X	2.4.4 - Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.0	1
259001	Reactor Feedwater System / 2											X	2.1.2 - Knowledge of operator responsibilities during all modes of plant operation.	3.0	1
259002	Reactor Water Level Control System / 2								X				A2.01 - Loss of any number of main steam flo inputs	3.3	1
259002	Reactor Water Level Control System / 2										X		A4.06 - DP/Single/three element control selector switch: Plant-Specific	3.1	1
261000	Standby Gas Treatment System / 9								X				A2.04 - High train moisture content	2.5	1
261000	Standby Gas Treatment System / 9								X				A2.13 - High secondary containment ventilation exhaust radiation	3.4	1
264000	Emergency Generators (Diesel/Jet) / 6							X					A1.09 - Maintaining minimum load on emergency generator (to prevent reverse power)	3.0	1
264000	Emergency Generators (Diesel/Jet) / 6									X			A3.06 - Cooling water system operation	3.1	1
K/A Category Totals:		2	3	3	3	2	2	2	3	3	3	2	Group Point Total:		28

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ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-2**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
201006	Rod Worth Minimizer System (RWM) (Plant Specific) / 7									X			A3.05 - Latched group indication: P-Spec(Not-BWR6)	3.0	1
202001	Recirculation System / 1						X						K6.02 - Component cooling water systems	3.1	1
205000	Shutdown Cooling System (RHR Shutdown Cooling Mode) / 4				X								K4.03 - Low reactor water level: Plant-Specific	3.8	1
205000	Shutdown Cooling System (RHR Shutdown Cooling Mode) / 4										X		A4.11 - Heat exchanger cooling flow	3.2	1
215002	Rod Block Monitor System / 7	X											K1.01 - APRM: BWR-3, 4, 5	2.9	1
219000	RHR/LPCI: Torus/Suppression Pool Cooling Mode / 5							X					A1.02 - System flow	3.5	1
219000	RHR/LPCI: Torus/Suppression Pool Cooling Mode / 5								X				A2.05 - A.C. electrical failures	3.3	1
226001	RHR/LPCI: Containment Spray System Mode / 5		X										K2.02 - Pumps	2.9*	1
226001	RHR/LPCI: Containment Spray System Mode / 5					X							K5.02 - Water hammer	2.6	1
230000	RHR/LPCI: Torus/Suppression Pool Spray Mode / 5						X						K6.05 - Suppression pool	3.3	1
239001	Main and Reheat Steam System / 3					X							K5.06 - Air operated MSIV's	2.8	1

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ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-2**

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
245000	Main Turbine Generator and Auxiliary Systems / 4			X									K3.02 - Reactor pressure	3.9	1
256000	Reactor Condensate System / 2								X				A2.12 - Loss of equipment component cooling water systems	3.1	1
262001	A.C. Electrical Distribution / 6		X										K2.01 - Off-site sources of power	3.3	1
262001	A.C. Electrical Distribution / 6							X					A1.01 - Effect on instrumentation and controls of switching power supplies	3.1	1
262002	Uninterruptable Power Supply (A.C./D.C.) / 6			X									K3.17 - Process monitoring: Plant-Specific	2.9	1
271000	Offgas System / 9					X							K5.07 - Radioactive decay	2.7	1
290003	Control Room HVAC / 9									X			A3.01 - Initiation/reconfiguration	3.3	1
300000	Instrument Air System (IAS) / 8				X								K4.02 - Cross-over to other air systems	3.0	1
K/A Category Totals:		1	2	2	2	3	2	2	2	2	1	0	**Group Point Total:**		19

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Plant Systems - Tier 2 / Group 3

Form ES-401-2

Sys/Ev #	System / Evolution Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
215001	Traversing In-Core Probe / 7									X			A3.03 - Valve operation: Not-BWR1	2.5*	1
234000	Fuel Handling Equipment / 8								X				A2.03 - †Loss of electrical power	2.8	1
288000	Plant Ventilation Systems / 9								X				A2.01 - High drywell pressure: Plant-Specific	3.3	1
288000	Plant Ventilation Systems / 9											X	2.1.33 - Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	3.4	1
K/A Category Totals:		0	0	0	0	0	0	0	2	1	0	1	**Group Point Total:**		4

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Generic Knowledge and Abilities Outline (Tier 3)

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Form ES-401-5

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.22	Ability to determine Mode of Operation.	2.8	1
	2.1.8	Ability to coordinate personnel activities outside the control room.	3.8	1
	2.1.32	Ability to explain and apply system limits and precautions.	3.4	1
			Category Total:	3
Equipment Control	2.2.26	Knowledge of refueling administrative requirements.	2.5	1
	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.	4.0	1
	2.2.34	Knowledge of the process for determining the internal and external effects on core reactivity.	2.8	1
			Category Total:	3
Radiation Control	2.3.2	Knowledge of facility ALARA program.	2.5	1
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5	1
	2.3.1	Knowledge of 10 CFR 20 and related facility radiation control requirements.	2.6	1
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	1
			Category Total:	4
Emergency Plan	2.4.7	Knowledge of event based EOP mitigation strategies.	3.1	1
	2.4.35	Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications.	3.3	1
	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.	3.3	1
			Category Total:	3
			Generic Total:	13