

RO Examination Outline

ES-401

BWR Examination Outline

Form ES-401-1

Facility: MNGP															Date of Exam: 12/06/2010														
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 Evolutions	1	3	3	3	N/A			3	4	N/A			4	20	5		2	7											
	2	1	1	1				2	1				1	7	2		1	3											
	Tier Totals	4	4	4				5	5				5	27	7		3	10											
2. Plant Systems	1	3	3	3	3	2	2	2	2	2	2	2	2	26	3		2	5											
	2	1	1	1	1	1	1	1	1	1	2	1	12	n/a	2	1	3												
	Tier Totals	4	4	4	4	3	3	3	3	3	4	3	38	5		3	8												
3. Generic Knowledge and Abilities Categories					1		2		3		4		10		1	2	3	4	7										
					3		3		2		2		2	2	1	2													
<p>Note:</p> <ol style="list-style-type: none"> 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). 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. 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/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements. 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. 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. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories. * 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. Refer to Section D.1.b of ES-401 for the applicable K/As. 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; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams. 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. 																													

RO Examination Outline

ES-401

2

Form ES-401-1

BWR Examination Outline							Form ES-401-1			
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)										
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4					X		AA2.02 Neutron monitoring	3.1	1	
295003 Partial or Complete Loss of AC / 6						X	2.2.22 Knowledge of limiting conditions for operations and safety limits.	4.0	2	
295004 Partial or Total Loss of DC Pwr / 6	X						AK1.05 Loss of breaker protection	3.3	3	
295005 Main Turbine Generator Trip / 3		X					AK2.07 Reactor pressure control	3.6	4	
295006 SCRAM / 1			X				AK3.01 Reactor water level response	3.8	5	
295016 Control Room Abandonment / 7				X			AA1.01 RPS	3.8	6	
295018 Partial or Total Loss of CCW / 8					X		AA2.03 Cause for partial or complete loss	3.2	7	
295019 Partial or Total Loss of Inst. Air / 8						X	2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	8	
295021 Loss of Shutdown Cooling / 4					X		AA2.05 Reactor vessel metal temperature	3.4	9	
295023 Refueling Acc / 8						X	2.4.31 Knowledge of annunciator alarms, indications or response procedures.	4.2	10	
295024 High Drywell Pressure / 5	X						EK1.01 Drywell integrity	4.1	11	
295025 High Reactor Pressure / 3		X					EK2.04 ARI/RPT/ATWS	3.9	12	
295026 Suppression Pool High Water Temp. / 5			X				EK3.01 Emergency/normal depressurization	3.8	13	
295027 High Containment Temperature / 5							N/A MNGP			
295028 High Drywell Temperature / 5				X			EA1.05 ADS	3.7	14	
295030 Low Suppression Pool Wtr Lvl / 5					X		EA2.04 Drywell/suppression chamber differential pressure	3.5	15	
295031 Reactor Low Water Level / 2						X	2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5	16	
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1	X						EK1.04 Hot shutdown boron weight	3.4	17	
295038 High Off-site Release Rate / 9		X					EK2.07 Control room ventilation	3.5	18	
600000 Plant Fire On Site / 8			X				AK3.04 Actions contained in the abnormal procedure for plant fire on site	2.8	19	
700000 Generator Voltage and Electric Grid Disturbances / 6				X			AA1.04 Reactor controls	4.1	20	
K/A Category Totals:	3	3	3	3	4	4	Group Point Total:	20		

RO Examination Outline

ES-401

3

Form ES-401-1

ES-401							BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)				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												
295007 High Reactor Pressure / 3												
295008 High Reactor Water Level / 2												
295009 Low Reactor Water Level / 2												
295010 High Drywell Pressure / 5			X				AK3.01 Drywell venting	3.8		21		
295011 High Containment Temp / 5							N/A MNGP					
295012 High Drywell Temperature / 5				X			AA1.01 Drywell ventilation system	3.5		22		
295013 High Suppression Pool Temp. / 5				X			AA1.01 Suppression pool cooling	3.9		23		
295014 Inadvertent Reactivity Addition / 1												
295015 Incomplete SCRAM / 1					X		AA2.01 Reactor power	4.1		24		
295017 High Off-site Release Rate / 9						X	2.4.1 Knowledge of EOP entry conditions and immediate action steps.	4.6		25		
295020 Inadvertent Cont. Isolation / 5 & 7												
295022 Loss of CRD Pumps / 1												
295029 High Suppression Pool Wtr Lvl / 5	X						EK1.01 Containment integrity	3.4		26		
295032 High Secondary Containment Area Temperature / 5												
295033 High Secondary Containment Area Radiation Levels / 9												
295034 Secondary Containment Ventilation High Radiation / 9		X					EK2.06 PCIS	3.9		27		
295035 Secondary Containment High Differential Pressure / 5												
295036 Secondary Containment High Sump/Area Water Level / 5												
500000 High CTMT Hydrogen Conc. / 5												
K/A Category Point Totals:	1	1	1	2	1	1	Group Point Total:			7		

RO Examination Outline

ES-401

4

Form ES-401-1

BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)													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									K3.04 Adequate core cooling	4.6	28
205000 Shutdown Cooling				X								K4.05 Reactor cooldown rate	3.6	29
206000 HPCI					X							K5.05 Turbine speed control	3.3	30
207000 Isolation (Emergency) Condenser												N/A MNGP		
209001 LPCS						X						K6.02 Emergency Generators	3.8	31
209002 HPCS												N/A MNGP		
211000 SLC							X					A1.06 Flow indication	3.8	32
212000 RPS								X				A2.15 Load rejection	3.7	33
215003 IRM									X			A3.02 Annunciator and alarm signals	3.3	34
215004 Source Range Monitor										X		A4.06 Alarms and lights	3.2	35
215005 APRM / LPRM	X										G	K1.07 Process computer, performance monitoring system	2.6	36
												2.2.37 Ability to determine operability and/or availability of safety related equipment.	3.6	37
217000 RCIC	X	X										K1.03 Suppression pool	3.6	38
												K2.03 RCIC flow controller	2.7	39
218000 ADS		X	X									K2.01 ADS logic	3.1	40
												K3.02 Ability to rapidly depressurize the reactor	4.5	41
223002 PCIS/Nuclear Steam Supply Shutoff			X	X								K3.14 Recirculation system	3.0	42
												K4.03 Manual initiation capability	3.5	43
239002 SRVs				X	X							K4.01 Insures that only one or two safety/relief valves reopen following the initial portion of a reactor isolation event (LLS Logic)	3.9	44
												K5.04 Tailpipe temperature monitoring	3.3	45
259002 Reactor Water Level Control						X						K6.04 Reactor feedwater flow input	3.1	46
261000 SGTS							X					A1.03 Off-site release levels	3.2	47
262001 AC Electrical Distribution								X				A2.10 Exceeding current limitations	2.9	48
262002 UPS (AC/DC)									X			A3.01 Transfer from preferred to alternate source	2.8	49
263000 DC Electrical Distribution										X		A4.01 Major breakers and control power fuses	3.3	50
264000 EDGs											X	2.4.35 Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects	3.8	51
300000 Instrument Air	X											K1.05 Main Steam Isolation Valve air	3.1	52
400000 Component Cooling Water		X										K2.01 CCW pumps	2.9	53
K/A Category Point Totals:	3	3	3	3	2	2	2	2	2	2	2	Group Point Total:		26

RO Examination Outline

ES-401

5

Form ES-401-1

BWR Examination Outline Plant Systems - Tier 2/Group 2 (RO)														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							K5.03 Pressure indication	2.7	54	
201002 RMCS															
201003 Control Rod and Drive Mechanism															
201004 RSCS												N/A MNGP			
201005 RCIS												N/A MNGP			
201006 RWM						X						K6.03 Rod position indication	2.9	55	
202001 Recirculation							X					A1.12 Recirculation pump differential pressure	2.6	56	
202002 Recirculation Flow Control								X				A2.07 Loss of feedwater signal inputs	3.3	57	
204000 RWCU									X			A3.04 Response to interlocks and trips designed to protect system components	3.4	58	
214000 RPIS															
215001 Traversing In-core Probe										X		A4.03 Isolation valves	3.0	59	
215002 RBM															
216000 Nuclear Boiler Inst.															
219000 RHR/LPCI: Torus/Pool Cooling Mode															
223001 Primary CTMT and Aux.															
226001 RHR/LPCI: CTMT Spray Mode										X		A4.07 Valve logic reset/ bypass/ override	3.5	60	
230000 RHR/LPCI: Torus/Pool Spray Mode															
233000 Fuel Pool Cooling/Cleanup															
234000 Fuel Handling Equipment															
239001 Main and Reheat Steam															
239003 MSIV Leakage Control															
241000 Reactor/Turbine Pressure Regulator															
245000 Main Turbine Gen. / Aux.											X	2.1.28 Knowledge of the purpose and function of major system components and controls	4.1	61	
256000 Reactor Condensate															
259001 Reactor Feedwater	X											K.1.11 RFP lube oil system	2.7	62	
268000 Radwaste															
271000 Offgas															
272000 Radiation Monitoring		X										K2.05 Reactor building ventilation monitors	2.6	63	
286000 Fire Protection			X									K3.01 The ability to detect fires	3.2	64	
288000 Plant Ventilation															
290001 Secondary CTMT															
290003 Control Room HVAC															
290002 Reactor Vessel Internals				X								K4.03 Core orificing	3.2	65	
K/A Category Point Totals:	1	1	1	1	1	1	1	1	1	2	1	Group Point Total:		12	

SRO Examination Outline

ES-401

2

Form ES-401-1

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (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	2.2.40 Ability to apply Technical Specifications for a system.	4.7	76
295003 Partial or Complete Loss of AC / 6									
295004 Partial or Total Loss of DC Pwr / 6					X		AA2.04 System lineups	3.3	77
295005 Main Turbine Generator Trip / 3									
295006 SCRAM / 1					X		AA2.02 Control rod position	4.4	78
295016 Control Room Abandonment / 7									
295018 Partial or Total Loss of CCW / 8									
295019 Partial or Total Loss of Inst. Air / 8						X	2.1.20 Ability to interpret and execute procedure steps.	4.6	79
295021 Loss of Shutdown Cooling / 4									
295023 Refueling Acc / 8									
295024 High Drywell Pressure / 5									
295025 High Reactor Pressure / 3									
295026 Suppression Pool High Water Temp. / 5									
295027 High Containment Temperature / 5							N/A MNGP		
295028 High Drywell Temperature / 5									
295030 Low Suppression Pool Wtr Lvl / 5									
295031 Reactor Low Water Level / 2					X		EA2.01 Reactor water level	4.6	80
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1									
295038 High Off-site Release Rate / 9									
600000 Plant Fire On Site / 8					X		AA2.15 Requirements for establishing a fire watch	3.5	81
700000 Generator Voltage and Electric Grid Disturbances / 6					X		AA2.08 Criteria to trip the turbine or reactor	4.4	82
K/A Category Totals:					5	2	Group Point Total:		7

SRO Examination Outline

ES-401

3

Form ES-401-1

<div> <div>ES-401</div> <div>BWR Examination Outline</div> <div>Form ES-401-1</div> </div>									
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (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									
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2									
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5							N/A MNGP		
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5					X		AA2.01 Suppression pool temperature	4.0	83
295014 Inadvertent Reactivity Addition / 1									
295015 Incomplete SCRAM / 1									
295017 High Off-site Release Rate / 9									
295020 Inadvertent Cont. Isolation / 5 & 7					X		AA2.06 Cause of isolation	3.8	84
295022 Loss of CRD Pumps / 1									
295029 High Suppression Pool Wtr Lvl / 5									
295032 High Secondary Containment Area Temperature / 5						X	2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	4.2	85
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5									
500000 High CTMT Hydrogen Conc. / 5									
K/A Category Point Totals:					2	1	Group Point Total:		3

SRO Examination Outline

ES-401**4****Form ES-401-1**

BWR Examination Outline														Form ES-401-1	
Plant Systems - Tier 2/Group 1 (SRO)															
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															
205000 Shutdown Cooling															
206000 HPCI															
207000 Isolation (Emergency) Condenser												N/A MNGP			
209001 LPCS															
209002 HPCS												N/A MNGP			
211000 SLC															
212000 RPS															
215003 IRM															
215004 Source Range Monitor															
215005 APRM / LPRM															
217000 RCIC															
218000 ADS															
223002 PCIS/Nuclear Steam Supply Shutoff															
239002 SRVs								X				A2.04 ADS actuation	4.2	86	
259002 Reactor Water Level Control											X	2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	87	
261000 SGTS								X				A2.13 High secondary containment ventilation exhaust radiation.	3.7	88	
262001 AC Electrical Distribution											X	2.4.18 Knowledge of the specific bases for EOPs	4.0	89	
262002 UPS (AC/DC)								X				A2.01 Undervoltage	2.8	90	
263000 DC Electrical Distribution															
264000 EDGs															
300000 Instrument Air															
400000 Component Cooling Water															
K/A Category Point Totals:								3			2	Group Point Total:		5	

SRO Examination Outline

ES-401

5

Form ES-401-1

ES-401 BWR Examination Outline Plant Systems - Tier 2/Group 2 (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															
201002 RMCS															
201003 Control Rod and Drive Mechanism								X				A2.10 Excessive SCRAM time for a given drive mechanism	3.4	91	
201004 RSCS												N/A MNGP			
201005 RCIS												N/A MNGP			
201006 RWM															
202001 Recirculation															
202002 Recirculation Flow Control															
204000 RWCU															
214000 RPIS															
215001 Traversing In-core Probe															
215002 RBM															
216000 Nuclear Boiler Inst.											X	2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes.	4.3	92	
219000 RHR/LPCI: Torus/Pool Cooling Mode															
223001 Primary CTMT and Aux.															
226001 RHR/LPCI: CTMT Spray Mode															
230000 RHR/LPCI: Torus/Pool Spray Mode															
233000 Fuel Pool Cooling/Cleanup															
234000 Fuel Handling Equipment															
239001 Main and Reheat Steam															
239003 MSIV Leakage Control															
241000 Reactor/Turbine Pressure Regulator															
245000 Main Turbine Gen. / Aux.															
256000 Reactor Condensate															
259001 Reactor Feedwater															
268000 Radwaste															
271000 Offgas															
272000 Radiation Monitoring															
286000 Fire Protection															
288000 Plant Ventilation															
290001 Secondary CTMT								X				A2.01 Personnel airlock failure	3.7	93	
290003 Control Room HVAC															
290002 Reactor Vessel Internals															
K/A Category Point Totals:								2			1	Group Point Total:		3	