

Facility: Vermont Yankee														Date of Exam:				
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	5	2	3	N/A			3	5	N/A			2	20			7	
	2	3	2	0				1	1				0	7			3	
	Tier Totals	8	4	3				4	6				2	27			10	
2. Plant Systems	1	4	1	2	4	2	3	1	2	3	1	3	26			5		
	2	1	1	1	1	1	2	1	2	1	1	0	12			3		
	Tier Totals	5	2	3	5	3	5	2	4	4	2	3	38			8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7
					2		3		2		3							
<p>Note:</p> <ol style="list-style-type: none"> <li>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).</li> <li>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 <math>\pm 1</math> 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.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</li> <li>* 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.</li> <li>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.</li> <li>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.</li> </ol>																		

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4		X					Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION and AK2.07 Core flow indication	3.4	1	
295003 Partial or Complete Loss of AC / 6					X		Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : AA2.04 System lineups	3.5	2	
295004 Partial or Total Loss of DC Pwr / 6				X			Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER : AA1.02 Systems necessary to assure safe plant shutdown	3.8	3	
295005 Main Turbine Generator Trip / 3					X		Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP : AA2.08 Electrical distribution status.	3.2	4	
295006 SCRAM / 1	X						Knowledge of the operational implications of the following concepts as they apply to SCRAM : AK1.02 Shutdown margin	3.4	5	

295016 Control Room Abandonment / 7			X			Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT : AK3.03 Disabling control room controls	3.5	6
295018 Partial or Total Loss of CCW / 8					X	2.4.31 Knowledge of annunciator alarms, indications, or response procedures.	4.2	7
295019 Partial or Total Loss of Inst. Air / 8				X		Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR : AA2.01 Instrument air system pressure	3.5	8
295021 Loss of Shutdown Cooling / 4			X			Ability to operate and/or monitor the following as they apply to LOSS OF SHUTDOWN COOLING : AA1.01 Reactor water cleanup system	3.4	9
295023 Refueling Acc / 8	X					Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS : AK1.01 Radiation exposure hazards	3.2	10

295024 High Drywell Pressure / 5	X					Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE: EA1.20 Standby gas treatment/FRVS: Plant-Specific	3.5	11
295025 High Reactor Pressure / 3					X	K&A: Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE: EA2.03 Suppression pool temperature.	3.9	12
295026 Suppression Pool High Water Temp. / 5	X					Knowledge of the interrelations between SUPPRESSION POOL HIGH WATER TEMPERATURE and the following: EK2.02 Suppression pool spray: Plant-Specific	3.6	13
295027 High Containment Temperature / 5						Suppressed, no MK III containment at VY		
295028 High Drywell Temperature / 5	X					Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE : EK1.01 Reactor water level measurement	3.5	14

295030 Low Suppression Pool Wtr Lvl / 5		X				Knowledge of the interrelations between LOW SUPPRESSION POOL WATER LEVEL and the following: EK2.07 Downcomer/ horizontal vent submergence	3.5	15
295031 Reactor Low Water Level / 2					X	Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL : EA2.02 Reactor power	4.0	16
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1					X	2.4.18 Knowledge of the specific bases for EOPs.	3.3	17
295038 High Off-site Release Rate / 9			X			Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: EK3.02 System isolations	3.9	18

600000 Plant Fire On Site / 8			X				Knowledge of the reasons for the following responses as they apply to PLANT FIRE ON SITE: 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			Ability to operate and/or monitor the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: AA1.01 Grid frequency and voltage	3.6	20
K/A Category Totals:	5	2	3	3	5	2	Group Point Total:	20/7	

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295002 Loss of Main Condenser Vac / 3									
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2		X					Knowledge of the interrelations between HIGH REACTOR WATER LEVEL and the following: AK2.05 HPCI: Plant-Specific	3.8	21
295009 Low Reactor Water Level / 2	X						Knowledge of the operational implications of the following concepts as they apply to LOW REACTOR WATER LEVEL : AK1.02 Recirculation pump net positive suction head: Plant- Specific	3.0	22
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5							Suppressed, no MK III containment at VY		
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1	X						Knowledge of the operational implications of the following concepts as they apply to INADVERTENT REACTIVITY ADDITION : AK1.02 Reactivity anomaly	3.3	23

295015 Incomplete SCRAM / 1					X	Ability to determine and/or interpret the following as they apply to INCOMPLETE SCRAM : AA2.01 Reactor power	4.1	24
295017 High Off-site Release Rate / 9								
295020 Inadvertent Cont. Isolation / 5 & 7	X					Knowledge of the operational implications of the following concepts as they apply to INADVERTENT CONTAINMENT ISOLATION : AK1.01 Loss of normal heat sink	3.7	25
295022 Loss of CRD Pumps / 1								
295029 High Suppression Pool Wtr Lvl / 5								
295032 High Secondary Containment Area Temperature / 5		X				Knowledge of the interrelations between HIGH SECONDARY CONTAINMENT AREA TEMPERATURE and the following: EK2.04 PCIS/NSSSS	3.6	26
295033 High Secondary Containment Area Radiation Levels / 9								



295034 Secondary Containment Ventilation High Radiation / 9				X			Ability to operate and/or monitor the following as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION : EA1.02 Process radiation monitoring system	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:	3	2	0	1	1	0	Group Point Total:		7/3

ES-401		BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#	
203000 RHR/LPCI: Injection Mode	X											Knowledge of the physical connections and/or causeeffect relationships between RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) and the following: K1.06 Automatic depressurization	3.9	28	
205000 Shutdown Cooling		X										Knowledge of electrical power supplies to the following: K2.02 Motor operated valves	2.5	29	
206000 HPCI				X								Knowledge of HIGH PRESSURE COOLANT INJECTION SYSTEM design feature(s) and/or interlocks which provide for the following: K4.04 Resetting system isolations: BWR-2,3,4	4.0	30	

206000 HPCI					X										Knowledge of the effect that a loss or malfunction of the following will have on the HIGH PRESSURE COOLANT INJECTION SYSTEM : K6.05 Suppression pool level: BWR-2,3,4	3.5	31
207000 Isolation (Emergency) Condenser															Suppressed, does not exist at VY		
209001 LPCS				X											Knowledge of LOW PRESSURE CORE SPRAY SYSTEM design feature(s) and/or interlocks which provide for the following: K4.08 Automatic system initiation	3.8	32
209002 HPCS															Suppressed, does not exist at VY		
211000 SLC				X											Knowledge of STANDBY LIQUID CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: K4.08 System initiation upon operation of SBLC control switch	4.2	33

211000 SLC														X	2.1.32 Ability to explain and apply system limits and precautions.	3.8	34
212000 RPS														X	2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	35
215003 IRM													X		Ability to monitor automatic operations of the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM including: A3.04 Control rod block status	3.5	36

215004 Source Range Monitor					X								Knowledge of the operational implications of the following concepts as they apply to SOURCE RANGE MONITOR (SRM) SYSTEM : K5.03 Changing detector position	2.8	37
215004 Source Range Monitor										X			Ability to monitor automatic operations of the SOURCE RANGE MONITOR (SRM) SYSTEM including: A3.04 control rod block status	3.6	38
215005 APRM / LPRM										X			Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A2.05 Loss of recirculation flow signal	3.5	39

215005 APRM / LPRM									X		Ability to monitor automatic operations of the AVERAGE POWER RANGE MONITOR /LOCAL POWER RANGE MONITOR SYSTEM including: A3.03 Meters and recorders	3.3	40
217000 RCIC					X						Knowledge of the operational implications of the following concepts as they apply to REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) : K5.01 Indications of pump cavitation	2.6	41
218000 ADS						X					Knowledge of the effect that a loss or malfunction of the following will have on the AUTOMATIC DEPRESSURIZATION SYSTEM : K6.03 Nuclear boiler instrument system (level indication)	3.8	42

223002 PCIS/Nuclear Steam Supply Shutoff			X													Knowledge of the effect that a loss or malfunction of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF will have on following: K3.07 Reactor pressure	3.7	43
239002 SRVs	X															Knowledge of the operational implications of the following concepts as they apply to RELIEF/SAFETY VALVES : K5.06 Vacuum breaker operation	2.7	44
259002 Reactor Water Level Control										X						Ability to manually operate and/or monitor in the control room: A4.04 FWRV lockup reset controls	3.7	45

261000 SGTS			X														Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on following: K3.04 High pressure coolant injection system: Plant- Specific	3.1	46
261000 SGTS	X																Knowledge of the physical connections and/or cause effect relationships between STANDBY GAS TREATMENT SYSTEM and the following: Primary containment pressure	3.2	47



262001 AC Electrical Distribution										X	2.4.11 Knowledge of abnormal condition procedures.	4.0	48
262002 UPS (AC/DC)				X							Knowledge of UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) design feature(s) and/or interlocks which provide for the following: Transfer from preferred power to alternate power supplies	3.1	49
263000 DC Electrical Distribution					X						Knowledge of the effect that a loss or malfunction of the following will have on the D.C. ELECTRICAL DISTRIBUTION : K6.01 A.C. electrical distribution	3.2	50

[illegible]





215001 Traversing In-core Probe	X																	Knowledge of the physical connections and/or cause effect relationships between TRAVERSING IN-CORE PROBE and the following: K1.05 Primary containment isolation system: (Not-BWR1)	3.3	57
215002 RBM																				
216000 Nuclear Boiler Inst.																				
219000 RHR/LPCI: Torus/Pool Cooling Mode															X			Ability to manually operate and/or monitor in the control room: A4.12 Suppression pool temperature	4.1	58
223001 Primary CTMT and Aux.															X			Ability to monitor automatic operations of the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES including: A3.03 System indicating light and alarms	3.4	59

[illegible]

241000 Reactor/Turbine Pressure Regulator					X						Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR/TURBINE PRESSURE REGULATING SYSTEM : K6.06 Reactor pressure	3.8	62
245000 Main Turbine Gen. / Aux.													
256000 Reactor Condensate													
259001 Reactor Feedwater		X									Knowledge of electrical power supplies to the following: K2.01 Reactor feedwater pump(s): Motor-Driven-Only	3.3	63
268000 Radwaste													
271000 Offgas					X						Knowledge of the effect that a loss or malfunction of the following will have on the OFFGAS SYSTEM : K6.11 Condenser vacuum	3.2	64

272000 Radiation Monitoring			X												Knowledge of the effect that a loss or malfunction of the RADIATION MONITORING System will have on following: K3.05 Offgas system	3.5	65
286000 Fire Protection																	
288000 Plant Ventilation																	
290001 Secondary CTMT																	
290003 Control Room HVAC																	
290002 Reactor Vessel Internals																	
K/A Category Point Totals:	1	1	1	1	1	2	1	2	1	1					Group Point Total:		12/3



Facility:		Date of Exam:					
Category	K/A #	Topic	RO		SRO-Only		
			IR	#	IR	#	
1. Conduct of Operations	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	66			
	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	67			
	Subtotal			2			
2. Equipment Control	2.2.12	Knowledge of surveillance procedures.	3.7	68			
	2.2.42	Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	3.9	69			

	2.2.25	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	3.2	70		
	Subtotal			3		
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency   conditions.	3.2	71		
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	72		
	Subtotal			2		
4. Emergency Procedures / Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps.	4.6	73		

	2.4.8	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	3.8	74		
	2.4.18	Knowledge of the specific bases for EOPs.	3.3	75		
	Subtotal			3		
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
Tier 1/ Group 1	295023/AK1.02 replaced with AK1.01	This K&A selection resulted in exam overlap with question #5 for the K&A statement about Shutdown margin. Although different topic names/areas the concept is of limited use in operator knowledge discrimination. Randomly selected AK1.01, Radiation exposure hazards.
Tier 2/ Group 1	2003000/K1.18 replaced with K1.06	This K&A statement ask what the physical relationship between RHR/LPCI and the Reactor vessel is. It would be difficult to write an adequate question beyond what the RHR to vessel flowpath is. Randomly selected K1.06 for the ADS relationship to RHR.
Tier 2/ Group 1	215004/A3.03 replaced with A3.04	This K&A for monitoring SRM operation and RPS status would not have resulted in a valid question. The only connection would be using the concept of RPS shorting links removed which VY has not done in many years and has no operational intention or need of doing to make the logic system non-coincidence. A question about control rod block status is more operationally relevant.
Tier 2/ Group 2	202002/K4.05 replaced with K4.02	This K&A statement was for design features of recirculation flow control that limited recirc pump speed mismatch. There are no design features at VY that do this. Another statement was randomly chosen resulting in a much broader area of knowledge in this topic.
Tier 2/ Group 2	241000/K6.14 replaced with K6.06	This K&A statement on the bearing oil malfunction to reactor/turbine pressure control was a low value (2.7) and would result in limited topics for a valid RO question. Randomly chose K6.06 for a better higher cognitive question result.
Tier 1/ Group 1	295025/EA2.05 replaced with EA2.03	Unable to write a sufficiently discriminating question to this K/A. The original K/A was for decay heat generation which the Chief Examiner and the utility agreed would only result in a GFES level question. Randomly selected within the topic area.
Tier 2/ Group 1	239002/K5.06 replaced with K1.06	Unable to write a sufficiently discriminating question to this K/A. The original K/A was for vacuum breaker operation on SRV's which the Chief Examiner and the utility agreed would only result in a GFES level question. Randomly selected within the topic area.
Tier 2/ Group 1	261000/K4.05 replaced with K1.11	Unable to write an operationally significant question to this K/A for SBT iodine removal. The Chief Examiner and the utility agreed would only result in a GFES level question. Randomly selected within the topic area.