

Facility: Fermi		Date of Exam: January 2020																	
Tier	Group	RO K/A Category Points											SRO-Only Points						
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2	G*	Total			
1. Emergency and Abnormal Plant Evolutions	1	3	3	4	N/A			4	3	N/A			3	20	4	3	7		
	2	2	1	1	N/A			1	1	N/A			1	7	1	2	3		
	Tier Totals	5	4	5	N/A			5	4	N/A			4	27	5	5	10		
2. Plant Systems	1	2	2	3	2	3	2	3	2	2	3	2	26	3	2	5			
	2	1	1	1	1	1	2	1	1	1	1	1	12	0	1	2	3		
	Tier Totals	3	3	4	3	4	4	4	3	3	4	3	38	4	4	8			
3. Generic Knowledge and Abilities Categories					1		2		3		4		10		1	2	3	4	7
					3		2		2		3				2	2	1	2	

- Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)
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 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.
3. Systems/evolutions within each group are identified on the outline. Systems or evolutions that do not apply at the facility should be deleted with justification. 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.
4. 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.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7. 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.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' 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 a category 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.
9. 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.

G* Generic K/As

- * These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.
- ** These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO)						Form ES-401-1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
295001 (APE 1) Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4			06				AK3.06 – Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Core flow indication. (CFR: 41.5 / 45.6)	2.9	1
295003 (APE 3) Partial or Complete Loss of AC Power / 6				02			AA1.02 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF AC POWER: Emergency generators. (CFR: 41.7 / 45.6)	4.2	2
295004 (APE 4) Partial or Total Loss of DC Power / 6					01		AA2.01 – Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF DC POWER: Cause of partial or complete loss of DC power. (CFR: 41.10 / 43.5 / 45.13)	3.2	3
295005 (APE 5) Main Turbine Generator Trip / 3						01.20	G2.1.20 – Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	4
295006 (APE 6) Scram / 1	03						AK1.03 – Knowledge of the operational implications of the following concepts as they apply to SCRAM: Reactivity control (CFR: 41.8 to 41.10)	3.7	5
295016 (APE 16) Control Room Abandonment / 7		01					AK2.01 – Knowledge of the interrelations between CONTROL ROOM ABANDONMENT and the following: Remote shutdown panel: Plant-specific (CFR: 41.7 / 45.6)	4.4	6
295018 (APE 18) Partial or Complete Loss of CCW / 8			02				AK3.02 – Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: Reactor power reduction. (CFR: 41.5 / 45.6)	3.3	7
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8				01			AA1.01 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Backup air supply. (CFR: 41.7 / 45.6)	3.5	8
295021 (APE 21) Loss of Shutdown Cooling / 4					02		AA2.02 – Ability to determine and/or interpret the following as they apply to LOSS OF SHUTDOWN COOLING: RHR/Shutdown cooling system flow. (CFR: 41.10 / 43.5 / 45.13)	3.4	9
295023 (APE 23) Refueling Accidents / 8						01.07	G2.1.7 – Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12, 45.13)	4.4	10
295024 High Drywell Pressure / 5	01						EK1.01 – Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE: Drywell integrity: Plant-specific. (CFR: 41.8 to 41.10)	4.1	11
295025 (EPE 2) High Reactor Pressure / 3		08					EK2.08 – Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following: Reactor/turbine regulating system: Plant-specific. (CFR: 41.7 / 45.8)	3.7	12

295026 (EPE 3) Suppression Pool High Water Temperature / 5			02			EK3.02 – Knowledge of the reasons for the following responses as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Suppression pool cooling. (CFR: 41.5 / 45.6)	3.9	13
295027 (EPE 4) High Containment Temperature (Mark III Containment Only) / 5								
295028 (EPE 5) High Drywell Temperature (Mark I and Mark II only) / 5				01		EA1.01 – Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell spray: Mark-1&II. (CFR: 41.7 / 45.6)	3.8	14
295030 (EPE 7) Low Suppression Pool Water Level / 5					02	EA2.03 – Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: Reactor pressure. (CFR: 41.10 / 43.5 / 45.13)	3.7	15
295031 (EPE 8) Reactor Low Water Level / 2					04.49	G2.4.49 – Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)	4.6	16
295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1	06					EK1.06 – Knowledge of the operational implications of the following concepts as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Cooldown effects on reactor power. (CFR: 41.8 to 41.10)	4.0	17
295038 (EPE 15) High Offsite Radioactivity Release Rate / 9		03				AK2.03 – Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following: Off gas system. (CFR: 41.7 / 45.8)	3.3	
						EK2.03 – Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following: Plant ventilation system. (CFR: 41.7 / 45.8)	3.6	18
600000 (APE 24) Plant Fire On Site / 8			04			AK3.04 – Knowledge of the reasons for the following responses as they apply to PLANT FIRE ON SITE: Actions contained in the abnormal procedure for plant fire on site. (CFR: 41.10 / 45.8)	2.8	19
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6				04		AA1.04 – Ability to operate and/or monitor the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Reactor controls. (CFR: 41.5, 41.10 / 45.5, 45.7, 45.8)	4.1	20
K/A Category Totals:	3	3	4	4	3	3	Group Point Total:	20

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO)						Form ES-401-1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
295002 (APE 2) Loss of Main Condenser Vacuum / 3									
295007 (APE 7) High Reactor Pressure / 3	04						AK1.04 – Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE: Turbine load. (CFR: 41.8 to 41.10)	2.7	21
295008 (APE 8) High Reactor Water Level / 2									
295009 (APE 9) Low Reactor Water Level / 2									
295010 (APE 10) High Drywell Pressure / 5		01					AK2.01 – Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Suppression pool level. (CFR: 41.7 / 45.8)	3.2	22
295011 (APE 11) High Containment Temperature (Mark III Containment only) / 5									
295012 (APE 12) High Drywell Temperature / 5									
295013 (APE 13) High Suppression Pool Temperature. / 5									
295014 (APE 14) Inadvertent Reactivity Addition / 1			02				AK3.02 – Knowledge of the reasons for the following responses as they apply to INADVERTENT REACTIVITY ADDITION: Control rod blocks. (CFR: 41.5 / 45.6)	3.7	23
295015 (APE 15) Incomplete Scram / 1				03			AA1.03 – Ability to operate and/or monitor the following as they apply to INCOMPLETE SCRAM: RMCS: Plant-specific. (CFR: 41.7 / 45.6)	3.6	24
295017 (APE 17) Abnormal Offsite Release Rate / 9									
295020 (APE 20) Inadvertent Containment Isolation / 5 & 7					05		AA2.05 – Ability to determine and/or interpret the following as they apply to INADVERTENT CONTAINMENT ISOLATION: Reactor water level. (CFR: 41.10 / 43.5 / 45.13)	3.6	25
295022 (APE 22) Loss of Control Rod Drive Pumps / 1									
295029 (EPE 6) High Suppression Pool Water Level / 5									
295032 (EPE 9) High Secondary Containment Area Temperature / 5									
295033 (EPE 10) High Secondary Containment Area Radiation Levels / 9						01. 20	G2.4.20 – Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)	3.8	26
295034 (EPE 11) Secondary Containment Ventilation High Radiation / 9									
295035 (EPE 12) Secondary Containment High Differential Pressure / 5	01						EK1.01 – Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE: Secondary containment integrity. (CFR: 41.8 to 41.10)	3.9	27

295036 (EPE 13) Secondary Containment High Sump/Area Water Level / 5									
500000 (EPE 16) High Containment Hydrogen Concentration / 5									
K/A Category Point Totals:	2	1	1	1	1	1	Group Point Total:		7

ES-401	BWR Examination Outline Plant Systems—Tier 2/Group 1 (RO)											Form ES-401-1		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
203000 (SF2, SF4 RHR/LPCI) RHR/LPCI: Injection Mode	x											K1.07 – Knowledge of the physical connections and/or cause-effect relationships between RHR/LPCI: INJECTINO MODE (PLANT SPECIFIC) and the following: DC electrical power. (CFR: 41.2 to 41.9 / 45.7, 45.8)	3.1	28
											02.42	G2.2.42 – Ability to recognize system parameters that are entry-level conditions for Technical Specifications. (CFR:41.7, 41.10 / 43.2, 43.3 / 45.3)	3.9	29
205000 (SF4 SCS) Shutdown Cooling										09		A4.09 – Ability to manually operate and/or monitor in the control room: System flow. (CFR: 41.7 / 45.5 to 45.8)	3.1	30
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection									04			A3.04 – Ability to monitor automatic operations of the HIGH PRESSURE COOLANT INJECTION SYSTEM including: System lineup: BWR-2,3,4 (CFR: 41.7 / 45.7)	4.2	31
207000 (SF4 IC) Isolation (Emergency) Condenser														
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray								08				A2.08 – Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Valve openings. (CFR: 41.5 / 45.6)	3.1	32
209002 (SF2, SF4 HPCS) High-Pressure Core Spray														
211000 (SF1 SLCS) Standby Liquid Control							09					A1.09 – Ability to predict and/or monitor changes in parameters associated with operating the STANDBY LIQUID CONTROL SYSTEM controls including: SBLC system lineup. (CFR: 41.5 / 45.5)	4.0	33
212000 (SF7 RPS) Reactor Protection					03							K6.03 – Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR PROTECTION SYSTEM: Nuclear boiler instrumentation. (CFR: 41.7 / 45.7)	3.5	34
215003 (SF7 IRM) Intermediate-Range Monitor					01							K5.01 – Knowledge of the operational implications of the following concepts as they apply to INTERMEDIATE RANGE MONITOR (IRM) SYSTEM: Detector operation. (CFR: 41.5 / 45.3)	2.6	35
215004 (SF7 SRMS) Source-Range Monitor			01									K3.01 – Knowledge of the effect that a loss or malfunction of the SOURCE RANGE MONITOR (SRM) SYSTEM will have on following: RPS. (CFR: 41.7 / 45.4)	3.4	36
				02								K4.02 – Knowledge of SOURCE RANGE MONITOR (SRM) SYSTEM design feature(s) and/or interlocks which provide for the following: Reactor SCRAM signals. (CFR: 41.7)	3.4	37

215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor			06															K3.06 – Knowledge of the effect that a loss or malfunction of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM will have on following: IRM: Plant-specific. (CFR: 41.7 / 45.4)	3.5	38
217000 (SF2, SF4 RCIC) Reactor Core Isolation Cooling			03															K2.03 – Knowledge of electrical power supplies to the following: RCIC flow controller (CFR: 41.7)	2.7	39
218000 (SF3 ADS) Automatic Depressurization			06															K1.06 – Knowledge of the physical connections and/or cause-effect relationships between AUTOMATIC DEPRESSURIZATION SYSTEM and the following: Safety/relief valves (CFR: 41.2 to 41.9 / 45.7, 45.8)	3.9	40
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff													01. 23					G2.1.23 – Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2, 45.6)	4.3	41
239002 (SF3 SRV) Safety Relief Valves													06					A4.06 – Ability to manually operate and/or monitor in the control room: Reactor water level. (CFR: 41.7 / 45.5 to 45.8)	3.9	42
259002 (SF2 RWLCS) Reactor Water Level Control						07												K5.07 – Knowledge of the operational implications of the following concepts as they apply to REACTOR WATER LEVEL CONTROL SYSTEM: Turbine speed control mechanisms: TDRFP. (CFR: 41.5 / 45.3)	2.7	43
													03					A3.03 – Ability to monitor automatic operations of the REACTOR WATER LEVEL CONTROL SYSTEM including: Changes in main steam flow. (CFR: 41.7 / 45.7)	3.2	44
261000 (SF9 SGTS) Standby Gas Treatment								04										A1.04 – Ability to predict and/or monitor changes in parameters associated with operating the STANDBY GAS TREATMENT SYSTEM controls including: Secondary containment differential pressure. (CFR: 41.5 / 45.5)	3.0	45
																		A2.05 – Ability to (a) predict the impacts of the following on the STANDBY GAS TREATMENT SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Fan trips. (CFR: 41.5 / 45.6)	3.0	46
262001 (SF6 AC) AC Electrical Distribution								03										A1.03 – Ability to predict and/or monitor changes in parameters associated with operating the AC ELECTRICAL DISTRIBUTION controls including: Bus voltage. (CFR: 41.5 / 45.5)	2.9	47
262002 (SF6 UPS) Uninterruptible Power Supply (AC/DC)								03										K6.03 – Knowledge of the effect that a loss or malfunction of the following will have on the UNINTERRUPTIBLE POWER SUPPLY (AC/DC): Static inverter. (CFR: 41.7 / 45.7)	2.7	48
263000 (SF6 DC) DC Electrical Distribution								01										K5.01 – Knowledge of the operational implications of the following concepts as they apply to DC ELECTRICAL DISTRIBUTION: Hydrogen generation during battery charging (CFR: 41.5 / 45.3)	2.6	49

264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG				06										K4.06 – Knowledge of EMERGENCY GENERATORS (DIESEL/JET) design feature(s) and/or interlocks which provide for the following: Governor control. (CFR: 41.7)	2.6	50									
											02			A4.02 – Ability to manually operate and/or monitor in the control room: Synchroscope (CFR: 41.7 / 45.5 to 45.8)	3.4	51									
300000 (SF8 IA) Instrument Air				02										K3.02 – Knowledge of the effect that a loss or malfunction of the (INSTRUMENT AIR SYSTEM) will have on the following: Systems having pneumatic valves and controls. (CFR: 41.7 / 45.6)	3.3	52									
400000 (SF8 CCS) Component Cooling Water				02										K2.02 – Knowledge of the electrical power supplies to the following: CCW valves. (CFR: 41.7)	2.9	53									
510000 (SF4 SWS*) Service Water (Normal and Emergency)																									
K/A Category Point Totals:													2	2	3	2	3	2	3	2	2	3	2	Group Point Total:	26

268000 (SF9 RW) Radwaste	09																	K1.09 – Knowledge of the physical connections and/or cause-effect relationships between RADWASTE and the following: ECCS systems. (CFR: 41.2 to 41.9 / 45.7, 45.8)	2.6	61
271000 (SF9 OG) Offgas			02															K3.02 – Knowledge of the effect that a loss or malfunction of the OFFGAS SYSTEM will have on the following: Off-site radioactive release rate. (CFR: 41.5 / 45.3)	3.3	62
272000 (SF7, SF9 RMS) Radiation Monitoring																				
286000 (SF8 FPS) Fire Protection				02														K4.02 – Knowledge of FIRE PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Automatic system initiation. (CFR: 41.5 / 45.7)	3.3	63
288000 (SF9 PVS) Plant Ventilation																				
290001 (SF5 SC) Secondary Containment																				
290003 (SF9 CRV) Control Room Ventilation					03													K5.03 – Knowledge of the operational implications of the following concepts as they apply to CONTROL ROOM HVAC: Temperature control. (CFR: 41.5 / 45.3)	2.6	64
290002 (SF4 RVI) Reactor Vessel Internals						07												K6.07 – Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR VESSEL INTERNALS: RWCU. (CFR: 41.7 / 45.7)	2.6	65
51001 (SF8 CWS*) Circulating Water																				
K/A Category Point Totals:	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	Group Point Total:		12

700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6					07	AA2.07 – Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Operational status of engineered safety features. (CFR: 41.5 / 43.5 / 45.5, 45.7, 45.8)	4.0	82
K/A Category Totals:					4	3	Group Point Total:	7

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E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#	
295002 (APE 2) Loss of Main Condenser Vacuum / 3										
295007 (APE 7) High Reactor Pressure / 3										
295008 (APE 8) High Reactor Water Level / 2										
295009 (APE 9) Low Reactor Water Level / 2										
295010 (APE 10) High Drywell Pressure / 5										
295011 (APE 11) High Containment Temperature (Mark III Containment only) / 5										
295012 (APE 12) High Drywell Temperature / 5						04-18	G2.4.18 – Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)	4.0	83	
295013 (APE 13) High Suppression Pool Temperature. / 5										
295014 (APE 14) Inadvertent Reactivity Addition / 1										
295015 (APE 15) Incomplete Scram / 1										
295017 (APE 17) Abnormal Offsite Release Rate / 9										
295020 (APE 20) Inadvertent Containment Isolation / 5 & 7										
295022 (APE 22) Loss of Control Rod Drive Pumps / 1					01		AA2.01 – Ability to determine and/or interpret the following as they apply to LOSS OF CRD PUMPS: Accumulator pressure. (CFR: 41.10 / 43.5 / 45.13)	3.6	84	
295029 (EPE 6) High Suppression Pool Water Level / 5						04-03	G2.4.3 – Ability to identify post-accident instrumentation. (CFR: 41.6 / 45.4)	3.9	85	
295032 (EPE 9) High Secondary Containment Area Temperature / 5										
295033 (EPE 10) High Secondary Containment Area Radiation Levels / 9										
295034 (EPE 11) Secondary Containment Ventilation High Radiation / 9										
295035 (EPE 12) Secondary Containment High Differential Pressure / 5										
295036 (EPE 13) Secondary Containment High Sump/Area Water Level / 5										
500000 (EPE 16) High Containment Hydrogen Concentration / 5										
K/A Category Point Totals:					1	2	Group Point Total:		3	

263000 (SF6 DC) DC Electrical Distribution										01											A2.01 – Ability to (a) predict the impacts of the following on the DC ELECTRICAL DISTRUBTION: and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Grounds. (CFR: 41.5 / 45.6)	3.2	90
264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG																							
300000 (SF8 IA) Instrument Air																							
400000 (SF8 CCS) Component Cooling Water																							
510000 (SF4 SWS*) Service Water (Normal and Emergency)																							
K/A Category Point Totals:											3										2	Group Point Total:	5

51001 (SF8 CWS*) Circulating Water															
K/A Category Point Totals:								1					2	Group Point Total:	3