Facility: **Fermi** Date of Exam: **6/17/2019 – 6/28/2019**

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	4	3	4	N/A			3	3	N/A		3	20	4		3		7				
	2	1	1	1				2	1			1	7	2		1		3				
	Tier Totals	5	4	5				5	4			4	27	6		4		10				
2. Plant Systems	1	3	2	2	2	2	3	2	3	2	3	2	26	3		2		5				
	2	1	1	1	1	1	1	1	1	1	1	2	12	0	2	1		3				
	Tier Totals	4	3	3	3	3	4	3	4	3	4	4	38	5		3		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						01.32	Generic K/A 2.1.32 - Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	3.8	1
295003 (APE 3) Partial or Complete Loss of AC Power / 6	01						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: Effect of battery discharge rate on capacity. (CFR: 41.8 to 41.10)	2.7	2
295004 (APE 4) Partial or Total Loss of DC Power / 6		01					AK2.01 - Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF D.C. POWER and the following: Battery charger. (CFR: 41.7 / 45.8)	3.1	3
295005 (APE 5) Main Turbine Generator Trip / 3			06				AK3.06 - Knowledge of the reasons for the following responses as they apply to MAIN TURBINE GENERATOR TRIP: Realignment of electrical distribution. (CFR: 41.5 / 45.6)	3.3	4
295006 (APE 6) Scram / 1				01			AA1.01 - Ability to operate and/or monitor the following as they apply to SCRAM: RPS. (CFR: 41.7 / 45.6)	4.2	5
295016 (APE 16) Control Room Abandonment / 7			03				AK3.03 - Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT: Disabling control room controls. (CFR: 41.5 / 45.6)	3.5	6
295018 (APE 18) Partial or Complete Loss of CCW / 8		02					AK2.02 - Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER and the following: Plant operations. (CFR: 41.7 / 45.8)	3.4	7
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8					02		AA2.02 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Status of safety-related instrument air loads (see AK2.1 – AK2.19). (CFR: 41.10 / 43.5 / 45.13)	3.6	8
295021 (APE 21) Loss of Shutdown Cooling / 4	02						AK1.02 - Knowledge of the operational implications of the following concepts as they apply to LOSS OF SHUTDOWN COOLING: Thermal stratification. (CFR: 41.8 to 41.10)	3.3	9
295023 (APE 23) Refueling Accidents / 8		07					AK2.07 - Knowledge of the interrelations between REFUELING ACCIDENTS and the following: Standby gas treatment/FRVS. (CFR: 41.7 / 45.8)	3.6	10
295024 High Drywell Pressure / 5				04			EA1.04 - Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE: RHR/LPCI. (CFR: 41.7 / 45.6)	4.1	11
295025 (EPE 2) High Reactor Pressure / 3			05				EK3.05 - Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE: RCIC operation: Plant-Specific. (CFR: 41.5 / 45.6)	3.6	12
295026 (EPE 3) Suppression Pool High Water Temperature / 5					01		EA2.01 - Ability to determine and/or interpret the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Suppression pool water temperature. (CFR: 41.10 / 43.5 / 45.13)	4.1	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					04		EA2.04 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell pressure. (CFR: 41.10 / 43.5 / 45.13)	4.1	14
295030 (EPE 7) Low Suppression Pool Water Level / 5						01. 20	Generic K/A 2.1.20 - Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	15
295031 (EPE 8) Reactor Low Water Level / 2	02						EK1.02 - Knowledge of the operational implications of the following concepts as they apply to REACTOR LOW WATER LEVEL: Natural circulation: Plant-Specific. (CFR: 41.8 to 41.10)	3.8	16
295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1	07						EK1.07 - Knowledge of the operational implications of the following concepts as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Shutdown margin. (CFR: 41.8 to 41.10)	3.4	17
295038 (EPE 15) High Offsite Radioactivity Release Rate / 9				07			EA1.07 - Ability to operate and/or monitor the following as they apply to HIGH OFF-SITE RELEASE RATE: Control room ventilation: Plant-Specific. (CFR: 41.7 / 45.6)	3.6	18
600000 (APE 24) Plant Fire On Site / 8						04. 31	Generic K/A 2.4.31 - Knowledge of annunciator alarms, indications, or response procedures. (CFR: 41.10 / 45.3)	4.2	19
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6			01				AK3.01 - Knowledge of the reasons for the following responses as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Reactor and turbine trip criteria. (CFR: 41.4, 41.5, 41.7, 41.10 / 45.8)	3.9	20
K/A Category Totals:	4	3	4	3	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	04						AK1.04 - Knowledge of the operational implications of the following concepts as they apply to LOSS OF MAIN CONDENSER VACUUM: Increased offgas flow. (CFR: 41.8 to 41.10)	3.0	21
295007 (APE 7) High Reactor Pressure / 3									
295008 (APE 8) High Reactor Water Level / 2									
295009 (APE 9) Low Reactor Water Level / 2					02		AA2.02 - Ability to determine and/or interpret the following as they apply to LOW REACTOR WATER LEVEL: Steam flow/feed flow mismatch. (CFR: 41.10 / 43.5 / 45.13)	3.6	22
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						01. 23	Generic K/A 2.1.23 – 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	23
295013 (APE 13) High Suppression Pool Temperature. / 5		01					AK2.01 - Knowledge of the interrelations between HIGH SUPPRESSION POOL TEMPERATURE and the following: Suppression pool cooling. (CFR: 41.7 / 45.8)	3.6	24
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				02			AA1.02 - Ability to operate and/or monitor the following as they apply to LOSS OF CRD PUMPS: RPS. (CFR: 41.7 / 45.6)	3.6	25
295029 (EPE 6) High Suppression Pool Water Level / 5			01				EK3.01 - Knowledge of the reasons for the following responses as they apply to HIGH SUPPRESSION POOL WATER LEVEL: Emergency depressurization. (CFR: 41.5 / 45.6)	3.5	26
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				03			EA1.03 - Ability to operate and/or monitor the following as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION: Secondary containment ventilation. (CFR: 41.7 / 45.6)	4.0	27
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	1	1	2	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									07			A3.07 - Ability to monitor automatic operations of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) including: Loop selection: Plant-Specific. (CFR: 41.7 / 45.7)	4.2	28
205000 (SF4 SCS) Shutdown Cooling				07								K4.07 - Knowledge of SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) design feature(s) and/or interlocks which provide for the following: Pump minimum flow. (CFR: 41.7)	2.7	29
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection					08							K5.08 - Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE COOLANT INJECTION SYSTEM: Vacuum breaker operation: BWR-2,3,4. (CFR: 41.5 / 45.3)	3.0	30
207000 (SF4 IC) Isolation (Emergency) Condenser														
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray		02										K2.02 - Knowledge of electrical power supplies to the following: Valve power. (CFR: 41.7)	2.5	31
209002 (SF2, SF4 HPCS) High-Pressure Core Spray														
211000 (SF1 SLCS) Standby Liquid Control	02				06							K1.02 - Knowledge of the physical connections and/or cause effect relationships between STANDBY LIQUID CONTROL SYSTEM and the following: Core plate differential pressure indication. (CFR: 41.2 to 41.9 / 45.7 to 45.8) K5.06 - Knowledge of the operational implications of the following concepts as they apply to STANDBY LIQUID CONTROL SYSTEM: Tank level measurement. (CFR: 41.5 / 45.3)	2.7 3.0	32 33
212000 (SF7 RPS) Reactor Protection						01				15		K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR PROTECTION SYSTEM: A.C. electrical distribution. (CFR: 41.7 / 45.7) A4.15 - Ability to manually operate and/or monitor in the control room: Recirculation pump trip/EOC RPT. (CFR: 41.7 / 45.5 to 45.8)	3.6 3.9	34 35
215003 (SF7 IRM) Intermediate-Range Monitor							01					A1.01 - Ability to predict and/or monitor changes in parameters associated with operating the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM controls including: Detector position. (CFR: 41.5 / 45.5)	3.4	36

215004 (SF7 SRMS) Source-Range Monitor							05				A2.05 - Ability to (a) predict the impacts of the following on the SOURCE RANGE MONITOR (SRM) SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Faulty or erratic operation of detectors/system. (CFR: 41.5 / 45.6)	3.3	37
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor							03			04.45	A1.03 – Ability to predict and/or monitor changes in parameters associated with operating the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM controls including: Control rod block status. (CFR: 41.5 / 45.5) Generic K/A 2.4.45 – Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	3.6 4.1	38 39
217000 (SF2, SF4 RCIC) Reactor Core Isolation Cooling			01				02				K3.01 - Knowledge of the effect that a loss or malfunction of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) will have on following: Reactor water level. (CFR: 41.7 / 45.4) A2.02 - Ability to (a) predict the impacts of the following on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Turbine trips. (CFR: 41.5 / 45.6)	3.7 3.8	40 41
218000 (SF3 ADS) Automatic Depressurization							06				A2.06 - Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: ADS initiation signals present. (CFR: 41.5 / 45.6)	4.2	42
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff			09								K3.09 - Knowledge of the effect that a loss or malfunction of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF will have on following: Main steam system. (CFR: 41.7 / 45.4)	3.4	43
239002 (SF3 SRV) Safety Relief Valves										02.38	Generic K/A 2.2.38 – Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)	3.6	44
259002 (SF2 RWLCS) Reactor Water Level Control	06										K1.06 - Knowledge of the physical connections and/or cause effect relationships between REACTOR WATER LEVEL CONTROL SYSTEM and the following: Plant air systems. (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.0	45
261000 (SF9 SGTS) Standby Gas Treatment				05							K4.05 - Knowledge of STANDBY GAS TREATMENT SYSTEM design feature(s) and/or interlocks which provide for the following: Fission product gas removal. (CFR: 41.7)	2.6	46

262001 (SF6 AC) AC Electrical Distribution						01				02		K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the A.C. ELECTRICAL DISTRIBUTION: D.C. power. (CFR: 41.7 / 45.7) A4.02 - Ability to manually operate and/or monitor in the control room: Synchroscope, including understanding of running and incoming voltages. (CFR: 41.7 / 45.5 to 45.8)	3.1 3.4	47 48
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)	01											K1.01 - Knowledge of the physical connections and/or cause effect relationships between UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) and the following: Feedwater level control: Plant-Specific. (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.8	49
263000 (SF6 DC) DC Electrical Distribution										01		A4.01 - Ability to manually operate and/or monitor in the control room: Major breakers and control power fuses: Plant-Specific. (CFR: 41.7 / 45.5 to 45.8)	3.3	50
264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG									05			A3.05 - Ability to monitor automatic operations of the EMERGENCY GENERATORS (DIESEL/JET) including: Load shedding and sequencing. (CFR: 41.7 / 45.7)	3.4	51
300000 (SF8 IA) Instrument Air						12						K6.12 – Knowledge of the effect that a loss or malfunction of the following will have on the INSTRUMENT AIR SYSTEM: Breakers, relays and disconnects. (CFR: 41.7 / 45.7)	2.9	52
400000 (SF8 CCS) Component Cooling Water		02										K2.02 - Knowledge of 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:	3	2	2	2	2	3	2	3	2	3	2	Group Point Total:		26

ES-401	BWR Examination Outline Plant Systems—Tier 2/Group 2 (RO)												Form ES-401-1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
201001 (SF1 CRDH) CRD Hydraulic														
201002 (SF1 RMCS) Reactor Manual Control				05								K4.05 - Knowledge of REACTOR MANUAL CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: "Notch override" rod withdrawal. (CFR: 41.7)	3.3	54
201003 (SF1 CRDM) Control Rod and Drive Mechanism														
201004 (SF7 RSCS) Rod Sequence Control														
201005 (SF1, SF7 RCIS) Rod Control and Information														
201006 (SF7 RWMS) Rod Worth Minimizer														
202001 (SF1, SF4 RS) Recirculation														
202002 (SF1 RSCTL) Recirculation Flow Control								05				A2.05 - 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: Scoop tube lockup: BWR-2,3,4. (CFR: 41.5 / 45.6)	3.1	55
204000 (SF2 RWCU) Reactor Water Cleanup														
214000 (SF7 RPIS) Rod Position Information														
215001 (SF7 TIP) Traversing In-Core Probe														
215002 (SF7 RBMS) Rod Block Monitor														
216000 (SF7 NBI) Nuclear Boiler Instrumentation											01.07	Generic K/A 2.1.7 – 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	56
219000 (SF5 RHR SPC) RHR/LPCI: Torus/Suppression Pool Cooling Mode														
223001 (SF5 PCS) Primary Containment and Auxiliaries							08					A1.08 - Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES controls including: Suppression pool level. (CFR: 41.5 / 45.5)	3.5	57
226001 (SF5 RHR CSS) RHR/LPCI: Containment Spray Mode														
230000 (SF5 RHR SPS) RHR/LPCI: Torus/Suppression Pool Spray Mode		02										K2.02 - Knowledge of electrical power supplies to the following: Pumps. (CFR: 41.7)	2.8	58
233000 (SF9 FPCCU) Fuel Pool Cooling/Cleanup														

234000 (SF8 FH) Fuel-Handling Equipment										02		A4.02 - Ability to manually operate and/or monitor in the control room: Control rod drive system. (CFR: 41.7 / 45.5 to 45.8)	3.4	59
239001 (SF3, SF4 MRSS) Main and Reheat Steam														
239003 (SF9 MSVLCS) Main Steam Isolation Valve Leakage Control														
241000 (SF3 RTPRS) Reactor/Turbine Pressure Regulating			04									K3.04 - Knowledge of the effect that a loss or malfunction of the REACTOR/TURBINE PRESSURE REGULATING SYSTEM will have on the following: Reactor steam flow. (CFR: 41.7 / 45.4)	3.8	60
245000 (SF4 MTGEN) Main Turbine Generator/Auxiliary					03							K5.03 - Knowledge of the operational implications of the following concepts as they apply to MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS: Hydraulically operated valve operation. (CFR: 41.5 / 45.3)	2.6	61
256000 (SF2 CDS) Condensate														
259001 (SF2 FWS) Feedwater	02											K1.02 - Knowledge of the physical connections and/or cause effect relationships between REACTOR FEEDWATER SYSTEM and the following: HPCI: Plant-Specific. (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.6	62
268000 (SF9 RW) Radwaste														
271000 (SF9 OG) Offgas														
272000 (SF7, SF9 RMS) Radiation Monitoring									01			A3.01 - Ability to monitor automatic operations of the RADIATION MONITORING SYSTEM including: Main steam isolation indications. (CFR: 41.7 / 45.7)	3.8	63
286000 (SF8 FPS) Fire Protection														
288000 (SF9 PVS) Plant Ventilation						01						K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the PLANT VENTILATION SYSTEMS: A.C. electrical. (CFR: 41.7 / 45.7)	2.7	64
290001 (SF5 SC) Secondary Containment											04.46	Generic K/A 2.4.46 - Ability to verify that the alarms are consistent with the plant conditions. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.2	65
290003 (SF9 CRV) Control Room Ventilation														
290002 (SF4 RVI) Reactor Vessel Internals														
51001 (SF8 CWS*) Circulating Water														
K/A Category Point Totals:	1	1	1	1	1	1	1	1	1	1	2	Group Point Total:		12

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (SRO)							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									
295003 (APE 3) Partial or Complete Loss of AC Power / 6									
295004 (APE 4) Partial or Total Loss of DC Power / 6									
295005 (APE 5) Main Turbine Generator Trip / 3									
295006 (APE 6) Scram / 1					03		AA2.03 - Ability to determine and/or interpret the following as they apply to SCRAM: Reactor water level. (CFR: 41.10 / 43.5 / 45.13)	4.2	76
295016 (APE 16) Control Room Abandonment / 7									
295018 (APE 18) Partial or Complete Loss of CCW / 8									
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8									
295021 (APE 21) Loss of Shutdown Cooling / 4						02.37	Generic K/A 2.2.37 – Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)	4.6	77
295023 (APE 23) Refueling Accidents / 8					05		AA2.05 - Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS: Entry conditions of emergency plan. (CFR: 41.10 / 43.5 / 45.13)	4.6	78
295024 High Drywell Pressure / 5									
295025 (EPE 2) High Reactor Pressure / 3									
295026 (EPE 3) Suppression Pool High Water Temperature / 5						04.18	Generic K/A 2.4.18 – Knowledge of the specific bases for EOPs (CFR: 41.10 / 43.1 / 45.13)	4.0	79
295027 (EPE 4) High Containment Temperature (Mark III Containment Only) / 5									
295028 (EPE 5) High Drywell Temperature (Mark I and Mark II only) / 5						04.08	Generic K/A 2.4.8 – Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 41.10 / 43.5 / 45.13)	4.5	80
295030 (EPE 7) Low Suppression Pool Water Level / 5									
295031 (EPE 8) Reactor Low Water Level / 2									
295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1									
295038 (EPE 15) High Offsite Radioactivity Release Rate / 9					03		EA2.03 - Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Radiation levels. (CFR: 41.10 / 43.5 / 45.13)	3.5	81

600000 (APE 24) Plant Fire On Site / 8					16		AA2.16 - Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Vital equipment and control systems to be maintained and operated during a fire.	3.5	82
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6									
K/A Category Totals:	0	0	0	0	4	3	Group Point Total:		7

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (SRO)							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									
295008 (APE 8) High Reactor Water Level / 2						02.44	Generic K/A 2.2.44 – Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)	4.4	83
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									
295013 (APE 13) High Suppression Pool Temperature. / 5									
295014 (APE 14) Inadvertent Reactivity Addition / 1					05		AA2.05 - Ability to determine and/or interpret the following as they apply to INADVERTENT REACTIVITY ADDITION: Violation of safety limits. (CFR: 41.10 / 43.5 / 45.13)	4.6	84
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									
295029 (EPE 6) High Suppression Pool Water Level / 5					02		EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL WATER LEVEL: Reactor pressure. (CFR: 41.10 / 43.5 / 45.13)	3.6	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:	0	0	0	0	2	1	Group Point Total:		3

ES-401	BWR Examination Outline Plant Systems—Tier 2/Group 1 (SRO)											Form ES-401-1		
System # / Name	K 1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
203000 (SF2, SF4 RHR/LPCI) RHR/LPCI: Injection Mode														
205000 (SF4 SCS) Shutdown Cooling														
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection								08				A2.08 - Ability to (a) predict the impacts of the following on the HIGH PRESSURE COOLANT INJECTION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High suppression pool temperature: BWR-2,3,4. (CFR: 41.5 / 45.6)	4.2	86
207000 (SF4 IC) Isolation (Emergency) Condenser														
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray								05				A2.05 - 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: Core spray line break. (CFR: 41.5 / 45.6)	3.3	87
209002 (SF2, SF4 HPCS) High-Pressure Core Spray														
211000 (SF1 SLCS) Standby Liquid Control														
212000 (SF7 RPS) Reactor Protection														
215003 (SF7 IRM) Intermediate-Range Monitor														
215004 (SF7 SRMS) Source-Range Monitor														
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor														
217000 (SF2, SF4 RCIC) Reactor Core Isolation Cooling														
218000 (SF3 ADS) Automatic Depressurization														
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff								06				A2.06 - Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Containment instrumentation failures. (CFR: 41.5 / 45.6)	3.2	88

239002 (SF3 SRV) Safety Relief Valves										04.30	Generic K/A 2.4.30 – Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator. (CFR: 41.10 / 43.5 / 45.11)	4.1	89
259002 (SF2 RWLCS) Reactor Water Level Control													
261000 (SF9 SGTS) Standby Gas Treatment													
262001 (SF6 AC) AC Electrical Distribution													
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)													
263000 (SF6 DC) DC Electrical Distribution										02.40	Generic K/A 2.2.40 – Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)	4.7	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:	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:	5

ES-401	BWR Examination Outline Plant Systems—Tier 2/Group 2 (SRO)												Form ES-401-1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
201001 (SF1 CRDH) CRD Hydraulic														
201002 (SF1 RMCS) Reactor Manual Control														
201003 (SF1 CRDM) Control Rod and Drive Mechanism														
201004 (SF7 RSCS) Rod Sequence Control														
201005 (SF1, SF7 RCIS) Rod Control and Information														
201006 (SF7 RWMS) Rod Worth Minimizer														
202001 (SF1, SF4 RS) Recirculation														
202002 (SF1 RSCTL) Recirculation Flow Control														
204000 (SF2 RWCU) Reactor Water Cleanup								11				A2.11 - Ability to (a) predict the impacts of the following on the REACTOR WATER CLEANUP SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Inadequate system flow: Plant-Specific. (CFR: 41.5 / 45.6)	2.7	91
214000 (SF7 RPIS) Rod Position Information														
215001 (SF7 TIP) Traversing In-Core Probe														
215002 (SF7 RBMS) Rod Block Monitor														
216000 (SF7 NBI) Nuclear Boiler Instrumentation														
219000 (SF5 RHR SPC) RHR/LPCI: Torus/Suppression Pool Cooling Mode														
223001 (SF5 PCS) Primary Containment and Auxiliaries														
226001 (SF5 RHR CSS) RHR/LPCI: Containment Spray Mode														
230000 (SF5 RHR SPS) RHR/LPCI: Torus/Suppression Pool Spray Mode														
233000 (SF9 FPCCU) Fuel Pool Cooling/Cleanup								02				A2.02 - Ability to (a) predict the impacts of the following on the FUEL POOL COOLING AND CLEAN-UP; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low pool level. (CFR: 41.5 / 45.6)	3.3	92
234000 (SF8 FH) Fuel-Handling Equipment											02.12	Generic K/A 2.2.12 – Knowledge of surveillance procedures. (CFR: 41.10 / 45.13)	4.1	93
239001 (SF3, SF4 MRSS) Main and Reheat Steam														

239003 (SF9 MSVLCS) Main Steam Isolation Valve Leakage Control														
241000 (SF3 RTPRS) Reactor/Turbine Pressure Regulating														
245000 (SF4 MTGEN) Main Turbine Generator/Auxiliary														
256000 (SF2 CDS) Condensate														
259001 (SF2 FWS) Feedwater														
268000 (SF9 RW) Radwaste														
271000 (SF9 OG) Offgas														
272000 (SF7, SF9 RMS) Radiation Monitoring														
286000 (SF8 FPS) Fire Protection														
288000 (SF9 PVS) Plant Ventilation														
290001 (SF5 SC) Secondary Containment														
290003 (SF9 CRV) Control Room Ventilation														
290002 (SF4 RVI) Reactor Vessel Internals														
51001 (SF8 CWS*) Circulating Water														
K/A Category Point Totals:	0	0	0	0	0	0	0	2	0	0	1	Group Point Total:		3

Facility: **Fermi** Date of Exam: **6/17/2019 – 6/28/2019**

Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements. (CFR: 41.10 / 45.13)	3.8	66		
	2.1.28	Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	4.1	67		
	2.1.41	Knowledge of the refueling process. (CFR: 41.2 / 41.10 / 43.6 / 45.13)	2.8	68		
	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. (CFR: 41.10 / 43.5 / 45.12)			3.9	94
	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12)			4.2	95
	Subtotal			3		2
2. Equipment Control	2.2.21	Knowledge of pre- and post-maintenance operability requirements. (CFR: 41.10 / 43.2)	2.9	69		
	2.2.39	Knowledge of less than or equal to one hour Technical Specification action statements for systems. (CFR: 41.7 / 41.10 / 43.2 / 45.13)	3.9	70		
	2.2.5	Knowledge of the process for making design or operating changes to the facility. (CFR: 41.10 / 43.3 / 45.13)			3.2	96
	2.2.15	Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc. (CFR: 41.10 / 43.3 / 45.13)			4.3	97
	Subtotal			2		2
3. Radiation Control	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.11 / 41.12 / 43.4 / 45.9)	2.9	71		
	2.3.13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 43.4 / 45.9 / 45.10)	3.4	72		
	2.3.11	Ability to control radiation releases. (CFR: 41.11 / 43.4 / 45.10)			4.3	98
	Subtotal			2		1
4. Emergency Procedures/Plan	2.4.14	Knowledge of general guidelines for EOP usuage. (CFR: 41.10 / 45.13)	3.8	73		
	2.4.32	Knowledge of operator response to loss of all annunciators. (CFR: 41.10 / 43.5 / 45.13)	3.6	74		
	2.4.35	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)	3.8	75		
	2.4.20	Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)			4.3	99

	2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc. (CFR: 41.7 / 43.5 / 45.12)			4.6	100
	Subtotal			3		2
Tier 3 Point Total				10		7