Facility: **Monticello Nuclear Generating Plant** Date of Exam: **October 29 – November 9, 2018**

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	3	N/A			4	4	N/A		3	20	4		3		7				
	2	1	2	1				1	1			1	7	2		1		3				
	Tier Totals	4	5	4				5	5			4	27	6		4		10				
2. Plant Systems	1	3	2	2	2	3	2	2	3	2	3	2	26	2		3		5				
	2	1	1	1	1	1	2	1	1	1	1	1	12	1	1	1		3				
	Tier Totals	4	3	3	3	4	4	3	4	3	4	3	38	4		4		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					

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				03			AA1.03 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: RMCS: Plant-Specific (CFR: 41.7 / 45.6)	2.6	1
295003 (APE 3) Partial or Complete Loss of AC Power / 6					05		AA2.05 – Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: Whether a partial or complete loss of A.C. power has occurred. (CFR: 41.10 / 43.5 / 45.13)	3.9	2
295004 (APE 4) Partial or Total Loss of DC Power / 6						04. 02	G2.4.02 – Knowledge of system set points, interlocks, and automatic actions associated with EOP entry conditions. (CFR: 41.7 / 45.7 / 45.8)	4.5	3
295005 (APE 5) Main Turbine Generator Trip / 3	03						AK1.03 – Knowledge of the operational implications of the following concepts as they apply to MAIN TURBINE GENERATOR TRIP: Pressure effects on reactor level. (CFR: 41.8 to 41.10)	3.5	4
295006 (APE 6) Scram / 1		07					AK2.07 – Knowledge of the interrelations between SCRAM and the following: Reactor pressure control. (CFR: 41.7 / 45.8)	4.0	5
295016 (APE 16) Control Room Abandonment / 7			01				AK3.01 – Knowledge of the reasons for the following responses as they apply to CONTORL ROOM ABANDONMENT: Reactor SCRAM. (CFR: 41.5 / 45.6)	4.1	6
295018 (APE 18) Partial or Complete Loss of CCW / 8				02			AA1.02 – Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: System loads. (CFR: 41.7 / 45.6)	3.3	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 COMPLET LOSS OF INSTRUMENT AIR: Status of safety-related instrument air system loads. (CFR: 41.10 / 43.5 / 45.13)	3.6	8
295021 (APE 21) Loss of Shutdown Cooling / 4						02. 44	G2.2.44 – 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)	4.2	9
295023 (APE 23) Refueling Accidents / 8	01						AK1.01 – Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS: Radiation exposure hazards. (CFR: 41.8 to 41.10)	3.6	10
295024 High Drywell Pressure / 5		12					EK2.12 – Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Suppression pool cooling. (CFR: 41.7 / 45.8)	3.5	11
295025 (EPE 2) High Reactor Pressure / 3			06				EK3.06 – Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE: Alternate rod insertion: Plant-Specific. (CFR: 41.5 / 45.6)	4.2	12

295026 (EPE 3) Suppression Pool High Water Temperature / 5				03			EA1.03 – Ability to operate and/or monitor the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Temperature monitoring. (CFR: 41.7 / 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					05		EA2.05 – Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE: Torus/suppression chamber pressure: Plant-Specific. (CFR: 41.10 / 43.5 / 45.13)	3.6	14
295030 (EPE 7) Low Suppression Pool Water Level / 5						01. 32	G2.1.32 – Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	3.8	15
295031 (EPE 8) Reactor Low Water Level / 2	03						EK1.03 – Knowledge of the operational implications of the following concepts as they apply to REACTOR LOW WATER LEVEL: Water level effects on reactor power (CFR: 41.8 to 41.10)	3.7	16
295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1		04					EK2.04 – Knowledge of the interrelations between SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN and the following: SBLC system. (CFR: 41.7 / 45.8)	4.4	17
295038 (EPE 15) High Offsite Radioactivity Release Rate / 9			02				EK3.02 – Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: System isolations. (CFR: 41.5 / 45.6)	3.9	18
600000 (APE 24) Plant Fire On Site / 8				06			AA1.06 – Ability to operate and/or monitor the following as they apply to PLANT FIRE ON SITE: Fire alarm.	3.0	19
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6					03		AA2.03 – Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Generator current outside the capability curve. (CFR: 41.5 and 43.5 / 45.5, 45.7, 45.8)	3.5	20
K/A Category Totals:	3	3	3	4	4	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									
295008 (APE 8) High Reactor Water Level / 2									
295009 (APE 9) Low Reactor Water Level / 2									
295010 (APE 10) High Drywell Pressure / 5	03						AK1.03 – Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE: Temperature increases. (CFR: 41.8 to 41.10)	3.2	21
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		10					AK2.10 – Knowledge of the interrelations between INADVERTENT REACTIVITY ADDITION and the following: Safety limits. (CFR: 41.7 / 45.8)	4.1	22
295015 (APE 15) Incomplete Scram / 1									
295017 (APE 17) Abnormal Offsite Release Rate / 9			02				AK3.02 – Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: Plant ventilation. (CFR: 41.5 / 45.6)	3.3	23
295020 (APE 20) Inadvertent Containment Isolation / 5 & 7									
295022 (APE 22) Loss of Control Rod Drive Pumps / 1				04			AA1.04 – Ability to operate and/or monitor the following as they apply to LOSS OF CRD PUMPS: Reactor water cleanup system: Plant-Specific. (CFR: 41.7 / 45.6)	2.5	24
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					02		EA2.02 – Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LIMITS: Equipment operability. (CFR: 41.10 / 43.5 / 45.13)	3.1	25
295034 (EPE 11) Secondary Containment Ventilation High Radiation / 9						04.35	G2.4.35 – Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)	4.2	26
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		06					EK2.06 – Knowledge of the interrelations between HIGH CONTAINMENT HYDROGEN CONCENTRATIONS and the following: Wetwell spray system. (CFR: 41.7 / 45.8)	3.0	27
K/A Category Point Totals:	1	2	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						10						K6.10 – Knowledge of the effect that loss or malfunction of the following will have on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC): Component cooling water systems (CFR: 41.7 / 45.7)	3.0	28
205000 (SF4 SCS) Shutdown Cooling					02		04					K5.02 – Knowledge of the operational implications of the following concepts as they apply to SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE): Valve operation. (CFR: 41.5 / 45.3) A1.04 – Ability to predict and/or monitor changes in parameters associated with operating the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) controls including: SDC/RHR pump suction pressure. (CFR: 41.5 / 45.5)	2.8 2.7	29 30
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection								05				A2.05 – 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: D.C. failures: BWR-2,3,4 (CFR: 41.5 / 45.6)	3.5	31
207000 (SF4 IC) Isolation (Emergency) Condenser														
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray									06			A3.06 – Ability to monitor automatic operation of the LOW PRESSURE CORE SPRAY SYSTEM including: Lights and alarms (CFR: 41.7 / 45.7)	3.6	32
209002 (SF2, SF4 HPCS) High-Pressure Core Spray														
211000 (SF1 SLCS) Standby Liquid Control										04		A4.04 – Ability to manually operate and/or monitor in the control room: Reactor power. (CFR: 41.7 / 45.5 to 45.8)	4.5	33
212000 (SF7 RPS) Reactor Protection											04. 46	G2.4.46 – Ability to verity that the alarms are consistent with the plant conditions. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.2	34
215003 (SF7 IRM) Intermediate-Range Monitor	04											K1.04 – Knowledge of the physical connections and/or cause-effect relationships between INTERMEDIATE RANGE MONITOR (IRM) SYSTEM and the following: Process computer / performance monitoring system (SPDS/ERIS/CRIDS/GDS): Plant-Specific (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.5	35
215004 (SF7 SRMS) Source-Range Monitor		01										K2.01 – Knowledge of electrical power supplies to the following: SRM channels/detectors. (CFR: 41.7)	2.6	36

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 the following: IRM: Plant-Specific. (CFR: 41.7 / 45.4)	3.5	37
217000 (SF2, SF4 RCIC) Reactor Core Isolation Cooling				05								K4.05 – Knowledge of REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) design feature(s) and/or interlocks which provide for the following: Prevents radioactivity release to auxiliary/reactor building. (CFR: 41.7)	3.2	38
218000 (SF3 ADS) Automatic Depressurization					01							K5.01 – Knowledge of the operational implications of the following concepts as they apply to AUTOMATIC DEPRESSURIZATION SYSTEM: ADS logic operation (CFR: 41.5 / 45.3)	3.8	39
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff						03				04		K6.03 – Knowledge of the effect that a loss or malfunction of the following will have on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF: Process radiation monitoring system (CFR: 41.7 / 45.7) A4.04 – Ability to manually operate and/or monitor in the control room: System indicating lights and alarms. (CFR: 41.7 / 45.5 to 45.8)	2.9 3.5	40 41
239002 (SF3 SRV) Safety Relief Valves							03					A1.03 – Ability to predict and/or monitor changes in parameters associated with operating the RELIEF/SAFETY VALVES controls including: Air supply: Plant-Specific. (CFR: 41.5 / 45.5)	2.8	42
259002 (SF2 RWLCS) Reactor Water Level Control					05			04				K5.05 – Knowledge of the operational implications of the following concepts as they apply to REACTOR WATER LEVEL CONTROL SYSTEM: Flow controllers. (CFR: 41.5 / 45.3) A2.04 – Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: RFP runout condition: Plant-Specific (CFR: 41.5 / 45.6)	2.6 3.0	43 44
261000 (SF9 SGTS) Standby Gas Treatment									01			A3.01 – Ability to monitor automatic operation of the STANDBY GAS TREATMENT SYSTEM including: System flow. (CFR: 41.7 / 45.7)	3.2	45
262001 (SF6 AC) AC Electrical Distribution										03		A4.03 – Ability to manually operate and/or monitor in the control room: Local operation of breakers. (CFR: 41.7 / 45.5 to 45.8)	3.2	46
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)											02.12	G2.2.12 – Knowledge of surveillance procedures. (CFR: 41.10 / 45.13)	3.7	47

263000 (SF6 DC) DC Electrical Distribution	01										K1.01 – Knowledge of the physical connections and/or cause-effect relationships between D.C. ELECTRICAL DISTRIBUTION and the following: A.C electrical distribution. (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.3	48
264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG			03					07			K3.03 – Knowledge of the effect that a loss or malfunction of the EMERGENCY GENERATORS (DIESEL/JET) will have on the following: Major loads powered from electrical buses fed by the emergency generators (CFR: 41.7 / 45.4) A2.09 - Ability to (a) predict the impacts of the following on the EMERGENCY GENERATORS (DIESEL/JET); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of offsite power during full-load testing. (CFR: 41.5 / 45.6)	4.1 3.5	49 50
300000 (SF8 IA) Instrument Air		01									K2.01 – Knowledge of the electrical power supplies to the following: Instrument air compressor. (CFR: 41.7)	2.8	51
400000 (SF8 CCS) Component Cooling Water	04			01							K1.04 – Knowledge of the physical connections and/or cause-effect relationships between CCWS and the following: Reactor coolant system, in order to determine source(s) of RCS leakage into CCWS (CFR: 41.2 to 41.9 / 45.7 to 45.8) K4.01 – Knowledge of CCWS design feature(s) and/or interlocks which provide for the following: Automatic start of standby pump (CFR: 41.7)	2.9 3.4	52 53
510000 (SF4 SWS*) Service Water (Normal and Emergency)													
K/A Category Point Totals:	3	2	2	2	3	2	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						03						K6.03 – Knowledge of the effect that a loss or malfunction of the following will have on the CONTROL ROD DRIVE HYDRAULIC System: Plant air systems. (CFR: 41.7 / 45.7)	3.0	54
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							02					A1.02 – Ability to predict and/or monitor changes in parameters associated with operating the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) controls including: Status of control rod movement blocks; P-Spec (Not BWR-6) (CFR: 41.5 / 45.5)	3.4	55
202001 (SF1, SF4 RS) Recirculation														
202002 (SF1 RSCTL) Recirculation Flow Control														
204000 (SF2 RWCU) Reactor Water Cleanup														
214000 (SF7 RPIS) Rod Position Information														
215001 (SF7 TIP) Traversing In-Core Probe								01				A2.01 – Ability to (a) predict the impacts of the following on TRAVERSING IN-CORE PROBE; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low reactor water level: Mark-I&II (Not-BWR1) (CFR: 41.5 / 45.6)	2.7	56
215002 (SF7 RBMS) Rod Block Monitor									05			A3.05 – Ability to monitor automatic operations of the ROD BLOCK MONITOR SYSTEM including: Back panel meters and indicating lights: BWR-3,4,5 (CFR: 41.7 / 45.7)	3.2	57
216000 (SF7 NBI) Nuclear Boiler Instrumentation														
219000 (SF5 RHR SPC) RHR/LPCI: Torus/Suppression Pool Cooling Mode														
223001 (SF5 PCS) Primary Containment and Auxiliaries										08		A4.08 - Ability to manually operate and/or monitor in the control room: System indicating lights and alarms (CFR: 41.7 / 45.5 to 45.8)	3.4	58
226001 (SF5 RHR CSS) RHR/LPCI: Containment Spray Mode														
230000 (SF5 RHR SPS) RHR/LPCI: Torus/Suppression Pool Spray Mode											04. 06	G2.4.6 – Knowledge of EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)	3.7	59

233000 (SF9 FPCCU) Fuel Pool Cooling/Cleanup	02											K1.02 – Knowledge of the physical connections and/or cause-effect relationships between FUEL POOL COOLING AND CLEAN-UP and the following: Residual heat removal system: Plant-Specific (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.9	60
234000 (SF8 FH) Fuel-Handling Equipment														
239001 (SF3, SF4 MRSS) Main and Reheat Steam		01										K2.01 – Knowledge of electrical power supplies to the following: Main steam isolation valve solenoids. (CFR: 41.7)	3.2	61
239003 (SF9 MSVLCS) Main Steam Isolation Valve Leakage Control														
241000 (SF3 RTPRS) Reactor/Turbine Pressure Regulating			08									K3.08 – Knowledge of the effect that a loss or malfunction of the REACTOR/TURBINE PRESSURE REGULATING SYSTEM will have on following: Control/governor valves (CFR: 41.7 / 45.4)	3.7	62
245000 (SF4 MTGEN) Main Turbine Generator/Auxiliary														
256000 (SF2 CDS) Condensate														
259001 (SF2 FWS) Feedwater				03								K4.03 – Knowledge of REACTOR FEEDWATER SYSTEM design feature(s) and/or interlocks which provide for the following: RFP minimum flow	2.7	63
268000 (SF9 RW) Radwaste					02							K5.02 – Knowledge of the operational implications of the following concepts as they apply to RADWASTE: Radiation hazards and ALARA concept. (CFR: 41.5 / 45.3)	3.1	64
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						06						K6.06 – Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR VESSEL INTERNALS: Relief/safety valves (CFR: 41.7 / 45.7)	3.0	65
51001 (SF8 CWS*) Circulating Water														
K/A Category Point Totals:	1	1	1	1	1	2	1	1	1	1	1	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					01		AA2.01 – Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Cause of partial or complete loss of D.C. power. (CFR: 41.7 / 45.6)	3.6	76
295005 (APE 5) Main Turbine Generator Trip / 3									
295006 (APE 6) Scram / 1						01. 30	G2.1.30 – Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)	4.0	77
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					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 system loads (see AK2.1-AK2.19) (CFR: 41.10 / 43.5 / 45.13)	3.7	78
295021 (APE 21) Loss of Shutdown Cooling / 4									
295023 (APE 23) Refueling Accidents / 8						04. 30	G2.4.30 - 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	79
295024 High Drywell Pressure / 5									
295025 (EPE 2) High Reactor Pressure / 3					04		EA2.04 – Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE: Suppression pool level (CFR: 41.10 / 43.5 / 45.13)	3.9	80
295026 (EPE 3) Suppression Pool High Water Temperature / 5									
295027 (EPE 4) High Containment Temperature (Mark III Containment Only) / 5									
295028 (EPE 5) High Drywell Temperature (Mark I and Mark II only) / 5									
295030 (EPE 7) Low Suppression Pool Water Level / 5						01. 19	G2.1.19 – Ability to use plant computers to evaluate system or component status. (CFR: 41.10 / 45.12)	3.8	81
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					04		EA2.04 – Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Source of off-site release (CFR: 41.10 / 43.5 / 45.13)	4.5	82
600000 (APE 24) Plant Fire On Site / 8									
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					02		AA2.02 – Ability to determine and/or interpret the following as they apply to LOSS OF MAIN CONDENSER VACUUM: Reactor power: Plant-Specific. (CFR: 41.10 / 43.5 / 45.13)	3.3	83
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									
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						04. 08	G2.4.8 – Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 41.10 / 43.5 / 45.13)	4.5	84
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					02		EA2.02 – Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Equipment operability. (CFR: 41.10 / 43.5 / 45.13)	3.5	85
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														
207000 (SF4 IC) Isolation (Emergency) Condenser														
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray											02. 25	G2.2.25 – Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (CFR: 41.5 / 41.7 / 43.2)	4.2	86
209002 (SF2, SF4 HPCS) High-Pressure Core Spray														
211000 (SF1 SLCS) Standby Liquid Control								04				A2.04 – Ability to (a) predict the impacts of the following on the STANDBY LIQUID CONTROL 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 (CFR: 41.5 / 45.6)	3.4	87
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											02. 22	G2.2.22 – Knowledge of limiting conditions for operations and safety limits. (CFR: 41.5 / 43.2 / 45.2)	4.7	88
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff														
239002 (SF3 SRV) Safety Relief Valves														
259002 (SF2 RWLCS) Reactor Water Level Control														
261000 (SF9 SGTS) Standby Gas Treatment								10				A2.10 – 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: Low reactor water level: Plant-Specific. (CFR: 41.5 / 45.6)	3.2	89

262001 (SF6 AC) AC Electrical Distribution													
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)													
263000 (SF6 DC) DC Electrical Distribution													
264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG													
300000 (SF8 IA) Instrument Air										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)	4.4	90
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	2	0	0	3	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														
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														
234000 (SF8 FH) Fuel-Handling Equipment							01					A1.03 – Ability to predict and/or monitor changes in parameters associated with operating the FUEL HANDLING EQUIPMENT controls including: core reactivity level. (CFR: 41.5 / 45.5)	3.9	91
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											01-20	G2.1.20 – Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	92
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							03				A2.03 – Ability to (a) predict the impacts of the following on the CONTROL ROOM HVAC; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Initiation/reconfiguration failure (CFR: 41.5 / 45.6)	3.6	93
290002 (SF4 RVI) Reactor Vessel Internals													
51001 (SF8 CWS*) Circulating Water													
K/A Category Point Totals:	0	0	0	0	0	0	1	1	0	0	1	Group Point Total:		3

Facility: **Monticello Nuclear Generating Plant** Date of Exam: **October 29 – November 9, 2018**

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		
	2.1.18	Ability to make accurate, clear, and concise logs, records, status boards, and reports. (CFR: 41.10 / 45.12 / 45.13)	3.6	67		
	2.1.44	Knowledge of RO dues in the control room during fuel handling, such as responding to alarms from the fuel handling area, communication with the fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation. (CFR: 41.10 / 43.7 / 45.12)	3.9	68		
	2.1.41	Knowledge of the refueling process. (CFR: 41.2 / 41.10 / 43.6 / 45.13)			3.7	94
	2.1.45	Ability to identify and interpret diverse indications to validate the response of another indication. (CFR: 41.7 / 43.5 / 45.4)			4.3	95
	Subtotal			3		2
2. Equipment Control	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels. (CFR: 41.6 / 41.7 / 45.2)	4.6	69		
	2.2.35	Ability to determine Technical Specification Mode of Operation. (CFR: 41.7 / 41.10 / 43.2 / 45.13)	3.6	70		
	2.2.36	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operation. (CFR: 41.10 / 43.2 / 45.13)	3.1	71		
	2.2.17	Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator. (CFR: 41.10 / 43.5 / 45.13)			3.8	96
	2.2.21	Knowledge of pre- and post-maintenance operability requirements. (CFR: 41.10 / 43.2)			4.1	97
	Subtotal			3		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	72		
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (CFR: 41.12 / 43.4 / 45.10)	3.4	73		
	2.3.12	Knowledge of radiation safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 45.9 / 45.10)			3.7	98
	Subtotal			2		1

4. Emergency Procedures/Plan	2.4.12	Knowledge of general operating crew responsibilities during emergency operations. (CFR: 41.10 / 45.12)	4.0	74		
	2.4.17	Knowledge of EOP terms and definitions. (CFR: 41.10 / 45.13)	3.9	75		
	2.4.40	Knowledge of SRO responsibilities in emergency plan implementation. (CFR: 41.10 / 43.5 / 45.11)			4.5	99
	2.4.41	Knowledge of the emergency action level thresholds and classifications. (CFR: 41.10 / 43.5 / 45.11)			4.6	100
	Subtotal			2		2
Tier 3 Point Total				10		7