Facility: Duane Arnold Energy Center Date of Exam: 4/6/15 – 4/17/15

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 & Abnormal Plant Evolutions	1	4	2	3	N/A			4	4	N/A		3	20	3		4		7		
	2	1	1	2				2	1			0	7	1		2		3		
	Tier Totals	5	3	5				6	5			3	27	4		6		10		
2. Plant Systems	1	3	2	3	3	3	2	2	2	3	2	1	26	3		2		5		
	2	1	2	2	1	0	1	1	0	1	1	2	12	0	1	2		3		
	Tier Totals	4	4	5	4	3	3	3	2	3	3	4	38	4		4		8		
3. Generic Knowledge and Abilities Categories		1		2		3		4					10	1	2	3	4	7		
		2		3		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 outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
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 associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
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 shall be selected. 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' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
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.

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions – Tier 1/Group 1 (**RO**)							Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4					05		Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Jet pump operability. CFR: 41.10	3.1	1
295003 Partial or Complete Loss of AC / 6						R	2.1.25: Ability to interpret reference materials, such as graphs, curves, tables, etc. CFR: 41.10	3.9	2
295004 Partial or Total Loss of DC Pwr / 6	03						Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Electrical bus divisional separation. CFR: 41.8 to 41.10	2.9	3
295005 Main Turbine Generator Trip / 3		08					Knowledge of the interrelations between MAIN TURBINE GENERATOR TRIP and the following: A.C. electrical distribution. CFR: 41.7	3.2	4
295006 SCRAM / 1			06				Knowledge of the reasons for the following responses as they apply to SCRAM : Recirculation pump speed reduction. CFR: 41.5	3.2	5
295016 Control Room Abandonment / 7				04			Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT : A.C. electrical distribution. CFR: 41.7	3.1	6
295018 Partial or Total Loss of CCW / 8					02		Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : Cooling water temperature. CFR: 41.10	3.1	7
295019 Partial or Total Loss of Inst. Air / 8						R	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	4.2	8
295021 Loss of Shutdown Cooling / 4	01						Knowledge of the operational implications of the following concepts as they apply to LOSS OF SHUTDOWN COOLING : Decay heat. CFR: 41.8 to 41.10	3.6	9
295023 Refueling Acc / 8		01					Knowledge of the interrelations between REFUELING ACCIDENTS and the following: Fuel handling equipment. CFR: 41.7	3.3	10
295024 High Drywell Pressure / 5			08				Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE : Containment spray. CFR: 41.5	3.7	11
295025 High Reactor Pressure / 3				02			Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE: Reactor/turbine pressure regulating system. CFR: 41.7	3.8	12
295026 Suppression Pool High Water Temp. / 5					03		Ability to determine and/or interpret the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Reactor pressure. CFR: 41.10	3.9	13
295027 High Containment Temperature / 5							(Not Applicable to Plant Design)		
295028 High Drywell Temperature / 5	01						Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE : Reactor water level measurement. CFR: 41.8 to 41.10	3.5	14

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions – Tier 1/Group 1 (**RO**)								Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#
295030 Low Suppression Pool Wtr Lvl / 5				05			Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: HPCI. CFR: 41.7		3.5	15
295031 Reactor Low Water Level / 2			01				Knowledge of the reasons for the following responses as they apply to REACTOR LOW WATER LEVEL: Automatic depressurization system actuation. CFR: 41.5		3.9	16
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1				04			Ability to operate and/or monitor the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN : SBLC. CFR: 41.7		4.5	17
295038 High Off-site Release Rate / 9					01		Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE : Off-site. CFR: 41.10		3.3	18
600000 Plant Fire On Site / 8						R	2.4.45: Ability to prioritize and interpret the significance of each annunciator or alarm. CFR: 41.10		4.1	19
700000 Generator Voltage and Electric Grid Disturbances / 6	01						Knowledge of the operational implications of the |following concepts as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Definition of terms: volts, watts, amps, VARs, power factor. CFR: 41.4, 41.5, 41.7, 41.10		3.3	20
K/A Category Totals:	4	2	3	4	4	3	Group Point Total: 20			**20** /7

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (**RO**)							Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295002 Loss of Main Condenser Vac / 3									
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2				05			Ability to operate and/or monitor the following as they apply to HIGH REACTOR WATER LEVEL: RCIC. CFR: 41.7	3.3	21
295009 Low Reactor Water Level / 2					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	3.6	22
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5									
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1		04					Knowledge of the interrelations between INADVERTENT REACTIVITY ADDITION and the following: Void concentration. CFR: 41.7	3.2	23
295015 Incomplete SCRAM / 1									
295017 High Off-site Release Rate / 9									
295020 Inadvertent Cont. Isolation / 5 & 7	01						Knowledge of the operational implications of the following concepts as they apply to INADVERTENT CONTAINMENT ISOLATION : Loss of normal heat sink. CFR: 41.8 to 41.10	3.7	24
295022 Loss of CRD Pumps / 1									
295029 High Suppression Pool Wtr Lvl / 5									
295032 High Secondary Containment Area Temperature / 5				01			Ability to operate and/or monitor the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE : Area temperature monitoring system. CFR: 41.7	3.6	25
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9			05				Knowledge of the reasons for the following responses as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION : Manual SCRAM and depressurization: Plant-Specific. CFR: 41.5	3.6	26
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5									
500000 High CTMT Hydrogen Conc. / 5			01				Knowledge of the reasons for the following responses as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS: Initiation of containment atmosphere control system. CFR: 41.5	2.9	27
K/A Category Point Totals:	1	1	2	2	1	0	Group Point Total: 7		**7**/3

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (**RO**)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
203000 RHR/LPCI: Injection Mode		0 2		0 6								Knowledge of electrical power supplies to the following: Valves. CFR: 41.7 / Knowledge of RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following: Adequate pump net positive suction head (interlock suction valve open): Plant-Specific. CFR: 41.7.	2.5 / 3.5	33 28
205000 Shutdown Cooling	0 1				0 3							Knowledge of the operational implications of the following concepts as they apply to SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) : Heat removal mechanisms. CFR: 41.5 / Knowledge of the physical connections and/or cause effect relationships between SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) and the following: Reactor pressure. CFR: 41.2 to 41.9	2.8 / 3.6	29 30
206000 HPCI						1 2			0 1			Knowledge of the effect that a loss or malfunction of the following will have on the HIGH PRESSURE COOLANT INJECTION SYSTEM: Reactor water level. CFR: 41.7 / Ability to monitor automatic operations of the HIGH PRESSURE COOLANT INJECTION SYSTEM including: Turbine speed. CFR: 41.7	4.2 / 3.6	31 32
207000 Isolation (Emergency) Condenser												(System Not Applicable)		
209001 LPCS								0 8				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	3.1	34
209002 HPCS												(System Not Applicable)		
211000 SLC										0 1		Ability to manually operate and/or monitor in the control room: Tank level. CFR: 41.7	3.9	35
212000 RPS											R	2.4.2: Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. CFR: 41.7	4.5	36
215003 IRM	0 4											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). CFR: 41.2 to 41.9	2.5	37

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (**RO**)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
215004 Source Range Monitor		01			03							Knowledge of electrical power supplies to the following: SRM channels/detectors. CFR: 41.7 / Knowledge of the operational implications of the following concepts as they apply to SOURCE RANGE MONITOR (SRM) SYSTEM: Changing detector position. CFR: 41.5	2.6 / 2.8	38 39
215005 APRM / LPRM			07				04					Knowledge of the effect that a loss or malfunction of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM will have on following: Rod block monitor. CFR: 41.7 / Ability to predict and/or monitor changes in parameters associated with operating the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM controls including: SCRAM and rod block trip setpoints. CFR: 41.5	3.2 / 4.1	40 41
217000 RCIC				03								Knowledge of REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) design feature(s) and/or interlocks which provide for the following: Prevents pump over heating. CFR: 41.7	2.9	42
218000 ADS					01							Knowledge of the operational implications of the following concepts as they apply to AUTOMATIC DEPRESSURIZATION SYSTEM: ADS logic operation. CFR: 41.5	3.8	43
223002 PCIS/Nuclear Steam Supply Shutoff						05						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: Containment instrumentation. CFR: 41.7	3.0	44
239002 SRVs							06					Ability to predict and/or monitor changes in parameters associated with operating the RELIEF/SAFETY VALVES controls including: Reactor power. CFR: 41.5	3.7	45
259002 Reactor Water Level Control								02				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: Loss of any number of reactor feedwater flow inputs. CFR: 41.5	3.3	46
261000 SGTS									03			Ability to monitor automatic operations of the STANDBY GAS TREATMENT SYSTEM including: Valve operation. CFR: 41.7	3.0	47
262001 AC Electrical Distribution										05		Ability to manually operate and/or monitor in the control room: Voltage, current, power, and frequency on A.C. buses. CFR: 41.7	3.3	48

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (**RO**)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
262002 UPS (AC/DC)									01			Ability to monitor automatic operations of the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) including: Transfer from preferred to alternate source. CFR: 41.7	2.8	49
263000 DC Electrical Distribution	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	3.3	50
264000 EDGs			02									Knowledge of the effect that a loss or malfunction of the EMERGENCY GENERATORS (DIESEL/JET) will have on following: A.C. electrical distribution. CFR: 41.7	3.9	51
300000 Instrument Air			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	3.3	52
400000 Component Cooling Water				01								Knowledge of CCWS design feature(s) and or interlocks which provide for the following: Automatic start of standby pump. CFR: 41.7	3.4	53
K/A Category Point Totals:	3	2	3	3	3	2	2	2	3	2	1	Group Point Total: 26		**26**/ 5

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (**RO**)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
201001 CRD Hydraulic		02										Knowledge of electrical power supplies to the following: Scram valve solenoids. CFR: 41.7	3.6	54
201002 RMCS														
201003 Control Rod and Drive Mechanism														
201004 RSCS												(System Not Applicable)		
201005 RCIS												(System Not Applicable)		
201006 RWM														
202001 Recirculation											R	2.2.25: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. CFR: 41.5 / 41.7	3.2	55
202002 Recirculation Flow Control														
204000 RWCU				03								Knowledge of REACTOR WATER CLEANUP SYSTEM design feature(s) and/or interlocks which provide for the following: Over temperature protection for system components. CFR: 41.7	2.9	56
214000 RPIS			03									Knowledge of the effect that a loss or malfunction of the ROD POSITION INFORMATION SYSTEM will have on following: RMCS. CFR: 41.7	3.1	57
215001 Traversing In-core Probe														
215002 RBM										03		Ability to manually operate and/or monitor in the control room: Trip bypasses: BWR-3,4,5. CFR: 41.7	2.8	58
216000 Nuclear Boiler Inst.						03						Knowledge of the effect that a loss or malfunction of the following will have on the NUCLEAR BOILER INSTRUMENTATION: Temperature compensation. CFR: 41.7	2.8	59
219000 RHR/LPCI: Torus/Pool Cooling Mode														
223001 Primary CTMT and Aux.														
226001 RHR/LPCI: CTMT Spray Mode														
230000 RHR/LPCI: Torus/Pool Spray Mode														
233000 Fuel Pool Cooling/Cleanup							03					Ability to predict and/or monitor changes in parameters associated with operating the FUEL POOL COOLING AND CLEAN-UP controls including: Pool temperature. CFR: 41.5	3.1	60
234000 Fuel Handling Equipment	01											Knowledge of the physical connections and/or cause effect relationships between FUEL HANDLING EQUIPMENT and the following: Fuel. CFR: 41.2 to 41.9	3.2	61
239001 Main and Reheat Steam														
239003 MSIV Leakage Control												(System Not Applicable)		
241000 Reactor/Turbine Pressure Regulator														
245000 Main Turbine Gen. / Aux.														
256000 Reactor Condensate														
259001 Reactor Feedwater														

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (**RO**)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
268000 Radwaste											R	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	4.0	62
271000 Offgas									05			Ability to monitor automatic operations of the OFFGAS SYSTEM including: System indicating lights and alarms. CFR: 41.7	2.9	63
272000 Radiation Monitoring		05										Knowledge of electrical power supplies to the following: Reactor building ventilation monitors: Plant-Specific. CFR: 41.7	2.6	64
286000 Fire Protection														
288000 Plant Ventilation														
290001 Secondary CTMT														
290003 Control Room HVAC			04									Knowledge of the effect that a loss or malfunction of the CONTROL ROOM HVAC will have on following: Control room pressure. CFR: 41.7	2.8	65
290002 Reactor Vessel Internals														
K/A Category Point Totals:	1	2	2	1	0	1	1	0	1	1	2	Group Point Total: 12		**12**/3

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (**SRO**)								Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4					06		Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : Nuclear boiler instrumentation. CFR: 41.10 / 43.5		3.3	76
295003 Partial or Complete Loss of AC / 6										
295004 Partial or Total Loss of DC Pwr / 6					03		Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Battery voltage. CFR: 41.10 / 43.5		2.9	77
295005 Main Turbine Generator Trip / 3										
295006 SCRAM / 1										
295016 Control Room Abandonment / 7										
295018 Partial or Total Loss of CCW / 8						S	2.1.20: Ability to interpret and execute procedure steps. CFR: 41.10 / 43.5		4.6	78
295019 Partial or Total Loss of Inst. Air / 8										
295021 Loss of Shutdown Cooling / 4										
295023 Refueling Acc / 8										
295024 High Drywell Pressure / 5										
295025 High Reactor Pressure / 3										
295026 Suppression Pool High Water Temp. / 5										
295027 High Containment Temperature / 5							(Not applicable; applies to Mark III Containments)			
295028 High Drywell Temperature / 5						S	2.2.38: Knowledge of conditions and limitations in the facility license. CFR: 41.7 / 41.10 / 43.1		4.5	79
295030 Low Suppression Pool Wtr Lvl / 5										
295031 Reactor Low Water Level / 2										
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1										
295038 High Off-site Release Rate / 9						S	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		4.4	80
600000 Plant Fire On Site / 8						S	2.4.35: Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. CFR: 41.10 / 43.5		4.0	81
700000 Generator Voltage and Electric Grid Disturbances / 6					04		Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: VARs outside capability curve. CFR: 41.5 and 43.5		3.6	82
K/A Category Totals:					3	4	Group Point Total: 7			20/**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	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295002 Loss of Main Condenser Vac / 3									
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2									
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5									
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1						S	2.1.23: Ability to perform specific system and integrated plant procedures during all modes of plant operation. CFR: 41.10 / 43.5	4.4	83
295015 Incomplete SCRAM / 1					01		Ability to determine and/or interpret the following as they apply to INCOMPLETE SCRAM : Reactor power. CFR: 41.10 / 43.5	4.3	84
295017 High Off-site Release Rate / 9									
295020 Inadvertent Cont. Isolation / 5 & 7									
295022 Loss of CRD Pumps / 1									
295029 High Suppression Pool Wtr Lvl / 5									
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5						S	2.4.49: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. CFR: 41.10 / 43.2	4.4	85
500000 High CTMT Hydrogen Conc. / 5									
K/A Category Point Totals:					1	2	Group Point Total: 3		7/**3**

ES-401 Plant Systems - Tier 2/Group 1 (**SRO**)								BWR Examination Outline						Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
203000 RHR/LPCI: Injection Mode														
205000 Shutdown Cooling								0 2				Ability to (a) predict the impacts of the following on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low shutdown cooling suction pressure. CFR: 41.5	2.7	86
206000 HPCI														
207000 Isolation (Emergency) Condenser														
209001 LPCS														
209002 HPCS														
211000 SLC											S	2.4.18: Knowledge of the specific bases for EOPs. CFR: 41.10 / 43.1	4.0	87
212000 RPS (DELL)								1 5				Ability to (a) predict the impacts of the following on the REACTOR PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Load rejection. CFR: 41.5	3.8	88
215003 IRM														
215004 Source Range Monitor														
215005 APRM / LPRM											S	2.2.40: Ability to apply Technical Specifications for a system. CFR: 41.10 / 43.2 / 43.5	4.7	89
217000 RCIC								0 1				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: System initiation signal. CFR: 41.5	3.7	90
218000 ADS														
223002 PCIS/Nuclear Steam Supply Shutoff														
239002 SRVs														
259002 Reactor Water Level Control														
261000 SGTS														
262001 AC Electrical Distribution														
262002 UPS (AC/DC)														

ES-401 Plant Systems - Tier 2/Group 1 (**SRO**)								BWR Examination Outline						Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)		IR	#
263000 DC Electrical Distribution															
264000 EDGs															
300000 Instrument Air															
400000 Component Cooling Water															
K/A Category Point Totals:								3			2	Group Point Total: 5			26/**5**

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (**SRO**)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
201001 CRD Hydraulic														
201002 RMCS														
201003 Control Rod and Drive Mechanism														
201004 RSCS												(System Not Applicable)		
201005 RCIS												(System Not Applicable)		
201006 RWM														
202001 Recirculation														
202002 Recirculation Flow Control														
204000 RWCU														
214000 RPIS														
215001 Traversing In-core Probe														
215002 RBM														
216000 Nuclear Boiler Inst.														
219000 RHR/LPCI: Torus/Pool Cooling Mode														
223001 Primary CTMT and Aux.														
226001 RHR/LPCI: CTMT Spray Mode														
230000 RHR/LPCI: Torus/Pool Spray Mode														
233000 Fuel Pool Cooling/Cleanup														
234000 Fuel Handling Equipment											S	2.1.32: Ability to explain and apply system limits and precautions. CFR: 41.10 / 43.2	4.0	91
239001 Main and Reheat Steam														
239003 MSIV Leakage Control														
241000 Reactor/Turbine Pressure Regulator								1 6				Ability to (a) predict the impacts of the following on the REACTOR/TURBINE PRESSURE REGULATING SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low turbine inlet pressure (loss of pressure signal). CFR: 41.5	3.4	92
245000 Main Turbine Gen. / Aux.														
256000 Reactor Condensate														
259001 Reactor Feedwater														
268000 Radwaste														
271000 Offgas											S	2.2.42: Ability to recognize system parameters that are entry-level conditions for Technical Specifications. CFR: 41.7 / 41.10 / 43.2 / 43.3	4.6	93
272000 Radiation Monitoring														
286000 Fire Protection														
288000 Plant Ventilation														
290001 Secondary CTMT														
290003 Control Room HVAC														
290002 Reactor Vessel Internals														

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (**SRO**)												Form ES-401-1
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
K/A Category Point Totals:								1			2	Group Point Total: 3		12/**3**

ES-401 Generic Knowledge and Abilities Outline (Tier 3) Form ES-401-3

Facility: Duane Arnold Energy Center Date of Exam: 4/6/15 – 4/17/15

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.32	Ability to explain and apply system limits and precautions. CFR: 41.10	3.8	66		
	2.1.39	Knowledge of conservative decision making practices. CFR: 41.10	3.6	67		
	2.1.36	Knowledge of procedures and limitations involved in core alterations. CFR: 41.10 / 43.6			4.1	94
	2.1.20	Ability to interpret and execute procedure steps. CFR: 41.10 / 43.5			4.6	95
	Subtotal			2		2
2. Equipment Control	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	2.6	68		
	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	4.6	69		
	2.2.22	Knowledge of limiting conditions for operations and safety limits. CFR: 41.5	4.0	70		
	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			4.4	96
	2.2.38	Knowledge of conditions and limitations in the facility license. CFR: 41.7 / 41.10 / 43.1			4.5	97
	Subtotal			3		2
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions. CFR: 41.12	3.2	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	3.4	72		
	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			2.9	98
	Subtotal			2		1
4. Emergency	2.4.28	Knowledge of procedures relating to a security event (non-safeguards information). CFR: 41.10	3.2	73		

Procedures / Plan	2.4.18	Knowledge of the specific bases for EOPs. CFR: 41.10	3.3	74		
	2.4.19	Knowledge of EOP layout, symbols, and icons. CFR: 41.10	3.4	75		
	2.4.16	Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, and severe accident management guidelines. CFR: 41.10 / 43.5			4.4	99
	2.4.35	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. CFR: 41.10 / 43.5			4.0	100
	Subtotal			3		2
Tier 3 Point Total				10		7