

Facility: BVPS Unit 2Date of Examination: 9/24 thru 10/4 2012Examination Level **RO** ☒Operating Test Number 2LOT8 NRC

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations (RO A.1.1)	N, R	2.1.25 (3.9) Ability to interpret reference materials, such as graphs, curves, tables, etc. (2AD-036) Perform S/D Margin Calculation (At Power with One Inoperable rod).
Conduct of Operations (RO A.1.2)	D, R	2.1.7 (4.4) Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (2AD-30) Calculate The RCS Initial Void Volume and Final Void Volume.
Equipment Control (RO A.2)	N, R	2.2.13 (4.1) Knowledge of tagging and clearance procedures. (2AD-031) Prepare a Clearance Tagout [2QSS-P21B] Quench Spray Pump 21B
Radiation Control (RO A.3)	D, R	2.3.11 (3.8) Ability to control radiation releases. (2AD-10) Determine GW Storage tank Discharge Bleed Flow Rate
Emergency Procedures/Plan		NOT EVALUATED

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

Type Codes & Criteria

(C)ontrol Room, (S)imulator, or Class(R)oom
 (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
 (N)ew or (M)odified from bank (≥ 1)
 (P)revious 2 exams (≤ 1 ; randomly selected)

Facility: BVPS Unit 2Date of Examination: 9/24 thru 10/4 2012Examination Level **SRO** ☒Operating Test Number 2LOT8 NRC

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations (SRO A.1.1)	N, R	2.1.25 (4.2) Ability to interpret reference materials, such as graphs, curves, tables, etc. (2AD-039) Review Completed S/D Margin Calculation (At Power with One Inoperable rod).
Conduct of Operations (SRO A.1.2)	N, R	2.1.7 (4.7) Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (2AD-040) Review completed RCS Initial Void Volume and Final Void Volume Calculation.
Equipment Control (SRO A.2)	N, R	2.2.18 (3.9) Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc. (2AD-041) Perform a Risk Assessment (2FWE*P23A maintenance)
Radiation Control (SRO A.3)	N, R	2.3.11 (4.3) Ability to control radiation releases. (2AD-042) Determine Compensatory actions for 2GWS-RQ104 and 2GWS-OA 100A being OOS.
Emergency Procedures/Plan (SRO A.4)	N, R	2.4.40 (4.5) Knowledge of SRO responsibilities in emergency plan implementation. (2AD-043) Complete Initial Notification that includes a PAR.

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

*Type Codes & Criteria

(C)ontrol Room, (S)imulator, or Class(R)oom

(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)(N)ew or (M)odified from bank (≥ 1)(P)revious 2 exams (≤ 1 ; randomly selected)

Facility: BVPS UNIT 2Date of Examination: 9/24 thru 10/4 2012Exam Level: RO ☒Operating Test No.: 2LOT8 NRCControl Room Systems[@] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
S1 - Shift from Main F/W Reg. Vlvs to Bypasses (2CR-072)	S, D	4S
S2 - Respond to Rad Monitor Alarm (leak Coll Vent) (2CR-622)	S, D	7
S3 - Raise Rx PWR to 10 ⁻⁸ AMPS (2CR-644)	S, D, A, L	1
S4 - Isolate SI Accumulators During a LOCA (2CR-654)	S, D, A, EN	3
S5 - Perform Manual Makeup to the Charging Suction (2CR-581)	S, D, A	2
S6 - X-fer 4Kv AE Emerg Bus from Emerg to Norm (2CR-597)	S, N, A	6
S7 - Containment Spray Manual Actuation (2CR-573)	S, M, A	5
S8 - Swap RHS Trains (2CR-636)	S, M, A, EN, L	4P

In-Plant Systems[@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

P1 - Align Service Water Supply to AFW Pump Suction (2PL-167)	N, R, E	4S
P2 - Startup a Rod Drive MG Set (2PL-003)	D	1
P3 - Place a RPS Channel in the Tripped Condition (2PL-009)	D	7

@ All RO and SRO control room (and in-plant) systems must be different and serve different safety functions; all 5SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate Path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	$\leq 9 / \leq 8 / \leq 4$
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$
(EN)gineered safety feature	- / - / ≥ 1 (Control room system)
(L)ow-power / Shutdown	$\geq 1 / \geq 1 / \geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)
(R)CA	$\geq 1 / \geq 1 / \geq 1$
(S)imulator	

Facility: BVPS UNIT 2Date of Examination: 9/24 thru 10/4 2012Exam Level: SRO(I) ☒Operating Test No.: 2LOT8 NRCControl Room Systems[@] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
S1 - Shift from Main F/W Reg. Vlvs to Bypasses (2CR-072)	S, D	4S
S2 - Respond to Rad Monitor Alarm (leak Coll Vent) (2CR-622)	S, D	7
S3 - Raise Rx PWR to 10 ⁻⁸ AMPS (2CR-644)	S, D, A, L	1
S4 - Isolate SI Accumulators During a LOCA (2CR-654)	S, D, A, EN	3
S5 - Perform Manual Makeup to the Charging Suction (2CR-581)	S, D, A	2
S6 - X-fer 4Kv AE Emerg Bus from Emerg to Norm (2CR-597)	S, N, A	6
S7 - Containment Spray Manual Actuation (2CR-573)	S, M, A	5

In-Plant Systems[@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

P1 - Align Service Water Supply to AFW Pump Suction (2PL-167)	N, R, E	4S
P2 - Startup a Rod Drive MG Set (2PL-003)	D	1
P3 - Place a RPS Channel in the Tripped Condition (2PL-009)	D	7

[@] All RO and SRO control room (and in-plant) systems must be different and serve different safety functions; all SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate Path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥ 1 (Control room system)
(L)ow-power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Appendix D

Scenario Outline

Form ES-D-1

Facility: **BVPS Unit 2**

Scenario No.:1

Op Test No.: 2LOT8 NRC

Examiners: _____

Candidates: _____

SRO

ATC

BOP

Initial Conditions: IC 211(7): 25% power, BOL, Xe increasing, CB "D" @ 121 steps, RCS boron - 1935 ppm.
Main feed regulating valves in service

Turnover: Increase power to 100%. 2FWE*P23A OOS, 2SAS-C21B OOS

Critical Tasks:

- 1. E-0.E Actuate 1 train of CNMT Spray**
- 2. E-0.P Manually actuate SLI**
- 3. E-2.A Isolate Faulted S/G**

Event No.	Malf. No.	Event Type	Event Description
1		(R) ATC (N) BOP, SRO	Raise power in accordance with reactivity plan.
2		(C) BOP, SRO	2CCS-P21A sheared shaft, auto start failure of 2CCS-P21B, requires manually starting standby pump.
3		(TS), SRO	2FWE*P22 (turbine driven Aux Feedwater pump) trips
4		(I) ATC, SRO	2CHS-PT145, fails high, ATC required to manually control letdown pressure via 2CHS-PCV145.
5		(C) BOP, SRO (TS), SRO	Loss of 2AE 4kv Emergency bus / 2-1 Emergency Diesel fails to auto start. BOP required to manually start EDG 2-1.
6		(M) ALL	Feedline break inside CNMT.
7		(C) ATC, SRO	CIB actuation failure
8		(C) BOP, SRO	MSLI actuation failure with 2SDS*AOV111's failing to auto close, requires BOP to manually actuate MSLI and close all 6 2SDS*AOV111's
9		(C) BOP, SRO	"B" train CREV's fails to actuate, requires BOP to manually actuate.

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

The crew will assume the shift at 25% power with instructions to raise power to 100% IAW 2OM-52.4.A and the reactivity plan.

When reactor power has increased to > P8 (30%), Secondary Component Cooling Water Pump, 2CCS-P21A, will experience a sheared shaft, requiring the crew to enter AOP 2.28.1, Loss of Secondary Component Cooling Water, and the BOP to manually start the standby pump, 2CCS-P21B, which failed to auto start.

The linkage for the trip-throttle valve for the Turbine Driven Auxiliary Feedwater Pump, 2FWE*P22, will fail requiring the US to determine appropriate Tech Spec action.

When Tech Specs have been addressed, Letdown Pressure Transmitter, 2CHS-PT145, will fail high, requiring the ATC to control letdown pressure by manually controlling the Letdown Pressure Control Valve, 2CHS-PCV145.

After the crew has stabilized the plant, 4KV emergency bus 2AE will de-energize and EDG 2-1 will fail to automatically start. The crew will enter AOP 2.36.2, Loss of 4KV Emergency Bus, which requires a manual start to restore power to the bus. The SRO will determine appropriate Tech Spec actions.

A Feedwater header rupture will occur inside containment. The reactor will trip. Upon the reactor trip, the crew will enter E-0.

MSLI will fail to automatically actuate, requiring the BOP to manually actuate a Steam Line Isolation. When MSLI is actuated, the main steam line drains (2SDS*AOV111's) will fail to close requiring the BOP to manually close at least 1 train.

CIB will fail to automatically actuate, The ATC will identify the failure to actuate and manually actuate both trains of CIB.

The crew will identify the "C" S/G as faulted and transition to E-2 to isolate. Train "B" CREV's, Control Room Emergency Ventilation System, will fail to actuate requiring the BOP to manually initiate.

The crew will progress through E-2 and transition to E-1.

The scenario will be terminated after the crew transitions to ES-1.1.

Expected procedure flow path is E-0 → E-2 → E-1 → ES-1.1.

Appendix D**Scenario Outline****Form ES-D-1**

Facility:	BVPS Unit 2	Scenario No.:	2	Op Test No.:	<u>2LOT8 NRC</u>
Examiners:	_____	Candidates:	_____		SRO
	_____		_____		ATC
	_____		_____		BOP

Initial Conditions: IC 212(17): 72% power, MOL, Eq Xe. CB "D"@180 steps, RCS boron - 1140 ppm.

Turnover: Maintain steady state power at 72%, 2FWE*P23A OOS, 2SAS-C21B OOS

Critical Tasks:

- 1. E-0.A Manually trip the Reactor**
- 2. E-0.Q Manually trip the turbine**
- 3. FR-H.1.A Establish feedwater flow before Feed and Bleed criteria**

Event No.	Malf. No.	Event Type	Event Description
1		(C) ATC, SRO (TS) SRO	N44 fails high, rods automatically step in.
2		(R) ATC (C) BOP, SRO	2FWS-P21B trips/ reduce power to 52%
3		(TS) SRO	Misaligned Rod
4		(M) ALL	2RCS*P21B locked rotor trip
5		(C) ATC, SRO	Automatic Reactor trip failure
6		(C) BOP, SRO	Automatic turbine trip failure
7		(M) ALL	Loss of all auxiliary feed water, entry into FR-H.1
8		(C) BOP, SRO	Failure of 2FWS-P24, 2FWS-P21A and P21B (requires secondary depressurization and use of condensate pump.
9		(C) BOP, SRO	2HVS-FN204A and B trip, requires manual starting of at least 1 fan.

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

The crew will assume the shift at 72% power with instructions to maintain steady state conditions.

N-44 will fail high causing the control rods to automatically insert. The crew will enter AOP 2.1.3, RCCA Control Bank Inappropriate Continuous Movement, verify no load rejection is occurring and then the ATC will place the control rods in Manual to stop rod insertion. The US will then enter AOP 2.2.1C, Power Range Channel Malfunction, to remove the channel from service and determine appropriate Tech Spec action.

Main Feedwater pump, 2FWS-P21B will then trip, the crew will enter AOP 2.24.1, Loss of Main Feedwater AOP, and begin an immediate power reduction to 52%. While the rods are inserting, 1 rod will experience a moveable gripper failure causing the rod to ratchet inward on each step demand. The crew will identify the misaligned rod and initiate boration for the remainder of the power reduction. After the plant has stabilized, the SRO will enter AOP 2.1.8, Rod Inoperability, and address Tech Spec's for the misaligned rod.

The "B" reactor coolant pump will then experience a locked rotor trip, the reactor will fail to automatically trip, the ATC will manually trip the reactor. The crew will enter E-0.

The turbine will fail to automatically trip in the reactor trip requiring the BOP to manually trip the turbine.

A loss of all aux feed water will then occur, the crew will recognize the loss and enter FR-H.1, Response to Loss of Secondary Heat Sink, to re-establish feedwater.

The crew will attempt to restore normal feedwater via the startup feedwater pump and the main feedwater pumps, Various failures will prevent each pump from starting. The crew will then depressurize the S/G's to establish feedwater flow from a condensate pump. When feedwater flow has been re-established, the SRO will return to E-0.

The Ventilation fans, 2HVS-FN204A & B will trip on the reactor trip, the BOP will start at least 1 fan.

The scenario will be terminated after the crew transitions to ES-1.1.

Expected procedure flow path is E-0 → FR-H.1 → E-0 → ES-1.1.

Appendix D**Scenario Outline****Form ES-D-1**Facility: **BVPS Unit 2**

Scenario No.:4

Op Test No.: 2LOT8 NRC

Examiners: _____

Candidates: _____

SRO

ATC

BOP

Initial

IC 214(18): 100% power, MOL, Eq Xe, CB "D" @ 225 steps, RCS boron – 1044 ppm.

Conditions:Turnover:

Maintain steady state power at 100%, 2FWE*P23A OOS, 2SAS-C21B OOS

Critical Tasks:**1. E-0.O Close CNMT isolation valves****2. E-1.C Stop RCP's****3. FR-S.1.C Insert RCCA's**

Event No.	Malf. No.	Event Type	Event Description
1		(I) ATC, SRO (TS) SRO	2RCS*LT459 fails low.
2		(N) ATC SRO	Restore letdown to service
3		(R) ATC (I) ATC, SRO	Valve position limiter failure causes load rejection with Auto rod malfunction, ATC required to insert negative reactivity.
4		(C) BOP, SRO	During load rejection, "A" Main Feed Regulating Valve controller holds valve in position, BOP required to manually control "A" S/G level.
5		(C) ATC, SRO (TS) SRO	2RCS*PT445 fails high, 2 PORV's open, 2RCS*PCV455C fails to 18% open with Block valve failed open, requiring crew to manually trip the reactor.
6		(M) ALL	ATWS, crew enters FR-S.1.
7		(M) ALL	2000 gpm SBLOCA on return to E-0.
8		(C) BOP, SRO	Train B CIA failure with 2CHS*MOV378 failing to auto close
9			

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

The crew will assume the shift at 100% power with instructions to maintain steady state conditions.

The controlling PZR level channel, 2RCS*LT459 will fail low causing letdown to automatically isolate. The crew will enter the Instrument failure procedure to address the failed channel and place the alternate channel in service. The US will determine appropriate Tech Spec action.

After the alternate channel is placed in service, the crew will restore normal letdown to service.

When letdown has been restored, the valve position limiter will fail causing a load rejection with an Auto Rod malfunction requiring the ATC to manually insert control rods.

During the load rejection, the "A" Main feed regulating valve will fail to control in auto (the valve will remain in its 100% power position), The BOP will be required to recognize the malfunction and manually control the "A" S/G level.

Once the plant has stabilized, a RCS control pressure transmitter, 2RCS*PT445 will fail high, causing 2 PORV's to open, 2RCS*PCV455C will stick at 18% open, with the block valve failing to close. The SRO will address PORV Tech Spec. RCS pressure will continue to slowly decrease requiring the SRO to direct the crew to manually trip the reactor and enter E-0.

The reactor will fail to trip from the control room, the SRO will transition to FR-S.1 and the crew will dispatch an operator to locally trip the Rx. After the reactor is locally tripped, the crew will return to E-0.

3 minutes after the reactor is locally tripped, a 2000 gpm LOCA will occur on the "A" loop, the crew will transition to E-1. The crew will be required to recognize that RCS / Secondary pressure DP requirements are met to require that the RCP's be manually tripped.

Train "B" CIA will fail to actuate along with 2CHS*MOV378 failing to auto close on the Train "A" CIA signal.

The scenario will be terminated after the crew transitions to ES-1.2.

Expected procedure flow path is E-0 → FR-S.1 → E-0 → E-1 → ES-1.2.

Appendix D

Scenario Outline

Form ES-D-1

Facility: **BVPS Unit 2**

Scenario No.:5

Op Test No.: 2LOT8 NRC

Examiners: _____

Candidates: _____

SRO

ATC

BOP

Initial Conditions: IC 217(10): 100% power, BOL, Eq Xe, CB "D" @ 225 steps, RCS boron – 1458 ppm.Turnover: Maintain steady state power at 100%, 2FWE*P23A OOS, 2SAS-C21B OOSCritical Tasks:

- 1. E-0.D Crew manually actuates at least one train of SIS**
- 2. E-0.F Crew establishes the minimum required AFW flow**
- 3. E-0.M Crew closes the upstream block MOV of the stuck open Pzr PORV**
- 4. E-0.I Establish flow from at least 1 High head ECCS pump**

Event No.	Malf. No.	Event Type	Event Description
1		(I) ATC, SRO	2RCS*PT444 drifts low, requires ATC to manually control RCS pressure.
2		(TS) SRO	2FWS-LT485 fails high
3		(C) BOP, SRO	Voltage regulator failure causes main generator over excitation, requires BOP to turn voltage regulator off and manually lower excitation.
4		(I) ATC, SRO	2CHS-LT115 fails high, requires ATC to restore letdown flow to the VCT and perform manual makeups as necessary.
5		(C) ATC, SRO (TS) SRO	25 gpm RCS leak on "A" Loop.
6		(M) ALL	500 gpm RCS leak on "A" Loop.
7		(C) ATC, SRO	2RCS-PCV455D fails open on Rx trip, requires ATC to close block valve.
8		(C) BOP, SRO	AFW malfunctions, 2FWE*P23A OOS on turnover, 2FWE*P23B auto start failure, requires BOP to manually start. 2FWE*P22 running with reduced flow (< 340 gpm)
9		(C) ATC, SRO	Auto SIS inhibited, requires ATC to manually actuate SIS.
10		(C) ATC, SRO	2SIS*MOV867's fail to open on SIS actuation signal, ATC required to manually open valves to initiate Safety Injection flow.

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

The crew will assume the shift at 100% power with instructions to maintain steady state conditions.

The controlling PZR pressure channel, 2RCS*PT444 will drift low causing RCS pressure to rise due to the pressurizer spray valves closing and the heaters energizing. The crew will respond IAW 2OM-6.4.IF, attachment 2. The ATC controls PZR pressure by manually operating the PZR heaters and spray valves or manual control of the PZR pressure master controller.

When the plant has stabilized, 2FWS-LT485, S/G 21B Channel II Narrow Range level transmitter will fail high requiring use of 2OM-24.4.IF attachment 1, SRO will review TS.

After the SRO completes FWS LT Tech Spec determination, the voltage regulator will fail causing overexcitation of the MUG. IAW the alarm response procedure, the BOP will turn the voltage regulator off and manually restore power factor and excitation by lowering the base adjust.

VCT level transmitter, 2CHS-LT115 will fail high causing the letdown flowpath to fully divert, using the instrument failure procedure guidance, the ATC will restore letdown flow to the VCT. The ATC will also be required to manually initiate VCT makeups.

A 25 gpm RCS leak will then occur on the "A" loop, the crew will recognize degrading parameters and enter AOP 2.6.7, Excessive Primary Plant Leakage, to address the primary plant leakage. The SRO will address RCS leakage Tech Spec.

The leak will then become a 500 gpm SBLOCA, RCS pressure and pressurizer level will decrease requiring the SRO to direct the crew to manually trip the reactor and enter E-0.

Upon the reactor trip, PORV 455D will fail partially open, the ATC will recognize PORV failure and close the block valve.

Auxiliary feedwater malfunctions also occur on the reactor trip, the turbine driven pump will start but provide insufficient flow and the remaining available Motor driven AFW pump will fail to auto start, the BOP will manually start 2FWE*P23B.

SIS will fail to automatically actuate on low RCS pressure, the ATC will manually actuate SIS.

Upon SIS actuation, 2SIS*MOV867's will fail to automatically open, the ATC will manually open valves to initiate SIS injection flow.

The crew will transition from E-0 to E-1 when checking if RCS is intact based on containment parameters. E-1 will then be performed until transition to ES-1.2.

The scenario will be terminated after the crew transitions to ES-1.2

Expected procedure flow path is E-0 → E-1 → ES-1.2.

Facility: **BVPS UNIT 2 RO**Date of Exam 9/24 thru 10/5 2012

Tier	Group	RO K/A Category Points												SRO ONLY Points		
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	TOTAL	A2	G*	TOTAL
1. Emergency & Abnormal Plant Evolutions	1	3	3	3				3	3			3	18			
	2	1	2	1				2	2			1	9			
	Tier Totals	4	5	4				5	5			4	27			
2. Plant Systems	1	2	2	3	3	2	2	3	3	3	2	3	28			
	2	2	1	1	1	1	1	1	0	0	1	1	10			
	Tier Totals	4	3	4	4	3	3	4	3	3	3	4	38			
3. Generic Knowledge and Abilities Category					1		2		3		4		10			
					3		2		2		3					

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.

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1(RO)

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000008 Pressurizer Vapor Space Accident / 3 [Question 1]		X					AK2 Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: AK2.03 Controllers and positioners (CFR 41.7 / 45.7)	2.5	1
000009 Small Break LOCA / 3 [Question 2]					X		EA2 Ability to determine or interpret the following as they apply to a small break LOCA: EA2.37 Existence of adequate natural circulation (CFR 43.5 / 45.13)	4.2	1
000015/000017 Reactor Coolant Pump (RCP) Malfunctions / 4 [Question 3]		X					AK2 Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: AK2.08 CCWS (CFR 41.7 / 45.7)	2.6	1
000022 Loss of Reactor Coolant Makeup / 2 [Question 4]						X	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	1
000025 Loss of RHR System / 4 [Question 5]				X			AA1 Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: AA1.11 Reactor building sump level indicators (CFR 41.7 / 45.5 / 45.6)	2.9	1
000027 Pressurizer Pressure Control System Malfunction / 3 [Question 6]				X			AA1 Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: AA1.01 PZR heaters, sprays, and PORVs (CFR 41.7 / 45.5 / 45.6)	4.0	1
000029 ATWS / 1 [Question 7]		X					EK2 Knowledge of the interrelations between the and the following an ATWS: EK2.06 Breakers, relays, and disconnects (CFR 41.7 / 45.7)	2.9*	1
000038 Steam Generator Tube Rupture / 3 [Question 8]			X				EK3 Knowledge of the reasons for the following responses as the apply to the SGTR: EK3.04 Automatic actions provided by each PRM (CFR 41.5 / 41.10 / 45.6 / 45.13)	3.9	1
000040 Steam Line Rupture – Excessive Heat Transfer / 4 [Question 9]			X				AK3 Knowledge of the reasons for the following responses as they apply to the Steam Line Rupture: AK3.01 Operation of steam line isolation valves (CFR 41.5,41.10 / 45.6 / 45.13)	4.2	1

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1(RO) *Continued*

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000054 Loss of Main Feedwater / 4 [Question 10]	X						AK1 Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): AK1.02 Effects of feedwater introduction on dry S/G (CFR 41.8 / 41.10 / 45.3)	3.6	1
000055 Station Blackout / 6 [Question 11]	X						EK1 Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : EK1.02 Natural circulation cooling (CFR 41.8 / 41.10 / 45.3)	4.1	1
000057 Loss of Vital AC Electrical Instrument Bus / 6 [Question 12]						X	2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)	4.5	1
000058 Loss of DC Power / 6 [Question 13]	X						AK1 Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: AK1.01 Battery charger equipment and instrumentation (CFR 41.8 / 41.10 / 45.3)	2.8	1
065 Loss of Instrument Air / 8 [Question 14]			X				AK3 Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: AK3.08 Actions contained in EOP for loss of instrument air (CFR 41.5, 41.10 / 45.6 / 45.13)	3.7	1
000077 Generator Voltage and Electric Grid Disturbances / 6 [Question 15]					X		AA2 Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: AA2.03 Generator current outside the capability curve (CFR: 41.5 and 43.5 / 45.5, 45.7, and 45.8)	3.5	1
W/E04 LOCA Outside Containment / 3 [Question 16]						X	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	1
W/E05 Loss of Secondary Heat Sink / 4 [Question 17]				X			EA1 Ability to operate and / or monitor the following as they apply to the (Loss of Secondary Heat Sink) EA1.2 Operating behavior characteristics of the facility. (CFR: 41.7 / 45.5 / 45.6)	3.7	1

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1(RO) *Continued*

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
W/E11 Loss of Emergency Coolant Recirculation / 4 [Question 18]					X		EA2 Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation): EA2.2 Adherence to appropriate procedures and operation within the limitations in the Facility's license and amendments. (CFR: 43.5 / 45.13)	3.4	1
K/A Category Point Totals:	3	3	3	3	3	3	Group Point Total:		18

Emergency and Abnormal Plant Evolutions - Tier 1/Group 2(RO)

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000036 Fuel Handling Incidents / 8 [Question 19]					X		AA2 Ability to determine and interpret the following as they apply to the Fuel Handling Incidents: AA2.02 Occurrence of a fuel handling incident (CFR: 43.5 / 45.13)	3.4	1
000061 ARM System Alarms / 7 [Question 20]		X					AK2 Knowledge of the interrelations between the Area Radiation Monitoring (ARM) System Alarms and the following: AK2.01 Detectors at each ARM system location (CFR 41.7 / 45.7)	2.5*	1
000067 Plant Fire On-site / 9 [Question 21]	X						AK1 Knowledge of the operational implications of the following concepts as they apply to Plant Fire on Site: AK1.02 Fire fighting (CFR 41.8 / 41.10 / 45.3)	3.1	1
000068 Control Room Evacuation / 8 [Question 22]				X			AA1 Ability to operate and / or monitor the following as they apply to the Control Room Evacuation: AA1.27 Local trip of main feed pumps and Condensate pumps (CFR 41.7 / 45.5 / 45.6)	3.2*	1
000076 High Reactor Coolant Activity / 9 [Question 23]						X	2.1.31 Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. (CFR: 41.10 / 45.12)	4.6	1
Vv/E07 Saturated Core Cooling / 4 [Question 24]				X			EA1 Ability to operate and / or monitor the following as they apply to the (Saturated Core Cooling): EA1.3 Desired operating results during abnormal and emergency situations. (CFR: 41.7 / 45.5 / 45.6)	3.5	1
W/E08 RCS Overcooling – PTS / 4 [Question 25]			X				EK3 Knowledge of the reasons for the following responses as they apply to the (Pressurized Thermal Shock): EK3.1 Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics. (CFR: 41.5 / 41.10, 45.6, 45.13)	3.4	1
E09 Natural Circulation Operations / 4 [Question 26]					X		EA2 Ability to determine and interpret the following as they apply to the (Natural Circulation Operations) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	3.1	1

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2(RO) Continued									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
W/E14 High Containment Pressure / 5 [Question 27]		X					EK2 Knowledge of the interrelations between the (High Containment Pressure) and the following: EK2.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. (CFR: 41.7 / 45.7)	3.4	1
K/A Category Point Totals:	1	2	1	2	2	1	Group Point Total:		9

ES-401		PWR Examination Outline											Form ES-401-2	
		Plant Systems											- Tier 2/Group 1(RO)	
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	#
003 Reactor Coolant Pump [Question 28]							X					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCPS controls including: A1.03 RCP motor stator winding temperatures (CFR: 41.5 / 45.5)	2.6	1
004 Chemical and Volume Control [Question 29]		X										K2 Knowledge of bus power supplies to the following: K2.02 Makeup pumps (CFR: 41.7)	2.9	1
004 Chemical and Volume Control [Question 30]				X								K4 Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following: K4.14 Control interlocks on letdown system (letdown tank bypass valve) (CFR: 41.7)	2.8*	1
005 Residual Heat Removal [Question 31]											X	2.1.32 Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	3.8	1
005 Residual Heat Removal [Question 32]	X											K1 Knowledge of the physical connections and/or cause/effect relationships between the RHRS and the following systems: K1.13 SIS (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.3	1
006 Emergency Core Cooling [Question 33]	X											K1 Knowledge of the physical connections and/or cause/effect relationships between the ECCS and the following systems: K1.07 MFW System (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.9*	1
007 Pressurizer Relief/Quench Tank [Question 34]									X			A3 Ability to monitor automatic operation of the PRTS, including: A3.01 Components which discharge to the PRT (CFR: 41.7 / 45.5)	2.7*	1
008 Component Cooling Water [Question 35]							X					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCWS controls including: A1.01 CCW flow rate (CFR: 41.5 / 45.5)	2.8	1
010 Pressurizer Pressure Control [Question 36]						X						K6 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: K6.03 PZR sprays and heaters (CFR: 41.7 / 45.7)	3.2	1

ES-401		PWR Examination Outline										Form ES-401-2		
		Plant Systems										- Tier 2/Group 1(RO) Continued		
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	#
012 Reactor Protection [Question 37]			X									K3 Knowledge of the effect that a loss or malfunction of the RPS will have on the following: K3.02 T/G (CFR: 41.7 / 45.6)	3.2*	1
013 Engineered Safety Features Actuation [Question 38]						X						K6 Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: K6.01 Sensors and detectors (CFR: 41.7 / 45.5 to 45.8)	2.7*	1
022 Containment Cooling [Question 39]		X										K2 Knowledge of power supplies to the following: K2.01 Containment cooling fans (CFR: 41.7)	3.0*	1
026 Containment Spray [Question 40]				X								K4 Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: K4.09 Prevention of path for escape of radioactivity from containment to the outside (interlock on RWST isolation after swapover). (CFR: 41.7)	3.7*	1
039 Main and Reheat Steam [Question 41]					X							K5 Knowledge of the operational implications of the following concepts as the apply to the MRSS: K5.05 Bases for RCS cooldown limits (CFR: 41.5 / 45.7)	2.7	1
059 Main Feedwater [Question 42]			X									K3 Knowledge of the effect that a loss or malfunction of the MFW will have on the following: K3.02 AFW system (CFR: 41.7 / 45.6)	3.6	1
061 Auxiliary/Emergency Feedwater [Question 43]					X							K5 Knowledge of the operational implications of the following concepts as the apply to the AFW: K5.01 Relationship between AFW flow and RCS heat transfer (CFR: 41.5 / 45.7)	3.6	1
061 Auxiliary/Emergency Feedwater [Question 44]							X					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including: A1.01 S/G level (CFR: 41.5 / 45.5)	3.9	1

ES-401		PWR Examination Outline											Form ES-401-2		
		Plant Systems											- Tier 2/Group 1(RO) Continued		
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	#
062 AC Electrical Distribution [Question 45]												X	A4 Ability to manually operate and/or monitor in the control room: A4.07 Synchronizing and paralleling of different ac supplies (CFR: 41.7 / 45.5 / to 45.8)	3.1*	1
062 AC Electrical Distribution [Question 46]					X								K4 Knowledge of ac distribution system design feature(s) and/or interlock(s) which provide for the following: K4.10 Uninterruptable ac power sources (CFR: 41.7)	3.1	1
063 DC Electrical Distribution [Question 47]												X	2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)	4.4	1
063 DC Electrical Distribution [Question 48]									X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.01 Grounds (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.5	1
064 Emergency Diesel Generator [Question 49]									X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.13 Consequences of opening auxiliary feeder bus (ED/G sub supply) (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.6*	1
064 Emergency Diesel Generator [Question 50]												X	A4 Ability to manually operate and/or monitor in the control room: A4.04 Remote operation of the air compressor switch (different modes) (CFR: 41.7 / 45.5 to 45.8)	3.2*	1
073 Process Radiation Monitoring [Question 51]				X									K3 Knowledge of the effect that a loss or malfunction of the PRM system will have on the following: K3.01 Radioactive effluent releases (CFR: 41.7 / 45.6)	3.6	1
076 Service Water [Question 52]										X			A3 Ability to monitor automatic operation of the SWS, including: A3.02 Emergency heat loads (CFR: 41.7 / 45.5)	3.7	1

ES-401		PWR Examination Outline										Form ES-401-2		
		Plant Systems										- Tier 2/Group 1(RO) Continued		
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	#
078 Instrument Air [Question 53]								X				A3 Ability to monitor automatic operation of the IAS, including: A3.01 Air pressure (CFR: 41.7 / 45.5)	3.1	1
103 Containment [Question 54]								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the containment system and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations A2.03 Phase A and B isolation (CFR: 41.5 / 43.5 / 45.3 / 45.13)	3.5*	1
103 Containment [Question 55]											X	2.4.6 Knowledge of EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)	3.7	1
K/A Category Point Totals:	2	2	3	3	2	2	3	3	3	2	3	Group Point Total:		28

Plant Systems

- Tier 2/Group 2(RO)

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	#
001 Control Rod Drive System [Question 56]		X										K2 Knowledge of bus power supplies to the following: K2.05 M/G sets (CFR: 41.7)	3.1*	1
015 Nuclear Instrumentation [Question 57]											X	2.2.37 Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)	3.6	1
016 Non-nuclear Instrumentation [Question 58]					X							K5 Knowledge of the operational implication of the following concepts as they apply to the NNIS: K5.01 Separation of control and protection circuits (CFR: 41.5 / 45.7)	2.7*	1
017 In-Core Temperature Monitor System (ITM) [Question 59]							X					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ITM system controls including: A1.01 Core exit temperature (CFR: 41.5 / 45.7)	3.7	1
041 Steam Dump System (SDS) Turbine Bypass Control [Question 60]	X											K1 Knowledge of the Physical connections and/or cause-effect relationships between the SDS and the following systems: K1.02 S/G level (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.7	1
033 Spent Fuel Pool Cooling [Question 61]				X								K4 Knowledge of design feature(s) and/or interlock(s) which provide for the following: K4.05 Adequate SDM (boron concentration) (CFR: 41.7)	3.1	1
034 Fuel Handling Equipment [Question 62]						X						K6 Knowledge of the effect of a loss or malfunction on the following will have on the Fuel Handling System : K6.02 Radiation monitoring systems (CFR: 41.7 / 45.7)	2.6*	1
055 Condenser Air Removal [Question 63]	X											K1 Knowledge of the physical connections and/or cause/effect relationships between the CARS and the following systems: K1.06 PRM system (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.6	1
071 Waste Gas Disposal [Question 64]											X	A4 Ability to manually operate and/or monitor in the control room: A4.05 Gas decay tanks, including valves, indicators, and sample line (CFR: 41.7 / 45.5 to 45.8)	2.6*	1

ES-401		PWR Examination Outline											Form ES-401-2	
		Plant Systems											- Tier 2/Group 2(RO) Continued	
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	#
075 Circulating Water. [Question 65]			X									K3 Knowledge of the effect that a loss or malfunctions of the circulating water system will have on the following: K3.07 ESFAS (CFR: 41.7 / 45.6)	3.4*	1
K/A Category Point Totals:	2	1	1	1	1	1	1	0	0	1	1	Group Point Total:		10

Facility: **BVPS UNIT 2 RO**

Date of Exam **9/24 thru 10/5 2012**

Category	K/A#	Topic	RO		SRO Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.21	Ability to verify the controlled procedure copy. [Question 66] (CFR: 41.10 / 45.10 / 45.13)	3.5*	1		
	2.1.39	Knowledge of conservative decision making practices. [Question 67] (CFR: 41.10 / 43.5 / 45.12)	3.6	1		
	2.1.45	Ability to identify and interpret diverse indications to validate the response of another indication. [Question 68] (CFR: 41.7 / 43.5 / 45.4)	4.3	1		
	Subtotal			3		
2. Equipment Control	2.2.23	Ability to track Technical Specification limiting conditions for operations. [Question 69] (CFR: 41.10 / 43.2 / 45.13)	3.1	1		
	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings. [Question 70] (CFR: 41.10 / 45.12 / 45.13)	3.5	1		
	Subtotal			2		
3. Radiation Control	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. [Question 71] (CFR: 41.12 / 43.4 / 45.10)	3.4	1		
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. [Question 72] (CFR: 41.12 / 43.4 / 45.9)	2.9	1		
	Subtotal			2		
4. Emergency Procedures/ Plan	2.4.3	Ability to identify post-accident instrumentation. [Question 73] (CFR: 41.6 / 45.4)	3.7	1		
	2.4.13	Knowledge of crew roles and responsibilities during EOP usage. [Question 74] (CFR: 41.10 / 45.12)	4.0	1		
	2.4.34	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects. [Question 75] (CFR: 41.10 / 43.5 / 45.13)	4.2	1		
	Subtotal			3		
Tier 3 Point Total				10		

Facility: **BVPS UNIT 2 SRO**Date of Exam 9/24 thru 10/5 2012

Tier	Group	RO K/A Category Points											SRO ONLY Points							
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	TOTAL	A2		G*	TOTAL			
1. Emergency & Abnormal Plant Evolutions	1													3		3	6			
	2													2		2	4			
	Tier Totals													5		5	10			
2. Plant Systems	1													3		2	5			
	2													1	1	1	3			
	Tier Totals													5		3	8			
3. Generic Knowledge and Abilities Category																1	2	3	4	7
																2	1	2	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.

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1(SRO)

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 Reactor Trip –Stabilization / 1 [Question 76]						X	2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)	4.3	1
000011 Large Break LOCA / 3 [Question 77]						X	2.4.44 Knowledge of emergency plan protective action recommendations. (CFR: 41.10 / 41.12 / 43.5 / 45.11)	4.4	1
000026 Loss of Component Cooling Water / 8 [Question 78]						X	2.1.20 Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	1
000056 Loss of Offsite Power / 6 [Question 79]					X		AA2. Ability to determine and interpret the following as they apply to the Loss of Offsite Power: AA2.45 Indicators to assess status of ESF breakers (tripped/not-tripped) and validity of alarms (false/not-false) (CFR: 43.5 / 45.13)	3.9	1
000062 Loss of Nuclear Service Water / 4 [Question 80]					X		AA2. Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: AA2.01 Location of a leak in the SWS (CFR: 43.5 / 45.13)	3.5	1
W/E12 Steam Line Rupture – Excessive Heat Transfer / 4 [Question 81]					X		EA2. Ability to determine and interpret the following as they apply to the (Uncontrolled Depressurization of all Steam Generators) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	4.0	1
K/A Category Point Totals:	0	0	0	0	3	3	Group Point Total:		6

Emergency and Abnormal Plant Evolutions - Tier 1/Group 2(SRO)

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000003 Dropped Control Rod / 1 [Question 82]					X		AA2. Ability to determine and interpret the following as they apply to the Dropped Control Rod: AA2.03 Dropped rod, using in-core/ex-core instrumentation, in-core or loop temperature measurements (CFR: 43.5 / 45.13)	3.8	1
000074 Inadequate Core Cooling / 4 [Question 83]						X	2.1.19 Ability to use plant computers to evaluate system or component status. (CFR: 41.10 / 45.12)	3.8	1
WE02 SI Termination / 3 [Question 84]					X		EA2. Ability to determine and interpret the following as they apply to the (SI Termination) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	4.2	1
WE10 Natural Circulation with Steam Void in Vessel with/without RVLIS / 4 [Question 85]						X	2.2.38 Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)	4.5	1
K/A Category Point Totals:	0	0	0	0	2	2	Group Point Total:		4

Plant Systems

- Tier 2/Group 1(SRO)

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	#
010 Pressurizer Pressure Control System (PZR PCS) [Question 86]								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.03 PORV failures (CFR: 41.5 / 43.5 / 45.3 / 45.13)	4.2	1
012 Reactor Protection System [Question 87]								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.07 Loss of dc control power (CFR: 41.5 / 43.5 / 45.3 / 45.5)	3.7	1
013 Engineered Safety Features Actuation System (ESFAS) [Question 88]											X	2.2.37 Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)	4.6	1
039 Main and Reheat Steam System (MRSS) [Question 89]								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.05 Increasing steam demand, its relationship to increases in reactor power (CFR: 41.5 / 43.5 / 45.3 / 45.13)	3.6	1
061 Auxiliary / Emergency Feedwater (AFW) System [Question 90]											X	2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)	4.7	1
K/A Category Point Totals:	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:		5

Plant Systems

- Tier 2/Group 2(SRO)

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	#
015 Nuclear Instrumentation System [Question 91]								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.02 Faulty or erratic operation of detectors or compensating components (CFR: 41.5 / 43.5 / 45.3 / 45.5)	3.5*	1
034 Fuel Handling Equipment System (FHES) [Question 92]				X								K4 Knowledge of design feature(s) and/or interlock(s) which provide for the following: K4.01 Fuel protection from binding and dropping (CFR: 41.7)	3.4	1
041 Steam Dump System (SDS) and Turbine Bypass Control [Question 93]											X	2.1.31 Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. (CFR: 41.10 / 45.12)	4.3	1
K/A Category Point Totals:	0	0	0	1	0	0	0	1	0	0	1	Group Point Total:		3

Facility: BVPS UNIT 2 SRO

Date of Exam 9/24 thru 10/5 2012

Category	K/A#	Topic	RO		SRO Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. [Question 94] (CFR: 41.10 / 43.5 / 45.12)			3.9	1
	2.1.32	Ability to explain and apply system limits and precautions. [Question 95] (CFR: 41.10 / 43.2 / 45.12)			4.0	1
	Subtotal					2
2. Equipment Control	2.2.20	Knowledge of the process for managing troubleshooting activities. [Question 96] (CFR: 41.10 / 43.5 / 45.13)			3.8	1
	Subtotal					1
3. Radiation Control	2.3.6	Ability to approve release permits. [Question 97] (CFR: 41.13 / 43.4 / 45.10)			3.8	1
	2.3.11	Ability to control radiation releases. [Question 98] (CFR: 41.11 / 43.4 / 45.10)			4.3	1
	Subtotal					2
4. Emergency Procedures/ Plan	2.4.20	Knowledge of the operational implications of EOP warnings, cautions, and notes. [Question 99] (CFR: 41.10 / 43.5 / 45.13)			4.3	1
	2.4.41	Knowledge of the emergency action level thresholds and classifications. [Question 100] (CFR: 41.10 / 43.5 / 45.11)			4.6	1
	Subtotal					2
Tier 3 Point Total						7

Facility: BVPS UNIT 2

Date of Exam 9/24 thru 10/5 2012

Operating Test No.: 2LOT8 NRC

ier / Group	Randomly Selected K/A	Reason for Rejection
		<u>RO OUTLINE</u>
1/1	000022 2.2.6	Question # 4; ES-401 D.1.b requires exclusion of generic K/As for Tier 1 & 2. These generic K/As were not suppressed and therefore were not automatically omitted using PWROG Random Generator. Randomly reselected 2.2.39 from same generic group.
1/1	000057 2.4.19	Question # 12; ES-401 D.1.b requires exclusion of generic K/As for Tier 1 & 2. These generic K/As were not suppressed and therefore were not automatically omitted using PWROG Random Generator. Randomly reselected 2.4.4 from same generic group.
1/2	000076 2.1.5	Question # 23; ES-401 D.1.b requires exclusion of generic K/As for Tier 1 & 2. These generic K/As were not suppressed and therefore were not automatically omitted using PWROG Random Generator. Randomly reselected 2.1.31 from same generic group.
2/1	025 K4.02	Question # 30; Beaver Valley Unit 2 does not have ice condensers. Randomly reselected 004 K4.14 as a replacement.
2/1	005 2.1.5	Question # 31; ES-401 D.1.b requires exclusion of generic K/As for Tier 1 & 2. These generic K/As were not suppressed and therefore were not automatically omitted using PWROG Random Generator. Randomly reselected 2.1.32 from same generic group.
2/1	025 A4.02	Question # 44; Beaver Valley Unit 2 does not have ice condensers. Randomly reselected 061 A1.01 as a replacement.
2/1	063 2.1.39	Question # 47; ES-401 D.1.b requires exclusion of generic K/As for Tier 1 & 2. These generic K/As were not suppressed and therefore were not automatically omitted using PWROG Random Generator. Randomly reselected 2.1.7 from same generic group.
2/2	027 2.2.37	Question # 57; Beaver Valley Unit 2 has removed the CNMT Iodine Removal system and replaced it with a passive sodium tetraborate basket system. Randomly reselected the 015 system as a replacement.
2/2	028 K1.01	Question # 60; Beaver Valley Unit 2 has removed the Hydrogen Recombiner system. Hydrogen Recombiner functions are now directed by the TSC and the equipment that will be used is on skid that will be hooked-up and utilized as necessary. Randomly reselected 041 K1.02 as a replacement.
2/1	062 K4.05	Question # 46; KA is too similar to 062 A4.07 KA that was randomly selected for question # 45. Randomly reselected 062 K4.10 as a replacement.
1/1	WE04 2.1.27	Question # 16; Knowledge of system purpose/function does not apply to a LOCA outside containment. Randomly reselected 2.1.23 from same generic group
1/2	WE08 EK3.2	Question # 25; Unable to construct a discriminatory question about the reason for having procedures to address PTS. Randomly reselected EK3.1 for the same Emergency Plant evolution.
2/1	007 K5.02	Question # 34; The PRT is no longer used at Beaver Valley Unit 2 during PZR steam bubble formation. Randomly reselected A3.01 as a replacement
2/1	103 A2.04	Question 54; Beaver Valley Unit 2 does not have any operations procedures that address how to correct a containment evacuation that has failed. This would be dealt with through the work order process. Randomly reselected A2.03 as a replacement.

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2/2	055 A3.03	Question # 63; Beaver Valley Unit 2 does not have any automatic diversion of CARS exhaust. Re-alignment of CARS exhaust is done manually. Randomly reselected K1.06 as a replacement.
		<u>SRO OUTLINE</u>
1/1	000007 2.4.26	Question # 76; ES-401 D.1.b requires exclusion of generic K/As for Tier 1 & 2. These generic K/As were not suppressed and therefore were not automatically omitted using PWROG Random Generator. Randomly reselected 2.4.20 from same generic group.
1/2	000074 2.1.36	Question # 83; ES-401 D.1.b requires exclusion of generic K/As for Tier 1 & 2. These generic K/As were not suppressed and therefore were not automatically omitted using PWROG Random Generator. Randomly reselected 2.1.19 from same generic group.
2/1	013 2.3.15	Question # 88; ES-401 D.1.b requires exclusion of generic K/As for Tier 1 & 2. These generic K/As were not suppressed and therefore were not automatically omitted using PWROG Random Generator. Randomly reselected 2.2.37 as a replacement.
2/1	041 2.3.11	Question # 93; ES-401 D.1.b requires exclusion of generic K/As for Tier 1 & 2. These generic K/As were not suppressed and therefore were not automatically omitted using PWROG Random Generator. Randomly reselected 2.1.31 as a replacement.
1/1	056 AA2.58	Question # 79; Unable to construct a discriminatory question at the SRO level around the air compressor indicating light status during a Loss of Offsite Power. Randomly reselected AA2.45 as a replacement.
2/2	015 A2.05	Question # 91, Unable to construct a discriminatory question at the SRO level around the impact of core voiding on the NIS and the procedural guidance to correct or mitigate. Randomly reselected A2.02 as a replacement.
1/1	000026 2.1.25	Question # 78, , Unable to construct a discriminatory question at the SRO level around the use of graphs and charts during a loss of CCW. Randomly reselected 2.1.20 as a replacement.