Facility: Beaver Valley Unit 2 **RO** Date of Exam Weeks of 12/8 & 12/15 2008

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	2	2	4				2	6			2	18			6
	2	2	2	1				0	2			2	9			4
	Tier Totals	**4**	**4**	**5**				**2**	**8**			**4**	27			10
2. Plant Systems	1	2	2	3	3	1	2	3	3	3	4	2	28			5
	2	2	0	0	2	1	0	1	1	0	3	0	10			3
	Tier Totals	**4**	**2**	**3**	**5**	**2**	**2**	**4**	**4**	**3**	**7**	**2**	38			8
3. Generic Knowledge and Abilities Category					1			2		3		4	10	1	2	3	4	7
					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 appl 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 befor 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	PWR Examination Outline	Form ES-401-2
	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	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1 **[Question 1]**		X					EK2 Knowledge of the interrelations between a reactor trip and the following: EK2.03 Reactor trip status panel (CFR 41.7 / 45.7)	3.5	1
000008 Pressurizer Vapor Space Accident / 3 **[Question 2]**			X				AK3 Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: AK3.04 RCP tripping requirements (CFR 41.5,41.10 / 45.6 / 45.13)	4.2	1
000009 Small Break LOCA / 3 **[Question 3]**				X			EA1 Ability to operate and monitor the following as they apply to a small break LOCA: EA1.13 ESFAS (CFR 41.7 / 45.5 / 45.6)	4.4	1
000015/17 RCP Malfunctions / 4 **[Question 4]**		X					AK2 Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: AK2.07 RCP seals (CFR 41.7 / 45.7)	2.9	1
000025 Loss of RHR System / 4 **[Question 5]**						X	2.4.11 Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)	4.0	1
000026 Loss of Component Cooling Water / 8 **[Question 6]**						X	2.4.8 Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 41.10 / 43.5 / 45.13)	3.8	1
000029 ATWS / 1 **[Question 7]**					X		EA2 Ability to determine or interpret the following as they apply to a ATWS: EA2.01 Reactor nuclear instrumentation (CFR 43.5 / 45.13)	4.4	1
000038 Steam Gen. Tube Rupture / 3 **[Question 8]**	X						EK1 Knowledge of the operational implications of the following concepts as they apply to the SGTR: EK1.01 Use of steam tables (CFR 41.8 / 41.10 / 45.3)	3.1	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4 **[Question 9]**	X						AK1 Knowledge of the operational implications of the following concepts as they apply to Steam Line Rupture: AK1.04 Nil ductility temperature (CFR 41.8 / 41.10 / 45.3)	3.2	1

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000055 Station Blackout / 6 **[Question 10]**					X		EA2 Ability to determine or interpret the following as they apply to a Station Blackout: EA2.02 RCS core cooling through natural circulation cooling to S/G cooling (CFR 43.5 / 45.13)	4.4	1
000056 Loss of Off-site Power / 6 **[Question 11]**					X		AA2 Ability to determine and interpret the following as they apply to the Loss of Offsite Power: AA2.88 Necessary S/G water level for natural circulation (CFR: 43.5 / 45.13)	4.1	1
000057 Loss of Vital AC Inst. Bus / 6 **[Question 12]**				X			AA1 Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus: AA1.01 Manual inverter swapping (CFR 41.7 / 45.5 / 45.6)	3.7	1
000058 Loss of DC Power / 6 **[Question 13]**			X				AK3 Knowledge of the reasons for the following responses as they apply to the Loss of DC Power: AK3.02 Actions contained in EOP for loss of DC power (CFR 41.5 / 41.10 / 45.6 / 45.1)	4.0	1
'62 Loss of Nuclear Svc Water / 4 **[Question 14]**			X				AK3 Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: AK3.03 Guidance actions contained in EOP for Loss of nuclear service water (CFR 41.4 / 41.8 / 45.7)	4.0	1
000065 Loss of Instrument Air / 8 **[Question 15]**					X		AA2 Ability to determine and interpret the following as they apply to the Loss of Instrument Air: AA2.08 Failure modes of air-operated equipment (CFR: 43.5 / 45.13)	2.9	1
W/E04 LOCA Outside Containment / 3 **[Question 16]**					X		EA2 Ability to determine and interpret the following as they apply to the (LOCA Outside Containment) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	3.4	1
W/E11 Loss of Emergency Coolant Recirc. / 4 **[Question 17]**			X				EK3 Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation) EK3.3 Manipulation of controls required to obtain desired operating results during abnormal and emergency situations. (CFR: 41.5 / 41.10 / 45.6 / 45.13)	3.8	1

ES-401	PWR Examination Outline						Form ES-401-2		
	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	#
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4 **[Question 18]**					**X**		EA2 Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	3.4	1
K/A Category Point Totals:	2	2	4	2	6	2	Group Point Total:		18

ES-401	PWR Examination Outline	Form ES-401-2

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	#
000005 Inoperable/Stuck Control Rod / 1 **[Question 19]**						X	*2.4.46 Ability to verify that the alarms are consistent* with the plant conditions. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.2	1
000032 Loss of Source Range NI / 7 **[Question 20]**						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
000037 Steam Generator Tube Leak / 3 **[Question 21]**			X				AK3 Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: AK3.04 Use of "feed" and "bleed" process. (CFR 41.5 / 41.10 / 45.6 / 45.13)	2.5	1
000069 (W/E14) Loss of CTMT Integrity / 5 **[Question 22]**					X		AA2 Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: AA2.01 Loss of containment integrity (CFR: 43.5 / 45.13)	3.7	1
W/E02 SI Termination/3 **[Question 23]**		X					EK2 Knowledge of the interrelations between the (SI Termination) and the following: EK2.2 Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility. (CFR: 41.7 / 45.7)	3.5	1
W/E13 Steam Generator Over-pressure / 4 **[Question 24]**		X					EK2 Knowledge of the interrelations between the *(Steam Generator Overpressure) 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)	3.0	1
W/E15 Containment Flooding / 5 **[Question 25]**	X						EK1 Knowledge of the operational implications of the following concepts as they apply to the (Containment Flooding). EK1.2 Normal, abnormal and emergency operating procedures associated with (Containment Flooding). (CFR: 41.8 / 41.10 / 45.3)	2.7	1
BW/E08; W/E03 LOCA Cooldown - Depress. / 4 **[Question 26]**					X		EA2 Ability to determine and interpret the following as they apply to the (LOCA Cooldown and Depressurization) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	3.4	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	#
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4 **[Question 27]**	X						EK1 Knowledge of the operational implications of the following concepts as they apply to the (Natural Circulation Operations) EK1.3 Annunciators and conditions indicating signals, and remedial actions associated with the (Natural Circulation Operations). (CFR: 41.8 / 41.10 / 45.3)	3.3	1
K/A Category Point Totals:	2	2	1	0	2	2	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									K3 Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: K3.04 RPS (CFR: 41.7 / 45.6)	3.9	1
004 Chemical and Volume Control **[Question 29]**				X								K4 Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following: K4.11 Temperature/pressure control in letdown line: prevent boiling, lifting reliefs, hydraulic shock, piping damage, and burst (CFR: 41.7)	3.1	1
005 Residual Heat Removal **[Question 30]**						X						K6 Knowledge of the effect of a loss or malfunction on the following will have on the RHRS: K6.03 RHR heat exchanger (CFR: 41.7 / 45.7)	2.5	1
006 Emergency Core Cooling **[Question 31]**						X						K6 Knowledge of the effect of a loss or malfunction on the following will have on the ECCS: K6.03 Safety Injection Pumps (CFR: 41.7 / 45.7)	3.6	1
006 Emergency Core Cooling **[Question 32]**										X		A4 Ability to manually operate and/or monitor in the control room: A4.05 Transfer of ECCS flowpaths prior to recirculation (CFR: 41.7 / 45.5 to 45.8)	3.9	1
007 Pressurizer Relief/Quench Tank **[Question 33]**			X									K3 Knowledge of the effect that a loss or malfunction of the PRTS will have on the following: K3.01 Containment (CFR: 41.7 / 45.6)	3.3	1
008 Component Cooling Water **[Question 34]**											X	2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 41.10 / 43.5 / 45.12)	4.2	1
010 Pressurizer Pressure Control **[Question 35]**							X					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PZR PCS controls including: A1.06 RCS heatup and cooldown effect on pressure (CFR: 41.5 / 45.5)	3.1	1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
010 Pressurizer Pressure Control **[Question 36]**									X			A3 Ability to monitor automatic operation of the PZR PCS, including: A3.02 PZR pressure (CFR: 41.7 / 45.5)	3.6	1
012 Reactor Protection **[Question 37]**				X								K4 Knowledge of RPS design feature(s) and/or interlock(s) which provide for the following: K4.06 Automatic or manual enable/disable of RPS trips (CFR: 41.7)	3.2	1
012 Reactor Protection **[Question 38]**							X					A1 Ability to predict and/or monitor Changes in parameters (to prevent exceeding design limits) associated with operating the RPS controls including: A1.01 Trip setpoint adjustment (CFR: 41.5 / 45.5)	2.9	1
013 Engineered Safety Features Actuation **[Question 39]**		X										K2 Knowledge of bus power supplies to the following: K2.01 ESFAS/safeguards equipment control (CFR: 41.7)	3.6	1
022 Containment Cooling **[Question 40]**										X		A4 Ability to manually operate and/or monitor in the control room: A4.01 CCS fans (CFR: 41.7 / 45.5 to 45.8)	3.6	1
026 Containment Spray **[Question 41]**	X											K1 Knowledge of the physical connections and/or cause-effect relationships between the CSS and the following systems: K1.01 ECCS (CFR: 41.2 to 41.9 / 45.7 to 45.8)	4.2	1
026 Containment Spray **[Question 42]**											X	2.2.40 Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)	3.4	1
039 Main and Reheat Steam **[Question 43]**										X		A4 Ability to manually operate and/or monitor in the control room: A4.07 Steam dump valves (CFR: 41.7 / 45.5 to 45.8)	2.8	1
059 Main Feedwater **[Question 44]**				X								K4 Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: K4.08 Feedwater regulatory valve operation (on basis of steam flow, feed flow mismatch) (CFR: 41.7)	2.5	1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
059 Main Feedwater **[Question 45]**								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.11 Failure of feedwater control system (CFR: 41.5 / 43.5 / 45.3 / 45.13)	3.0	1
061 Auxiliary/Emergency Feedwater **[Question 46]**		X										K2 Knowledge of bus power supplies to the following: K2.02 AFW electric drive pumps (CFR: 41.7)	3.7	1
061 Auxiliary/Emergency Feedwater **[Question 47]**							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 SG level (CFR: 41.5 / 45.5)	3.9	1
062 AC Electrical Distribution **[Question 48]**								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.11 Aligning standby equipment with correct emergency power source (D/G) (CFR: 41.5 / 43.5 / 45.3 / 45.13)	3.7	1
063 DC Electrical Distribution **[Question 49]**	X											K1 Knowledge of the physical connections and/or cause-effect relationships between the DC electrical system and the following systems: K1.02 AC electrical system (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.7	1
064 Emergency Diesel Generator **[Question 50]**			X									K3 Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: K3.02 ESFAS controlled or actuated systems (CFR: 41.7 / 45.6)	4.2	1
073 Process Radiation Monitoring **[Question 51]**					X							K5 Knowledge of the operational implications as they apply to concepts as they apply to the PRM system: K5.01 Radiation theory, including sources, types, units, and effects (CFR: 41.5 / 45.7)	2.5	1

ES-401	PWR Examination Outline	Form ES-401-2
	Plant Systems - Tier 2/Group 1(RO) *Continued*	

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
076 Service Water **[Question 52]**								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.01 Loss of SWS (CFR: 41.5 / 43.5 / 45.3 / 45.13)	3.5	1
076 Service Water **[Question 53]**										X		A4 Ability to manually operate and/or monitor in the control room: A4.04 Emergency heat loads (CFR: 41.7 / 45.5 to 45.8)	3.5	1
078 Instrument Air **[Question 54]**									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 55]**									X			A3 Ability to monitor automatic operation of the containment system, including: A3.01 Containment isolation (CFR: 41.7 / 45.5)	3.9	1
Category Point Totals:	2	2	3	3	1	2	3	3	3	4	2	Group Point Total:		28

ES-401	PWR Examination Outline	Form ES-401-2
	Plant Systems - Tier 2/Group 2(RO)	

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
014 Rod Position Indication **[Question 56]**								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RPIS; and (b) based on those on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.02 Loss of power to the RPIS (CFR: 41.5 / 43.5 / 45.3 / 45.13)	3.[illegible]	1
015 Nuclear Instrumentation **[Question 57]**										X		A4 Ability to manually operate and/or monitor in the control room: A4.03 Trip bypasses (CFR: 41.7 / 45.5 to 45.8)	3.[illegible]	1
016 Non-nuclear Instrumentation **[Question 58]**										X		A4 Ability to manually operate and/or monitor in the control room: A4.01 NNI channel select controls (CFR: 41.7 / 45.5 to 45.8)	2.[illegible]	1
028 Hydrogen Recombiner and Purge Control **[Question 59]**					X							K5 Knowledge of the operational implications of the following concepts as they apply to the HRPS: K5.03 Sources of hydrogen within containment (CFR: 41.5 / 45.7)	2.[illegible]	1
[illegible]n-Core Temperature Monitor System (ITM) **[Question 60]**										X		A4 Ability to manually operate and/or monitor in the control room: A4.02 Temperature values used to determine RCS/RCP operation during inadequate core cooling (i.e., if applicable, average of five highest values) (CFR: 41.7 / 45.5 to 45.8)	3.[illegible]	1
034 Fuel Handling Equipment **[Question 61]**				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)	2.[illegible]	1
041 Steam Dump/Turbine Bypass Control **[Question 62]**	X											K1 Knowledge of the Physical connections and/or cause-effect relationships between the SDS and the following systems: K1.05 RCS (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.[illegible]	1
056 Condensate **[Question 63]**	X											K1 Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: K1.03 MFW (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.[illegible]	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 64]**				X								K4 Knowledge of circulating water system design feature(s) and interlock(s) which provide for the following: K4.01 Heat sink (CFR: 41.7)	2.[illegible]	1
086 Fire Protection **[Question 65]**							X					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Fire Protection System operating the controls including: A1.05 FPS lineups (CFR: 41.5 / 45.5)	2.[illegible]	1
K/A Category Point Totals:	2	0	0	2	1	0	1	1	0	3	0	Group Point Total:		10

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

Facility: Beaver Valley Unit 2 **RO** Date of Exam Weeks of 12/8 & 12/15 2008

Category	K/A#	Topic	RO IR	RO #	SRO Only IR	SRO Only #
1. Conduct of Operations	2.1.29	Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc. (CFR: 41.10 / 45.1 / 45.12) **[Question 66]**	4.1	1		
	2.1.36	Knowledge of procedures and limitations involved in core alterations. (CFR: 41.10 / 43.6 / 45.7) **[Question 67]**	3.0	1		
	2.1.43	Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc. (CFR: 41.10 / 43.6 / 45.6) **[Question 68]**	4.1	1		
	Subtotal			3		
2. Equipment Control	2.2.25	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (CFR: 41.5 / 41.7 / 43.2) **[Question 69]**	3.2	1		
	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings. (CFR: 41.10 / 45.12 / 45.13) **[Question 70]**	3.5	1		
	Subtotal			2		
3. Radiation Control	2.3.12	Knowledge of radiological 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) **[Question 71]**	3.2	1		
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 43.4 / 45.9) **[Question 72]**	2.9	1		
	Subtotal			2		
4. Emergency Procedures/ Plan	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) **[Question 73]**	4.5	1		
	2.4.11	Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13) **[Question 74]**	4.0	1		
	2.4.13	Knowledge of crew roles and responsibilities during EOP usage. (CFR: 41.10 / 45.12) **[Question 75]**	4.0	1		
	Subtotal			3		
Tier 3 Point Total				10		7

Facility: Beaver Valley Unit 2 **SRO** Date of Exam Weeks of 12/8 & 12/15 2008

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												18	4		2	6
	2												9	2		2	4
	Tier Totals												27	**6**		**4**	10
2. Plant Systems	1												28	4		1	5
	2												10	0	0	3	3
	Tier Totals												38	**4**		**4**	8
3. Generic Knowledge and Abilities Category					1		2		3		4		10	**1**	**2**	**3**	**4**	7
														2	2	1	2	

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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	PWR Examination Outline						Form ES-401-2		
	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	#
000011 Large Break LOCA / 3 **[Question 76]**						X	2.4.35 Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)	4.0	1
000015/17 RCP Malfunctions / 4 **[Question 77]**					X		AA2 Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): AA2.10 When to secure RCPs on loss of cooling or seal injection (CFR 43.5 / 45.13)	3.7	1
000027 Pressurizer Pressure Control System Malfunction / 3 **[Question 78]**					X		AA2 Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: AA2.14 RCP injection flow (CFR: 43.5 / 45.13)	2.9	1
000038 Steam Generator Tube Rupture (SGTR) **[Question 79]**						X	***2.4.18 Knowledge of the specific bases for EOPs.*** ***(CFR: 41.10 / 43.1 / 45.13)***	***4.0***	1
000056 Loss of Off-site Power / 6 **[Question 80]**					X		AA2 Ability to determine and interpret the following as they apply to the Loss of Offsite Power: AA2.19 T-cold and T-hot indicators (wide range) (CFR: 43.5 / 45.13)	4.2	1
W/E04 LOCA Outside Containment / 3 **[Question 81]**					X		EA2 Ability to determine and interpret the following as they apply to the (LOCA Outside Containment) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	4.3	1
K/A Category Point Totals:	0	0	0	0	4	2	Group Point Total:		6

ES-401	PWR Examination Outline						Form ES-401-2		
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: AA2.01 Rod position indication to actual rod position (CFR: 43.5 / 45.13)	3.9	1
000059 Accidental Liquid RadWaste Rel. / 9 **[Question 83]**						X	2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 41.10 / 43.5 / 45.12)	4.2	1
000067 Plant Fire on-site ***[Question 84]***						X	***2.4.27 Knowledge of "fire in the plant" procedures*** ***(CFR: 41.10 / 43.5 / 45.13)***	***3.9***	***1***
000061 ARM System Alarms / 7 **[Question 85]**					X		AA2 Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: AA2.06 Required actions if alarm channel is out of service (CFR: 43.5 / 45.13)	4.1	1
K/A Category Point Totals:	0	0	0	0	2	2	Group Point Total:		4

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ES-401	PWR Examination Outline	Form ES-401-2
	Plant Systems - Tier 2/Group 2(SRO)	

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
011 Pressurizer Level Control **[Question 91]**											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)	4.4	1
071 *Waste Gas Disposal* **[Question 92]**											X	2.1.20 Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	1
086 Fire Protection **[Question 93]**											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	0	0	0	3	Group Point Total:		3

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

Facility: Beaver Valley Unit 2 **SRO** Date of Exam Weeks of 12/8 & 12/15 2008

Category	K/A#	Topic	RO IR	RO #	SRO Only IR	SRO Only #
1. Conduct of Operations	2.1.4	Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc. (CFR: 41.10 / 43.2) **[Question 94]**			3.8	1
	2.1.34	Knowledge of primary and secondary plant chemistry limits. (CFR: 41.10 / 43.5 / 45.12) **[Question 95]**			3.5	1
	Subtotal					**2**
2. Equipment Control	2.2.21	Knowledge of pre- and post-maintenance operability requirements. (CFR: 41.10 / 43.2) **[Question 96]**			4.1	1
	2.2.37	Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12) **[Question 97]**			4.6	1
	Subtotal					**2**
3. Radiation Control	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 43.4 / 45.9) **[Question 98]**			3.1	1
	Subtotal					**1**
4. Emergency Procedures/ Plan	2.4.20	Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13) **[Question 99]**			4.3	1
	2.4.35	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13) **[Question 100]**			4.0	1
	Subtotal					**2**
Tier 3 Point Total				10		**7**

.er / Group	Randomly Selected K/A	Reason for Rejection
2/1	025	Beaver Valley does NOT have Ice Condensers.
2/1	059 K4.05	Beaver Valley does NOT have variable speed main feedwater pumps.
1/2	APE 003 AA2.04	Beaver Valley does NOT have any automatic outward rod motion. All automatic outward rod motion has b en defeated.
N/A	2.1.27	K/A is NOT linked to 10CFR 55.43 and is therefore NOT suitable for SRO exam.
N/A	2.4.3	K/A is NOT linked to 10CFR 55.43 and is therefore NOT suitable for SRO exam.
2/1	022 A2.05	Unable to construct a SRO discriminatory question for this K/A.
2/2	072 A2.01	Balance of exam. This would be the sixth radiation monitor question.
2/2	028	BVPS Post DBA Hydrogen control equipment and associated procedures have been retired in place. If th need arises, Post DBA Hydrogen control equipment and procedures will be directed by the Technical support c nter with engineering support.
1/2	WE16 EK 1.1	At BVPS the response to containment high radiation procedure (FR-Z.3) has no actions for the operations crew other than contact the TSC. Any response to high containment radiation will be guided by ERO. This K/A therefore has no discriminatory value for a written exam question.
2/2	033 A3.02	BVPS Unit 2 Does NOT have any automatic controls on spent fuel pool cooling associated with a leaking r ruptured fuel assembly.
2/2	061 A1.04	BVPS Unit 2 Does Not have any AFW controls on the AFW source tank (FWE*TK210) except a level con ol valve that will provide makeup to the tank as level drops. Unable to construct a discriminatory written que tion to match this K/A.
1/1	***000029 2.4.1***	***Unable to construct a SRO discriminatory question for this K/A. Knowledge of ATWS EOP entry conditions and immediate actions are also RO knowledge's. (Q 79)***
1/2	***000060 2.4.21***	***Unable to construct a SRO discriminatory question for this K/A. Generic K/A is a difficult match to accidental gas release. Too much time(8 hours) spent trying to construct a valid SRO discriminatory question. (Q 84)***

Facility: **Beaver Valley Unit 2** Date of Examination: **Weeks of 12/8 & 12/15 2008**

'amination Level **RO** ☒ Operating Test Number **2LOT6 NRC Exam**

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M, R	Plot and Evaluate 1/M Data 2.1.43 4.1
Conduct of Operations	M, R	Perform Daily Heat Balance 2.1.7 4.4
Equipment Control	N, R	Prepare Tagout of 21B Service Water Pump 2.2.13 3.6
Radiation Control	N, S	Respond to Radiation Monitor Alarm ***and complete the Radioactive Waste Discharge permit.*** 2.3.11 3.3
Emergency Procedures/Plan	N/A	N/A

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: **Beaver Valley Unit 2** Date of Examination **Weeks of 12/8 & 12/15 2008**

Examination Level **SRO** ☒ Operating Test Number **2LOT6 NRC Exam**

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M, R	Plot and Evaluate 1/M Data and make recommendations for continued Rod Withdrawal 2.1.43 4.3
Conduct of Operations	N, R	Prepare Partial OST for Performance ***(2OST-6.6, PORV Isolation Valve Test and Position Check)*** 2.1.20 4.6
Equipment Control	N, R	Review/Approve Completed RHS Pump Surveillance 2.2.37 4.6
Radiation Control	N, R	Review/Approve LW Discharge Permit 2.3.11 4.3
Emergency Procedures/Plan	N, S	Evaluate EPP ***and complete the Initial Notification Form.*** 2.4.41 4.1

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: **Beaver Valley Unit 2** Date of Examination: **Weeks of 12/8 & 12/15 2008**

Exam Level: RO ☒ SRO(I) ☐ SRO(U) ☐ Operating Test No.: **2LOT6 NRC Exam**

Control 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
a 001 A3.05 3.5/3.5 *(Paired with S2)* S1 JPM 2CR-647 Perform Partial Movement Test (CB-D)	N, A, S	1
b. 062 K1.04 3.7/4.2 *(Paired with S1)* S2 JPM 2CR-023 Perform Hot Bus Transfer (100% Power)	D, S	6
c. 006 A4.02 4.0/3.8 *(Stand-alone)* S3 JPM 2CR-529 Transfer To Cold Leg Recirculation (Post LOCA)	S, M, A	3
d. E05 EA1.1 4.1/4.0 *(Stand-alone)* S4 JPM 2CR-624 Establish RCS Bleed and Feed per FR-H.1 (Post LOCA)	D, S, A	4P
[illegible]		
[illegible]	D, S, A	[illegible]
g 015 A3.03 3.9/3.9 *(Paired with S8)* S7 JPM 2CR-646 Perform Nuclear IR Channel Functional Test ***(Mode 2 ~ 3% RX Power)***	N, S, L	7
h. 004 A4.04 3.2/3.6 *(Paired with S7)* S8 JPM 2CR-537 Batch To RWST ***(Mode 2 ~ 3% RX Power)***	S, M, A, L	2
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. 013 A3.01 3.7/3.9 P1 JPM 2PL-048 Safeguards test of FWI	D, EN	2
j. 061 A2.04 3.4/3.8 P2 JPM 2PL-069 Local Shutdown of 2FWE*P22 (IAW 2OST-24.4A)	N, R	4***S***
k. 064 A4.01 4.0/4.3 P3 JPM 2PL-606 Locally Start the No. 1(2) Emergency Diesel Generator	E, D, A, EN	6

@ 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	

ES-301 **Control Room/In-Plant Systems Outline** **Form ES-301-2**

Facility: **Beaver Valley Unit 2** Date of Examination: **Weeks of 12/8 & 12/15 2008**

Exam Level: RO ☐ SRO(I) ☒ SRO(U) ☐ Operating Test No.: **2LOT6 NRC Exam**

Control 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
a. 001 A3.05 3.5/3.5 *(Paired with S2)* S1 JPM 2CR-647 Perform Partial Movement Test (CB-D)	N, A, S	1
b. 062 K1.04 3.7/4.2 *(Paired with S1)* S2 JPM 2CR-023 Perform Hot Bus Transfer (100% Power)	D, S	6
d. E05 EA1.1 4.1/4.0 *(Stand-alone)* S4 JPM 2CR-624 Establish RCS Bleed and Feed per FR-H.1 (Post LOCA)	D, S, A	4P
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
g. 015 A3.03 3.9/3.9 *(Paired with S8)* S7 JPM 2CR-646 Perform Nuclear IR Channel Functional Test ***(Mode 2 ~ 3% RX Power)***	N, S, L	7
h. 004 A4.04 3.2/3.6 *(Paired with S7)* S8 JPM 2CR-537 Batch To RWST ***(Mode 2 ~ 3% RX Power)***	S, M, A, L	2
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. 013 A3.01 3.7/3.9 P1 JPM 2PL-048 Safeguards test of FWI	D, EN	2
j. 061 A2.04 3.4/3.8 P2 JPM 2PL-069 Local Shutdown of 2FWE*P22 (IAW 2OST-24.4A)	N, R	4S
k. 064 A4.01 4.0/4.3 P3 JPM 2PL-606 Locally Start the No. 1(2) Emergency Diesel Generator	E, D, A, EN	6

@ 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	

Facility:	BVPS 2	Scenario No.: 1	Op Test No.: NRC	
Examiners:	_____	Candidates:	_____	SRO
	_____		_____	ATC
	_____		_____	BOP

Initial Conditions: BOL, ~5% power following Xe free S/U, CB D = 104, 2003 PPM IC-165

Turnover: Continue plant startup IAW 2OM-52.4.A. [2SAS-C21B] Station Air Compressor OOS, will not be returned this shift

Critical Tasks:

1. E-0.I Crew establishes flow from at least one high head ECCS pump before transition out of E-0.
2. E-0.P Crew manually actuates main steam line isolation before a Severe (orange path) challenge develops to either the Sub-criticality or Integrity CSF or before transition to ECA-2.1, whichever occurs first.
3. E-2.A Crew isolates the faulted SG and directs operator to close isolation valve(s) operated from outside of the control room before transition out of E-2.

Event No.	Malf. No.	Event Type	Event Description
1		R(RO) N(ALL)	Crew raises power IAW procedure (Must raise power above 10% before N-36 failure)
2	NIS07B	*SRO T.S.*	IRNI N-36 Intermediate Range Nuclear Instrument Inst Pwr fuse blows
3	XMT-RCS019A	I(RO/SRO) *SRO T.S.*	[2RCS*LT459] Controlling PRZR Level Channel fails low, L/D isolates
4		N(RO/SRO)	Alternate channel selected and L/D restored
5	CNH-CFW15B	C(BOP/SRO)	'C' BPFRV fails open in auto, manual control required
6	MSS01C	M(ALL)	Steam leak inside CNMT slowly progresses to Steam line RUPTURE inside CNMT, SI, CIA, CIB
7	PMP-CHS002 PPL07A	C(RO/SRO)	[2CHS*P21B] HHSI Pump trips on SI [2CHS*P21A] HHSI pump Fails to AUTO, requires manual start on SI
8	PPL10A PPL10B	C(BOP/SRO)	AUTO MSLI failure BOTH Trains, requires manual actuation

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

Facility: BVPS 2 Scenario No.: 2 Op Test No.: NRC

Examiners: _____ Candidates: _____ SRO

_____ _____ ATC

_____ _____ BOP

Initial Conditions: MOL, 75 % power Equ Xe, CB = 188, 1116 PPM IC-166

Turnover: Maintain current plant conditions

Critical Tasks:

1. E-1.C Crew trips all RCPs when RCS to highest SG D/P criteria is exceeded and SI flow verified prior to exiting procedure E-1.
2. FR-S.1.C Crew inserts negative reactivity into the core by inserting RCCAs before completing the immediate action steps of FR-S.1.
3.

Event No.	Malf. No.	Event Type	Event Description
1	XMT-MSS022A	I(BOP/SRO) *SRO T.S.*	[2MSS*FT485] "B" SG Selected Steam Flow Channel drifts HIGH
2	XMT-LDS003A	I(RO/SRO)	VCT Level control channel failure LOW
3	XMT-RCS032A	*SRO T.S.*	[2RCS*PT455] PRZR Pressure Protection Channel fails HIGH
4		R(RO) N(BOP/SRO)	Power reduction due to TS 3.0.3 requirement (No TS Action addressing two channels of OTΔT being inoperable)
5	RCP01A	C(RO/SRO)	RCP #1 seal leakoff excessive (requires Rx trip)
6	PPL01A PPL01B	M(ALL)	ATWS – Failure of auto/manual Rx trip
7	LOA-AFW022 PPL07B	C(BOP/SRO)	[2FWE*P22], Turbine driven AFW pump trips during S/U, [2FWE-P23B] Motor Driven AFW Pump requires manual start
8	VLV-RCS032A	M(ALL)	PORV [2RCS*PCV455C] sticks open after auto open and its block valve [2RCS*MOV535] cannot be closed from CR (PRZR Vapor space leak)

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

Facility:	BVPS 2	Scenario No.: 3	Op Test No.: NRC	
Examiners:	_____	Candidates:	_____	SRO
	_____		_____	ATC
	_____		_____	BOP

Initial Conditions: MOL, 75 % power Equ Xe, CB = 188, 1116 PPM IC-167

Turnover: Plant has been at 75% for three days at system request. Crew is to return the unit to full power at 12%/Hr IAW 2OM-52.4.B, Load Follow, and the reactivity plan provided by Reactor Engineering. [2FWE*P23A] Motor Driven AFW Pump is on clearance for motor replacement and is due to be returned tomorrow. [2SAS-C21B] Station Air Compressor is on clearance for bearing replacement and due to be returned 2 days from now.

Critical Tasks:

1. E-0.Q Crew manually trips the main turbine before a Severe (orange path) challenge develops to either the Sub-criticality or the Integrity CSF or before transition to ECA-2.1, whichever occurs first.
2. FR-H.1.A Crew establishes feedwater flow into at least one SG before RCS feed and bleed is required.

Event No.	Malf. No.	Event Type*	Event Description
1	NIS03D	I (RO/SRO) *SRO T.S.*	PRNI N-44 fails HIGH causing automatic control rod insertion
2	CRF03-H14	*SRO T.S.*	Misaligned rod. During control rod motion, Control Rod H-14 will drop to some position below the group and then remain stuck at that position
3		R (RO) N (BOP/SRO)	Normal power reduction
4	PMP-CFW05	C (BOP/SRO)	[2FWS-P21B], Main Feedwater Pump trips
5	PMP-CFW04	M (ALL)	[2FWS-P21A], 2nd Main Feedwater Pump trips
6	EHC08A	C (BOP/SRO)	Main Turbine fails to auto trip, manual trip successful
7	LOA-AFW022 PMP-AFW002	M (ALL)	[2FWE*P22] Turbine driven AFW Pump trips during startup [2FWE*P23B] Motor driven AFW Pump Trips resulting in Entry into FR-H.1 Loss of Secondary Heat Sink.

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

Facility:	BVPS 2	Scenario No.: 4	Op Test No.: NRC	
Examiners:	_____	Candidates:	_____	SRO
	_____		_____	ATC
	_____		_____	BOP

Initial Conditions: BOL, 100% power Equ Xe, CB 229, 1459 PPM IC-168

Turnover: Maintain current plant conditions
2CHS*P21C HHSI Pump OOS. Will be returned in approximately 1 week

Critical Tasks:
1. E-0.A Crew manually trips the reactor from the control room before performing the mitigation strategy of FR-S.1.
2. E-0.D Crew manually actuates at least one train of SIS-actuated safeguards before transition to any ORP.
3. ECA-3.1.B Crew initiates cool down of the RCS to cold shutdown conditions at the highest rate achievable but less than 100°F per hour in all RCS cold legs.

Event No.	Malf. No.	Event Type*	Event Description
1	XMT-MSS042A	I(ALL) *SRO T.S.*	2MSS*PT446 Selected First Stage Pressure Transmitter fails LOW
2	PMP-CHS002	C(RO/SRO) *SRO T.S.*	2CHS*P21B HHSI Pump trips
3	N/A	R(RO) N(BOP/SRO)	Crew begins power reduction
4	XMT-RCS030A	I(RO/SRO)	2RCS-PT444 PRZR Pressure Control Channel fails HIGH
5	VLV-RCS032	C(RO/SRO)	[2RCS*PCV455C] PRZR PORV sticks open after lifting, block valve closure required
6	IMF PPL01A IMFPPL01B IOR XB1I021T	I(RO/SRO)	Automatic reactor trip failure Manual RX trip from BB 'B' UNSUCCESSFUL, Manual RX trip from BB 'A' SUCCESSFUL
7	RCS04C ***VLV-MSS003*** ***VLV-MSS004*** ***VLV-MSS005***	M(ALL)	350 GPM SGTR on "C" SG ***with all MSIVs stuck open***
8	PPL05A PPL05B	***C(RO/SRO)***	Auto SI failure, both trains, manual actuation required

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