Facility Name:Comanche Peak Date of Exam:June 8, 2015

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	A 2	G *	Total
1. Emergency & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A		3	18	3	3	6
	2	1	1	2				2	2			1	9	2	2	4
	Tier Totals	4	4	5				5	5			4	27	5	5	10
2. Plant Systems	1	4	2	2	3	2	2	2	3	3	3	2	28	3	2	5
	2	1	1	1	1	1	1	1	0	1	1	1	10	0 / 1	2	3
	Tier Totals	5	3	3	4	3	3	3	3	4	4	3	38	4	4	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7
		3			2			3			2			1	2	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 that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

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

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

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
39	000007 Reactor Trip - Stabilization - Recovery / 1						04. 45	Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	1
40	000008 Pressurizer Vapor Space Accident / 3			0 4				RCP tripping requirements	4.2	1
41	000009 Small Break LOCA / 3		0 3					S/Gs	3.0	1
42	000011 Large Break LOCA / 3					0 5		Significance of charging pump operation	3.3	1
43	000015 RCP Malfunctions / 4 000017 RCP Malfunctions (Loss of RC Flow) / 4	0 2						Consequences of an RCPS failure	3.7	1
	000022 Loss of Rx Coolant Makeup / 2									0
44	000025 Loss of RHR System / 4		0 3					Service water or closed cooling water pumps	2.7	1
45	000026 Loss of Component Cooling Water / 8				0 5			The CCWS surge tank, including level control and level alarms, and radiation alarm	3.1	1
46	000027 Pressurizer Pressure Control System Malfunction / 3		0 3					Controllers and positioners	2.6	1
47	000029 ATWS / 1						02. 44	Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.2	1
48	000038 Steam Gen. Tube Rupture / 3			0 5				Normal operating precautions to preclude or minimize SGTR	4.0	1
49	000040 Steam Line Rupture - Excessive Heat Transfer / 4					0 1		Occurrence and location of a steam line rupture from pressure and flow indications	4.2	1
	WE12 Uncontrolled Depressurization of all Steam Generators / 4									
50	000054 (CE/E06) Loss of Main Feedwater / 4				0 1			AFW controls, including the use of alternate AFW sources	4.5	1
51	000055 Station Blackout / 6					0 4		Instruments and controls operable with only dc battery power available	3.7	1
52	000056 Loss of Off-site Power / 6				0 9			CCW pump	3.3	1
	000057 Loss of Vital AC Inst. Bus / 6									0
53	000058 Loss of DC Power / 6	0 1						Battery charger equipment and instrumentation	2.8	1
	000062 Loss of Nuclear Svc Water / 4									0
	000065 Loss of Instrument Air / 8									0
55	W/E04 LOCA Outside Containment / 3	0 3						Annunciators and conditions indicating signals, and remedial actions associated with the LOCA Outside Containment	3.5	1
	W/E11 Loss of Emergency Coolant Recirc. / 4									0
54	BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4						01. 28	Knowledge of the purpose and function of major system components and controls.	4.1	1
56	000077 Generator Voltage and Electric Grid Disturbances / 6			0 2				Actions contained in abnormal operating procedure for voltage and grid disturbances	3.6	1
	K/A Category Totals:	3	3	3	3	3	3	Group Point Total:		18

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

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

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000001 Continuous Rod Withdrawal / 1									0
57	000003 Dropped Control Rod / 1						04. 21	Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment	4.0	1
58	000005 Inoperable/Stuck Control Rod / 1					01		Stuck or inoperable rod from in-core and ex-core NIS, in-core or loop temperature measurements	3.3	1
59	000024 Emergency Boration / 1			02				Actions contained in EOP for emergency boration	4.2	1
	000028 Pressurizer Level Malfunction / 2									0
	000032 Loss of Source Range NI / 7									0
60	000033 Loss of Intermediate Range NI / 7				02			Level trip bypass	3.0	1
	000036 Fuel Handling Accident / 8									0
61	000037 Steam Generator Tube Leak / 3			03				Comparison of makeup flow and letdown flow for various modes of operation	3.1	1
62	000051 Loss of Condenser Vacuum / 4					02		Conditions requiring reactor and/or turbine trip	3.9	1
	000059 Accidental Liquid RadWaste Rel. / 9									0
63	000060 Accidental Gaseous Radwaste Rel. / 9		02					Auxiliary building ventilation system	2.7	1
	000061 ARM System Alarms / 7									0
64	000067 Plant Fire On-site / 8	01						Fire classifications, by type	2.9	1
65	000068 Control Room Evac. / 8				03			S/G level	4.1	1
	000069 Loss of CTMT Integrity / 5									0
	W/E14 High Containment Pressure / 5									
	000074 Inad. Core Cooling / 4									0
	W/E06 Degraded Core Cooling / 4									
	W/E07 Saturated Core Cooling / 4									
	000076 High Reactor Coolant Activity / 9									0
	W/E01 Rediagnosis / 3									0
	W/E02 SI Termination / 3									
	W/E13 Steam Generator Over-pressure / 4									0
	W/E15 Containment Flooding / 5									0
	W/E16 High Containment Radiation / 9									0
	W/E03 LOCA Cooldown - Depress. / 4									0
	W/E09 Natural Circulation Operations / 4									0
	W/E10 Natural Circulation with Steam Voide in Vessel with/without RVLIS. / 4									
	W/E08 RCS Overcooling - PTS / 4									0
	K/A Category Totals:	1	1	2	2	2	1	Group Point Total:		9

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

Plant Systems - Tier 2/Group 1 (RO)

Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
22,1	003 Reactor Coolant Pump					02	02						Effects of RCP coastdown on RCS parameters; RCP seals and seal water supply	2.8; 2.7	2
2,23	004 Chemical and Volume Control		03						10				Charging pumps; Inadvertent boration/dilution	3.3; 3.9	2
3	005 Residual Heat Removal							05					Detection of and response to presence of water in RHR emergency sump	3.3	1
28,4	006 Emergency Core Cooling				17					04			Safety Injection valve interlocks; Cooling water systems	3.8; 3.8	2
5	007 Pressurizer Relief/Quench Tank	03											RCS	3.0	1
6	008 Component Cooling Water								03				High/low CCW temperature	3.0	1
7	010 Pressurizer Pressure Control			02									RPS	4.0	1
24,8	012 Reactor Protection							01				01.32	Trip setpoint adjustment; Ability to explain and apply system limits and precautions.	2.9; 3.8	2
9	013 Engineered Safety Features Actuation					02							Safety system logic and reliability	2.9	1
10	022 Containment Cooling										01		CCS fans	3.6	1
	025 Ice Condenser														0
11	026 Containment Spray	02											Cooling water	4.1	1
12	039 Main and Reheat Steam	06											Condenser steam dump	3.1	1
13	059 Main Feedwater									02			Programmed levels of the S/G	2.9	1
25,14	061 Auxiliary/Emergency Feedwater			02			02						S/G; Pumps	4.2; 2.6	2
15	062 AC Electrical Distribution		01										Major system loads	3.3	1
16	063 DC Electrical Distribution										03		Battery discharge rate	3.0	1
26,17	064 Emergency Diesel Generator	05							19				Starting air system; Consequences of high VARS on ED/G integrity	3.4; 2.5	2
18	073 Process Radiation Monitoring				01								Release termination when radiation exceeds setpoint	4.0	1
19	076 Service Water									02			Emergency heat loads	3.7	1
27,20	078 Instrument Air										01	01.27	Pressure gauges; Knowledge of system purpose and/or function.	3.1; 3.9	2
21	103 Containment				04								Personnel access hatch and emergency access hatch	2.5	1
															0
	K/A Category Totals:	4	2	2	3	2	2	2	3	3	3	2	Group Point Total:		28

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

Plant Systems - Tier 2/Group 2 (RO)

Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
29	001 Control Rod Drive										11		Determination of SDM	3.5	1
30	002 Reactor Coolant						04						RCS vent valves	2.5	1
31	011 Pressurizer Level Control		02										PZR heaters	3.1	1
32	014 Rod Position Indication					02							RPIS independent of demand position	2.8	1
33	015 Nuclear Instrumentation				07								Permissives	3.7	1
34	016 Non-nuclear Instrumentation	06											AFW System	3.6	1
35	017 In-core Temperature Monitor									01			Indications of normal, natural, and interrupted circulation of RCS	3.6	1
	027 Containment Iodine Removal														0
	028 Hydrogen Recombiner and Purge Control														0
	029 Containment Purge														0
36	033 Spent Fuel Pool Cooling											04.08	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	3.8	1
	034 Fuel Handling Equipment														0
	035 Steam Generator														0
37	041 Steam Dump/Turbine Bypass Control			01									S/G	3.2	1
	045 Main Turbine Generator														0
	055 Condenser Air Removal														0
	056 Condensate														0
	068 Liquid Radwaste														0
	071 Waste Gas Disposal														0
	072 Area Radiation Monitoring														0
	075 Circulating Water														0
	079 Station Air														0
38	086 Fire Protection							02					Fire water storage tank level	3.0	1
	K/A Category Totals:	1	1	1	1	1	1	1	0	1	1	1	Group Point Total:		10

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

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

Q#	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 - Recovery / 1									0
	000008 Pressurizer Vapor Space Accident / 3									0
	000009 Small Break LOCA / 3									0
76	000011 Large Break LOCA / 3					1 0		Verification of adequate core cooling	4.7	1
	000015 RCP Malfunctions / 4 000017 RCP Malfunctions (Loss of RC Flow) / 4									0
	000022 Loss of Rx Coolant Makeup / 2									0
77	000025 Loss of RHR System / 4					0 4		Location and isolability of leaks	3.6	1
78	000026 Loss of Component Cooling Water / 8						01. 20	Ability to interpret and execute procedure steps.	4.6	1
	000027 Pressurizer Pressure Control System Malfunction / 3									0
	000029 ATWS / 1									0
	000038 Steam Gen. Tube Rupture / 3									0
	000040 Steam Line Rupture - Excessive Heat Transfer / 4									0
	WE12 Uncontrolled Depressurization of all Steam Generators / 4									
	000054 (CE/E06) Loss of Main Feedwater / 4									0
	000055 Station Blackout / 6									0
	000056 Loss of Off-site Power / 6									0
	000057 Loss of Vital AC Inst. Bus / 6									0
79	000058 Loss of DC Power / 6						02. 40	Ability to apply Technical Specifications for a system.	4.7	1
80	000062 Loss of Nuclear Svc Water / 4						04. 35	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	4.0	1
	000065 Loss of Instrument Air / 8									0
	W/E04 LOCA Outside Containment / 3									0
	W/E11 Loss of Emergency Coolant Recirc. / 4									0
	BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									0
81	000077 Generator Voltage and Electric Grid Disturbances / 6					0 6		Generator frequency limitations	3.5	1
	K/A Category Totals:	0	0	0	0	3	3	Group Point Total:		6

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

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

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
	000001 Continuous Rod Withdrawal / 1									0
	000003 Dropped Control Rod / 1									0
	000005 Inoperable/Stuck Control Rod / 1									0
82	000024 Emergency Boration / 1						04. 20	Knowledge of the operational implications of EOP warnings, cautions, and notes.	4.3	1
	000028 Pressurizer Level Malfunction / 2									0
	000032 Loss of Source Range NI / 7									0
	000033 Loss of Intermediate Range NI / 7									0
	000036 Fuel Handling Accident / 8									0
83	000037 Steam Generator Tube Leak / 3					11		When to isolate one or more S/Gs	3.8	1
	000051 Loss of Condenser Vacuum / 4									0
	000059 Accidental Liquid RadWaste Rel. / 9									0
	000060 Accidental Gaseous Radwaste Rel. / 9									0
	000061 ARM System Alarms / 7									0
84	000067 Plant Fire On-site / 8						04. 11	Knowledge of abnormal condition procedures.	4.2	1
	000068 Control Room Evac. / 8									0
	000069 Loss of CTMT Integrity / 5									0
	W/E14 High Containment Pressure / 5									
85	000074 Inad. Core Cooling / 4					01		Subcooling Margin	4.9	1
	W/E06 Degraded Core Cooling / 4									
	W/E07 Saturated Core Cooling / 4									
	000076 High Reactor Coolant Activity / 9									0
	W/E01 Rediagnosis / 3									0
	W/E02 SI Termination / 3									
	W/E13 Steam Generator Over-pressure / 4									0
	W/E15 Containment Flooding / 5									0
	W/E16 High Containment Radiation / 9									0
	W/E03 LOCA Cooldown - Depress. / 4									0
	W/E09 Natural Circulation Operations / 4									0
	W/E10 Natural Circulation with Steam Voide in Vessel with/without RVLIS. / 4									
	W/E08 RCS Overcooling - PTS / 4									0
	K/A Category Totals:	0	0	0	0	2	2	Group Point Total:		4

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

Plant Systems - Tier 2/Group 1 (SRO)

Q#	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														0
86	004 Chemical and Volume Control											01. 07	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	1
	005 Residual Heat Removal														0
	006 Emergency Core Cooling														0
87	007 Pressurizer Relief/Quench Tank								0 1				Stuck-open PORV or code safety	4.2	1
	008 Component Cooling Water														0
	010 Pressurizer Pressure Control														0
	012 Reactor Protection														0
	013 Engineered Safety Features Actuation														0
	022 Containment Cooling														0
	025 Ice Condenser														0
	026 Containment Spray														0
	039 Main and Reheat Steam														0
	059 Main Feedwater														0
	061 Auxiliary/Emergency Feedwater														0
88	062 AC Electrical Distribution								1 2				Restoration of power to a system with a fault on it	3.6	1
	063 DC Electrical Distribution														0
	064 Emergency Diesel Generator														0
	073 Process Radiation Monitoring														0
	076 Service Water														0
89	078 Instrument Air								0 1				Air dryer and filter malfunctions	2.9	1
90	103 Containment											04. 28	Knowledge of procedures relating to a security event.	4.1	1
															0
	K/A Category Totals:	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:		5

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

Plant Systems - Tier 2/Group 2 (SRO)

Q#	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														0
	002 Reactor Coolant														0
	011 Pressurizer Level Control														0
	014 Rod Position Indication														0
	015 Nuclear Instrumentation														0
	016 Non-nuclear Instrumentation														0
	017 In-core Temperature Monitor														0
	027 Containment Iodine Removal														0
	028 Hydrogen Recombiner and Purge Control														0
	029 Containment Purge														0
	033 Spent Fuel Pool Cooling														0
	034 Fuel Handling Equipment														0
	035 Steam Generator														0
	041 Steam Dump/Turbine Bypass Control														0
	045 Main Turbine Generator														0
	055 Condenser Air Removal														0
91	056 Condensate								05				Condenser tube leakage	2.5	1
	068 Liquid Radwaste														0
92	071 Waste Gas Disposal											01.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.4	1
	072 Area Radiation Monitoring														0
	075 Circulating Water														0
	079 Station Air														0
93	086 Fire Protection											04.30	Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission	4.1	1
	K/A Category Totals:	0	0	0	0	0	0	0	1	0	0	2	Group Point Total:		3

Facility Name:Comanche Peak Date of Exam:June 8, 2015

Q#	Category	K/A #	Topic	RO IR	RO #	SRO-Only IR	SRO-Only #
66	1. Conduct of Operations	2.1. 05	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	2.9	1		
67		2.1. 08	Ability to coordinate personnel activities outside the control room.	3.4	1		
68		2.1. 13	Knowledge of facility requirements for controlling vital/controlled access.	2.5	1		
94		2.1. 37	Knowledge of procedures, guidelines, or limitations associated with reactivity management.			4.6	1
		2.1.					
		2.1.					
		Subtotal			3		1
69	2. Equipment Control	2.2. 12	Knowledge of surveillance procedures.	3.7	1		
70		2.2. 13	Knowledge of tagging and clearance procedures.	4.1	1		
95		2.2. 05	Knowledge of the process for making design or operating changes to the facility.			3.2	1
96		2.2. 25	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.			4.2	1
		2.2.					
		2.2.					
		Subtotal			2		2
71	3. Radiation Control	2.3. 07	Ability to comply with radiation work permit requirements during normal or abnormal conditions.	3.5	1		
72		2.3. 15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	1		
73		2.3. 11	Ability to control radiation releases.	3.8	1		
97		2.3. 06	Ability to approve release permits.			3.8	1
98		2.3. 14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.			3.8	1
		2.3.					
		Subtotal			3		2
74	4. Emergency Procedures / Plan	2.4. 12	Knowledge of general operating crew responsibilities during emergency operations.	4.0	1		
75		2.4. 22	Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.	3.6	1		
99		2.4. 18	Knowledge of the specific bases for EOPs.			4.0	1
100		2.4. 32	Knowledge of operator response to loss of all annunciators.			4.0	1
		2.4.					
		2.4.					
		Subtotal			2		2
Tier 3 Point Total					10		7

Tier/Group	Randomly Selected K/A	Reason for Rejection
RO Exam		
1/1	015/017 AK1.02	Question 43 Reactor Coolant Pump Malfunctions: Could not write a discriminating question based on the content of the original K/A. Replaced K/A 015/017 AK1.05 with K/A 015/017 AK1.02
1/1	W/E05 G2.1.28	Question 54 Loss of Instrument Air function of major components: Original sample plan resulted in Instrument Air system and malfunctions being over sampled (five occurrences). Replaced K/A 065 G2.1.28 with W/E05 G.2.1.28.
2/1	022 A4.01	Question 10 Loss of CCS pump: Unable to write an operationally valid question based on CPNPP design for the original K/A. Replaced K/A 022 A2.06 with K/A 022 A4.01.
2/1	006 K4.17	Question 28 Ability to monitor ECCS Valve lineups: Tier 2 Group 1 also sampled ECCS with A3.04, which resulted in over sampling A3 for ECCS. Replaced K/A 006 A3.06 with K/A 006 K4.17.
2/2	017 A3.01	Question 35 Monitor the ITM system: Task not performed by operators; unable to write an operationally valid question for the original K/A. Replaced K/A 017 A3.02 with K/A 017 A3.01.
2/2	086 A1.02	Question 38 Fire Protection, Fire Dampers: Could not write a discriminatory, operationally valid question for the original K/A. Replaced K/A 086 A1.04 with K/A 086 A1.02.
SRO Exam		
1/1	026 G.2.1.20	Question 78 Loss of Component Cooling Water: Original K/A is not allowed for selection in Tier 1 and Tier 2. Replaced K/A 026 G.2.1.45 with K/A 026 G.2.1.20.
1/1	058 G.2.2.40	Question 79 Loss of DC Power: Original K/A is not allowed for selection in Tier 1 and Tier 2. Replaced K/A 058 G2.2.23 with K/A 058 G.2.2.40.
1/1	062 G.2.4.35	Question 80 Loss of Instrument Air local operator actions: Original sample plan resulted in Instrument Air system and malfunctions being over sampled (five occurrences). Replaced K/A 065 G.2.4.35 with K/A 062 G.2.4.35.
1/2	067 G.2.4.11	Question 84 Knowledge of Fire Protection Procedures: Original K/A is not allowed for selection in Tier 1 and Tier 2. Replaced K/A 067 G.2.4.25 with K/A 067 G.2.4.11.
2/1	004 G.2.1.7	Question 86 Chemical and Volume Control System: Original K/A is not allowed for selection in Tier 1 and Tier 2. Replaced K/A 004 G.2.1.45 with K/A 004 G.2.1.7.

2/1	103 G2.4.28	Question 90 Containment Generic Radiological procedures: Original K/A is not allowed for selection in Tier 1 and Tier 2. Replaced K/A 103 G2.3.13 with K/A 103 G2.4.28.
2/2	071 G2.1.23	Question 92 Waste Gas Disposal (Generic): Original K/A is not allowed for selection in Tier 1 and Tier 2. Replaced K/A 071 G2.3.11 with K/A 071 G2.1.23.
2/2	086 G2.4.30	Question 93 Fire Protection (Generic): Original K/A is not allowed for selection in Tier 1 and Tier 2. Replaced K/A 086 G2.4.26 with K/A 086 G2.4.30.

Facility: **CPNPP Units 1 and 2**		Date of Examination: **June 2015**
Examination Level: RO ☒ SRO ☐		Operating Test Number: **NRC**
Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations (RA1)	M,R	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (4.3). JPM: Perform Power Change Worksheet Calculation. (RO1302A)
Conduct of Operations (RA2)	N,R	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. (3.3). JPM: Determine RO License Status.
Equipment Control (RA3)	D,R	2.2.12 Knowledge of surveillance procedures. (3.7). JPM: Perform Axial Flux Difference Surveillance. (RO1808)
Radiation Control (RA4)	M,R	2.3.11 Ability to control radiation releases. (3.8). JPM: Determine Maximum Allowable Venting Time. (RO7030)
Emergency Procedures/Plan	–	–

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

RA1 The applicant will determine boron/dilution requirements to lower power from 100% to 50% equilibrium per IPO-003A, Power Operations, Attachment 3, Power Change Worksheet. The calculations include Power Defect, Rod Worth, Xenon Worth, change in Boron concentration and boration/dilution quantity. The critical steps are to determine the reactivity change for power defect, the rod position change, equilibrium xenon, and the total reactivity change for these parameters, the required change in boron concentration, and the amount of boration needed. This is a modified bank JPM.

RA2 The applicant will be presented with a detailed record (in table form) of watch standing and other activities performed by 3 individual Reactor Operators over a period of 4 to 6 weeks. The applicant will be required to analyze the work records of these three operators, and apply the guidance of ODA-315, Licensed Operator Maintenance Tracking, to evaluate and determine if the RO license status is active or inactive for each of the three operators. The critical steps are to determine that the RO licenses for two of the three operators are NOT active. This is a new JPM.

RA3 The applicant will be presented with Power Range Nuclear Instrument Axial Flux Difference data and will perform a manual Axial Flux Difference calculation using OPT-403, Axial Flux Difference. The critical steps are to determine whether at least 3 of 4 PR Δ FLUX channels are within the Acceptable Operation region of NUC-204-6, Axial Flux Difference as a Function of Rated Thermal Power. This is a direct from bank JPM.

RA4 The applicant will determine the maximum allowable venting time for venting the reactor vessel using FRI-0.3A, Response to Voids in Reactor Vessel, Attachment 5. Critical steps include various stages of the calculation, including the final determination of allowable venting time. This is a modified bank JPM.

Facility: **CPNPP Units 1 and 2** Date of Examination: **June 2015**

Examination Level: RO ☐ SRO ☒ Operating Test Number: **NRC**

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations (SA1)	D,R	2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. (4.2). JPM: Loss of RHR Time / Tech Specs. (SO1101)
Conduct of Operations (SA2)	N,R	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. (3.8). JPM: Determine SRO License Status.
Equipment Control (SA3)	D,R	2.2.23 Ability to track Technical Specification limiting conditions for operations. (4.6). JPM: Complete LCOAR for TDAFW Pump Steam Admission Valve. (SO1024D)
Radiation Control (SA4)	D,R	2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. (3.7). JPM: Select Volunteer for Emergency Exposure. (SO1142A)
Emergency Procedures/Plan (SA5)	M,P,R	2.4.44 Knowledge of emergency plan protective action recommendations. (4.4). JPM: Determine Protective Action Recommendations. (SO1140A)

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

SA1 The applicant is presented with Loss of RHR conditions and then uses ABN-104, Residual Heat Removal System Malfunction, Attachment 5, Time to Saturation for Loss of All RHR with the RCS at Reduced Inventory and Attachment 19, Available Time for Containment Closure to determine Time to Saturation, Time to Core Uncovery, and Containment Closure Time. The critical steps are to determine Time to Saturation, Time to Core Uncovery, Containment Closure Time, and identify any Technical Specification required actions associated with the loss of the standby RHR pump. This is a direct from bank JPM.

SA2 The applicant is presented with a detailed record (in table form) of watch standing and other activities performed by 3 individual Senior Reactor Operators over a period of 4 to 6 weeks. The applicant will be required to analyze the work records of these three operators, and apply the guidance of ODA-315, Licensed Operator Maintenance Tracking, to evaluate and determine if the SRO license status is active or inactive for each of the three operators. The critical steps are to determine that the SRO licenses for two of the three operators are NOT active. This is a new JPM.

SA3 The applicant will be presented with conditions involving a TDAFW Pump Steam Admission Valve that has not been returned to service within the Completion Time and will use ODA-308, LCO Tracking Program, and Technical Specification 3.7.5 Auxiliary Feedwater System, to manually complete a Tracking LCOAR. The critical steps consist of various determinations on the LCOAR form, including correct information in required fields to pass the JPM. This is a direct from bank JPM.

SA4 The applicant is given accident conditions involving the need for a volunteer to attempt a lifesaving activity. Using the guidance in EPP-305, Emergency Exposure Guidelines and Personnel Dosimetry, the applicant will evaluate a series of potential volunteers and select the preferred volunteer from this list. The critical steps are evaluation and elimination of volunteers who do not meet the criteria required for the activity, and then final selection of the preferred volunteer. This is a direct from bank JPM.

SA5 The applicant will determine the appropriate Protective Action Recommendations for an emergency. This JPM is designated as a "P" because a form of it was used on the 2013 NRC exam. This JPM will be modified to include different conditions, including severity and meteorological parameters. The "random selection" aspect was performed due to limited topics available for SRO A.4 category, the fact that this JPM meets the requirements of NUREG-1021, and to avoid overlap with the Audit Exam. The critical steps will include several determinations the SRO must make, such as release duration, core damage, and identification of affected sectors. This is a modified bank JPM.

Facility: **CPNPP Units 1 and 2**		Date of Examination: **June 2015**	
Exam Level: RO SRO(I) **SRO (U)**		Operating Test Number: **NRC**	
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
S-1	001 –Control Rod Drive System (RO1030) Respond to Control Rods Below Insertion Limit	A,D,S	1
S-2	**006 –Emergency Core Cooling System (RO1506D)** **Transfer ECCS to Cold Leg Recirculation**	**A,EN,L,M,S**	**2**
S-3	006 –Emergency Core Cooling System (RO1511) Isolate SI Accumulators Following a LOCA	A,EN,L,N,S	3
S-4	**005 –Residual Heat Removal System (RO1402)** **Alternate Residual Heat Removal Trains**	**L,N,S**	**4P**
S-5	045 –Main Turbine Generator System (RO3149) Roll Main Turbine to 1800 RPM (RO Only)	L,N,S	4S
S-6	**022 –Containment Cooling System (RO2101A)** **Alternate Containment Recirculation Units(CACRS)**	**A,N,S**	**5**
S-7	064 –Emergency Diesel Generator System (RO4302D) Load Emergency Diesel Generator	A,D,S	6
S-8	008 –Component Cooling Water System (RO3603C) Rotate Component Cooling Water Pumps	M,S	8
In-Plant Systems[@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
P-1	**007 –Reactor Trip (AO6439B)** **Trip the Reactor and Stop MG Sets**	**D,E,R**	**1**
P-2	068 –Control Room Evacuation (AO6415A) Place MDAFW Pump on Alternate Suction Source	D,E,L,R	8
P-3	**062 –AC Electrical Distribution System (AO4204D)** **Transfer Inverter IV<u>u</u>PC1 from Bypass to Normal**	**N,E**	**6**

@	All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 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	

NRC JPM Examination
Summary Description

S-1 Following a turbine runback, due to a trip of a Heater Drain Pump from 100% power, the applicant will determine that control rods are below the required rod insertion limit by using ABN-302, Feedwater, Condensate, Heater Drain System Malfunction, Section 4.0, Heater Drain Pump Trip. This is an Alternate Path JPM, requiring the applicant to manually determine the required boration using the Reactivity Briefing Sheet. The critical steps include determination of how much boration is needed, and the various control board manipulations needed to perform the boration. This is a direct from bank JPM under Control Rod Drive System – Reactivity Control Safety Function. (K/A 001.A4.05 - IR 3.7 / 3.7)

S-2 The applicant will be required to use EOS-1.3A, Transfer to Cold Leg Recirculation following a Large Break LOCA. This is an Alternate Path JPM because one of the RHR pump suction valves will NOT open, and the applicant will need to perform alternate steps for system realignment, including shutting off one pump and ensuring the other RHR pump is running. The critical steps include recognition of one RHR pump suction valve failing to open, and various control board manipulations needed for realignment in order to achieve cold leg recirculation. This is a PRA significant action. This is a modified from bank JPM under the Emergency Core Cooling System – Reactor System Inventory Control Safety Function. (K/A 006.A4.05 - IR 3.7 / 3.6)

S-3 Using EOS-1.2A, Post LOCA Cooldown and Depressurization, the applicant will be required to continue with Step 26 for determining if SI accumulators should be isolated and to isolate the accumulators. This is an Alternate Path JPM and requires the applicant to determine that one of the accumulator injection valves will NOT close. This will require the applicant to vent off this accumulator to minimize the consequences of undesired injection, since the accumulator cannot be isolated. The critical steps include restoring power to the injection valves, operation of the accumulator injection valves, and venting of the accumulator that cannot be isolated. This is a new JPM under the Emergency Core Cooling System – Reactor Pressure Control Safety Function. (K/A 006.A4.02 - IR 4.0 / 3.8)

S-4 The applicant will use SOP-102A, Residual Heat Removal System, Section 5.6 Alternating RHR Trains in MODE 5, 6, or Defueled to perform the task. The critical steps will include various control board manipulations required for making the swap such as starting and stopping RHR pumps, operation of control valves, and requirements for temperature control. This is a new JPM under the Residual Heat Removal System – Primary System Heat Removal from Reactor Core Safety Function. (K/A 005.A4.01 - IR 3.6 / 3.4)

S-5 The applicant will use IPO-003A, Power Operations, Section 5.1, Warmup and Synchronization of the Turbine Generator, beginning at Step 5.1.18 and completing Step 5.1.21. This involves setting up the turbine control for rolling the turbine to 1800 RPM. The Overspeed Trip test will NOT be required. The critical steps include setting up the turbine control panel to open the HP and LP stop valves, an interim step of holding at 500 RPM, placing of bearing lift oil pumps to AUTO, and then continuing to 1800 RPM where the JPM will terminate. This is a new JPM under the Main Turbine Generator System – Secondary System Heat Removal from Reactor Core Safety Function. RO Only. (K/A 045.A4.02 – IR 2.7 / 2.6)

S-6 With a Containment Vent in progress, the applicant is directed to alternate Containment Recirculation Units using SOP-801A, Containment Ventilation System, Section 5.1.3. During the swap Containment Air Gaseous radiation monitor goes into Alert. This is an alternate path JPM requiring action to manually initiate isolation of the Containment Vent. The critical steps include starting the desired cooling unit and manual operation of several valves for isolation of the Containment Vent evolution. This is a new JPM under the Containment Cooling System – Containment Integrity Safety Function. (K/A 022.A4.01 - IR 3.6 / 3.6)

S-7 With OPT-214A, Diesel Generator Operability Test in progress and following a fast start of Diesel Generator 1-01, the applicant is to continue with the surveillance. This involves beginning to load the diesel generator. This is an Alternate Path JPM. When loading is raised to approximately 2.2 MW, the Station Service Water Pump 1-01 will trip. This will result in the diesel generator running loaded with no cooling water. The applicant is required to shut down the diesel generator. The critical steps are proper loading of the diesel generator and shutting down the diesel generator to prevent equipment damage. This is a direct from bank JPM under the Emergency Diesel Generator System – Electrical Safety Function. (K/A 064.A4.06 - IR 3.9 / 3.9)

S-8 The applicant is directed to swap Component Cooling Water Pumps from Train A to Train B, using SOP-502A, Component Cooling Water System. The critical steps include establishing required system flow prior to and after the swap, control board manipulations required for the swap, starting the idle pump, and shutting down the pump to be idled. This is a modified from bank JPM under the Component Cooling Water System – Plant Service Systems Safety Function.
(K/A 008.A4.01 - IR 3.3 / 3.1)

P-1 With an Anticipated Transient Without Trip in progress on Unit 1, the applicant is required to locally trip the Unit 1 reactor, and to stop both Rod Drive Motor Generator Sets, in accordance with FRS-0.1A, Response to Nuclear Power Generator/ATWT, Step 6a RNO. Through a series of simulated operations and examiner cues, the applicant will open RTA and RTB trip breakers as critical steps. The bypass breakers will not be considered critical steps. When that is complete, the applicant will de-energize both MG Sets by opening associated breakers, each of which is a critical step. This is a PRA significant action. This is a direct from bank JPM under the Reactor Trip System – Reactivity Control Safety Function.
(K/A 007.EA2.02 - IR 4.3 / 4.6)

P-2 During a Control Room evacuation due a fire, the applicant is required to supply an alternate suction source to Motor Driven Auxiliary Feedwater Pump 1-01, which has tripped due to loss of suction pressure. Actions will be performed using ABN-803A/B, Response to a Fire in the Control Room or Cable Spreading Room, Attachment 9, Alternate AFW Supply. The critical steps include operation of breakers and manual operation of valves required for supplying the alternate suction source (which will be from Station Service Water). This is a PRA significant action. This is a direct from bank JPM under the Control Room Evacuation System – Plant Service Systems Safety Function.
(K/A 068.AA1.26 - IR 3.6 / 3.8)

P-3 The applicant will be directed to perform SOP-607A/B, 118 VAC Distribution System and Inverters, Section 5.5.9 Transferring Inverter IV<u>u</u>PC1 from Bypass to Normal Operation. The critical steps will include operating the Static Transfer Switch to make the swap, and placing of several other controls to complete the operation. This is a new JPM under the AC Electrical Distribution System – Electrical Safety Function. (K/A 062.A4.04 - IR 2.6 / 2.7)

Facility: **Comanche Peak** Date of Exam: **June 2015** Operating Test No.: **1**

APPLICANT	EVENT TYPE	NRC EXAM OUTLINE SUBMITTAL												TOTAL	MINIMUM(*)		
		Scenario 1			Scenario 2												
		CREW POSITION			CREW POSITION												
		SRO	ATC	BOP	SRO	ATC	BOP								R	I	U
RO 1	RX			---		1								**1**	1	1	0
	NOR			1		---								**1**	1	1	1
	I/C			2,3,5		2,3,5								**6**	4	4	2
	MAJ			6		6,7								**3**	2	2	1
	TS			---		---								**0**	0	2	2
RO 2	RX			---		1								**1**	1	1	0
	NOR			1		---								**1**	1	1	1
	I/C			2,3,5		2,3,5								**6**	4	4	2
	MAJ			6		6,7								**3**	2	2	1
	TS			---		---								**0**	0	2	2
RO 3	RX		1				---							**1**	1	1	0
	NOR		---				1							**1**	1	1	1
	I/C		4,5,7,8				4							**5**	4	4	2
	MAJ		6				6,7							**3**	2	2	1
	TS		---				---							**0**	0	2	2
SRO-I 1	RX		1		---									**1**	1	1	0
	NOR		---		1									**1**	1	1	1
	I/C		4,5,7,8		5									**5**	4	4	2
	MAJ		6		6,7									**3**	2	2	1
	TS		---		2,3,4									**3**	0	2	2

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must do one scenario, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

Facility: **Comanche Peak** Date of Exam: **June 2015** Operating Test No.: **1**

APPLICANT	EVENT TYPE	NRC EXAM OUTLINE SUBMITTAL												TOTAL	MINIMUM(*)		
		Scenario 1			Scenario 2												
		CREW POSITION			CREW POSITION												
		SRO	ATC	BOP	SRO	ATC	BOP								R	I	U
SRO-I 2	RX		1		---									**1**	1	1	0
	NOR		---		1									**1**	1	1	1
	I/C		4,5,7,8		5									**5**	4	4	2
	MAJ		6		6,7									**3**	2	2	1
	TS		---		2,3,4									**3**	0	2	2
SRO-U 1	RX	---					---							**0**	1	1	0
	NOR	1					1							**2**	1	1	1
	I/C	3,5					4							**3**	4	4	2
	MAJ	6					6,7							**3**	2	2	1
	TS	2,4					---							**2**	0	2	2
SRO-U 2	RX	---					---							**0**	1	1	0
	NOR	1					1							**2**	1	1	1
	I/C	3,5					4							**3**	4	4	2
	MAJ	6					6,7							**3**	2	2	1
	TS	2,4					---							**2**	0	2	2
SRO-U 3	RX	---			---									**0**	1	1	0
	NOR	1			1									**2**	1	1	1
	I/C	3,5			5									**3**	4	4	2
	MAJ	6			6,7									**3**	2	2	1
	TS	2,4			2,3,4									**5**	0	2	2

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must do one scenario, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

Appendix D	Scenario Outline	Form ES-D-1

June 2015 NRC Exam

Facility:	CPNPP 1 & 2	Scenario No.:	1	Op Test No.:	June 2015
Examiners:		Operators:			

Initial Conditions: 100% power. CCP 1-02 is tagged out for maintenance.

Turnover: Begin reducing power to 50% for removing Main Feedwater Pump 1-01 from service to repair an oil leak. CCP 1-02 will be returned to service in 3 hours.

Critical Tasks:
- Initiate Train A and/or Train B Safety Injection due to Failure to Automatically Actuate prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.
- Establish flow from at least one high-head ECCS pump (CCP 1-01) prior to Exiting EOP-1.0A, Reactor Trip or Safety Injection.
- Initiate Cooldown of Reactor Coolant System Prior to Exiting EOS-1.2A, Post LOCA Cooldown and Depressurization.

Event No.	Malf. No.	Event Type*	Event Description
1	----	R - RO N - BOP N - SRO	Begin power reduction for removing MFP 1-01 from service.
2	CC02A CC03A	C - BOP TS - SRO	CCW Pump 1-01 trips. Standby fails to auto start.
3	CH10	C - BOP C - SRO	CRDM Vent Fan trips. Requires manual start of alternate.
4	RP05A	I - RO TS - SRO	NR Cold Leg TI (TE-411B) fails high.
5	RC03C	C – RO C – BOP C - SRO	RCP 1-03 vibration (Ramps to 20 mils over 5 min.)
6	RC19C	M - ALL	SBLOCA.
7	RP07A RP07B	I - RO	Both trains SI fail to auto actuate.
8	ED05E CV01D	C - RO	Loss of 1EA1 Safeguards Bus (86-2 actuation). CCP 1-01 fails to sequence on. Requires manual start.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specifications

Actual	Target Quantitative Attributes
7	Total malfunctions (5-8)
3	Malfunctions after EOP entry (1-2)
4	Abnormal events (2-4)
1	Major transients (1-2)
2	EOPs entered/requiring substantive actions (1-2)
0	EOP contingencies requiring substantive actions (0-2)
3	Critical tasks (2-3)

SCENARIO 1 SUMMARY

Event 1
Due to an oil leak on Main Feedwater Pump 1-01, the crew begins reducing power to approximately 50% for removing MFP 1-01 from service.

Event 2
The next event is a trip of Component Cooling Water Pump 1-01, with a failure of the standby pump (CCW Pump 1-02) to automatically start . The crew will enter ABN-502, Section 2.0, CCW Pump Trip, and manually start CCW Pump 1-02, per Step 1 RNO. The SRO will refer to Technical Specifications for this malfunction.

Event 3
The operating CRDM vent fan trips. The crew will refer to 1-ALB-3A, Window 1.6, CRDM SHROUD EXH TEMP HI, and ensure that at least one CRDM vent fan is in service, and manually start an alternate vent fan, per SOP-801A. They will use either Section 5.3.1, Control Rod Drive Mechanism Ventilation System Startup, or Section 5.3.3, Alternating Control Rod Drive Mechanism Ventilation Fans, for this evolution.

Event 4
The next event is a failure of Cold Leg Loop 1 NR Temperature Transmitter (TE-411B). It will fail high (630°F). Operator actions are per ABN-704, Tc/N-16 Instrumentation Malfunction, and requires taking manual control of rods, since the Tc failure results in a higher Tave and rods will be inserting in auto. The SRO will refer to Technical Specifications.

Event 5
The next event is the precursor to the major event and involves high shaft vibration of Reactor Coolant Pump 1-03. This malfunction ramps in over a period of 5 minutes, allowing the crew time to evaluate and enter ABN-101, Section 6.0, Excessive Reactor Coolant Pump Vibration. Alarm 1-ALB-5B, Window 3.5, RCP 3 VIBR HI will come in (setpoint is 15 mils shaft vibration). Bearing temperatures and amps will continue to rise as the condition worsens. As this progresses the crew will recognize that trip criteria will be exceeded. The crew then trips the reactor and enters to EOP-0.0A.

Event 6
When the reactor is tripped, a SBLOCA occurs in RCS Loop 3 of 1500 gpm. The crew will progress through EOP-0.0A, and then transition to EOP-1.0A, Loss of Reactor or Secondary Coolant. Adverse Containment Conditions will apply at some point as containment pressure rises due to the LOCA.

Event 7
This scenario is complicated by the automatic failure of both trains of Safety Injection to actuate. Manual actuation of both trains will be successful.

Event 8
Once SI has been reset, a Safeguard Bus 1EA1 lockout (86-2) occurs. The bus will reenergize from the Emergency Diesel Generator and all loads will properly sequence on with the exception of CCP 1-01. With CCP 1-02 tagged out, as given in the turnover conditions, high head injection is not established. To satisfy the Critical Task of establishing at least one train of high head injection, the operator will start CCP 1-01.

The crew will transition to EOS-1.2A, Post LOCA Cooldown and Depressurization, and begin the required cooldown. The scenario will be terminated approximately 5 minutes after the cooldown is commenced.

Risk Significance:

- Failure of risk important system prior to trip: Loss of CCW (Pump trip)
RCP high vibration
- Risk significant core damage sequence: RCP high vibration, then Small Break LOCA
- Risk significant operator actions: Manually Initiate Safety Injection
Manually start CCP 1-01

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
Initiate Train A and/or Train B Safety Injection due to Failure to Automatically Actuate prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.	Recognize a failure or an incorrect automatic actuation of an ESF system or component.	Procedural direction at EOP-0.0A Step 4 to determine if a Safety Injection is required and annunciators indicating that an SI should have occurred yet did not occur.	The operator will manually actuate Safety Injection using either the handswitch on CB-07 or CB-02.	PCIP Window 1.8 annunciates indicating both trains of SI have actuated. Numerous equipment changes of state.
Establish flow from at least one high-head ECCS pump (CCP 1-01) prior to Exiting EOP-1.0A, Reactor Trip or Safety Injection.	Recognize a failure or an incorrect automatic actuation of an ESF system or component resulting in degraded ECCS capacity.	Procedural note in EOP-1.0A prior to resetting SI that equipment would need to be restarted if a loss of power were to occur. Numerous annunciators indicating that off-site power was lost to the bus and that the Blackout sequencer has operated.	The operator will manually start CCP 1-01 using the handswitch on CB-06.	Indication of pump start including light indication, pressure and flow.
Initiate Cooldown of Reactor Coolant System Prior to Exiting EOS-1.2A, Post LOCA Cooldown and Depressurization.	Take one or more actions that would prevent a challenge to plant safety.	Procedurally driven from EOS-1.2A to commence cooldown to reduce the overall temperature of the RCS.	The operator will increase dumping steam from the SGs via the ARVs or Steam Dumps to reduce RCS temperature.	Lowering SG pressures and lowering RCS temperatures beginning with the cold leg temperatures.

Appendix D	Scenario Outline	Form ES-D-1

June 2015 NRC Exam

Facility:	CPNPP 1 & 2	Scenario No.:	2	Op Test No.:	June 2015
Examiners:		Operators:			

Initial Conditions: 3% power following a refueling outage. MFP 1-01 is forward feeding with AFW in Standby. Steam dumps are in Steam Pressure mode.

Turnover: Raise power to 100%.

Critical Tasks:
- Isolate Reactor Coolant System Leakage Paths in accordance with ECA-0.0A, Loss of All AC Power, prior to initiation of Steam Generator depressurization.
- Restore Power to Bus 1EA2 in accordance with ECA-0.0A, Loss of All AC Power, prior to initiation of Steam Generator depressurization.
- Identify and isolate the Faulted Steam Generator Prior to Exiting EOP-2.0A, Faulted Steam Generator Isolation.
- Terminate Safety Injection prior to exiting from EOS-1.1A, Safety Injection Termination.

Event No.	Malf. No.	Event Type*	Event Description
1	---	R - RO N - BOP N - SRO	Begin raising power to 6% to 8%.
2	CV01B	C - RO TS - SRO	CCP 1-01 trips. Standby requires manual start.
3	RX08A	I - RO TS - SRO	PT-455 PZR pressure fails high.
4	FW03A FW24B	C - BOP TS - SRO	MFP 1-01 trips. AFW Pump 1-02 trips. Manual start of TDAFW Pump.
5	RD03B12 RD03D2 RD03M14 RD03P4	C - RO C - SRO	Shutdown Bank A (4 rods) drops.
6	ED01 EG06A EG15B	M - ALL	Loss of Offsite Power DG 1-01 will not start in auto or manual. DG 1-02 requires manual start.
7	MS01B	M - ALL	Main Steam Line Break on SG 1-02 inside containment.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specifications

Actual	Target Quantitative Attributes
6	Total malfunctions (5-8)
2	Malfunctions after EOP entry (1-2)
4	Abnormal events (2-4)
2	Major transients (1-2)
3	EOPs entered/requiring substantive actions (1-2)
1	EOP contingencies requiring substantive actions (0-2)
4	Critical tasks (2-3)

SCENARIO 2 SUMMARY

Event 1
In accordance with turnover instructions, crew begins raising power to 6% to 8%, per IPO-003A, Power Operations.

Event 2
The next event is that Centrifugal Charging Pump 1-01 trips. The crew will enter ABN-105, Section 3.0, Charging Pump Trip; and per the first step, will manually start CCP 1-02 since it did not automatically start. The SRO will refer to Technical Specification and the Technical Requirements Manual.

Event 3
The next event involves a failure of Pressurizer Pressure Channel PT-455 failing high. The crew will enter ABN-705, Pressurizer Pressure Malfunction, Section 2.0, Pressurizer Pressure Instrument Malfunction. Per the Automatic Actions section, the associated PORV will open and then reclose at control setpoint (2185 psig). The operator will place 1-PK-455A, Master Pressurizer Pressure Controller in manual and control PZR pressure. The SRO will refer to Technical Specification.

Event 4
Once Pressurizer pressure control has been restored to automatic, Main Feedwater Pump 1-01 trips. The crew enters ABN-302, Section 2.0, Feedwater Pump Trip. Since the unit is less than 700 MWe, the operator will not expect a turbine runback to occur. MDAFW Pump 1-02 auto starts, and then trips, requiring manual start of the Turbine Driven AFW pump. The SRO will refer to Technical Specifications.

Event 5
When the Unit is stable once again, Shutdown Bank A will drop fully into the core. The reactor is manually tripped. The crew will enter EOP-0.0A, Reactor Trip or Safety Injection, and transition to EOS-0.1A, Reactor Trip Response.

Event 6
After the crew has begun EOS-0.1A, Reactor Trip Response, a Loss of Offsite Power occurs. In conjunction with the Loss of Offsite Power, Emergency Diesel Generator (EDG) 1-01 will fail to start and EDG 1-02 will fail to automatically start. The crew will then transition to ECA-0.0A, Loss of All AC Power. Letdown will be isolated as a Critical Task for isolating leakage paths. Power is subsequently restored in ECA-0.0A, via manual start of EDG 1-02.

Event 7
After returning to EOS-0.1A, the event is once again complicated by initiation of a Main Steamline Break on SG 1-02 main steam line inside containment. The crew will transition back to EOP-0.0A, and then transition to EOP-2.0A, Faulted Steam Generator isolation. These actions will be performed, and when completed, the crew will terminate Safety Injection in accordance with EOS-1.1A, Safety Injection Termination. The scenario will be terminated at this point.

Risk Significance:

- Failure of risk important system prior to trip:
  - Charging pump trips
  - 4 dropped rods
  - AFW pump trips
- Risk significant core damage sequence:
  - Loss of Offsite Power
  - DG failures to start
  - Main Steam Line Break
- Risk significant operator actions:
  - Manually start TDAFW pump
  - Manually start DG 1-02
  - Identify and isolate faulted SG

Critical Task Determination

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
Isolate Reactor Coolant System Leakage Paths in accordance with ECA-0.0A, Loss of All AC Power, prior to initiation of Steam Generator depressurization.	Take one or more actions that would prevent a challenge to plant safety.	Procedural direction at ECA-0.0A Step 3 to minimize RCS inventory loss. Valve position indication and letdown flow.	The operator will manually close the Letdown Isolation Valves.	Valve position will change and letdown flow will lower to zero.
Restore Power to Bus 1EA2 in accordance with ECA-0.0A, Loss of All AC Power, prior to initiation of Steam Generator depressurization.	Recognize a failure or an incorrect automatic actuation of an ESF system or component resulting in degraded ECCS capacity.	Procedural direction at ECA-0.0A Step 5 to restore power via EDG 1-02 to 1EA2. Bus voltage indication and EDG parameters.	The operator will manually start EDG 1-02 using the handswitch on CB-11.	Indication of DG running and loading via bus voltage and frequency.
Identify and isolate the Faulted Steam Generator Prior to Exiting EOP-2.0A, Faulted Steam Generator Isolation.	Take one or more actions that would prevent a challenge to plant safety.	Procedurally driven from EOP-2.0A to isolate the faulted SG to prevent further RCS cooldown and mass addition to containment.	The operator will close the AFW flow control valve to SG 1-02.	Valve position will change and AFW flow to SG 1-02 will reduce to zero.
Terminate Safety Injection prior to exiting from EOS-1.1A, Safety Injection Termination.	Take one or more actions that would prevent a challenge to plant safety.	Procedurally driven from EOS-1.1A to terminate Safety Injection and preclude filling the pressurizer.	The operator will stop pumps and close valves which will terminate flow to the RCS via the SI injection flow paths.	Valve position, pump running indication and discharge pressures and flow to the RCS.

Appendix D	Scenario Outline	Form ES-D-1

June 2015 NRC Exam

Facility:	CPNPP 1 & 2	Scenario No.:	3	Op Test No.:	June 2015
Examiners:		Operators:			

Initial Conditions: 100% power, EOL. SI Pump 1-02 tagged out for inspection. (IC-20)

Turnover: SI Pump 1-02 returned to service in approx. 4 hours.

Critical Tasks:
- Place EHC Pumps in PULL OUT Upon Failure of Main Turbine Trip Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.
- Manually Start Safety Injection Pump 1-01 Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.
- Identify and isolate the Ruptured Steam Generator Prior to Commencing an Operator Induced Cooldown per EOP-3.0A.

Event No.	Malf. No.	Event Type*	Event Description
1	NI04E	I – RO C - BOP TS - SRO	NI42 Power Range Channel fails high.
2	TP01	C - BOP C - SRO	TPCW leak. Auto makeup fails.
3	RX05B	I - RO TS - SRO	PZR LT-460 fails low. Letdown isolates.
4	FW16 FW17A	C - BOP C - SRO	CEV pump trips. Manually start alternate.
5	SG01B	R - RO N - BOP, TS - SRO	SG 1-02 tube leak. Down power per ABN-106.
6	SG02B	M - ALL	SG 1-02 tube rupture.
7	TC07C	C - BOP	Turbine fails to auto trip. Manual trip not successful. EHC pumps to Pull Out.
8	SI04C	C - BOP	SI Pump 1-01 fails to Auto start.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specifications

Actual	Target Quantitative Attributes
7	Total malfunctions (5-8)
2	Malfunctions after EOP entry (1-2)
4	Abnormal events (2-4)
1	Major transients (1-2)
1	EOPs entered/requiring substantive actions (1-2)
0	EOP contingencies requiring substantive actions (0-2)
3	Critical tasks (2-3)

SCENARIO 3 SUMMARY

Event 1
The first event is failure high of NI42 Power Range Channel. The crew will enter ABN-703, Power Range Instrumentation Malfunction. Since the failure is in the high direction, rods will be rapidly inserting. This will require the operator to place rod control to Manual, per Step 1.b of ABN-703. The SRO will refer to Technical Specifications.

Event 2
The next event is initiation of a leak in the Turbine Plant Cooling Water system at 15 gpm. The normal makeup valve (1-HS-3050 Makeup Valve) fails to auto open. Requires manual makeup, as directed by 1-ALB-9A, Window 2.10, TPCW HEAD TK LVL LO. This manual makeup operation will be successful, and alarm will clear as level restores.

Event 3
Once the TPCW Head Tank level is restored, the next event is a low failure of PZR LT-460. This failure causes letdown to isolate and a loss of the pressurizer heaters. The crew will enter ABN-706, Section 2.0, Pressurizer Level Instrument Malfunction, and per Step 1 and 2, manually control PZR level and reenergize PZR heaters. The SRO will refer to Technical Specifications.

Event 4
The operating Condenser Exhaust Vacuum (CEV) pump trips. The crew will observe megawatts lowering and condenser vacuum lowering. They will also receive an alarm (1-ALB-9A, Window 1.12, CNDSR ANY VAC PMP TRIP, for the actual trip of the vacuum pump. They will also enter ABN-304, Section 3.0, Main or Auxiliary Condenser vacuum Decreasing, and manually start the alternate CEV pump. The crew may slightly reduce turbine load.

Event 5
A tube leak (10 gpm) will develop on SG 1-02. The crew will enter ABN-106, Section 3.0, Steam Generator Tube Leakage Greater than or equal to 75 gpd (0.52 gpm). They will recognize per the procedure, that a reduction in power is required. This evolution is intended to satisfy the reactivity manipulation requirement and normal evolution for this scenario. The SRO will refer to Technical Specifications.

Event 6
As the power reduction progresses, the tube leak on SG 1-02 worsens to a tube rupture event. The crew will recognize the change in leakage and conclude that a manual reactor trip is warranted. The reactor will be manually trippred, but the turbine will fail to auto trip. The crew enters EOP-0.0A, Reactor Trip or Safety Injection.

Event 7
The Main Turbine fails to auto trip. The Manual trip is NOT successful. This will require the operator to place the EHC pumps to PULL OUT, per Immediate Action Step 2, RNO.

Event 8
When safety injection is actuated in response to the SG Tube Rupture SI Pump 1-01 will fail to auto start. The operator performing EOP-0.0A, Attachment 2 should start the pump. The crew will continue through EOP-0.0A, and transition EOP-3.0A, Steam Generator Tube Rupture. When the ruptured Steam Generator 1-02 is isolated, including stopping Auxiliary Feedwater flow, the scenario can be terminated.

Risk Significance:

- Failure or risk important system prior to trip: Steam Generator Tube Leak
Main Turbine Fails to Trip
- Risk significant core damage sequence: SG tube leak leads to tube rupture event
- Risk significant operator actions: Place Turbine EHC Pumps to PULL OUT
Initiate Emergency Boration for stuck rods
Identify and isolate ruptured Steam Generator

Critical Task Determination

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
Place EHC Pumps in PULL OUT Upon Failure of Main Turbine Trip Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.	Recognize a failure or an incorrect automatic actuation of an ESF system or component.	Procedural direction at EOP-0.0A Step 2 to determine if a turbine trip has occurred. Position indication of the HP Turbine Stop Valves as still open.	The operator will manually place all EHC pumps handswitch on CB-10 to pull out.	EHC fluid pressure lowering and position indication for HP Turbine Stop Valves indicating closed.
Manually Start Safety Injection Pump 1-01 Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.	Recognize a failure or an incorrect automatic actuation of an ESF system or component.	Procedural direction per EOP-0.0A Attachment 2 to start SI Pump 1-01. Pump indication lights, flow and discharge pressure.	The operator will manually start SI Pump 1-01.	Indication of pump start including light indication, pressure and flow.
Identify and isolate the Ruptured Steam Generator Prior to Commencing an Operator Induced Cooldown per EOP-3.0A.	Take one or more actions that would prevent a challenge to plant safety.	Procedurally driven from EOP-3.0A, to identify and isolate a ruptured SG. Indications include MSL Radiation alarms and SG level.	The operator will close the MSIV and stop feeding the SG once sufficient level to cover the tubes is available.	SG pressure increasing, AFW flow reduced to zero and valve position indications.