

ES-401

PWR Examination Outline

FORM ES-401-2

Facility Name:CPNPP		Date of Exam:04/01/2013																
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	2	4	3				2	4				3	18	3	3	6	
	2	1	1	2	N/A			2	2	N/A			1	9	2	2	4	
	Tier Totals	3	5	5				4	6				4	27	5	5	10	
2. Plant Systems	1	2	3	3	3	3	2	3	3	1	3	2	28	2	3	5		
	2	1	1	0	1	1	1	1	1	1	1	1	10	0	2	3		
	Tier Totals	3	4	3	4	4	3	4	4	2	4	3	38	4	4	8		
3. Generic Knowledge and Categories				Abilities		1	2	3	4				10	1	2	3	4	7
						2	2	3	3					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**2****Form ES-401-2**

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		0 3					Reactor trip status panel	3.5	1
40	000008 Pressurizer Vapor Space Accident / 3		0 3					Controllers and positioners	2.5	1
41	000009 Small Break LOCA / 3					3 7		Existence of adequate natural circulation	4.2	1
	000011 Large Break LOCA / 3									0
42	000015 RCP Malfunctions / 4 000017 RCP Malfunctions (Loss of RC Flow) / 4	0 4						Basic steady state thermodynamic relationship between RCS loops and S/Gs resulting from unbalanced RCS flow	2.9	1
	000022 Loss of Rx Coolant Makeup / 2									0
43	000025 Loss of RHR System / 4			0 3				Immediate actions contained in EOP for Loss of RHRS	3.9	1
	000026 Loss of Component Cooling Water / 8									0
44	000027 Pressurizer Pressure Control System Malfunction / 3		0 3					Controllers and positioners	2.6	1
	000029 ATWS / 1									0
45	000038 Steam Gen. Tube Rupture / 3						04. 18	Knowledge of the specific bases for EOPs.	3.3	1
	000040 Steam Line Rupture - Excessive Heat Transfer / 4									0
	WE12 Uncontrolled Depressurization of all Steam Generators / 4									0
46	000054 Loss of Main Feedwater / 4	0 1						MFW line break depressurizes the S/G (similar to a steam line break)	4.1	1
47	000055 Station Blackout / 6					0 3		Actions necessary to restore power	3.9	1
48	000056 Loss of Off-site Power / 6				0 5			Initiation (manual) of safety injection process	3.8	1
49	000057 Loss of Vital AC Inst. Bus / 6					1 5		That a loss of ac has occurred	3.8	1
50	000058 Loss of DC Power / 6			0 2				Actions contained in EOP for loss of dc power	4.0	1
51	000062 Loss of Nuclear Svc Water / 4					0 3		The valve lineups necessary to restart the SWS while bypassing the portion of the system causing the abnormal condition	2.6	1
52	000065 Loss of Instrument Air / 8			0 4				Cross-over to backup air supplies	3.0	1
54	W/E04 LOCA Outside Containment / 3		0 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	3.8	1
56	W/E11 Loss of Emergency Coolant Recirc. / 4				0 3			Desired operating results during abnormal and emergency situations	3.7	1
55	W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4					02. 03		Knowledge of the design, procedural, and operational differences between units.	3.8	1
53	000077 Generator Voltage and Electric Grid Disturbances / 6					04. 01		Knowledge of EOP entry conditions and immediate action steps.	4.6	1
K/A Category Totals:		2	4	3	2	4	3	Group Point Total:		18

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ES-401**3****Form ES-401-2**

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	03						Relationship of reactivity and reactor power to rod movement	3.5	1
	000005 Inoperable/Stuck Control Rod / 1									0
	000024 Emergency Boration / 1									0
58	000028 Pressurizer Level Malfunction / 2				06			Checking of RCS leaks	3.3	1
	000032 Loss of Source Range NI / 7									0
	000033 Loss of Intermediate Range NI / 7									0
	000036 Fuel Handling Accident / 8									0
	000037 Steam Generator Tube Leak / 3									0
	000051 Loss of Condenser Vacuum / 4									0
	000059 Accidental Liquid RadWaste Rel. / 9									0
59	000060 Accidental Gaseous Radwaste Rel. / 9						04. 45	Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	1
	000061 ARM System Alarms / 7									0
60	000067 Plant Fire On-site / 8					08		Limits of affected area	2.9	1
61	000068 Control Room Evac. / 8					09		Saturation margin	4.1	1
	000069 Loss of CTMT Integrity / 5									0
	W/E14 High Containment Pressure / 5									0
	000074 Inad. Core Cooling / 4									0
	W/E06 Degraded Core Cooling / 4									0
	W/E07 Saturated Core Cooling / 4									0
62	000076 High Reactor Coolant Activity / 9		01					Process radiation monitors	2.6	1
	W/E01 Rediagnosis / 3									0
	W/E02 SI Termination / 3									0
	W/E13 Steam Generator Over-pressure / 4									0
65	W/E15 Containment Flooding / 5				01			Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes,	2.9	1
	W/E16 High Containment Radiation / 9									0
	W/E03 LOCA Cooldown - Depress. / 4									0
	W/E09 Natural Circulation Operations / 4									0
64	W/E10 Natural Circulation with Steam Voide in Vessel with/without RVLIS. / 4			03				Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations	3.4	1
63	W/E08 RCS Overcooling - PTS / 4			01				Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature,	3.4	1
K/A Category Totals:		1	1	2	2	2	1	Group Point Total:		9

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ES-401**4****Form ES-401-2**

ES-401		PWR Examination Outline												Form ES-401-2	
		Plant Systems - Tier 2/Group 1 (RO)													
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	#
1	003 Reactor Coolant Pump		0 2										CCW pumps	2.5	1
2	004 Chemical and Volume Control		0 6										Control instrumentation	2.6	1
3,4	005 Residual Heat Removal						0 3		0 3				RHR heat exchanger; RHR pump/motor malfunction	2.5; 2.9	2
5,6	006 Emergency Core Cooling					0 6		1 6					Relationship between ECCS flow and RCS pressure; RCS temperature, including superheat, saturation, and subcooled	3.5; 4.1	2
7	007 Pressurizer Relief/Quench Tank			0 1									Containment	3.3	1
8	008 Component Cooling Water										0 1		CCW indications and controls	3.3	1
9	010 Pressurizer Pressure Control						0 1						Pressure detection systems	2.7	1
10	012 Reactor Protection	0 2											125V dc system	3.4	1
11	013 Engineered Safety Features Actuation					0 1							Definitions of safety train and ESF channel	2.8	1
12,13	022 Containment Cooling							0 2			0 1		Containment pressure; CCS fans	3.6; 3.6	2
	025 Ice Condenser												CPNPP does not have this system		
14	026 Containment Spray								0 7				Loss of containment spray pump suction when in recirculation mode, possibly caused by clogged sump screen, pump inlet high temperature exceeded cavitation.	3.6	1
15	039 Main and Reheat Steam							0 5					RCS T-ave	3.2	1
16	059 Main Feedwater				1 6								Automatic trips for MFW pumps	3.1	1
17	061 Auxiliary/Emergency Feedwater					0 3							Pump head effects when control valve is shut	2.6	1
18	062 AC Electrical Distribution				0 2								Circuit breaker automatic trips	2.5	1
19	063 DC Electrical Distribution									0 1			Meters, annunciators, dials, recorders, and indicating lights	2.7	1
20,21	064 Emergency Diesel Generator				1 0				1 8				Automatic load sequencer: blackout; Consequences of premature opening of breaker under load	3.5; 2.6	2
22,23	073 Process Radiation Monitoring			0 1								04. 06	Radioactive effluent releases; Knowledge of EOP mitigation strategies.	3.6; 3.7	2
24,25	076 Service Water	1 5									0 4		FPS; Emergency heat loads	2.5; 3.5	2
26,27	078 Instrument Air		0 1	0 3									Instrument air compressor; Cross-tied units	2.7; 3	2
28	103 Containment											02. 42	Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	3.9	1
															0
K/A Category Totals:		2	3	3	3	3	2	3	3	1	3	2	Group Point Total:		28

ES-401**5****Form ES-401-2**

ES-401		PWR Examination Outline											Form ES-401-2		
		Plant Systems - Tier 2/Group 2 (RO)													
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	#
29	001 Control Rod Drive						1 2						Location and interpretation of CRDS ac/dc status alarms	2.9	1
	002 Reactor Coolant														0
30	011 Pressurizer Level Control							0 3					VCT level	2.8	1
31	014 Rod Position Indication								0 6				Loss of LVDT	2.6	1
	015 Nuclear Instrumentation														0
	016 Non-nuclear Instrumentation														0
32	017 In-core Temperature Monitor					0 2							Saturation and subcooling of water	3.7	1
33	027 Containment Iodine Removal		0 1										Fans	3.1	1
	028 Hydrogen Recombiner and Purge Control														0
34	029 Containment Purge											01. 32	Ability to explain and apply system limits and precautions.	3.8	1
	033 Spent Fuel Pool Cooling														0
	034 Fuel Handling Equipment														0
35	035 Steam Generator				0 5								Amount of reserve water in S/G	2.9	1
	041 Steam Dump/Turbine Bypass Control														0
36	045 Main Turbine Generator								0 5				Electrohydraulic control	2.6	1
37	055 Condenser Air Removal	0 6											PRM system	2.6	1
	056 Condensate														0
38	068 Liquid Radwaste										0 4		Automatic isolation	3.8	1
	071 Waste Gas Disposal														0
	072 Area Radiation Monitoring														0
	075 Circulating Water														0
	079 Station Air														0
	086 Fire Protection														0
K/A Category Totals:		1	1	0	1	1	1	1	1	1	1	1	Group Point Total:	10	

ES-401**2****Form ES-401-2**

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						02. 04	Ability to explain the variations in control board layouts, systems, instrumentation, and procedural actions between units at a facility.	3.6	1
	000015 RCP Malfunctions / 4 000017 RCP Malfunctions (Loss of RC Flow) / 4									0
77	000022 Loss of Rx Coolant Makeup / 2					0 2		Charging pump problems	3.7	1
	000025 Loss of RHR System / 4									0
79	000026 Loss of Component Cooling Water / 8					0 4		The normal values and upper limits for the temperatures of the components cooled by CCW	2.9	1
	000027 Pressurizer Pressure Control System Malfunction / 3									0
78	000029 ATWS / 1						04. 06	Knowledge of EOP mitigation strategies.	4.7	1
	000038 Steam Gen. Tube Rupture / 3									0
80	000040 Steam Line Rupture - Excessive Heat Transfer / 4						04. 41	Knowledge of the emergency action level thresholds and classifications.	4.6	1
81	WE12 Uncontrolled Depressurization of all Steam Generators / 4					0 2		Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.9	1
	000054 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
	000058 Loss of DC Power / 6									0
	000062 Loss of Nuclear Svc Water / 4									0
	000065 Loss of Instrument Air / 8									0
	W/E04 LOCA Outside Containment / 3									0
	W/E11 Loss of Emergency Coolant Recirc. / 4									0
	W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									0
	000077 Generator Voltage and Electric Grid Disturbances / 6									0
K/A Category Totals:		0	0	0	0	3	3	Group Point Total:		6

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ES-401**3****Form ES-401-2**

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
	000024 Emergency Boration / 1									0
	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
82	000037 Steam Generator Tube Leak / 3					02		Agreement/disagreement among redundant radiation monitors	3.9	1
83	000051 Loss of Condenser Vacuum / 4						02. 44	Ability to interpret control room indications to verify the status and operation of a system, and understand how operator	4.4	1
	000059 Accidental Liquid RadWaste Rel. / 9									0
	000060 Accidental Gaseous Radwaste Rel. / 9									0
	000061 ARM System Alarms / 7									0
	000067 Plant Fire On-site / 8									0
	000068 Control Room Evac. / 8									0
	000069 Loss of CTMT Integrity / 5									0
85	W/E14 High Containment Pressure / 5						04. 49	Ability to perform without reference to procedures those actions that require immediate operation of system components and	4.4	1
	000074 Inad. Core Cooling / 4									0
	W/E06 Degraded Core Cooling / 4									0
	W/E07 Saturated Core Cooling / 4									0
	000076 High Reactor Coolant Activity / 9									0
	W/E01 Rediagnosis / 3									0
	W/E02 SI Termination / 3									0
	W/E13 Steam Generator Over-pressure / 4									0
	W/E15 Containment Flooding / 5									0
	W/E16 High Containment Radiation / 9									0
84	W/E03 LOCA Cooldown - Depress. / 4					01		Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.2	1
	W/E09 Natural Circulation Operations / 4									0
	W/E10 Natural Circulation with Steam Voide in Vessel with/without RVLIS. / 4									0
	W/E08 RCS Overcooling - PTS / 4									0
K/A Category Totals:		0	0	0	0	2	2	Group Point Total:		4

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ES-401**4****Form ES-401-2**

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
88	004 Chemical and Volume Control												02. 25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	4.2	1
	005 Residual Heat Removal														0
	006 Emergency Core Cooling														0
	007 Pressurizer Relief/Quench Tank														0
	008 Component Cooling Water														0
	010 Pressurizer Pressure Control														0
86	012 Reactor Protection								0 1				Faulty bistable operation	3.6	1
	013 Engineered Safety Features Actuation														0
	022 Containment Cooling														0
	025 Ice Condenser														0
	026 Containment Spray														0
87	039 Main and Reheat Steam								0 3				Indications and alarms for main steam and area radiation monitors (during SGTR)	3.7	1
	059 Main Feedwater														0
89	061 Auxiliary/Emergency Feedwater												02. 40 Ability to apply Technical Specifications for a system.	4.7	1
	062 AC Electrical Distribution														0
	063 DC Electrical Distribution														0
	064 Emergency Diesel Generator														0
	073 Process Radiation Monitoring														0
	076 Service Water														0
	078 Instrument Air														0
90	103 Containment												04. 04 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.7	1
															0
K/A Category Totals:		0	0	0	0	0	0	0	2	0	0	3	Group Point Total:		5

ES-401**5****Form ES-401-2**

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
93	002 Reactor Coolant											04.18	Knowledge of the specific bases for EOPs.	4.0	1
	011 Pressurizer Level Control														0
	014 Rod Position Indication														0
91	015 Nuclear Instrumentation								05				Core void formation	3.8	1
	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
	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
92	086 Fire Protection								02				Low FPS header pressure	3.3	1
K/A Category Totals:		0	0	0	0	0	0	0	2	0	0	1	Group Point Total:		3

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ES-401	Generic Knowledge and Abilities Outline (Tier 3)	Form ES-401-3
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Facility Name: CPNPP	Date of Exam: 04/01/2013
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Q#	Category	K/A #	Topic	RO		SRO-Only		
				IR	#	IR	#	
94	1. Conduct of Operations	2.1. 4	Knowledge of refueling administrative requirements.			3.9	1	
66		2.1. 2	Ability to interpret and execute procedure steps.	4.6	1			
67		2.1. 36	Knowledge of procedures and limitations involved in core alterations.	3.0	1			
		2.1.						
		2.1.						
		2.1.						
		Subtotal				2		1
95	2. Equipment Control	2.2. 07	Knowledge of the process for conducting special or infrequent tests.			3.6	1	
96		2.2. 35	Ability to determine Technical Specification Mode of Operation.			4.5	1	
68		2.2. 18	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.	2.6	1			
69		2.2. 38	Knowledge of conditions and limitations in the facility license.	3.6	1			
		2.2.						
		2.2.						
		Subtotal				2		2
97	3. Radiation Control	2.3. 05	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.			2.9	1	
98		2.3. 15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.			3.1	1	
70		2.3. 04	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	1			
71		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, alignment filters, etc.	3.2	1			
72		2.3. 13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, alignment filters, etc.	3.4	1			
		2.3.						
		Subtotal				3		2
99	4. Emergency Procedures / Plan	2.4. 29	Knowledge of the emergency plan.			4.4	1	
100		2.4. 40	Knowledge of SRO responsibilities in emergency plan implementation.			4.5	1	
73		2.4. 49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	1			
74		2.4. 31	Knowledge of annunciator alarms, indications, or response procedures.	4.2	1			
75		2.4. 46	Ability to verify that the alarms are consistent with the plant conditions.	4.2	1			
		2.4.						
		Subtotal				3		2
Tier 3 Point Total					10		7	

ES-401**Record of Rejected K/As****Form ES-401-4**

Tier / Group	Randomly Selected K/A	Reason for Rejection
2 / 1	073 G 2.4.41	Replacement K/A 073 G 2.4.6. (Q#23) – This K/A topic (Knowledge of emergency action level thresholds and classifications) is not covered in the RO curriculum. Randomly reselected 073 G 2.4.6.
2 / 1	076 K1.09	Replacement K/A 076 K1.15. (Q#25) – There is no Reactor Building Closed Cooling Water System at CPNPP. Randomly reselected 076 K1.15.
2 / 1	078 A2.01	Replacement K/A 059 A2.01. (Q#89) – Randomly reselected 059 A2.01 to avoid three (3) Instrument Air System questions between the RO and SRO exams.
3 / 1	G 2.1.26	Replacement K/A G 2.1.45. (Q#94) – This K/A does not have a corresponding 10CFR55.43(b) reference for the SRO per ES-401-2 Note #9. Randomly reselected G 2.1.45.
Note to Chief Examiner		There are 24 topic areas (procedures) in the Comanche Peak Tier 1 Group 1 setting. There are a total of 24 questions in Tier 1 Group 1 between the RO and SRO exams; therefore, every procedure requires a corresponding question per ES-401-2. Questions 76 through 81 were directly reselected from the CPNPP list of available procedures.
1 / 1	008 G 2.2.4	Replacement K/A 011 G 2.2.4. (Q#76) – Replaced procedure to meet NUREG 1021, ES-401-2, Note #4 requirements. Reselected 011 G 2.2.4. 008 AK2.03 was used on Tier 1 Group 1 (Q#40).
1 / 1	025 AA2.02	Replacement K/A 022 AA2.02. (Q#77) – Replaced procedure to meet NUREG 1021, ES-401-2, Note #4 requirements. Reselected 022 AA2.02. 025 AK3.03 was used on Tier 1 Group 1 (Q#43).
1 / 1	056 G 2.2.4	Replacement K/A 029 G 2.2.40. (Q#78) – Replaced procedure and K/A (there are no differences between units for either LOOP or ATWS) to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected 029 G 2.2.40. 056 AA1.05 was used on Tier 1 Group 1 (Q#48).
1 / 1	065 AA2.04	Replacement K/A 026 AA2.04. (Q#79) – Replaced procedure to meet NUREG 1021, ES-401-2, Note #4 requirements. Reselected 026 AA2.04. 065 AK3.04 was used on Tier 1 Group 1 (Q#52).
1 / 1	W/E04 G 2.4.41	Replacement K/A 040 G 2.4.41. (Q#80) – Replaced procedure to meet NUREG 1021, ES-401-2, Note #4 requirements. Reselected 040 G 2.4.41. W/E04 EK2.02 was used on Tier 1 Group 1 (Q#54).
1 / 1	W/E05 EA2.2	Replacement K/A W/E12 EA2.2. (Q#81) – Replaced procedure to meet NUREG 1021, ES-401-2, Note #4 requirements. Reselected W/E12 EA2.2. W/E05 G 2.2.23 was used on Tier 1 Group 1 (Q#55).
Note to Chief Examiner		These SRO topics were randomly reselected as there are more procedures/systems in Tier 1 Group 2 and Tier 2 Group 2 than available questions.

1 / 2	001 AA2.02	Replacement K/A 037 AA2.02. (Q#82) – Replaced procedure to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected 037 AA2.02. 001 AK1.12 was used on Tier 1 Group 2 (Q#57).
1 / 2	076 G 2.4.31	Replacement K/A 051 G 2.2.44. (Q#83) – Replaced procedure to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected 051 G 2.2.44. 076 AK2.01 was used on Tier 1 Group 2 (Q#62) and G 2.4.31 was used on Tier 3 (Q#74).
2 / 2	068 A2.02	Replacement K/A 056 A2.04. (Q#92) – Replaced system to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected 056 A2.04 (A2.04 is the only K/A that is ≥ 2.5 IR). 068 AA2.09 was used on Tier 1 Group 2 (Q#61)
Note to Chief Examiner		These topics were reselected to avoid overlap of generic K/As.
2 / 1	076 G 2.2.38	Replacement K/A 004 G 2.2.25. (Q#88) – Reselected 004 to avoid three (3) Service Water System questions between the RO and SRO exams and G 2.2.25 to avoid generic K/A overlap. G 2.2.38 was used on Tier 3 (Q#69).
1 / 1	W/E05 G 2.2.38	Replacement K/A W/E05 G 2.2.3. (Q#55) – Reselected W/E05 G 2.2.3 to avoid generic K/A overlap. G 2.2.38 was used on Tier 3 (Q#69).
2 / 1	073 G 2.4.31	Replacement K/A 073 K3.01. (Q#22) – Reselected 073 K3.01 to avoid generic K/A overlap and balance skyscraper (selected only topic available in K3). G 2.4.31 was used on Tier 3 (Q#74).
1 / 2	060 G 2.4.35	Replacement K/A 060 G 2.4.45. (Q#59) – Reselected 060 G 2.4.45 to avoid generic K/A overlap. G 2.4.35 was used on Tier 2 Group 2 (Q#93).
Note to Chief Examiner		These topics were reselected to avoid overlap on the written exam.
1/1	038 G 2.4.8	Replacement K/A 038 G.2.4.18. Q#45 – Reselected 038 G 2.4.18 to avoid question overlap. 038 G 2.4.8 overlaps with the K/A used on Q#23 (073 G 2.4.6) since CPNPP has few Process Radiation Monitors that interface with EOPs.
1/1	027 AK1.02	Replacement K/A 027 AK2.03. Q#44 - Reselected 027 AK2.03 based on inability to write a RO level question which was not a GFE question.
1/1	057 AA1.05	Replacement K/A 057 AA2.15. Q#49 - Reselected 057 AA2.15 based on inability to write satisfactory RO level question to the previously selected K/A.
1/2	001 AK1.12	Replacement K/A 003 AK1.03. Q#57 - Reselected 003 AK1.03 based on inability to write satisfactory question for a Continuous Rod Withdrawal.
1/1	029 G 2.2.40	Replacement K/A 029 G.2.4.6. Q#78 - Reselected 029 G.2.4.6 based on inability to write satisfactory Technical Specification associated with ATWS.
2/1	059 A2.01	Replacement K/A 061 G.2.2.40. Q#89 - Reselected 061 G.2.2.40 based on inability to write satisfactory SRO level question for Main Feedwater.
2/2	028 A2.03	Replacement K/A 015 A2.05. Q#91 - Reselected 015 A2.05 based on inability to write satisfactory SRO level question for Hydrogen Recombiner and Purge Control.
2/2	056 A2.04	Replacement K/A 086 A2.02. Q#92 - Reselected 086 A2.02 based on inability to write satisfactory SRO level question for Condensate.

ES-401		Record of Rejected K/As	Form ES-401-4
2/2	071 G 2.4.35	Replacement K/A 002 G 2.4.18. Q#93 - Reselected 002 G 2.4.18 based on inability to write satisfactory SRO level question for Waste Gas Disposal.	
3/1	G 2.1.45	Replacement K/A G 2.1.4. Q#94 - Reselected G 2.1.4 based on inability to write discriminating SRO level question for K/A.	
3/4	G.2.4.11	Replacement K/A G 2.4.49. Q#73 - Reselected G 2.4.49 based on inability to write satisfactory RO level question for K/A that was not system specific.	

Administrative Topics Outline

Facility: CPNPP Units 1 and 2		Date of Examination: 04/01/13
Examination Level RO <input type="checkbox"/>		Operating Test Number: NRC
Administrative Topic (see Note)	Type Code*	Describe Activity to be Performed
Conduct of Operations (RA1)	D, R	2.1.25 Ability to interpret reference materials such as graphs, curves, tables, etc. (3.9).
		JPM: Restore Refueling Water Storage Tank Level (RO1307).
Conduct of Operations (RA2)	M, R	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation (4.3).
		JPM: Perform Reactor Coolant System Pressure / Temperature Verification (RO5115).
Equipment Control (RA3)	M, R	2.2.1 Ability to perform pre-startup procedures including operating those controls associated with plant equipment that could affect reactivity (4.5).
		JPM: Perform a 1/M Plot and Predict Critical Conditions (RO1003).
Radiation Control (RA4)	D, S	2.3.13 Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (3.4)
		JPM: Perform Actions for Fuel Handling Accident in the Spent Fuel Pool (RO4504).
Emergency 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 all 5 are required.		
*Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; \leq for 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected)		

Administrative Topics Outline

Task Summary

- RA1 The applicant will restore Refueling Water Storage Tank (RWST) level when it is determined out of specification per SOP-104A, Reactor Make-Up and Chemical Control System, Section 5.2.7, Makeup to RWST. Critical steps include calculating the required volume of borated water necessary to raise RWST level, Boric Acid Flowrate, total gallons of Boric Acid, and potentiometer settings for the Flow Control Valves. This is a bank JPM.
- RA2 The applicant will perform a Reactor Coolant System Pressure/Temperature Verification per ABN-905A, Loss of Control Room Habitability, Attachment 7, RCS Pressure/Temperature Verification. Critical steps include calculating saturation temperatures, subcooled margin, and cooldown rate. This is a modified bank JPM.
- RA3 The applicant will perform a 1/M plot for a Reactor Startup per IPO-002A, Plant Startup from Hot Standby, Attachment 2, Inverse Count Rate Ratio Calculation. The critical steps include accurately calculating and plotting 1/M, predicting critical conditions, and identifying action for criticality below the Power Dependent Insertion Limit. This is a modified bank JPM.
- RA4 The applicant will implement radiological emergency actions per ABN-908, Fuel Handling Accident, Section 3.0, Fuel Handling Accident in the Fuel Building Involving Spent Fuel. The critical steps include initiating local evacuation, activating the Radiological Emergency Alarm, and ensuring proper ventilation alignment. This is a bank JPM.

Administrative Topics Outline

Facility: CPNPP Units 1 and 2		Date of Examination: 04/01/13
Examination Level	SRO <input type="checkbox"/>	Operating Test Number: NRC
Administrative Topic (see Note)	Type Code*	Describe Activity to be Performed
Conduct of Operations (SA1)	M, R	2.1.25 Ability to interpret reference materials such as graphs, curves, tables, etc. (4.2). JPM: Restore Refueling Water Storage Tank Level and Evaluate Technical Specifications (SO1211).
Conduct of Operations (SA2)	M, R	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation (4.4). JPM: Perform Reactor Coolant System Pressure / Temperature Verification and Evaluate Technical Specifications (SO1005).
Equipment Control (SA3)	M, R	2.2.14 Knowledge of the process for controlling equipment configuration or status. (4.3) JPM: Determine Fire Compensatory Measures for an Emergent Condition (SO1048).
Radiation Control (SA4)	D, R	2.3.6 Ability to approve release permits (3.8). JPM: Approve a Liquid Waste Release Permit (SO1039).
Emergency Plan (SA5)	M, R	2.4.44 Knowledge of emergency plan protective action recommendations. (4.4) JPM: Determine Protective Action Requirements (SO1140).
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; \leq for 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected)		

Administrative Topics Outline

Task Summary

- SA1 The applicant will restore Refueling Water Storage Tank (RWST) per SOP-104A, Reactor Make-Up and Chemical Control System, Section 5.2.7, Makeup to RWST. Critical steps include calculating the required volume of borated water necessary to raise RWST level, Boric Acid Flowrate, total gallons of Boric Acid, and potentiometer settings for the Flow Control Valves and then evaluating Technical Specifications when it is determined that RWST temperature is out of specification. This is a modified bank JPM.
- SA2 The applicant will perform a Reactor Coolant System Pressure/Temperature Verification per ABN-905A, Loss of Control Room Habitability, Attachment 7, RCS Pressure/Temperature Verification. Critical steps include calculating saturation temperatures, subcooled margin, cooldown rate, and evaluating Technical Specifications when the cooldown rate exceeds 100°F/hr. This is a modified bank JPM.
- SA3 The applicant will evaluate a Fire Protection Impairment per STA-738, Fire Protection Systems/Equipment Impairments. The critical steps are to determine Fire Watch implementation and other Compensatory Measures. This is a modified bank JPM.
- SA4 The applicant will approve a Liquid Waste Release Permit per STA-603, Control of Station Radioactive Effluents and STA-603-10, Batch Liquid Radioactive Effluent Release Data Sheet. The critical steps include identifying any errors and actions required prior to approving the release. This is a bank JPM.
- SA5 The applicant will determine Protective Actions per EPP-304, Protective Action Recommendations. The critical steps include determining the proper Protective Actions, Pasquill Stability Class, and Zones to be evacuated or sheltered. This is a modified bank JPM.

Facility:	CPNPP Units 1 and 2	Date of Examination:	04/01/13
Exam Level:	RO SRO(I) SRO (U)	Operating Test No.:	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	004 – Chemical and Volume Control System (RO1335) Emergency Boration from the RWST	A, M, S	1
S-2	010 – Pressurizer Pressure Control System (RO1824) Wide Range Pressure Transmitter Failure in MODE 5	A, L, D, S	3
S-3	003 – Reactor Coolant Pump System (RO1118) Respond to Reactor Coolant Pump Seal Failure	D, S	4P
S-4	061 – Auxiliary Feedwater (AFW) System (RO3516) Respond to a Motor Driven AFW Pump Trip	A, L, N, S	4S
S-5	026 – Containment Spray (CS) System (RO2002C) Transfer CS from Injection to Recirculation	A, D, EN, S	5
S-6	064 – Emergency Diesel Generator System (RO4302E) Loss of Both 6900 Volt Safeguards Buses	A, EN, N, S	6
S-7	086 – Fire Protection System (RO4405) Respond to a Fire in the Safeguards Building	D, S	8
S-8	060 – Accidental Gaseous Radwaste Release (RO4006) Perform a Containment Pressure Reduction (RO Only)	A, D, S	9
In-Plant Systems [®] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P-1	004 – Chemical & Volume Control System (RO5112) Perform Actions to Restart Positive Displacement Pump	D, E, R	2
P-2	015 – Nuclear Instrumentation System (RO1818) Respond to Loss of Source Range Instrumentation	E, L, N, R	7
P-3	035 – Steam Generator (SG) System (RO5115) Transfer SG Atmospheric Relief Valve Control	D, E, R	4P

@ 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	$\leq 9 / \leq 8 / \leq 4$
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$
(EN)gineered safety feature	- / - / ≥ 1 (control room system)
(L)ow Power / Shutdown	$\geq 1 / \geq 1 / \geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)
(R)CA	$\geq 1 / \geq 1 / \geq 1$
(S)imulator	

NRC JPM Examination
Summary Description

- S-1 The applicant will initiate an emergency boration per ABN-107, Emergency Boration following a Reactor Trip with two stuck Control Rods. The alternate path occurs when Boric Acid flow is not available due to a failed normal boration path valve and an alternate path or the Refueling Water Storage Tank must be aligned via either Attachments 2, 3, or 4. This is a modified bank JPM under the Chemical and Volume Control System – Reactivity Control safety function. This is a PRA significant action.
(K/A 004.A2.14 - IR 3.8 / 3.9)
- S-2 The applicant will respond to a Wide Range Pressure Transmitter failure while in MODE 5 per ALM-0053A, 1-ALB-5C, Window 1.4 – PORV 455A/456 NOT CLOSE or ABN-715, Wide Range RCS Pressure Instrument Malfunction. The alternate path occurs when the Power Operated Relief Valve opens and fails to close. This is a bank JPM under the Pressurizer Pressure Control System – Reactor Pressure Control Safety Function. This is a PRA significant action. (K/A 010.A4.03 - IR 4.0 / 3.8)
- S-3 The applicant will respond to a Reactor Coolant Pump Seal failure per ABN-101, Reactor Coolant Pump Trip / Malfunction. This is a time critical, bank JPM under the Reactor Coolant Pump System – Primary System Heat Removal from Reactor Core Safety Function. (K/A 015.AA1.22 - IR 4.0 / 4.2)
- S-4 The applicant will respond to a Motor Driven Auxiliary Feedwater Pump (MDAFWP) trip per ABN-305, Auxiliary Feedwater System Malfunction, Section 3.0, Motor Driven Auxiliary Feedwater Pump Malfunction while at low power. The alternate path occurs when the MDAFWP trips and flow is lost to 2 of 4 Steam Generators. The Turbine Driven Auxiliary Feedwater Pump must be started and aligned to those Steam Generators. This is a new JPM under the Auxiliary Feedwater System – Secondary System Heat Removal from Reactor Core Safety Function. This is a PRA significant action.
(K/A 061.A2.04 - IR 3.4 / 3.8)

- S-5 The applicant will transfer Containment Spray suction to the Containment Sumps per EOS-1.3A, Transfer to Cold Leg Recirculation, Attachment 1.H, Containment Spray Switchover Criterion. The alternate path occurs when one of the Containment Sump Valves to the Containment Spray Pumps cannot be opened. This is a bank JPM under the Containment Spray System – Containment Integrity Safety Function. This is a PRA significant action. (K/A 026.A4.01 - IR 4.5 / 4.3)
- S-6 The applicant will respond to a loss of both 6900 Volt Safeguards Buses per ABN-601, Response to a 138/345 KV System Malfunction, Section 7.0, Loss of Both Safeguards Buses – MODE 1, 2, 3, or 4. The alternate path includes tripping the Reactor, stopping Reactor Coolant Pumps, and closing the Train A Emergency Diesel Generator Output Breaker. This is a new JPM under the Emergency Diesel Generator System – Electrical Safety Function. This is a PRA significant action. (K/A 064.A4.06 - IR 3.9 / 3.9)
- S-7 The applicant will respond to a fire in the Safeguards Building per ABN-804A, Respond to a Fire in the Safeguards Building, Section 5.0, Fire Affecting Safeguards Building Fire Area 1SD. This is a bank JPM under the Fire Protection System – Plant Service Systems Safety Function. (K/A 068.AA1.22 - IR 4.0 / 4.3)
- S-8 The applicant will perform a Containment Pressure Reduction per SOP-801A, Containment Ventilation System. The alternate path requires closing the Containment release path upon receipt of a high radiation alarm. This is a bank JPM under the Accidental Gaseous Radwaste Release – Radioactive Release safety function. (K/A 060.AA2.05 - IR 3.7 / 4.2)
- P-1 The applicant will perform Unit 2 local actions to restart the Positive Displacement Pump per ABN-301, Instrument Air System Malfunction and SOP-103B, Chemical and Volume Control. This is a bank JPM under the Chemical and Volume Control System – Reactor Coolant System Inventory Control Safety Function. (K/A 004.A4.01 - IR 3.1 / 3.5)
- P-2 The applicant will respond to a Unit 2 Loss of Source Range Instrumentation while in MODE 3 and perform actions to isolate potential dilution flowpaths per ABN-701, Source Range Instrument Malfunction, Attachment 1, Actions Required When SR Instrumentation Cannot Be Restored, Step 6. This is a new JPM under the Nuclear Instrumentation System – Instrumentation Safety Function. (K/A G 2.1.30 - IR 4.4 / 4.0)
- P-3 The applicant will transfer control of Unit 2 Steam Generator Atmospheric Relief Valves per ABN-905B, Loss of Control Room Habitability, Attachment 9, Control Transfer of Steam Generator Atmospheric Relief Valves. This is a bank JPM under Steam Generator System – Primary System Heat Removal from Reactor Core safety function. This is a PRA significant action. (K/A 068.AA1.01 - IR 4.3 / 4.5)

Facility:	CPNPP 1 & 2	Scenario No.:	1	Op Test No.:	April 2013 NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions: 100% power MOL - RCS Boron is 908 ppm (by sample).					
Turnover: Maintain steady-state power conditions.					
Critical Tasks: <ul style="list-style-type: none"> Manually Initiate Train A and Train B Safety Injection Signal Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection. (Event 6) Identify and Isolate the Faulted Steam Generator Prior to Exiting EOP-2.0A, Faulted Steam Generator Isolation. (Event 8) 					

Event No.	Malf. No.	Event Type*	Event Description
1 +10 min	RX08A	I (RO, SRO) TS (SRO)	Pressurizer Pressure Channel (PT-455) Fails Low.
2 +20 min	RX02A	I (BOP, SRO)	Steam Generator (1-01) Steam Flow Instrument (FT-512) Fails High.
3 +25 min	CV31A	C (RO, SRO) TS (SRO)	Centrifugal Charging Pump (1-01) Sheared Shaft.
4 +40 min	FW22	R (RO) N (BOP, SRO) TS (SRO)	Low Pressure Feedwater Heater Bypass Valve (PV-2286) Fails Open.
5 +45 min	FW25A	M (RO, BOP, SRO)	Feedwater Line Leak to Steam Generator (1-01) Outside Containment After Feedwater Isolation Valve (600 second ramp).
6 +50 min	RP07A RP07B	C (RO)	Train A Safety Injection Fails to Automatically Actuate. Train B Safety Injection Fails to Automatically Actuate.
7 +50 min	CS02F CS02H	C (RO)	Train B Containment Spray Pumps 1-02 & 1-04 Safety Injection Sequencer Start Failure.
8 +50 min	FW38A OVRDE	I (BOP)	Steam Generator 1-01 Feedwater Isolation Valve (HS-2134) Actuation Failure.

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

Actual	Target Quantitative Attributes
8	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)
2	Critical tasks (2-3)

SCENARIO SUMMARY NRC 1

The crew will assume the watch at 100% power with no scheduled activities per IPO-003A, Power Operations.

The first event is a Pressurizer Pressure Channel (PT-455) that fails low. The crew will enter ABN-705, Pressurizer Pressure Malfunction, Section 2.0, place the Pressurizer Master Pressure Controller in MANUAL, transfer to an Alternate Channel, and restore Pressurizer Pressure Control to AUTO. The SRO will refer to Technical Specifications.

The next event is a high failure of Steam Generator (1-01) Steam Flow Instrument, FT-512. Operator actions are per ABN-707, Steam Flow Instrument Malfunction, Section 2.0. The crew must manually control Steam Generator level, transfer to an Alternate Channel, and restore Steam Generator (SG) Feedwater Flow Control to AUTO.

The next event is a sheared shaft of the running Centrifugal Charging Pump (CCP). When low flow alarms are received, the initial operator actions of ABN-105, Chemical and Volume Control System Malfunction, Section 3.0, will be performed (start the standby CCP). Any delay in determining the cause of the low Charging flow will result in the isolation of Letdown which will be restored prior to proceeding. The SRO will refer to Technical Specifications.

When Technical Specifications have been referenced, the Low Pressure Heater Bypass Valve fails open. Entry into ABN-302, Feedwater, Condensate, Heater Drain System Malfunction, Section 7.0, is required and Rod Control is returned to AUTO and a Manual Turbine Runback to 900 MWe is performed. During this event, Control Rod position may drop below the Rod Insertion Limit (RIL) and when informed, the SRO will refer to Technical Specifications.

When plant conditions are stable, a Feed Line Break will commence on a 600 second ramp outside Containment downstream of Steam Generator (SG) 1-01 Feed Line Isolation Valve HS-2134. The crew will observe lowering Pressurizer pressure and level and manually initiate a Reactor Trip and Safety Injection. EOP-0.0A, Reactor Trip or Safety Injection, is entered and actions implemented until it is determined that SG 1-01 pressure is lower than the other Steam Generators and a transition into EOP-2.0A, Faulted Steam Generator Isolation, is performed.

The scenario includes a failure of Train A and Train B Safety Injection to automatically actuate and a Feedwater Isolation Signal actuation failure on HS-2134, Main Feedwater Line Isolation Valve which fails to close when the P-4 interlock is satisfied. Additionally, the Train B Containment Spray Pumps must be manually started due to a Safety Injection Sequencer failure.

This scenario is terminated when the Faulted Steam Generator is identified and isolated per EOP-2.0A and a transition to EOS-1.1A, Safety Injection Termination, is required.

Risk Significance:

- Failure of risk important system prior to trip: Centrifugal Charging Pump Sheared Shaft
- Risk significant core damage sequence: Feed Line Break Outside Containment
- Risk significant operator actions:
 - Manually Initiate Turbine Runback
 - Manually Initiate Safety Injection
 - Start Train B Containment Spray Pumps
 - Isolate Faulted Steam Generator

Facility:	CPNPP 1 & 2	Scenario No.:	3	Op Test No.:	April 2013 NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions: 100% power MOL - RCS Boron is 908 ppm (by sample).					
Turnover: Maintain steady-state power conditions.					
Critical Tasks: <ul style="list-style-type: none"> • Restore Component Cooling Water Flow Prior to Tripping the Reactor per ABN-502, Component Cooling Water System Malfunctions. (Event 1) • Initiate Train A and/or Train B Containment Isolation Phase B due to Failure to Automatically Actuate Prior to Exiting FRZ-0.1A, Response to High Containment Pressure. (Event 7) • Initiate Train A and/or Train B Containment Spray Flow Prior to Exiting FRZ-0.1A, Response to High Containment Pressure. (Event 8) 					
Event No.	Malf. No.	Event Type*	Event Description		
1 +10 min	CC02A CC03A	C (BOP, SRO) TS (SRO)	Train A Component Cooling Water Pump 1-01 Trip. Train B Component Cooling Water Pump 1-02 Auto Start Failure.		
2 +20 min	CV16A	I (RO, SRO)	Volume Control Tank Level Transmitter (LT-112) Fails Low.		
3 +30 min	ED07A	C (RO, BOP, SRO) TS (SRO)	Loss of Inverter (IV1PC1).		
4 +35 min	RC17B	M (RO, BOP, SRO)	Reactor Coolant Leak Inside Containment on Loop 2 Hot Leg of 600 GPM on 600 second ramp.		
5 +40 min	CV01E	C (BOP)	Centrifugal Charging Pump (1-02) Auto Start Failure on Safety Injection Signal.		
6 +50 min	RC08B2	M (RO, BOP, SRO)	Large Break Loss of Coolant Accident Inside Containment on Loop 2 Hot Leg.		
7 +50 min	RP10A RP10B	C (BOP)	Train A and B Containment Isolation Phase B Automatic Actuation Failure.		
8 +50 min	CS07A CS07B	C (BOP)	Train A and B Containment Spray Heat Exchanger Outlet Valves Fail to Auto Open.		
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specifications					

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

SCENARIO SUMMARY NRC 3

The crew will assume the watch at 100% power with no scheduled activities per IPO-003A, Power Operations. The first event is a trip of the Train A Component Cooling Water (CCW) Pump and auto start failure of the Train B CCW Pump. The crew will enter ABN-502, Component Cooling Water System Malfunction, Section 2.0, and transfer CCW flow to Train B. The SRO will refer to Technical Specifications.

When Technical Specifications are referenced, a low failure of the Volume Control Tank Level Transmitter will occur. The crew will reference annunciator ALM-0061A-4.5, VCT LEVEL LO, and ABN-105, Chemical and Volume Control System Malfunction, and establish an Alternate Operating Mode for the Reactor Makeup System.

The next event is a loss of Inverter IV1PC1. Actions are per ABN-603, Loss of Protection or Instrument Bus, Section 2.0, and include placing Rod Control in MANUAL, controlling Steam Generator (SG) level and RCS pressure, and adjusting Charging flow due to a loss of Letdown. The SRO will refer to Technical Specifications.

When the Alternate Power Supply is aligned in ABN-603, a Reactor Coolant Leak inside Containment will commence. Once it is determined that Pressurizer level cannot be maintained, the Reactor must be manually tripped and Safety Injection manually initiated. The crew will enter EOP-0.0A, Reactor Trip or Safety Injection, and then transition to EOP-1.0A, Loss of Reactor or Secondary Coolant.

The scenario is complicated by a Train A and B Containment Isolation Phase B and Train A and B Containment Spray Heat Exchanger Outlet Valve automatic actuation failures. Additionally, the Train B Centrifugal Charging Pump will fail to auto start upon actuation of the Safety Injection Sequencer.

When EOP-1.0A is entered, a Large Break Loss of Coolant Accident will occur. At that point, the Unit Supervisor should recognize that entry into FRZ-0.1A, Response to High Containment Pressure, is required due to a Critical Safety Function Status Tree ORANGE path inside Containment. When the actions of FRZ-0.1A are completed a transition to FRP-0.1A, Response to Imminent Pressurized Thermal Shock Condition, is required. FRP-0.1A will be exited at Step 1 RNO when it is determined that Reactor Coolant System pressure is less than 425 psig and Residual Heat Removal System flow is greater than 750 GPM.

The crew will return to EOP-1.0A, Loss of Reactor or Secondary Coolant, as this is the current procedure and step in effect. This scenario is terminated when the conditions are reached for a Transfer to Cold Leg Recirculation.

Risk Significance:

- Failure of risk important system prior to trip: Loss of Component Cooling Water
Loss of Protection System Inverter
- Risk significant core damage sequence: Small then Large Break LOCA
- Risk significant operator actions: Restore Steam Generator Level Control
Restore Pressurizer Pressure Control
Start Train B Centrifugal Charging Pump
Actuate Phase B Containment Isolation
Initiate Containment Spray Flow

Facility:	CPNPP 1 & 2	Scenario No.:	4	Op Test No.:	April 2013 NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions: ~3% power BOL - RCS Boron is 1659 ppm by Chemistry sample. Steam Dump System in service for Reactor Coolant System Temperature Control.					
Turnover: Recirculate the Refueling Water Storage Tank prior to MODE 1 entry then raise Reactor Power from 3% to 8% in preparation for Turbine Startup.					
Critical Tasks: <ul style="list-style-type: none"> Manually Trip Reactor Due to Reactor Protection System Failure Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection. (Event 7) Trip Reactor Coolant Pumps within 10 minutes upon a Loss of Subcooling per EOP-1.0A, Loss of Reactor or Secondary Coolant, Foldout Page. (Event 9) 					

Event No.	Malf. No.	Event Type*	Event Description
1 +10 min		N (BOP)	Recirculate the Refueling Water Storage Tank with Containment Spray Pump 1-01.
2 +20 min	RX12	C (RO, BOP, SRO)	Main Steam Header Pressure (PT-507) Fails High on 360 second ramp.
3 +40 min		R (RO) N (BOP, SRO)	Raise Power to 6% to 8% in Preparation for Synchronizing Main Generator to Electrical Grid.
4 +50 min	RX04A	I (BOP, SRO) TS (SRO)	Steam Generator (1-01) Level Channel (LT-551) Fails Low.
5 +55 min	CS02A	TS (SRO)	Containment Spray Pump (1-01) Trip.
6 +60 min	RP14B	M (RO, BOP, SRO)	Spurious Train B Safety Injection Actuation Signal.
7 +60 min	RP01	C (RO)	Automatic Reactor Trip Failure. Reactor Protection System Failure requires Manual Reactor Trip.
8 +60 min	RP09B	C (BOP)	Train B Containment Isolation Phase A Automatic Actuation Failure.
9 +80 min	RC08C1	M (RO, BOP, SRO)	Small Break Loss of Coolant Accident Inside Containment When Safety Injection Pump 1-02 is Secured in EOS-1.1A.
* (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)
2	Abnormal events (2-4)
2	Major transients (1-2)
2	EOPs entered/requiring substantive actions (1-2)
0	EOP contingencies requiring substantive actions (0-2)
2	Critical tasks (2-3)

SCENARIO SUMMARY NRC 4

The crew will assume the watch with power at approximately 3% per IPO-003A, Power Operations. Prior to raising power, the crew will recirculate the Refueling Water Storage Tank (RWST) using Containment Spray Pump 1-01 per SOP-204A, Containment Spray System, Section 5.1.3, Recirculation through the Recirculation Header.

The next event is a high failure of Main Steam Header Pressure Transmitter (PT-507) on a 360 second ramp. The crew enters ABN-709, Steam Header Pressure Instrument Malfunction, Section 3.0, and places the Steam Dump System in MANUAL to regain control of Reactor Coolant System (RCS) temperature. The controller will remain in MANUAL for the duration of the scenario.

When RCS temperature control is restored, the crew will continue with IPO-003A, Section 5.1, Warmup and Synchronization of the Turbine Generator, Step 5.1.16, and perform a power ascension using the Rod Control and Steam Dump Systems.

The next event is a Steam Generator Level Transmitter failure. Actions are per ABN-710, Steam Generator Level Instrumentation Malfunction. The BOP will be required to take manual control of the Feedwater Bypass Control Valve and then select an alternate controlling channel to return the Feedwater System to automatic control. The SRO will refer to Technical Specifications.

When conditions are stable, Containment Spray Pump 1-01 will trip. Actions are per ALM-0022A, 1-ALB-2B, Window 1.3 – ANY CSP OVRLD TRIP. The SRO will refer to Technical Specifications.

When Technical Specifications have been referenced, a spurious Train B Safety Injection Signal will actuate. The crew will determine that the Reactor did not automatically trip and initiate a Reactor Trip and Safety Injection and enter EOP-0.0A, Reactor Trip or Safety Injection. This scenario is complicated by Train B Containment Isolation Phase A Automatic actuation failure.

The crew will exit EOP-0.0A at Step 15 and enter EOS-1.1A, Safety Injection Termination. While in EOS-1.1A, Safeguards Signals are reset, the Charging flow path is realigned, and Safety Injection (SI) Pumps are stopped. When SI Pump 1-02 is stopped, a Small Break Loss of Coolant Accident will initiate. At this point, the crew will follow guidance on the EOS-1.1A Foldout Page that requires a transition to EOP-1.0A, Loss of Reactor or Secondary Coolant.

The scenario is terminated when it is determined in EOP-1.0A that Pressurizer pressure continues to slowly lower, and a transition to EOS-1.2 A, Post LOCA Cooldown and Depressurization, is required.

Risk Significance:

- Failure of risk important system prior to trip: Containment Spray Pump Trip
- Risk significant core damage sequence: Automatic Reactor Trip Failure
Small Break Loss of Coolant Accident
- Risk significant operator actions: Manually Trip Reactor
Manually Initiate Safety Injection
Initiate Train B Containment Isolation