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<tr><td colspan="5" rowspan="2">3. Generic Knowledge and Abilities Categories</td><td colspan="2">1</td><td colspan="2">2</td><td colspan="2">3</td><td colspan="2">4</td><td rowspan="2">10</td><td>1</td><td>2</td><td>3</td><td>4</td><td rowspan="2">7</td></tr>
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Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the “Tier Totals” in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems / evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems / evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.

7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.

8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics’ importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
054 / Loss of Main Feedwater / 4						X	2.2.4	Equipment Control: (multi-unit license) Ability to explain the variations in control board/control room layouts, systems, instrumentation, and procedural actions between units at a facility.	3.6	76
038 / Steam Generator Tube Rupture / 3					X		EA2.08	Ability to determine and interpret the following as they apply to the Steam Generator Tube Rupture: Viable alternatives for placing plant in safe condition when condenser is not available	4.4	77
040 / Steam Line Rupture - Excessive Heat Transfer / 4						X	2.2.38	Equipment Control: Knowledge of conditions and limitations in the facility license.	4.5	78
062 / Loss of Nuclear Service Water / 4					X		AA2.06	Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: The length of time after the loss of SWS flow to component before that component may be damaged	3.1	79
W/E04 / LOCA Outside Containment / 3						X	2.2.22	Equipment Control: Knowledge of limiting conditions for operations and safety limits.	4.7	80
W/E05 / Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4					X		EA2.2	Ability to determine and interpret the following as they apply to the Loss of Secondary Heat Sink: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	4.3	81
007 / Reactor Trip - Stabilization - Recovery / 1			X				EK3.01	Knowledge of the reasons for the following as the apply to a reactor trip: Actions contained in EOP for reactor trip	4.0	39
008 / Pressurizer Vapor Space Accident / 3	X						AK1.02	Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident: Change in leak rate with change in pressure	3.1	40
009 / Small Break LOCA / 3		X					EK2.03	Knowledge of the interrelations between the small break LOCA and the following: Steam Generators	3.0	41
011 / Large Break LOCA / 3				X			EA1.04	Ability to operate and monitor the following as they apply to a Large Break LOCA: ESF actuation system in manual	4.4	42

CPNPP 1 & 2
NRC Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
015/17 / RCP Malfunctions / 4						X	2.4.20	Emergency Procedures/Plan: Knowledge of the operational implications of EOP warnings, cautions, and notes	3.8	43
022 / Loss of Reactor Coolant Makeup / 2					X		AA2.03	Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: Failures of flow control valve or controller	3.1	44
025 / Loss of RHR System / 4		X					AK2.02	Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: LPI or Decay Heat Removal/RHR pumps	3.2	45
026 / Loss of Component Cooling Water / 8			X				AK3.02	Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS	3.6	46
027 / Pressurizer Pressure Control System Malfunction / 3				X			AA1.03	Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: Pressure control when on a steam bubble	3.6	47
029 / ATWS / 1	X						EK1.02	Knowledge of the operational implications of the following concepts as they apply to the ATWS: Definition of reactivity	2.6	48
055 / Station Blackout / 6						X	2.4.49	Emergency Procedures/Plan: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls	4.6	49
056 / Loss of Offsite Power / 6				X			AA1.32	Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: PZR PORV hand switch	3.4	50
058 / Loss of DC Power / 6					X		AA2.02	Ability to determine and interpret the following as they apply to the Loss of DC Power: 125V DC bus voltage, low/critical low, alarm	3.3	51
065 / Loss of Instrument Air / 8						X	2.4.35	Emergency Procedures/Plan: Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	3.8	52

NRC Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
W/E12 /Uncontrolled Depressurization of All Steam Generators / 4		X					EK2.1	Knowledge of the interrelations between the Uncontrolled Depressurization of All Steam Generators and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.5	53
W/E11 / Loss of Emergency Coolant Recirculation / 4					X		EA2.2	Ability to determine and interpret the following as they apply to the Loss of Emergency Coolant Recirculation: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments	3.4	54
057 / Loss of Vital AC Instrument Bus / 6			X				AK3.01	Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital AC electrical instrument bus	4.1	55
077 / Generator Voltage and Electric Grid Disturbances / 6			X				AK3.01	Knowledge of the reasons for the following responses as they apply to Generator Voltage and Electric Grid Disturbances: Reactor and turbine trip criteria	3.9	56
K/A Category Point Totals:	2	3	4	3	3 / 3	3 / 3	Group Point Total:			**18 / 6**

NRC Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
028 / Pressurizer Level Malfunction / 2					X		AA2.07	Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Seal water flow indicator for RCP	2.9	82
037 / Steam Generator Tube Leak / 3						X	2.4.6	Emergency Procedures/Plan: Knowledge of EOP mitigation strategies.	4.7	83
W/E15 / Containment Flooding / 5					X		EA2.1	Ability to determine and interpret the following as they apply to the (Containment Flooding): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.2	84
W/E08 / RCS Overcooling - PTS / 4						X	2.1.23	Conduct of Operations: Ability to perform specific and integrated plant procedures during all modes of plant operation.	4.4	85
003 / Dropped Control Rod / 1				X			AA1.07	Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: Incore and excore instrumentation	3.8	57
032 / Loss of Source Range Nuclear Instrument / 7		X					AK2.01	Knowledge of the interrelations between the Loss of Source Range Nuclear Instrumentation and the following: Power supplies, including proper switch positions	2.7	58
036 / Fuel Handling Accident / 8			X				AK3.01	Knowledge of the reasons for the following responses as they apply to the Fuel Handling Incidents: Different inputs that will cause a reactor building evacuation	3.1	59
051 / Loss of Condenser Vacuum / 4						X	2.1.7	Conduct of Operations: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation	4.4	60
067 / Plant Fire On Site / 8					X		AA2.16	Ability to determine and interpret the following as they apply to the Plant Fire on Site: Vital equipment and control systems to be maintained and operated during a fire	2.9	61
076 / High Reactor Coolant Activity / 9					X		AA2.01	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: Location or process point that is causing alarm	2.7	62

CPNPP 1 & 2
NRC Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
W/E03 / LOCA Cooldown - Depressurization / 4						X	2.4.1	Emergency Procedures/Plan: Knowledge of EOP entry conditions and immediate action steps	4.6	63
W/E09 & E10 / Natural Circulation / 4				X			EA1.2	Ability to operate and / or monitor the following as they apply to the Natural Circulation with Steam Void in Vessel with/without RVLIS: Operating behavior characteristics of the facility	3.6	64
024 / Emergency Boration / 1	X						AK1.02	Knowledge of the operational implications of the following concepts as they apply to Emergency Boration: Relationship between boron addition and reactor power	3.6	65
K/A Category Point Totals:	1	1	1	2	2 / 2	2 / 2	Group Point Total:			**9 / 4**

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
003 / Reactor Coolant Pump											X	2.4.35	Emergency Procedures/Plan: Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	4.0	86
005 / Residual Heat Removal								X				A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Pressure transient protection during cold shutdown	3.7	87
010 / Pressurizer Pressure Control								X				A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: PORV failures	4.2	88
064 / Emergency Diesel Generator								X				A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Unloading prior to securing an EDG	3.0	89
076 / Service Water											X	2.4.46	Emergency Procedures/Plan: Ability to verify that the alarms are consistent with the plant conditions.	4.2	90
003 / Reactor Coolant Pump		X										K2.01	Knowledge of bus power supplies to the following: RCPs	3.1	1
004 / Chemical and Volume Control			X									K3.04	Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: RCPs	3.4	2
005 / Residual Heat Removal				X								K4.05	Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following: Relation between RHR flowpath and refueling cavity	2.5	3

NRC Written Examination Outline
Plant Systems – Tier 2 Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
005 / Residual Heat Removal											X	2.4.49	Emergency Procedures/Plan: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls	4.6	4
006 / Emergency Core Cooling					X							K5.10	Knowledge of the operational implications of the following concepts as they apply to ECCS: Theory of thermal stress	2.5	5
006 / Emergency Core Cooling										X		A4.04	Ability to manually operate and/or monitor in the control room: RHRS	3.7	6
007 / Pressurizer Relief/Quench Tank	X											K1.01	Knowledge of the physical connections and/or cause-effect relationships between the PRTS and the following systems: Containment system	2.9	7
008 / Component Cooling Water								X				A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High/low CCW temperature	3.0	8
010 / Pressurizer Pressure Control							X					A1.05	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PZR PCS controls including: Pressure effect on level	2.8	9
012 / Reactor Protection				X								K4.09	Knowledge of RPS design feature(s) and/or interlock(s) which provide for the following: Separation of control and protection circuits	2.8	10
013 / Engineered Safety Features Actuation					X							K5.01	Knowledge of the operational implications of the following concepts as they apply to the ESFAS: Definitions of safety train and ESF channel	2.8	11
013 / Engineered Safety Features Actuation								X				A2.06	Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Inadvertent ESFAS actuation	3.7	12

CPNPP 1 & 2
NRC Written Examination Outline
Plant Systems – Tier 2 Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
022 / Containment Cooling									X			A3.01	Ability to monitor automatic operation of the CCS, including: Initiation of safeguards mode of operation	4.1	13
026 / Containment Spray									X			A3.01	Ability to monitor automatic operation of the CSS, including: Pump starts and correct MOV positioning	4.3	14
039 / Main and Reheat Steam			X									K3.06	Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: SDS	2.8	15
039 / Main and Reheat Steam									X			A3.02	Ability to monitor automatic operation of the MRSS, including: Isolation of the MRSS	3.1	16
059 / Main Feedwater										X		A4.01	Ability to manually operate and monitor in the control room: MFW turbine trip indication	3.1	17
061 / Auxiliary/Emergency Feedwater	X											K1.05	Knowledge of the physical connections and/or cause-effect relationships between the AFW and the following systems: Condensate system	2.6	18
062 / AC Electrical Distribution				X								K4.10	Knowledge of AC distribution system design feature(s) and/or interlock(s) which provide for the following: Uninterruptable AC power sources	3.1	19
063 / DC Electrical Distribution							X					A1.01	Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including: Battery capacity as it is affected by discharge rate	2.5	20
064 / Emergency Diesel Generator						X						K6.07	Knowledge of the effect of a loss or malfunction of the following will have on the EDG system: Air receivers	2.7	21
073 / Process Radiation Monitoring											X	2.4.45	Emergency Procedures/Plan: Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	22
076 / Service Water		X										K2.01	Knowledge of bus power supplies to the following: Service water	2.7	23

NRC Written Examination Outline
Plant Systems – Tier 2 Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
076 / Service Water								X				A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Service water header pressure	2.7	24
078 / Instrument Air	X											K1.01	Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: Sensor air	2.8	25
078 / Instrument Air										X		A4.01	Ability to manually operate and/or monitor in the control room: Pressure gauges	3.1	26
103 / Containment			X									K3.01	Knowledge of the effect that a loss or malfunction of the containment system will have on the following: Loss of containment integrity under shutdown conditions	3.3	27
103 / Containment							X					A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: Containment pressure, temperature, and humidity	3.7	28
K/A Category Point Totals:	3	2	3	3	2	1	3	3 / 3	3	3	2 / 2	Group Point Total:			**28 / 5**

NRC Written Examination Outline
Plant Systems – Tier 2 Group 2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
029 / Containment Purge System								X				A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the Containment Purge System; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations: startup operations and the associated required lineups	3.1	91
056 / Condensate								X				A2.05	Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Condenser tube leakage	2.5	92
072 / Area Radiation Monitoring											X	2.4.3	Emergency Procedures/Plan: Ability to identify post-accident instrumentation	3.9	93
001 / Control Rod Drive										X		A4.05	Ability to manually operate and/or monitor in the control room: Determination of the amount of boron needed to back the rods out of the core, including xenon effects if equilibrium is not yet achieved	3.7	29
015 / Nuclear Instrumentation		X										K2.01	Knowledge of bus power supplies to the following: NIS channels, components, and interconnections	3.3	30
016 / Non-Nuclear Instrumentation									X			A3.02	Ability to monitor automatic operation of the NNIS, including: Relationship between meter readings and actual parameter value	2.9	31
028 / Hydrogen Purge Control			X									K3.01	Knowledge of the effect that a loss or malfunction of the HPS will have on the following: Hydrogen concentration in containment	3.3	32
034 / Fuel Handling Equipment							X					A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Fuel Handling System controls including: Water level in the refueling canal	2.9	33

NRC Written Examination Outline
Plant Systems – Tier 2 Group 2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
035 / Steam Generator						X						K6.03	Knowledge of the effect of a loss or malfunction on the following will have on the SGS: SG level detector	2.6	34
041 / Steam Dump/Turbine Bypass Control											X	2.1.25	Conduct of Operations: Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	35
045 / Main Turbine Generator					X							K5.17	Knowledge of the operational implications of the following concepts as the apply to the MTG System: Relationship between moderator temperature coefficient and boron concentration in RCS as TG load increases	2.5	36
071 / Waste Gas Disposal				X								K4.05	Knowledge of design feature(s) and/or interlock(s) which provide for the following: Point of release	2.7	37
086 / Fire Protection	X											K1.03	Knowledge of the physical connections and/or cause-effect relationships between the Fire Protection System and the following systems: AFW system	3.4	38
K/A Category Point Totals:	1	1	1	1	1	1	1	0 / 2	1	1	1 / 1	Group Point Total:			**10 / 3**

Facility: **CPNPP 1 & 2** Date of Exam: **06/11/12**

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.34	Knowledge of primary and secondary plant chemistry limits.			3.5	94
	2.1.45	Ability to identify and interpret diverse indications to validate the response of another indication.			4.3	95
	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	2.9	66		
	2.1.15	Knowledge of administrative requirements for temporary management directives, such as standing orders, night orders, Operations memos, etc.	2.7	67		
	Subtotal			2		2
2. Equipment Control	2.2.40	Ability to apply Technical Specifications for a system.			4.7	96
	2.2.18	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.			3.9	97
	2.2.6	Knowledge of the process for making changes to procedures.	3.0	68		
	2.2.14	Knowledge of the process for controlling equipment configuration or status.	3.9	69		
	2.2.23	Ability to track Technical Specification limiting conditions for operations.	3.1	70		
	Subtotal			3		2
3. Radiation Control	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.			2.9	98
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.			3.8	99
	2.3.11	Ability to control radiation releases.	3.8	71		
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	72		
	Subtotal			2		2
4. Emergency Procedures / Plan	2.4.32	Knowledge of operator response to loss of all annunciators.			4.6	100
	2.4.12	Knowledge of general operating crew responsibilities during emergency operations.	4.0	73		
	2.4.31	Knowledge of annunciator alarms, indications, or response procedures.	4.1	74		
	2.4.34	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	75		
	Subtotal			3		1
Tier 3 Point Total				**10**		**7**

Tier / Group	Randomly Selected K/A	Reason for Rejection
2 / 1	008 K6	Q#08 – All of the K/A topics have Importance Ratings less than 2.5. Reselected from 008 A2.
2 / 1	064 K5	Q#11 – All of the K/A topics have Importance Ratings less than 2.5. Re-selected from 013 K5.
2 / 1	025 K3	Q#15 – Randomly selected a system (Ice Condenser) that the plant does not have. Re-sampled for 039 K3 in same Tier/Group.
2 / 1	061 A4	Q#18 – There are no actual K/A topics listed for this K/A. Reselected from 059 A4.
2 / 1	059 K6	Q#21 – All of the K/A topics have Importance Ratings less than 2.5. In order to maintain compliance with Note 1 on Form ES-401-2, Reselected another K6 item from a different system. Selected 064 K6.
2 / 1	073 K2	Q#23 – All of the K/A topics have Importance Ratings less than 2.5. Reselected from 076 K2.
2 / 2	076 K2	Q#30 – All of the K/A topics have Importance Ratings less than 2.5. Reselected from 015 K2.
2 / 2	056 K6	Q#34 – All of the K/A topics have Importance Ratings less than 2.5. Reselected from 035 K6.
1 / 2	054 AK2	Q#45 – All of the K/A topics have Importance Ratings less than 2.5. Reselected from 025 AK2.
1 / 2	BW/A01 Generic	Q#63 – Randomly selected topic that is specific to another plant design (B&W). Re-sampled for W/E03 Generic item in same Tier/Group.
1/2	BW/A07 A1	Q#64 – Randomly selected topic that is specific to another plant design (B&W). Re-sampled for W/E09&E10 A1 item in same Tier/Group.
3	2.2.19	Q#69 – Randomly selected a Generic K/A that has an Importance Rating less than 2.5 (2.3). Re-sampled Generic 2.2.14 as replacement.
1 /2	BW/E03.A2	Q#84 – Randomly selected topic that is specific to another plant design (B&W). Re-sampled for W/E15 A2 item in same Tier/Group.
3	2.2.33	Q#97 – The K/A has been deleted in NUREG-1122. Randomly resampled 2.2.18.
3	2.3.10	The K/A has been deleted in NUREG-1122. Randomly re-sampled 2.3.14.
2 / 2	055.A2	Q#92 – All of the K/A topics have Importance Ratings less than 2.5. Reselected from 056 A2.
1 / 1	008	Q#76 – Replaced procedure (only) to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected 054.
1 / 1	026.AA2.04	Q#77 – Replaced procedure and K/A to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected W/E11.EA2.1.
1 / 1	040(W/E12)	Q#49 – Replaced procedure (only) to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected 055.
1 / 1	W/E04	Q#53 – Replaced procedure (only) to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected W/E12.

Tier / Group	Randomly Selected K/A	Reason for Rejection
1 / 1	W/E05.EK1.3	Q#55 – Replaced procedure and K/A to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected 057.AA1.06.
1 / 1	065 G 2.4.3	Q#52 – Replaced K/A because there is no Post Accident Monitoring Instrumentation associated with Instrument Air at CPNPP. Randomly reselected G 2.4.35.
1 / 2	W/E15.EK1.1	Q#62 – Replaced procedure and K/A to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected 076.AA2.01.
1 / 2	W/E08.EK2.1	Q#65 – Replaced procedure and K/A to meet NUREG 1021, ES-401-2, Note #4 requirements. Randomly reselected 024.AK1.02.
2 / 1	061.K1.09	Q#18 – Replaced K/A because there is no Process Radiation Monitoring System interface with AFW at CPNPP. Randomly reselected 061.K1.05.
2 / 1	078.A4.01	Q#26 – Replaced wording for K/A. Draft outline contained wording for Station Air System K/A 079.K4.01 which is a Tier 2 / Group 2 System.
2 / 2	028	Q#91 – Replaced procedure and K/A to meet NUREG 1021, ES-401-2, Note #4 requirements. Reselected 029.
2 / 2	072 G 2.4.1	Q#93 – Unable to develop a question at the SRO level for EOP entry conditions and immediate action steps. Randomly reselected 072 G 2.4.3.
2 / 2	028.K3.01	Q#32 – Question will be developed using SOP-205, Hydrogen Purge Supply and Exhaust System. The Hydrogen Recombiner is retired in place at CPNPP.
3 / 2	G 2.2.13	Q#96 – This K/A does not have a corresponding 55.43(b) reference for the SRO. Randomly reselected G 2.2.40.
3 / 4	G 2.4.2	Q#100 – This K/A does not have a corresponding 55.43(b) reference for the SRO. Randomly reselected G 2.4.32.
1 / 1	057.AA1.06	Q#55 – Reselected 057.AK3.01 for skyscraper balance. There is no 057 AK1 K/A and there is no 057 AK2 K/A that is ≥ 2.5 Importance Factor.
1 / 1	W/E11.EA2.1	Q#77 – Replaced procedure and K/A to meet NUREG 1021, ES-401-2, Note #4 requirements. Reselected 038.EA2.08. W/E11 is used for Q#54.

Facility: CPNPP Units 1 and 2		Date of Examination:	06/11/12
Examination Level	RO ☐	Operating Test Number:	NRC

Administrative Topic (see Note)	Type Code*	Describe Activity to be Performed
Conduct of Operations (RA1)	M, R	2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. (3.9). JPM: Determine Loss of Residual Heat Removal Time Limitations (RO1413).
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 a Calorimetric Heat Balance (RO1804).
Equipment Control (RA3)	M, R	2.2.12 Knowledge of surveillance procedures (3.7). JPM: Perform Control Room Air Conditioning System Surveillance Data (RO4108).
Radiation Control (RA4)	M, R	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: Determine Containment Stay Time Requirements (RWT029).
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; ≤ for 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 the Time to Boil and Time to Achieve Containment Closure during a Loss of Residual Heat Removal System per ABN-104, RHR 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. Critical steps include determining the time for each evolution. This is a modified bank JPM.

RA2 The applicant will perform a calorimetric heat balance per OPT-309, Unit Calorimetric. Critical steps include completing OPT-309-2, Calorimetric Data Reduction Worksheet, and determining the thermal output of the Reactor. This is a modified bank JPM.

RA3 The applicant will record and evaluate the data obtained in a surveillance of the Control Room Air Conditioning System per OPT-116, Control Room Air Conditioning System, and determine whether Acceptance Criteria are met. Critical steps include recording data, performing calculations, and applying Acceptance Criteria. This is a modified bank JPM.

RA4 The applicant will calculate maximum allowable stay time within Containment per STA-620, Containment Entry, STA-655, Exposure Monitoring Program, STA-657, ALARA Job Planning/Debriefing, STA-660, Control of High Radiation Areas, and STA-674, Heat Stress Management. Critical steps include calculating allowable gamma dose, neutron dose, and Heat Stress Stay Time. This is a modified bank JPM.

Facility: CPNPP Units 1 and 2		Date of Examination:	06/11/12
Examination Level	SRO ☐	Operating Test Number:	NRC

Administrative Topic (see Note)	Type Code*	Describe Activity to be Performed
Conduct of Operations (SA1)	N, R	2.1.2 Knowledge of operator responsibilities during all modes of plant operation (4.4). JPM: Identify Reduced Inventory Contingencies (SO1002).
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 a Calorimetric Heat Balance and Evaluate Technical Specifications (SO1058).
Equipment Control (SA3)	M, R	2.2.12 Knowledge of surveillance procedures (4.1). JPM: Perform Control Room Air Conditioning System Surveillance Data and Evaluate Technical Specifications (SO1202).
Radiation Control (SA4)	M, R	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. (3.8). JPM: Determine Containment Stay Time Requirements and Event Reportability (SO1005).
Emergency Plan (SA5)	N, R	2.4.41 Knowledge of the emergency action level thresholds and classifications. (4.6) JPM: Classify an Emergency Plan Event (SO1136).

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

SA1 The applicant will identify the Reactor Coolant System Reduced Inventory contingencies regarding the Containment Equipment Hatch being removed per IPO-010A, Reactor Coolant System Reduced Inventory Operations, Attachment 1, Shiftly Checklist. Critical steps include identifing Reduced Inventory contingencies when it is determined that the standby RHR Pump is not available. This is a new JPM.

SA2 The applicant will perform a Calorimetric Heat Balance per OPT-309, Unit Calorimetric. Critical steps include completing OPT-309-2, Calorimetric Data Reduction Worksheet, determining the thermal output of the Reactor and evaluating Technical Specification Surveillance Requirements. This is a modified bank JPM.

SA3 The applicant will record and evaluate the data obtained in a surveillance of the Control Room Air Conditioning System per OPT-116, Control Room Air Conditioning System, and determine whether Acceptance Criteria are met. Critical steps include recording the data, performing calculations, applying Acceptance Criteria, then identifying any impacted Technical Specification Limiting Condition for Operation, Required Action, and Completion Time. This is a modified bank JPM.

SA4 The applicant will calculate maximum allowable stay time within Containment per STA-501, Nonroutine Reporting, STA-620, Containment Entry, STA-655, Exposure Monitoring Program, STA-657, ALARA Job Planning/Debriefing, STA-660, Control of High Radiation Areas, and STA-674, Heat Stress Management. Critical steps include calculating allowable gamma dose, neutron dose, Heat Stress Stay Time, and the oral and written Reporting Requirements for a contaminated injured person. This is a modified bank JPM.

SA5 The applicant will classify an Emergency Plan event per EPP-201, Assessment of Emergency Action Levels, Emergency Classification, and Plan Activation. Critical steps include determining the Event Category and Event Classification using the Hot and Cold Emergency Action Level Classification Charts. This is a new JPM.

Facility:	CPNPP Units 1 and 2	Date of Examination:	06/11/12
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	001 – Control Rod Drive System (RO1014A) (RO ONLY) Perform a Dropped Control Rod Recovery	A, M, S	1
S-2	004 – Chemical and Volume Control System (RO1305A) Remove Excess Letdown from Service	N, S	2
S-3	**002 – Reactor Coolant System (RO1412B) Respond to Shutdown Loss of Coolant**	**A, L, N, S**	**4P**
S-4	059 – Main Feedwater System (RO3301C) Place 2nd Main Feedwater Pump in Service	D, S	4S
S-5	**026 – Containment Spray (CS) System (RO2002) Transfer CS From Injection to Recirculation**	**D, EN, S**	**5**
S-6	**062 – AC Electrical Distribution System (RO4201) Shift Normal Bus 1A4 Between UAT and SUT**	**A, D, P, S**	**6**
S-7	073 – Process Radiation Monitoring System (RO4103A) Respond to Control Room Ventilation Radiation Alarms	A, D, S	7
S-8	086 – Component Cooling Water System (RO3603A) Rotate Component Cooling Water Pumps	A, D, S	8

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

P-1	**061 – Auxiliary Feedwater System (AFW) (AO6415A) Align Alternate AFW Supply From SSW**	**D, E, R**	**4S**
P-2	068 – Liquid Radwaste System (RO4005C) Terminate Release of Radioactive Liquid	N, R	9
P-3	**006 – Emergency Core Cooling System (RO7017) Align Emergency Makeup to the RWST**	**E, M, R**	**2**

@	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 The applicant will perform a dropped Control Rod recovery per ABN-712, Rod Control System Malfunction, Section 3.0, Dropped or Misaligned Control Rod in MODE 1 or 2. The alternate path requires a Reactor Trip when a second Control Rod drops into the core during recovery actions. This is a modified bank JPM under the Control Rod Drive System – Reactivity Control Safety Function. (K/A 003.AA1.02 - IR 3.6 / 3.4)

S-2 The applicant will remove Excess Letdown from service per SOP-103A, Chemical and Volume Control System, Section 5.5.4, Removing Excess Letdown from Service. This is a new JPM under the Chemical and Volume Control System – Reactor Coolant System Inventory Control Safety Function. (K/A 004.A2.02 - IR 3.2 / 3.2)

S-3 The applicant will respond to a lowering Pressurizer level with the Residual Heat Removal System in service per ABN-108, Shutdown Loss of Coolant, Section 2.0, Shutdown Loss of Coolant. The alternate path occurs when it is determined that Pressurizer level continues to lower until Letdown is isolated. This is a new JPM under the Residual Heat Removal System – Primary System Heat Removal from Reactor Core Safety Function. This is a PRA significant action. (K/A 025.AA1.02- IR 3.8 / 3.9)

S-4 The applicant will place the second Main Feedwater Pump in service per IPO-003A, Power Operations, Step 5.4.18, Perform the following to place the FWPT speed controls in AUTO. This is a bank JPM under the Main Feedwater System – Secondary System Heat Removal from Reactor Core Safety Function. (K/A 059.A4.10 - IR 3.9 / 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. This is a time critical, 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 shift Normal Bus 1A4 between the Unit Auxiliary Transformer and the Startup Transformer per SOP-603A, 6900 V Switchgear, Step 5.3.2, Transferring a 6.9 KV Normal Bus from Unit 1 Auxiliary Transformer 1UT to Station Service Transformer 1ST. The alternate path occurs when Incoming Breaker 1A4-1 fails to trip during Bus transfer. This is a bank JPM under the AC Electrical Distribution System – Electrical Safety Function. (K/A 062.A4.07 - IR 3.1 / 3.1)

S-7 The applicant will respond to PC-11, Digital Radiation Monitoring System alarms per ABN-902 Release of Radioactive/Toxic Gas. The alternate path occurs when the Control Room Ventilation System fails to shift to the Emergency Recirculation Mode and the alignment must be manually performed per SOP-802, Control Room Ventilation System. This is a bank JPM under the Process Radiation Monitoring System – Instrumentation Safety Function. (K/A 073.A4.02 - IR 3.7 / 3.7)

S-8 The applicant will shift from Train A to Train B Component Cooling Water Pumps per SOP-502A, Component Cooling Water System, Step 5.2.2.1, Starting a Standby CCW Pump During Normal Operation, then Step 5.2.1.2, Placing a CCW Pump in Standby from Dual Pump Operation. The alternate path occurs when the Train B CCW Pump trips shortly after it is started. This is a bank JPM under the Component Cooling Water System – Plant Service Systems Safety Function. (K/A 008.A2.01 - IR 3.3 / 3.6)

P-1 The applicant will align an alternate source of Auxiliary Feedwater from the Station Service Water System per ABN-803A(B), Response to a Fire in the Control Room or Cable Spreading Room, Attachment 9, Alternate AFW Supply. This is a bank JPM under the Auxiliary Feedwater System – Secondary System Heat Removal from the Reactor Core Safety Function. This is a PRA significant action. (K/A 054.AA1.01 - IR 4.5 / 4.4)

P-2 The applicant will perform actions to terminate a radioactive discharge per RWS-103, Drain Channel B, Section 5.2.3, Discharging PET X-01 with Pump X-01 with Radiation Monitor Operable, Step 5.2.3 N. This is a new JPM under the Liquid Radwaste System – Radioactivity Release Safety Function. (K/A 059.AA2.04 - IR 3.2 / 3.5)

P-3 The applicant will align makeup to the Refueling Water Storage Tank during a Loss of Emergency Coolant Recirculation per ECA-1.1A(B), Loss of Emergency Coolant Recirculation, Attachment 3, RWST Makeup Methods. This is a modified bank JPM under the Emergency Core Cooling System – Reactor Coolant System Inventory Control Safety Function. This is a PRA significant action. (K/A E11.EA1.1 - IR 3.9 / 4.0)

Facility: CPNPP 1 & 2 Scenario No.: 1 Op Test No.: June 2012 NRC

Examiners: Operators:

Initial Conditions: 100% power MOL - RCS Boron is 908 ppm (by sample).

Turnover: Maintain steady-state power conditions.

Critical Tasks:

- Control Steam Generator Level to Avoid RPS or ESFAS Actuation per ABN-708, Feedwater Flow Instrument Malfunction.
- Reduce Reactor Power to Less Than 100% Prior to Exiting ABN-304, Main Condenser and Circulating Water System Malfunction.
- Initiate Emergency Boration Due to Loss of Digital Rod Position Indication Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.
- Trip Reactor Coolant Pumps within 10 minutes upon a Loss of Subcooling per EOP-0.0A, Reactor Trip or Safety Injection, or EOP-1.0A, Loss of Reactor or Secondary Coolant, Foldout Pages.

Event No.	Malf. No.	Event Type*	Event Description
1 +10 min	RX01E	I (BOP, SRO)	Steam Generator (1-03) Feed Flow Instrument (FT-530) Fails High.
2 +25 min	NI05E	I (RO, SRO) TS (SRO)	Power Range Nuclear Instrument Channel (N-43) Fails High.
3 +35 min	CW02A	R (RO) N (BOP, SRO)	Circulating Water Pump (1-01) Trip.
4 +45 min	RX09A	I (RO, SRO) TS (SRO)	Main Turbine 1st Stage Pressure Transmitter (PT-505) Fails Low.
5 +55 min	RC19C	M (RO, BOP, SRO)	Small Break Loss of Coolant Accident Inside Containment at 1750 GPM on 300 second ramp.
6 +58 min	RD12C	I (RO)	Loss of Digital Rod Position Indication.
7 +58 min	CC02D	C (BOP)	Component Cooling Water Pump (1-02) SI Sequencer Start Failure.
8 +75 min	SW01A	C (BOP)	Station Service Water Pump (1-01) Trip Upon Containment Isolation Phase A RESET.

* (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)
1	EOPs entered/requiring substantive actions (1-2)
0	EOP contingencies requiring substantive actions (0-2)
4	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 it is a high failure of Steam Generator (1-03) Feed Flow Instrument, FT-530. Operator actions are per ABN-708, Feedwater 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 high failure of Power Range Nuclear Instrument Channel (N-43). Crew actions are per ABN-703, Power Range Instrumentation Malfunction, Section 2.0, and include placing Rod Control in MANUAL, bypassing the failed Channel, restoring T_{AVE} to program, and verifying Permissive Interlocks match current power level. The SRO will refer to Technical Specifications.

When Technical Specifications have been reference, Circulating Water Pump (1-01) will trip. The crew enters ABN-304, Main Condenser and Circulating Water System Malfunction, Section 2.0, Circulating Water Pump Trip, and initiates a 50 MWe Turbine Load reduction when Reactor Power rises above 100%. Rod Control is returned to AUTO during this evolution.

When plant conditions are stable, Main Turbine First Stage Pressure Transmitter (PT-505) will fail low. The crew enters ABN-709, Turbine 1st Stage Pressure Instrument Malfunction, Section 4.0, places Rod Control in MANUAL, disables the Steam Dump System, and transfers to Turbine Impulse Pressure Channel PT-506. The SRO will refer to Technical Specifications.

When Technical Specifications have been referenced, a Small Break Loss of Coolant Accident will commence on a 300 second ramp inside Containment. 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 a loss of primary coolant is diagnosed and then a transition into EOP-1.0A, Loss of Primary or Secondary Coolant, is made. An Emergency Boration due to loss of Digital Rod Position Indication must be initiated after Step 4 of EOP-0.0A.

The scenario includes a manual Train B Component Cooling Water (CCW) Pump start following failure of the Safety Injection Sequencer and a Service Water Pump 1-01 trip that requires stopping the Train A Emergency Diesel Generator (EDG) when Containment Isolation Phase A is RESET while in EOP-1.0A. Additionally, the Reactor Coolant Pumps (RCPs) must be tripped when a loss of subcooling occurs in either EOP-0.0A or EOP-1.0A.

This scenario is terminated when a Reactor Coolant System cooldown is commenced per EOS-1.2A, Post LOCA Cooldown and Depressurization.

<u>Risk Significance:</u>

- Failure of risk important system prior to trip: SG Feed Flow Instrument Failure
- Risk significant core damage sequence: Small Break LOCA
- Risk significant operator actions: Restore SG Feedwater Flow Control
  Manually Initiate Emergency Boration
  Manually Start Train B CCW Pump
  Trip RCPs Due to Loss of Subcooling

Facility:	CPNPP 1 & 2	Scenario No.:	2	Op Test No.:	June 2012 NRC
Examiners:			Operators:		

Initial Conditions: 100% power MOL - RCS Boron is 908 ppm (by sample).

Turnover: Maintain steady-state power conditions. Boric Acid Transfer Pump 1-01 is OOS.

Critical Tasks:

- Close PORV Block Valve to Maintain RCS Pressure Greater Than Low Pressure Reactor Trip Setpoint Following Entry Into ABN-705, Pressurizer Pressure Malfunction.
- Control Steam Generator Level to Avoid RPS or ESFAS Actuation per ABN-710, Steam Generator Level Instrumentation Malfunction.
- Initiate Emergency Boration due to Two (2) Stuck Control Rods Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.
- Trip Reactor Coolant Pumps Prior to Establishing Bleed and Feed per FRH-0.1A, Response to Loss of Secondary Heat Sink.
- Establish Core Cooling via Reactor Coolant System Bleed and Feed per FRH-0.1A, Response to Loss of Secondary Heat Sink.

Event No.	Malf. No.	Event Type*	Event Description
1 +10 min	RX08B RX16B	I (RO, SRO) TS (SRO)	Pressurizer Pressure Channel (PT-456) Fails High. Stuck Power Operated Relief Valve (PCV-456) at 50% Open.
2 +20 min	RX04B	I (BOP, SRO) TS (SRO)	Steam Generator (1-02) Level Transmitter (LT-552) Fails High.
3 +30 min	RP06B	I (RO, SRO) TS (SRO)	Loop 2 N-16 Channel (JI-421A/B) Fails Low.
4 +40 min	FW03A TC09C	R (RO) N (BOP, SRO)	Main Feedwater Pump A Trip. Automatic Turbine Runback Failure.
5 +45 min	FW06A	M (RO, BOP, SRO)	Main Feedwater Pump A Recirculation Valve (FV-2289) Fails Open. Loss of both Main Feedwater Pumps.
6 +45 min	RD04K2 RD04K8	C (RO)	Two Control Rods Fail to Insert Upon Reactor Trip. Emergency Boration Required.
7 +47 min	FW08B	C (BOP)	Motor Driven Auxiliary Feedwater Pump (1-02) Start Failure.
8 +47 min	OVRDE FW09B	C (BOP)	Turbine Driven Auxiliary Feedwater Pump (TDAFW) Steam Valves Fail to Auto Open Followed by TDAFW Trip (60 second time delay).
9 +50 min	ED05H	C (BOP) M (RO, BOP, SRO)	6900 Volt Train A Safeguards Bus 1EA1 86-1 Trip and Lockout Five minutes Post Trip. Loss of Feedwater Flow.

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

Actual	Target Quantitative Attributes
9	Total malfunctions (5-8)
4	Malfunctions after EOP entry (1-2)
4	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)
5	Critical tasks (2-3)

SCENARIO SUMMARY NRC #2

The crew will assume the watch at 100% power with no scheduled activities per IPO-003A, Power Operations. Boric Acid Transfer Pump 1-01 is out-of-service.

The first event it is a high failure of a Pressurizer Pressure Channel. Operator actions are per ABN-705, Pressurizer Pressure Malfunction, Section 2.0, and require closing the Block Valve on a partially open Power Operated Relief Valve (PORV), placing the Pressurizer Master Pressure Controller in MANUAL, selecting an alternate controlling Channel, and restoring Pressurizer pressure to normal. The SRO will refer to Technical Specifications.

The next event is a high failure of a Steam Generator (1-02) Level Transmitter. Crew actions are per ABN-710, Steam Generator Level Instrumentation Malfunction, Section 2.0, and include placing Steam Generator (SG) Level Control in MANUAL, stabilizing the plant, aligning an Alternate Channel, and transferring SG Level Control back to AUTO. The SRO will refer to Technical Specifications.

When Technical Specifications are referenced, a low failure of T_{COLD} Temperature Instrument, TI-421A will occur. Operator actions are per ABN-704, TC/N-16 Instrumentation Malfunction, Section 2.0, and require stopping Control Rod motion and stabilizing Reactor Coolant System (RCS) temperature and Pressurizer level. The SRO will refer to Technical Specifications.

When RCS temperature is restored to normal, a Main Feedwater Pump (MFW) will trip and an AUTO Turbine Runback will fail to initiate. Rod Control will be placed in AUTO and a Manual Turbine Runback to 900 MWe is commenced per ABN-302, Feedwater, Condensate, Heater Drain System Malfunction, Section 2.0. The MFW Pump Recirculation Valve will fail open shortly after the Runback initiates and result in a lowering MFW Pump suction pressure and a trip of the second MFW Pump. When this occurs, the crew will manually trip the Reactor and enter EOP-0.0A, Reactor Trip or Safety Injection.

Two Control Rods failed to insert on the Reactor Trip and an Emergency Boration is required. While performing the actions of EOP-0.0A, a Motor Driven Auxiliary Feedwater (AFW) Pump will fail to start and require placing the Turbine Driven AFW (TDAFW) Pump in service. Shortly after the TDAFW Pump is started, the pump will trip. The crew will transition from EOP-0.0A to EOS-0.1A, Reactor Trip Response. Five minutes after the Reactor trips, Train A Safeguards Bus 1EA1 will trip and lockout resulting in a Loss of Feedwater Flow. Entry into FRH-0.1A, Response to Loss of Secondary Heat Sink, will be performed with an immediate transition to Step 12 for RCS Bleed and Feed.

The scenario success path includes tripping the Reactor Coolant Pumps and opening the Pressurizer and Reactor Head Vents.

<u>Risk Significance:</u>

• Failure of risk important system prior to trip:	Automatic Turbine Runback Failure
• Risk significant core damage sequence:	Loss of Feedwater Flow
• Risk significant operator actions:	Close PORV Block Valve
	Restore Steam Generator 1-02 Level Control
	Start TDAFW Pump
	Trip Reactor Coolant Pumps
	Initiate RCS Bleed and Feed

Facility: CPNPP 1 & 2 Scenario No.: 3 Op Test No.: June 2012 NRC

Examiners: ______________________ Operators: ______________________

______________________ ______________________

______________________ ______________________

Initial Conditions: 100% power MOL - RCS Boron is 908 ppm (by sample).

Turnover: Maintain steady-state power conditions.

Critical Tasks:

- Close Pressurizer Spray Valve to Maintain RCS Pressure Greater Than Low Pressure Reactor Trip Setpoint Following Entry Into ABN-705, Pressurizer Pressure Malfunction.
- Control Steam Generator Level to Avoid RPS or ESFAS Actuation per ABN-709, Feed Header Pressure Instrument Malfunction.
- Identify and Isolate Ruptured Steam Generator Prior to Commencing an Operator Induced Cooldown per EOP-3.0A, Steam Generator Tube Rupture.
- Initiate Cooldown of Reactor Coolant System Prior to Exiting EOP-3.0A, Steam Generator Tube Rupture.

Event No.	Malf. No.	Event Type*	Event Description
1 +5 min	CV31A	C (RO, SRO) TS (SRO)	Centrifugal Charging Pump (1-01) Sheared Shaft.
2 +10 min	CH10	C (BOP, SRO)	Control Rod Drive Mechanism Ventilation Fan (1-01) Overcurrent Trip.
3 +20 min	RX15A	C (RO, SRO) TS (SRO)	Pressurizer Spray Valve (PCV-455B) Fails 35% Open.
4 +25 min	RX18	I (BOP, SRO)	Main Feedwater Header Pressure Transmitter (PT-508) Fails Low.
5 +45 min	SG01A	R (RO) N (BOP, SRO) TS (SRO)	Steam Generator (1-01) Tube Leak at 10 GPM. Rapid Down Power Required.
6 +50 min	SG01A	M (RO, BOP, SRO)	Steam Generator (1-01) Tube Rupture at 300 GPM (300 second ramp).
7 +50 min	SS02A1 SS02A2 TC07C	I (BOP)	Main Turbine Trip Block Failure.
8 +55 min	CS02E CS02G	C (RO)	Train A Containment Spray Pumps (1-01 & 1-03) Safety Injection Sequencer Start Failure.
9 +55 min	OVRDE		Main Steam Isolation Valve (HV-2333A) Fails to Auto Close.

*(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)
1	EOPs entered/requiring substantive actions (1-2)
0	EOP contingencies requiring substantive actions (0-2)

4	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 sheared shaft of the running Centrifugal Charging Pump (CCP). When low flow alarms for Charging and Reactor Coolant Pump seal flow 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.

The next event is an overcurrent trip of the running Control Rod Drive Mechanism (CRDM) Ventilation Fan. Crew actions are per 1-ALB-3A, Window 2-1, CONTAINMENT FAN MASTER TRIP. The Alarm Light Box (ALB) will direct starting of the standby CRDM Vent Fan.

This event is followed by a Pressurizer Spray Valve that is failed 35% open. The crew enters ABN-705, Pressurizer Pressure Malfunction, Section 3.0, and attempts to close the valve. When this action fails, Pressurizer Heaters are energized and the Driver Card for the failed Spray Valve is pulled to close the valve. The SRO will refer to Technical Specifications.

When Pressurizer pressure is restored, a Main Feedwater (MFW) Header Pressure Transmitter will fail low. Entry into ABN-709, Feedwater Header Pressure Instrument Malfunction, Section 5.0, is required and the MFW Pump Turbine Master Speed Controller is placed in MANUAL. This controller will remain in MANUAL for the duration of the scenario and require monitoring during the subsequent down power.

When Feedwater Pressure Control is restored, a 10 GPM Steam Generator (SG) Tube Leak will ensue. The crew will enter ABN-105, High Secondary Activity, Section 3.0, and determine that a Rapid Downpower is required. The SRO will refer to Technical Specifications. When power has been reduced 3% to 5%, a 300 GPM Steam Generator Tube Rupture will commence on a 300 second ramp.

When control of the power reduction is no longer feasible, the crew will trip the Reactor, initiate a Safety Injection, and enter EOP-0.0A, Reactor Trip or Safety Injection. While performing the actions of EOP-0.0A, the Main Turbine will fail to trip until the Electro Hydraulic Control Pumps are secured. The crew will transition from EOP-0.0A to EOP-3.0A, Steam Generator Tube Rupture.

The scenario includes Train A Containment Spray Pumps that fail to start upon initiation of the Safety Injection Sequencer and a Main Steam Isolation Valve (HV-2333A) that fails to AUTO Close. This scenario is terminated when the Ruptured Steam Generator is isolated, Reactor Coolant System (RCS) temperature is lowered, and a depressurization of the RCS to the Ruptured Steam Generator pressure is commenced as outlined in EOP-3.0A.

Risk Significance:

• Failure of risk important system prior to trip:	Loss of Centrifugal Charging Pump
• Risk significant core damage sequence:	Steam Generator Tube Rupture
	Main Turbine Trip Failure
• Risk significant operator actions:	Close Pressurizer Spray Valve
	Restore Steam Generator Level Control
	Identify & Isolate Ruptured SG
	Cooldown/Depressurize RCS

Facility: CPNPP 1 & 2	Scenario No.: 4 Op Test No.: June 2012 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: Restore Accumulator 1-01 level prior to MODE 1 entry then raise Reactor Power from 3% to 8% in preparation for Turbine Startup.

Critical Tasks:

- Manually Initiate Train A Safety Injection Signal Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.
- Manually Initiate Train A Containment Spray Flow Prior to Exiting EOP-0.0A, Reactor Trip or Safety Injection.
- Identify and Isolate the Faulted Steam Generator Prior to Exiting EOP-2.0A, Faulted Steam Generator Isolation.

Event No.	Malf. No.	Event Type*	Event Description
1 +10 min		N (BOP, SRO)	Raise Safety Injection Accumulator (1-01) Level Prior to MODE 1 Entry per SOP-202A, Safety Injection Accumulators.
2 +30 min		R (RO) N (BOP, SRO)	Raise Power to 6% to 8% in Preparation for Synchronizing Main Generator to Electrical Grid.
3 +40 min	RX05A	I (RO, SRO)	Pressurizer Level Channel (LT-459) Fails High.
4 +45 min	MS13B	I (BOP, SRO)	Steam Generator (1-02) Atmospheric Relief Valve (HV-2326) Fails Open due to Steam Pressure Transmitter (PT-2326) Failure.
5 +50 min	SW01B	C (BOP, SRO) TS (SRO)	Station Service Water Pump 1-02 Trip.
6 +55 min	RP17D	TS (SRO)	Containment Pressure Transmitter (PT-937) Fails High.
7 +58 min	MS01C	M (RO, BOP, SRO)	Faulted Steam Generator (1-03) Inside Containment @ 2.0 ft^2 (180 second ramp).
8 +58 min	ED05F	C (BOP)	Safeguards Bus 1EA2 86-2 Trip and Lockout on Reactor Trip.
9 +58 min	RP07A	C (RO)	Train A Safety Injection Fails to Automatically Actuate.
10 +60 min	CS07A	C (RO)	Train A Containment Spray Isolation Valve (HV-4776) Fails to Open.

* (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)
3	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 SUMMARY NRC #4

The crew will assume the watch with power at approximately 3% per IPO-003A, Power Operations. With Safety Injection Pump 1-01 running in the recirculation mode per SOP-201A, Safety Injection System, raise Safety Injection Accumulator (1-01) level prior to MODE 1 entry per SOP-202A, Safety Injection Accumulators. When Accumulator level is within specification, 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.

When power has been raised 3% to 5%, a Pressurizer Level Channel will fail high. Response is per ABN-706, Pressurizer Level Instrumentation Malfunction, Section 2.0, and requires MANUAL control of either the Pressurizer Level Controller or the Charging Flow Controller. If response to this channel failure is not timely, Letdown will isolate. Once an Alternate Channel is selected, Pressurizer Level is restored to AUTO operation.

The next event is caused by a Main Steam Line Pressure Instrument that fails high and opens its associated Steam Generator Atmospheric Relief Valve. Actions are per ABN-709, Steam Line Pressure Instrument Malfunction, Section 2.0, and requires taking MANUAL control of the Atmospheric Relief Valve and closing the valve.

When conditions are stable, Station Service Water Pump 1-02 will trip. The crew will enter ABN-501, Station Service Water System Malfunction, Section 2.0. Initial operator actions include placing the Train A Emergency Diesel Generator in PULLOUT. The SRO will refer to Technical Specifications.

The next event is a Containment Pressure Transmitter failure. Actions are per ALM-0022A, 1-ALB-2B, Window 3.10 – CNTMT 1 OF 4 PRESS HI-3. The SRO will refer to Technical Specifications.

A Faulted Steam Generator is the major event, and a manual Reactor Trip and Safety Injection should be performed per EOP-0.0A, Reactor Trip or Safety Injection, with a transition to EOP-2.0, Faulted Steam Generator. When EOP-0.0A, Attachment 2, Safety Injection Actuation Alignment, actions are complete, the SRO may transition to FRZ-0.1A, Response to High Containment Pressure, if an Orange Path exists at that time. With Containment pressure remaining less than 50 PSIG, the Response Not Obtained actions of FRZ-0.1A, Step 1, will return the crew to the Procedure and Step in effect.

This event is complicated by a trip and lockout of the Train B 6900 Volt Safeguards Bus, Train A Safety Injection Actuation failure, and a Train A Containment Spray System (CSS) Isolation Valve that does not open. These conditions reduce the event success path to single Train A operation.

When the Faulted Steam Generator is isolated, the crew will transition from EOP-2.0A to EOS-1.1A, Safety Injection Termination.

Risk Significance:

• Failure of risk important system prior to trip:	Station Service Water Pump Trip
• Risk significant core damage sequence:	Faulted Steam Generator
	Containment Spray Flow Failure
• Risk significant operator actions:	Manually Initiate Train A Safety Injection
	Manually Open CSS Isolation Valve
	Identify and Isolate Faulted SG