

Facility: Calvert Cliffs Nuclear Power Plant Exam Level: SRO-U		Date of Examination: 3/25/2019 Operating Test #: 2019
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, N	Reactivation of SRO License G2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc. (SRO-3.8)
Conduct of Operations	R, D	Respond to a Condenser Tube Leak G2.1.34 Knowledge of primary and secondary plant chemistry (SRO-3.5)
Equipment Control	R, D	Monitor Azimuthal Power Tilt (Tq) using Excore Nuclear instrumentation G2.2.40 Ability to apply Technical Specifications for a system (SRO-4.7)
Radiation Control	R, N	Authorize Emergency Exposures G2.3.4 - Knowledge of radiation exposure limits under normal or emergency conditions. (SRO-3.7)
Emergency Plan	R, N	Recommend Protective Action Guidelines to public officials G2.4.44 Knowledge of emergency plan protective actions. (SRO-4.4)
NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) [2] (N)ew or (M)odified from bank (≥ 1) [3] (P)revious 2 exams (≤ 1 ; randomly selected) [0]		

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Control Room Systems: * 8 for RO; 7 for SRO-I; **2 or 3 for SRO-U**

System / JPM Title	Type Code*	Safety Function
a. SIM-1 Respond to a Fuel Handling incident in the Containment 103 Containment System A3.01 Containment Isolation (SRO-4.2)	A, E, EN, L, N	5
b. SIM-2 Respond to a Pressurizer Spray Valve Failure 010 Pressurizer Pressure Control System A2.02 Spray Valve Failures (SRO-3.9)	A, E, M	3
c. SIM-3 Respond to a condensate or feedwater rupture at power 059 Main Feedwater System A2.05 Rupture in MFW suction or discharge line (SRO-3.4)	A, E, N	4S
d.		
e.		
f.		
g.		
h.		

In-Plant Systems * 3 for RO; 3 for SRO-I; **3 or 2 for SRO-U**

i. PLT-1 Starting/Securing Containment Purge System 029 Containment Purge System A2.03 Startup operations and the associated required valve lineups (SRO-3.1)	D, R	8
j. PLT-2 Tie 120 VAC instrument buses 2Y10 and 2Y09 062 AC Electrical Distribution System A2.05 Methods for energizing a dead bus (SRO-3.3)	N, E	6
k.		

* 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 [3]
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4 [1]
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1 [1]
(EN)gineered safety feature	≥ 1 / ≥ 1 / ≥ 1 (control room system) [1]
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1 [1]
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1 [4 including 3(A)]
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected) [0]
(R)CA	≥ 1 / ≥ 1 / ≥ 1 [1]
(S)imulator	

Examiners:

Operators:

Initial Conditions: Unit-1 is at 100% power, MOC. Unit-2 is at 100% power.

Turnover: 12 EHC Pump is OOS, 11 CAC is OOS.

Instructions to the crew: Prepare to place 11 BAST in direct recirculation to obtain a sample for analyzing per OI-2C, Concentrated Boric Acid System Operations.

Critical Tasks

1. Identifies 11 S/G as the ruptured SG and isolates 11 S/G.
2. Recognizes SFSC in EOP-6 not met and transitions to EOP-8 within 30 minutes.
3. Trip 11A & 12B RCPs or 11B & 12A RCPs when RCS pressure decreases to <1725 PSIA prior to RCS pressure reaching 1300 PSIA.
4. Trips all RCPs within 15 minutes after receiving CIS or within 4 minutes of subcooling <20°F.

Event #	Malfunction #	Event Type*	Event Description
1	N/A	N-RO/SRO	Recirculate 11 BAST
2	ni008_04	I-BOP/SRO T-SRO	NI B Upper Detector Fails Low
3	srw003_01	C-BOP/SRO T-SRO	11 SRW Pump Breaker Trip/AOP-7B
4	ms001_01 Downpower	C-BOP/SRO R-ATC T-SRO	11 S/G Tube Leak (100 gpm)/AOP-2A
5	ms002_01	M-ALL	EOP-0 SGTR (1 tube) in 11 SG/EOP-6
6	rcs002	M-ALL	LOCA (5000gpm)/EOP-8

* (N)ormal (R)eactivity (I)nstrument (C)omponent (M)ajor (T)ech Spec

Scenario Overview

Initial Conditions:

Unit-1 at 100% power, MOC, Unit-2 at 100% power

Equipment OOS: 12 EHC Pump. 11 CAC.

Abnormal Conditions: None

Instructions for shift: 11 BAST was not sampled this week yet due to maintenance on 11 BA Pump. 11 BA Pump has been returned to service. Chemistry requests 11 BAST in Direct Recirc to get a sample.

Event 1 - The crew will place 11 BAST in direct recirculation per OI-2C section 6.3 for Chemistry request.

Event 2 - A LRNI upper detector failure for Channel B occurs. Alarm Response Manual (ARM 1C05) actions will have crew investigate failure at 1C15 and when failure is recognized the crew should reference OP-CA-103-102-0200 and bypass T/U's 1,2,7,8, & 10 and enter TS 3.3.1.A & D.

Event 3 - Once the trip units are bypassed, 11 SRW Pump Breaker will trip. The crew will implement AOP-7B, Loss of Service Water, which will direct their actions in protecting plant equipment and aligning and starting 13 SRW Pp. Determines T.S. LCO 3.7.6.B is applicable.

Event 4 - 11 S/G will begin to experience tube leakage ramping in from 0 GPM to 100 GPM over a one (1) minute period. The crew will respond using AOP-2A, Excessive Reactor Coolant Leakage, and will reduce power to reduce T_{AVE} to less than 537°F at which point the reactor will be tripped. EOP-0, Post-Trip Immediate Actions will be implemented. Determines T.S. LCOs 3.4.13.A and 3.4.13.B are applicable.

Event 5 - During EOP-0, the S/G tube leak will increase to a rupture of 1 S/G tube. The crew is expected to implement EOP-6. The crew will commence a cooldown, not to exceed 100°F/hr, to prepare to isolate 11 S/G. Once $T_h < 515^\circ\text{F}$, the crew will isolate 11 S/G. If plant conditions degrade or the crew is unsure of the diagnosis it is acceptable for them to enter EOP-8 directly from EOP-0. If EOP-8 is entered all critical tasks still apply unless individual tasks are invalidated by the exam team.

Event 6 - After 11 S/G has been isolated a 5000gpm RCS leak to containment will occur. The crew should identify degrading Containment pressures and temperatures. The crew is expected to implement EOP-8 based on the combined SGTR and LOCA in progress. The crew should trip all 4 RCPs after CIS initiates. The crew should identify the success paths in EOP-8 (RC-1 Met, VA-1 Met, PIC-4 Met, HR-2 Met, CE-3 Met, RLEC-2 Met) and priority (PIC-4, CE-3, RLEC-2, RC-1, VA-1, HR-2). Crew will commence PIC-4 and CE-3. As part of PIC-4, the crew should try and identify location of leak. As part of CE-3, the crew will establish containment environment. The scenario will end once containment environment has been established.

Facility Name:CCNPP		Date of Exam:3/25/2019																
Tier	Group	RO K/A Category Points											Total	SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *		A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A			3	18	3	3	6	
	2	3	2	2	N/A			0	1	N/A			1	9	2	2	4	
	Tier Totals	6	5	5	N/A			3	4	N/A			4	27	5	5	10	
2. Plant Systems	1	2	2	2	3	2	2	3	3	2	4	3	28	3	2	5		
	2	1	1	1	1	0	1	1	1	1	1	1	10	0	2	1	3	
	Tier Totals	3	3	3	4	2	3	4	4	3	5	4	38	5	3	8		
3. Generic Knowledge and Categories		Abilities			1	2	3	4					10	1	2	3	4	7
					3	2	3	2						1	2	2	2	

- Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category).
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.
- G* Generic K/As

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 Reactor Trip / 1		0 2					Knowledge of the interrelations between a reactor trip and the following: Breakers, relays and disconnects	2.6	1
CE/E02 Reactor Trip Recovery / 1									
000008 Pressurizer Vapor Space Accident / 3			0 4				Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: RCP tripping requirements	4.2	1
000009 Small Break LOCA / 3	0 1						Knowledge of the operational implications of the following concepts as they apply to the small break LOCA: Natural circulation and cooling, including reflux boiling	4.2	1
000011 Large Break LOCA / 3		0 2					Knowledge of the interrelations between the and the following Large Break LOCA: Pumps	2.6	1
000015 RCP Malfunctions / 4 000017 RCP Malfunctions (Loss of RC Flow) / 4	0 3						Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow): The basis for operating at a reduced power level when one RCP is out of service	3.0	1
000022 Loss of Rx Coolant Makeup / 2						04. 46	Ability to verify that the alarms are consistent with the plant conditions.	4.2	1
000025 Loss of RHR System / 4				1 2			Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: RCS temperature indicators	3.6	1
000026 Loss of Component Cooling Water / 8				0 2			Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: Loads on the CCWS in the control room	3.2	1
000027 Pressurizer Pressure Control System Malfunction / 3			0 1				Knowledge of the reasons for the following responses as they apply to the Pressurizer Pressure Control Malfunctions: Isolation of PZR spray following loss of PZR heaters	3.5	1
000029 ATWS / 1					0 1		Ability to determine or interpret the following as they apply to a ATWS: Reactor nuclear instrumentation	4.4	1
000038 Steam Gen. Tube Rupture / 3	0 3						Knowledge of the operational implications of the following concepts as they apply to the SGTR: Natural circulation	3.9	1
000040 Steam Line Rupture / 4									1
CE/E05 Excessive Steam Demand / 4					0 2		Ability to determine and interpret the following as they apply to the (Excess Steam Demand): Adherence to appropriate procedures and operation within the limitations in the Facility's license and amendments.	3.4	
000054 Loss of Main Feedwater / 4									1
CE/E06 Loss of Feedwater / 4		0 2					Knowledge of the interrelations between the (Loss of Feedwater) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.5	
000055 Station Blackout / 6				0 5			Ability to operate and monitor the following as they apply to a Station Blackout: Battery, when approaching fully discharged	3.3	1
000056 Loss of Off-site Power / 6						04. 08	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	3.8	1
000057 Loss of Vital AC Inst. Bus / 6									0
000058 Loss of DC Power / 6					0 3		Ability to determine and interpret the following as they apply to the Loss of DC Power: DC loads lost; impact on to operate and monitor plant systems	3.5	1
000062 Loss of Nuclear Svc Water / 4						02. 42	Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	3.9	1
000065 Loss of Instrument Air / 8									0
000077 Generator Voltage and Electric Grid Disturbances / 6			0 2				Knowledge of the reasons for the following responses as they apply to Generator Voltage and Electric Grid Disturbances: Actions contained in abnormal operating procedure for voltage and grid disturbances	3.6	1
K/A Category Totals:	3	3	3	3	3	3	Group Point Total:		18

ES-401		PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)										
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	16						Knowledge of the operational implications of the following concepts as they apply to Continuous Rod Withdrawal: Definition and application of power defect	3.0	1	
000003 Dropped Control Rod / 1	16						Knowledge of the operational implications of the following concepts as they apply to Dropped Control Rod: MTC	2.9	1	
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		01					Knowledge of the interrelations between the Loss of Source Range Nuclear Instrumentation and the following: Power supplies, including proper switch positions	2.7	1	
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						01, 28	Knowledge of the purpose and function of major system components and controls.	4.1	1	
000059 Accidental Liquid RadWaste Rel. / 9									0	
000060 Accidental Gaseous Radwaste Rel. / 9									0	
000061 ARM System Alarms / 7	01						Knowledge of the operational implications of the following concepts as they apply to Area Radiation Monitoring (ARM) System Alarms: Detector limitations	2.5	1	
000067 Plant Fire On-site / 9 8									0	
000068 Control Room Evac. / 8									0	
000069 Loss of CTMT Integrity / 5									0	
000074 Inad. Core Cooling / 4						05	Ability to determine or interpret the following as they apply to a Inadequate Core Cooling: Trends in water levels of PZR and makeup storage tank caused by various sized leaks in the RCS	3.4	1	
000076 High Reactor Coolant Activity / 9									0	
CE/A13 Natural Circ. / 4			01				Knowledge of the reasons for the following responses as they apply to the (Natural Circulation Operations): Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	3.4	1	
CE/A11 RCS Overcooling / 4		01					Knowledge of the interrelations between the (RCS Overcooling) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.2	1	
CE/A16 Excess RCS Leakage / 2									0	
CE/E09 Functional Recovery			02				Knowledge of the reasons for the following responses as they apply to the (Functional Recovery): Normal, abnormal and emergency operating procedures associated with (Functional Recovery).	3.0	1	
									0	
									0	
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K/A Category Totals:	3	2	2	0	1	1	Group Point Total:		9	

ES-401	PWR Examination Outline													Form ES-401-2	
Plant Systems - Tier 2/Group 1 (RO)															
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)		IR	#
003 Reactor Coolant Pump				0 2							0 6		Knowledge of RCPS design feature(s) and/or interlock(s) which provide for the following: Prevention of cold water accidents or transients; Ability to manually operate and/or monitor in the control room: RCP parameters	2.5; 2.9	2
004 Chemical and Volume Control			0 7										Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: PZR level and pressure	3.8	1
005 Residual Heat Removal											0 3		Ability to manually operate and/or monitor in the control room: RHR temperature, PZR heaters and flow, and nitrogen	2.8	1
006 Emergency Core Cooling							0 7						Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: Pressure, high and low	3.3	1
007 Pressurizer Relief/Quench Tank							0 3					02; 03	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Monitoring quench tank temperature; Knowledge of the design, procedural, and operational differences between units.	2.6; 3.8	2
008 Component Cooling Water		0 2											Knowledge of bus power supplies to the following: CCW pump, including emergency backup	3.0	1
010 Pressurizer Pressure Control						0 2							Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: PZR	3.2	1
012 Reactor Protection				0 1									Knowledge of the operational implications of the following concepts as the apply to the RPS: DNB	3.3	1
013 Engineered Safety Features Actuation								0 3					Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; Rapid depressurization	4.4	1
022 Containment Cooling		0 1										04; 02	Knowledge of power supplies to the following: Containment cooling fans; Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	3; 4.5	2
025 Ice Condenser															0
026 Containment Spray			0 2				0 2						Knowledge of the effect that a loss or malfunction of the CSS will have on the following: Recirculation spray system; Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: Containment temperature	4.2; 3.6	2
039 Main and Reheat Steam								0 4					Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Malfunctioning steam dump	3.4	1
059 Main Feedwater	0 3							0 7					Knowledge of the physical connections and/or cause-effect relationships between the MFW and the following systems S/Gs; Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Tripping of MFW pump turbine	3.1; 3	2
061 Auxiliary/Emergency Feedwater					0 5								Knowledge of the operational implications of the following concepts as the apply to the AFW: Feed line voiding and water hammer	2.7	1
062 AC Electrical Distribution			0 3								0 2		Knowledge of ac distribution system design feature(s) and/or interlock(s) which provide for the following: Interlocks between automatic bus transfer and breakers; Ability to manually operate and/or monitor in the control room: Remote racking in and out of breakers	2.8; 2.5	2
063 DC Electrical Distribution	0 2												Knowledge of the physical connections and/or cause-effect relationships between the DC electrical system and the following systems: AC electrical system	2.7	1
064 Emergency Diesel Generator						0 7					0 1		Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Air receivers; Ability to manually operate and/or monitor in the control room: Local and remote operation of the ED/G	2.7; 4	2
073 Process Radiation Monitoring			0 2										Knowledge of PRM system design feature(s) and/or interlock(s) which provide for the following: Letdown isolation on high-RCS activity	3.3	1
076 Service Water												01; 25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	1
078 Instrument Air										0 1			Ability to monitor automatic operation of the IAS, including: Air pressure	3.1	1
103 Containment										0 1			Ability to monitor automatic operation of the containment system, including: Containment isolation	3.9	1
															0
K/A Category Totals:	2	2	2	3	2	2	3	3	2	4	3		Group Point Total:		28

ES-401	PWR Examination Outline											Form ES-401-2		
Plant Systems - Tier 2/Group 2 (RO)														
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
001 Control Rod Drive														0
002 Reactor Coolant								0 3				Ability to (a) predict the impacts of the following malfunctions or operations on the RCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of forced circulation	4.1	1
011 Pressurizer Level Control		0 2										Knowledge of bus power supplies to the following: PZR heaters	3.1	1
014 Rod Position Indication	0 1											Knowledge of the physical connections and/or cause-effect relationships between the RPIS and the following systems: CRDS	3.2	1
015 Nuclear Instrumentation										0 3		Ability to manually operate and/or monitor in the control room: Trip bypasses	3.8	1
016 Non-nuclear Instrumentation											04. 31	Knowledge of annunciator alarms, indications, or response procedures.	4.2	1
017 In-core Temperature Monitor														0
027 Containment Iodine Removal														0
028 Hydrogen Recombiner and Purge Control														0
029 Containment Purge				0 3								Knowledge of design feature(s) and/or interlock(s) which provide for the following: Automatic purge isolation	3.2	1
033 Spent Fuel Pool Cooling							0 1					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Spent Fuel Pool Cooling System operating the controls including: Spent fuel pool water level	2.7	1
034 Fuel Handling Equipment														0
035 Steam Generator														0
041 Steam Dump/Turbine Bypass Control														0
045 Main Turbine Generator									1 1			Ability to monitor automatic operation of the MT/G system, including: Generator trip	2.6	1
055 Condenser Air Removal			0 1									Knowledge of the effect that a loss or malfunction of the CARS will have on the following: Main condenser	2.5	1
056 Condensate														0
068 Liquid Radwaste						1 0						Knowledge of the effect of a loss or malfunction on the following will have on the Liquid Radwaste System: Radiation monitors	2.5	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	1	1	0	1	1	1	1	1	1	Group Point Total:		10

ES-401		PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (SRO)										
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
000007 Reactor Trip / 1									0	
CE/E02 Reactor Trip Recovery / 1										
000008 Pressurizer Vapor Space Accident / 3									0	
000009 Small Break LOCA / 3						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	
000011 Large Break LOCA / 3									0	
000015 RCP Malfunctions / 4									0	
000017 RCP Malfunctions (Loss of RC Flow) / 4									0	
000022 Loss of Rx Coolant Makeup / 2									0	
000025 Loss of RHR System / 4					0 6		Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Existence of proper RHR overpressure protection	3.4	1	
000026 Loss of Component Cooling Water / 8									0	
000027 Pressurizer Pressure Control System Malfunction / 3									0	
000029 ATWS / 1									0	
000038 Steam Gen. Tube Rupture / 3						04 09	Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	1	
000040 Steam Line Rupture / 4									0	
CE/E05 Excessive Steam Demand / 4										
000054 Loss of Main Feedwater / 4									0	
CE/E06 Loss of Feedwater / 4										
000055 Station Blackout / 6						04 08	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	4.5	1	
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 5		Ability to determine and interpret the following as they apply to the Loss of Instrument Air: When to commence plant shutdown if instrument air pressure is decreasing	4.1	1	
000077 Generator Voltage and Electric Grid Disturbances / 6					0 2		Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: Voltage outside the generator capability curve	3.6	1	
K/A Category Totals:	0	0	0	0	3	3	Group Point Total:		6	

ES-401	PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (SRO)									
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
000037 Steam Generator Tube Leak / 3									0
000051 Loss of Condenser Vacuum / 4									0
000059 Accidental Liquid RadWaste Rel. / 9									0
000060 Accidental Gaseous Radwaste Rel. / 9									0
000061 ARM System Alarms / 7									0
000067 Plant Fire On-site / 9 8						01 31	Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.3	1
000068 Control Room Evac. / 8						05	Ability to determine and interpret the following as they apply to the Control Room Evacuation: Availability of heat sink	4.3	1
000069 Loss of CTMT Integrity / 5									0
000074 Inad. Core Cooling / 4									0
000076 High Reactor Coolant Activity / 9						06	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: Response of PZR LCS to changes in the letdown flow rate	2.5	1
CE/A13 Natural Circ. / 4									0
CE/A11 RCS Overcooling / 4									0
CE/A16 Excess RCS Leakage / 2						04 46	Ability to verify that the alarms are consistent with the plant conditions.	4.2	1
CE/E09 Functional Recovery									0
									0
									0
									0
									0
									0
									0
									0
									0
									0
									0
									0
									0
K/A Category Totals:	0	0	0	0	2	2	Group Point Total:		4

ES-401	PWR Examination Outline										Form ES-401-2			
Plant Systems - Tier 2/Group 1 (SRO)														
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
004 Chemical and Volume Control														0
005 Residual Heat Removal														0
006 Emergency Core Cooling								0	9			Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Radioactive release from venting RWST to atmosphere	3.2	1
007 Pressurizer Relief/Quench Tank														0
008 Component Cooling Water														0
010 Pressurizer Pressure Control								0	1			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: Heater failures	3.6	1
012 Reactor Protection														0
013 Engineered Safety Features Actuation														0
022 Containment Cooling														0
025 Ice Condenser														0
026 Containment Spray														0
039 Main and Reheat Steam														0
059 Main Feedwater														0
061 Auxiliary/Emergency Feedwater											01.30	Ability to locate and operate components, including local controls.	4.0	1
062 AC Electrical Distribution														0
063 DC Electrical Distribution														0
064 Emergency Diesel Generator														0
073 Process Radiation Monitoring											04.01	Knowledge of EOP entry conditions and immediate action steps.	4.8	1
076 Service Water														0
078 Instrument Air								0	1			Ability to (a) predict the impacts of the following malfunctions or operations on the IAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Air dryer and filter malfunctions	2.9	1
103 Containment														0
														0
K/A Category Totals:	0	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:	5

ES-401	PWR Examination Outline											Form ES-401-2		
Plant Systems - Tier 2/Group 2 (SRO)														
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												04.50 Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.0	1
002 Reactor Coolant														0
011 Pressurizer Level Control														0
014 Rod Position Indication														0
015 Nuclear Instrumentation														0
016 Non-nuclear Instrumentation														0
017 In-core Temperature Monitor														0
027 Containment Iodine Removal														0
028 Hydrogen Recombiner and Purge Control														0
029 Containment Purge														0
033 Spent Fuel Pool Cooling														0
034 Fuel Handling Equipment														0
035 Steam Generator														0
041 Steam Dump/Turbine Bypass Control								03				Ability to (a) predict the impacts of the following malfunctions or operations on the SDS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of IAS	3.1	1
045 Main Turbine Generator														0
055 Condenser Air Removal														0
056 Condensate														0
068 Liquid Radwaste														0
071 Waste Gas Disposal								01				Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Use of WGDS to prevent entry of oxygen into holdup tanks during liquid transfers	2.8	1
072 Area Radiation Monitoring														0
075 Circulating Water														0
079 Station Air														0
086 Fire Protection														0
K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	1	Group Point Total:		3

Facility Name:CCNPP Date of Exam:3/25/2019						
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1. 01	Knowledge of conduct of operations requirements.	3.8	1	4.2	
	2.1. 25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	1	4.2	
	2.1. 36	Knowledge of procedures and limitations involved in core alterations.	3.0	1	4.1	
	2.1. 29	Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.	4.1		4.0	1
	2.1.					
	2.1.					
	Subtotal				3	
2. Equipment Control	2.2. 20	Knowledge of the process for managing troubleshooting activities.	2.6	1	3.8	
	2.2. 43	Knowledge of the process used to track inoperable alarms.	3.0	1	3.3	
	2.2. 15	Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc.	3.9		4.3	1
	2.2. 21	Knowledge of pre- and post-maintenance operability requirements.	2.9		4.1	1
	2.2.					
	2.2.					
	Subtotal				2	
3. Radiation Control	2.3. 11	Ability to control radiation releases.	3.8	1	4.3	
	2.3. 14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	1	3.8	
	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	2.9	
	2.3. 04	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2		3.7	1
	2.3. 07	Ability to comply with radiation work permit requirements during normal or abnormal conditions.	3.5		3.6	1
	2.3.					
	Subtotal				3	
4. Emergency Procedures / Plan	2.4. 23	Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.	3.4	1	4.4	
	2.4. 43	Knowledge of emergency communications systems and techniques.	3.2	1	3.8	
	2.4. 34	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2		4.1	1
	2.4. 46	Ability to verify that the alarms are consistent with the plant conditions.	4.2		4.2	1
	2.4.					
	2.4.					
	Subtotal				2	
Tier 3 Point Total				10		7