Form 4.1-PWR Pressurized-Water Reactor Examination Outline

Facility: Palo Verde	**K/A Catalog Rev. 3**	**Rev.** 2	**Date of Exam:** 5/6/2024

Tier	Group	RO K/A Category Points												**SRO-Only Points**				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	**A2**		**G***		**Total**
1. Emergency and Abnormal Plant Evolutions	1	3	3	3				3	3			3	18	**3**		**3**		**6**
	2	1	2	1				1	2			1	8	**2**		**2**		**4**
	Tier Totals	4	5	4				4	5			4	26	**5**		**5**		**10**
2. Plant Systems	1	3	3	2	2	2	3	2	3	3	3	2	28	**2**		**3**		**5**
	2	1	0	1	1	1	0	1	1	1	1	1	9	**0**	**2**	**1**		**3**
	Tier Totals	4	3	3	3	3	3	3	4	4	4	3	37	**4**		**4**		**8**

3. Generic Knowledge and Abilities Categories	CO	EC	RC	EM		**CO**	**EC**	**RC**	**EM**	
	2	2	1	1	6	**2**	**2**	**1**	**2**	**7**

4. Theory	Reactor Theory	Thermodynamics	
	3	3	6

Notes: CO = Conduct of Operations; EC = Equipment Control; RC = Radiation Control;
EM = Emergency Procedures/Plan

* These systems/evolutions may be eliminated from the sample when Revision 2 of the K/A catalog is used to develop the sample plan.

** These systems/evolutions are only included as part of the sample (as applicable to the facility) when Revision 2 of the K/A catalog is used to develop the sample plan.

ES-4.1-PWR PWR Examination Outline (Palo Verde)

Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/**SRO**)

Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
1	(008) (APE 8) Pressurizer Vapor Space Accident		X					(008AK2.11) Knowledge of the relationship between (APE 8) PRESSURIZER VAPOR Space Accident and the following systems or components: PZR safeties (CFR: 41.7 / 45.7)	4.0	1
2	(009) (EPE 9) Small Break LOCA	X						(009EK1.01) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (EPE 9) SMALL-Break LOCA: Natural circulation and cooling, including reflux boiling (CFR: 41.8 / 41.10 / 45.3)	3.8	2
3	(011) (EPE 11) Large Break LOCA	X						(011EK1.08) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (EPE 11) LARGE-Break LOCA: Containment hydrogen concentration (CFR: 41.8 / 41.10 / 45.3)	3.6	3
4	(015) (APE 15) Reactor Coolant Pump Malfunctions						X	(G2.2.17) EQUIPMENT CONTROL (015) (APE 15) Reactor Coolant Pump Malfunctions: Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator (CFR: 41.10 / 43.5 / 45.13)	2.6	4
5	(022) (APE 22) Loss of Reactor Coolant Makeup	X						(022AK1.05) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 22) LOSS OF REACTOR Coolant Makeup: How long a PZR level can be maintained within limits (CFR: 41.8 / 41.10 / 45.3 / 45.3)	3.5	5
6	(025) (APE 25) Loss of Residual Heat Removal System					X		(025AA2.07) Ability to determine and/or interpret the following as they apply to (APE 25) LOSS OF RESIDUAL Heat Removal System: Pump cavitation (CFR: 43.5 / 45.13)	3.6	6
7	(026) (APE 26) Loss of Component Cooling Water		X					(026AK2.01) Knowledge of the relationship between (APE 26) LOSS OF Component Cooling Water and the following systems or components: CVCS (CFR: 41.8 / 41.10 / 45.3)	3.6	7
8	(027) (APE 27) Pressurizer Pressure Control System Malfunction		X					(027AK2.09) Knowledge of the relationship between (APE 27) PRESSURIZER PRESSURE Control System Malfunction and the following systems or components: PZR spray (CFR: 41.7 / 45.7)	4.0	8
9	(029) (EPE 29) Anticipated Transient Without Scram				X			(029EA1.15) Ability to operate and/or monitor the following as they apply to (EPE 29) ANTICIPATED TRANSIENT WITHOUT SCRAM (ATWS): AFW system (CFR: 41.7 / 45.5 / 45.6)	3.8	9
10	(038) (EPE 38) Steam Generator Tube Rupture			X				(038EK3.01) Knowledge of the reasons for the following response and/or actions as they apply to a Steam Generator Tube Rupture: Controlling RCS pressure for equalizing pressure on primary and secondary sides of ruptured S/G (CFR: 41.5 / 41.10 / 45.6 / 45.13)	4.1	10
11	(040) (APE 40; BW E05; CE E05; W E12) Steam Line Rupture – Excessive Heat Transfer						X	(G2.1.7) CONDUCT OF OPERATIONS (040) (APE 40; BW E05; CE E05; W E12) Steam Line Rupture – Excessive Heat Transfer: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation (CFR: 41.5 / 43.5 / 45.12 / 45.13)	4.4	11
12	(054) (APE 54; CE E06) Loss of Main Feedwater			X				(CE06EK3.05) Knowledge of the reasons for the following responses and/or actions as they apply to (CE E06) LOSS OF FEEDWATER: Stop all RCPs (CFR: 41.5 / 41.10 / 45.6 / 45.13)	4.1	12

13	(055) (EPE 55) Station Blackout				X			(055EA1.11) Ability to operate and/or monitor the following as they apply to (EPE 55) Station Blackout: AC electrical distribution system (CFR: 41.7 / 45.5 / 45.6)	4.0	13
14	(056) (APE 56) Loss of Offsite Power						X	(G2.1.30) CONDUCT OF OPERATIONS (056) (APE 56) Loss of Offsite Power: Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)	4.4	14
15	(057) (APE 57) Loss of Vital AC Instrument Bus				X			(057AA1.04) Ability to operate and/or monitor the following as they apply to (APE 57) LOSS OF VITAL AC ELECTRICALINSTRUMENT BUS: RWST and VCT valves(CFR: 41.7 / 45.5 / 45.6)	3.8	15
16	(062) (APE 62) Loss of Nuclear Service Water			X				(062AK3.03 Knowledge of the reasons for the following responses and/or actions as they apply to (APE 62) LOSS OF SERVICE WATER: Guidance actions contained in AOPs for loss of service water (CFR: 41.4 / 41.8 / 45.7)	3.9	16
17	(065) (APE 65) Loss of Instrument Air					X		(065AA2.10) Ability to determine and/or interpret the following as they apply to (APE 65) LOSS OF Instrument Air: Instrument air pressure (CFR: 41.10 / 43.5 / 45.13)	3.8	17
18	(077) (APE 77) Generator Voltage and Electric Grid Disturbances					X		(077AA2.04) Ability to determine and/or interpret the following as they apply to (APE 77) GENERATOR VOLTAGE AND ELECTRIC Grid Disturbances: VAR (CFR: 41.5 / 43.5 / 45.5 / 45.7 / 45.8)	3.6	18
19	**(007) (EPE 7; BW E02 & E10; CE E02) Reactor Trip, Stabilization, Recovery**						**X**	**(G2.4.4) EMERGENCY PROCEDURES/PLAN (007) (EPE 7; BW E02 & E10; CE E02) Reactor Trip, Stabilization, Recovery: Ability to recognize abnormal indication for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6)**	**4.7**	**76**
20	**(011) (EPE 11) Large Break LOCA**					**X**		**(011EA2.11) Ability to determine and/or interpret the following as they apply to (EPE 11) LARGE-Break LOCA: Throttling or stopping HPI (CFR: 43.5 / 45.13)**	**3.9**	**77**
21	**(026) (APE 26) Loss of Component Cooling Water**						**X**	**(026) (APE 26) Loss of Component Cooling Water (G2.4.29) EMERGENCY PROCEDURES/PLAN: Knowledge of the emergency plan implementing procedures (CFR: 41.10 / 43.5 / 45.11)**	**4.4**	**78**
22	**(029) (EPE 29) Anticipated Transient Without Scram**					**X**		**(029EA2.13) Ability to determine and/or interpret the following as they apply to (EPE 29) ANTICIPATED TRANSIENT WITHOUT SCRAM (ATWS): RCS cooldown or heatup (CFR: 43.5 / 45.13)**	**3.9**	**79**
23	**(058) (APE 58) Loss of DC Power**						**X**	**(G2.1.9) CONDUCT OF OPERATIONS (058) (APE 58) Loss of DC Power: Ability to direct licensed personnel activities inside the control room (SRO Only) (CFR 43.1 / 45.5 / 45.12 / 45.13)**	**4.5**	**80**
24	**(065) (APE 65) Loss of Instrument Air**					**X**		**(065AA2.02) Ability to determine and/or interpret the following as they apply to (APE 65) LOSS OF Instrument Air: Airflow readings (CFR: 41.10 / 43.5 / 45.13)**	**2.7**	**81**
	(W E04) LOCA Outside Containment / 3									
	(W E11) Loss of Emergency Coolant Recirculation / 4									

	(BW E04; W E05) Inadequate Heat Transfer – Loss of Secondary Heat Sink / 4									
K/A Category Totals:		3	3	3	3	6	6	Group Point Total:		24

ES-4.1-PWR	PWR Examination Outline (Palo Verde) Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/**SRO**)									
Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
25	(001) (APE 1) Continuous Rod Withdrawal				X			(001AA1.13) Ability to operate and/or monitor the following as they apply to (APE 1) CONTINUOUS Rod Withdrawal: CRDS (CFR: 41.7 / 45.5 / 45.6)	3.7	19
26	(003) (APE 3) Dropped Control Rod	X						(003AK1.01) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 3) DROPPED Control Rod: Turbine load reduction (CFR: 41.8 / 41.10 / 45.3)	3.7	20
27	(032) (APE 32) Loss of Source Range Nuclear Instrumentation						X	(032) (APE 32) Loss of Source Range Nuclear Instrumentation (G2.4.31) EMERGENCY PROCEDURES/PLAN: Knowledge of annunciator alarms, indications, or response procedures (CFR 41.10 / 45.3)	4.2	21
28	(033) (APE 33) Loss of Intermediate Range Nuclear Instrumentation					X		(033AA2.01) Ability to determine and/or interpret the following as they apply to (APE 33) LOSS OF INTERMEDIATE RANGE Nuclear Instrumentation: Equivalency among source range, intermediate range, and power range channel readings (CFR: 43.5 / 45.13)	3.0	22
29	(067) (APE 67) Plant Fire On Site		X					(067AK2.07) Knowledge of the relationship between (APE 67) PLANT Fire On-Site and the following systems or components: Electrical distribution system (CFR: 41.7 / 45.7)	3.3	23
30	(068) (APE 68; BW A06) Control Room Evacuation			X				(068AK3.17) Knowledge of the reasons for the following responses and/or actions as they apply to (APE 68) Control Room Evacuation: Injection of boric acid into the RCS (CFR: 41.5 / 41.10 / 45.6 / 45.13)	3.8	24
31	(074) (EPE 74; W E06 & E07) Inadequate Core Cooling		X					(074EK2.07) Knowledge of the relationship between (EPE 74) Inadequate Core Cooling and the following systems or components: Main steam system (CFR: 41.7 / 45.7)	3.4	25
32	(078) (APE 78*) RCS Leak					X		(078AA2.12) Ability to determine and/or interpret the following as they apply to (APE 78) REACTOR COOLANT SYSTEM LEAK: RCS water inventory balance and TS limits (CFR: 43.5 / 45.13)	4.0	26
33	**(028) (APE 28) Pressurizer (PZR) Level Control Malfunction**						**X**	**(G2.2.45) EQUIPMENT CONTROL (028) (APE 28) Pressurizer (PZR) Level Control Malfunction: Ability to determine and/or interpret TS with action statements of greater than 1 hour (SRO Only) (CFR: 41.10 / 43.3 / 45.13)**	**4.7**	**82**
34	**(036) (APE 36; BW/A08) Fuel-Handling Incidents**					**X**		**(036AA2.01) Ability to determine and/or interpret the following as they apply to (APE 36) FUEL HANDLING INCIDENTS: Radiation monitoring equipment indications (CFR: 41.7 / 43.5 / 43.7 / 45.13)**	**3.7**	**83**
35	**(061) (APE 61) Area Radiation Monitoring System Alarms**					**X**		**(061AA2.06) Ability to determine and/or interpret the following as they apply to (APE 61) AREA RADIATION MONITORING (ARM) System Alarms: Required actions if the alarm channel is out of service (CFR: 43.5 / 45.13)**	**3.3**	**84**
36	**(CE E13*) Loss of Forced Circulation/LOOP/Blackout**						**X**	**(G2.1.20) CONDUCT OF OPERATIONS (CE E13*) Loss of Forced Circulation/LOOP/Blackout: Ability to interpret and execute procedure steps (CFR 41.10 / 43.5 / 45.12)**	**4.6**	**85**
	(005) (APE 5) Inoperable/Stuck Control Rod / 1									

	(024) (APE 24) Emergency Boration / 1									
	(037) (APE 37) Steam Generator Tube Leak / 3									
	(051) (APE 51) Loss of Condenser Vacuum / 4									
	(059) (APE 59) Accidental Liquid Radwaste Release / 9									
	(060) (APE 60) Accidental Gaseous Radwaste Release / 9									
	(069) (APE 69; W E14) Loss of Containment Integrity / 5									
	(076) (APE 76) High Reactor Coolant Activity / 9									
	(W E01 & E02) Rediagnosis & SI Termination / 3									
	(W E13) Steam Generator Overpressure / 4									
	(W E15) Containment Flooding / 5									
	(W E16) High Containment Radiation /9									
	(BW A01) Plant Runback / 1									
	(BW A02 & A03) Loss of NNI-X/Y/7									
	(BW A04) Turbine Trip / 4									
	(BW A05) Emergency Diesel Actuation / 6									
	(BW A07) Flooding / 8									
	(BW E03) Inadequate Subcooling Margin / 4									
	(BW E08; W E03) LOCA Cooldown – Depressurization / 4									
	(BW E09; CE A13**; W E09 & E10) Natural Circulation/4									

	(BW E13 & E14) EOP Rules and Enclosures									
	(CE A11**; W E08) RCS Overcooling – Pressurized Thermal Shock / 4									
	(CE A16) Excess RCS Leakage / 2									
	(CE E09) Functional Recovery									
K/A Category Totals:		1	2	1	1	4	3	Group Point Total:		12

ES-4.1-PWR	PWR Examination Outline (Palo Verde)														
	Plant Systems—Tier 2/Group 1 (RO/**SRO**)														
Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
37	(003) (SF4P RCP) REACTOR COOLANT PUMP SYSTEM			X									(003K3.02) Knowledge of the effect that a loss or malfunction of the (SF4P RCP) REACTOR COOLANT PUMP SYSTEM will have on the following systems or system parameters: S/G (CFR: 41.7 / 45.6)	3.9	27
38	(004) (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM								X				(004A2.21) Ability to (a) predict the impacts of the following on the (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Excessive letdown flow, pressure, and temperatures on ion exchange resins (CFR: 41.5 to 41.7 / 43.5 / 45.3 / 45.5)	2.9	28
39	(005) (SF4P RHR) RESIDUAL HEAT REMOVAL SYSTEM		X										(005K2.01) Knowledge of electrical power supplies to the following: (SF4P RHR) RESIDUAL HEAT REMOVAL SYSTEM RHR pumps (CFR: 41.7)	4.1	29
40	(006) (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM				X								(006K4.08) Knowledge of (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM design features and/or interlocks that provide for the following: Recirculation flowpath of reactor building sump (CFR: 41.7 / 41.8)	3.9	30
41	(007) (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM	X											(007K1.04) Knowledge of the physical connections and/or cause and effect relationships between the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM and the following systems: Nitrogen system (CFR: 41.2 to 41.9 / 45.7 / 45.8)	2.6	31
42	(008) (SF8 CCW) COMPONENT COOLING WATER SYSTEM									X			(008A3.06) Ability to monitor automatic features of the (SF8 CCW) COMPONENT COOLING WATER SYSTEM, including: Typical CCW pump operating conditions, including vibration and sound levels and motor current (CFR: 41.7 / 45.5)	2.7	32

43	(010) (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM							X					(010A1.14) Ability to predict and/or monitor changes in parameters associated with operation of the (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM, including: RCS temperature (CFR: 41.5 / 45.5)	3.3	33
44	(010) (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM										X		(010A4.02) Ability to manually operate and/or monitor the (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM in the control room: PZR heaters (CFR: 41.7 / 45.5 to 45.8)	3.6	34
45	(012) (SF7 RPS) REACTOR PROTECTION SYSTEM											X	(G2.2.2) EQUIPMENT CONTROL (012) (SF7 RPS) REACTOR PROTECTION SYSTEM: Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels (CFR: 41.10 / 43.1 / 45.13)	4.6	35
46	(013) (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM						X						(013K6.09) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM: Main steamline break (CFR: 41.6 to 41.8 / 45.5 to 45.8)	4.0	36
47	(022) (SF5 CCS) CONTAINMENT COOLING SYSTEM									X			(022A3.02) Ability to monitor automatic features of the (SF5 CCS) CONTAINMENT COOLING SYSTEM, including: Containment coolers cooling water flow (CFR: 41.7 / 45.5)	3.6	37
48	(022) (SF5 CCS) CONTAINMENT COOLING SYSTEM		X										(022K2.01) Knowledge of electrical power supplies to the following: (SF5 CCS) CONTAINMENT COOLING SYSTEM CCS fans (CFR: 41.7)	3.6	38
49	(026) (SF5 CSS) CONTAINMENT SPRAY SYSTEM			X									(026K3.01) Knowledge of the effect that a loss or malfunction of the (SF5 CSS) CONTAINMENT SPRAY SYSTEM will have on the following systems or system parameters: CCS (CFR: 41.7 / 45.6)	3.8	39
50	(039) (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM									X			(039A3.01) Ability to monitor automatic features of the (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM, including: Moisture separator reheater steam supply (CFR: 41.5 / 45.5)	2.8	40

51	(039) (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM					X							(039K5.09) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM: Expected values of main steam temperature downstream of MSIVs during warmup (CFR: 41.5 / 45.7)	2.6	41
52	(059) (SF4S MFW) MAIN FEEDWATER SYSTEM	X											(059K1.02) Knowledge of the physical connections and/or cause and effect relationships between the (SF4S MFW) MAIN FEEDWATER SYSTEM and the following systems: AFW system (CFR: 41.2 to 41.9 / 45.7 / 45.8)	3.9	42
53	(059) (SF4S MFW) MAIN FEEDWATER SYSTEM				X								(059K4.22) Knowledge of (SF4S MFW) MAIN FEEDWATER SYSTEM design features and/or interlocks that provide for the following: S/G water LCS (CFR: 41.7)	3.8	43
54	(061) (SF4S AFW) AUXILIARY / EMERGENCY FEEDWATER SYSTEM					X							(061K5.02) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF4S AFW) AUXILIARY/EMERGENCY FEEDWATER SYSTEM: Decay heat sources and magnitude (CFR: 41.5 / 45.7)	3.9	44
55	(062) (SF6 ED AC) AC ELECTRICAL DISTRIBUTION SYSTEM										X		(062A4.02) Ability to manually operate and/or monitor the (SF6 ED AC) AC ELECTRICAL DISTRIBUTION SYSTEM in the control room: Racking in and out of breakers (CFR: 41.7 / 45.5 to 45.8)	2.9	45
56	(062) (SF6 ED AC) AC ELECTRICAL DISTRIBUTION SYSTEM		X										(062K2.01) Knowledge of electrical power supplies to the following: (SF6 ED AC) AC ELECTRICAL DISTRIBUTION SYSTEM Major bus or motor control center power supplies (CFR: 41.7)	3.8	46
57	(063) (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM						X						(063K6.07) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM: Loss of all AC power (CFR: 41.7 / 45.7)	4.3	47

58	(064) (SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM								X				(064A2.29) Ability to (a) predict the impacts of the following on the (SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: ESFAS actuation (CFR: 41.5 / 43.5 / 45.3 / 45.13)	4.3	48
59	(064) (SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM						X						(064K6.09) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM: EDG building ventilation (CFR: 41.7 / 45.7)	3.2	49
60	(073) (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM								X				(073A2.01) Ability to (a) predict the impacts of the following on the (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: PRM component failures (CFR: 41.5 / 43.5 / 45.3 / 45.13 / 8-9)	3.9	50
61	(073) (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM	X											(073K1.08) Knowledge of the physical connections and/or cause and effect relationships between the (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM and the following systems: SWS (CFR: 41.7 to 41.9 / 41.11 / 45.8 / 45.9)	3.1	51
62	(076) (SF4S SW) SERVICE WATER SYSTEM										X		(076A4.01) Ability to manually operate and/or monitor the (SF4S SW) SERVICE WATER SYSTEM in the control room: SWS pumps (CFR: 41.7 / 45.5 to 45.8)	3.9	52
63	(078) (SF8 IAS) INSTRUMENT AIR SYSTEM											X	(G2.1.45) CONDUCT OF OPERATIONS (078) (SF8 IAS) INSTRUMENT AIR SYSTEM): Ability to identify and interpret diverse indications to validate the response of another indication (CFR 41.7 / 43.5 / 45.4)	4.3	53

64	(103) (SF5 CNT) CONTAINMENT SYSTEM							X					(103A1.01) Ability to predict and/or monitor changes in parameters associated with operation of the (SF5 CNT) CONTAINMENT SYSTEM, including: Containment pressure, temperature, and/or humidity (CFR: 41.5 / 45.5)	3.9	54
65	**(006) (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM**										**X**		**(G2.2.22) EQUIPMENT CONTROL (006) (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM: Knowledge of limiting conditions for operation and safety limits (CFR: 41.5 / 43.2 / 45.2)**	**4.7**	**86**
66	**(007) (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM**								**X**				**(007A2.01) Ability to (a) predict the impacts of the following on the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: A PORV that is stuck open, or code safety valve (CFR: 41.5 / 43.5 / 45.3 / 45.13)**	**4.1**	**87**
67	**(012) (SF7 RPS) REACTOR PROTECTION SYSTEM**										**X**		**(G2.1.32) CONDUCT OF OPERATIONS (012) (SF7 RPS) REACTOR PROTECTION SYSTEM: Ability to explain and apply system precautions, limitations, notes, or cautions (CFR: 41.10 / 43.2 / 45.12)**	**4.0**	**88**
68	**(013) (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM**										**X**		**(G2.2.14) EQUIPMENT CONTROL (013) (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM: Knowledge of the process for controlling equipment configuration or status (CFR: 41.10 / 43.3 / 45.13)**	**4.3**	**89**
69	**(026) (SF5 CSS) CONTAINMENT SPRAY SYSTEM**								**X**				**(026A2.07) Ability to (a) predict the impacts of the following on the (SF5 CSS) CONTAINMENT SPRAY SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of containment spray pump suction when in recirculation mode (CFR: 41.5 / 43.5 / 45.3 / 45.13)**	**3.9**	**90**

	(025) (SF5 ICE) ICE CONDENSER SYSTEM														
	(053) (SF1; SF4P ICS*) INTEGRATED CONTROL SYSTEM														
K/A Category Totals:		3	3	2	2	2	3	2	5	3	3	5	Group Point Total:		33

ES-4.1-PWR	PWR Examination Outline (Palo Verde) Plant Systems—Tier 2/Group 2 (RO/**SRO**)														
Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
70	(001) (SF1 CRDS) CONTROL ROD DRIVE SYSTEM										X		(001A4.04) Ability to manually operate and/or monitor the (SF1 CRDS) CONTROL ROD DRIVE SYSTEM in the control room: Part-length rod position (CFR: 41.6 / 45.5 to 45.8)	2.9	55
71	(002) (SF2; SF4P RCS) REACTOR COOLANT SYSTEM							X					(002A1.11) Ability to predict and/or monitor changes in parameters associated with operation of the (SF2; SF4P RCS) REACTOR COOLANT SYSTEM, including: Relative level indications in the RWST, the refueling cavity, the PZR, and the reactor vessel during preparation for refueling (CFR: 41.5 / 45.7)	3.3	56
72	(011) (SF2 PZR LCS) PRESSURIZER LEVEL CONTROL SYSTEM											X	(191002K1.09) Sensors and Detectors | Level (011) (SF2 PZR LCS) PRESSURIZER LEVEL CONTROL SYSTEM: Modes of failure (CFR: 41.7)	3.0	57
73	(014) (SF1 RPI) ROD POSITION INDICATION SYSTEM			X									(014K3.02) Knowledge of the effect that a loss or malfunction of the (SF1 RPI) ROD POSITION INDICATION SYSTEM will have on the following systems or system parameters: Plant computer (CFR: 41.7 / 45.6)	3.2	58
74	(017) (SF7 ITM) IN CORE TEMPERATURE MONITOR SYSTEM					X							(017K5.04) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF7 ITM) IN CORE TEMPERATURE MONITOR SYSTEM: Calculated core limits (CE) (CFR: 41.5 / 45.7)	3.5	59
75	(033) (SF8 SFPCS) SPENT FUEL POOL COOLING SYSTEM	X											(033K1.09) Knowledge of the physical connections and/or cause and effect relationships between the (SF8 SFPCS) SPENT FUEL POOL COOLING SYSTEM and the following systems: RMS (CFR: 41.2 to 41.9 / 45.7 / 45.8)	3.1	60
76	(055) (SF4S CARS) CONDENSER AIR REMOVAL SYSTEM									X			(055A3.03) Ability to monitor automatic features of the (SF4S CARS) CONDENSER AIR REMOVAL SYSTEM, including: Automatic diversion of CARS exhaust (CFR: 41.7 / 45.5)	3.0	61

77	(056) (SF4S CDS) CONDENSATE SYSTEM				X							(056K4.16) Knowledge of (SF4S CDS) CONDENSATE SYSTEM design features and/or interlocks that provide for the following: Low- and high-level heater (CFR: 41.7)	2.9	62
78	(086) (SF8 FPS) FIRE PROTECTION SYSTEM								X			(086A2.05) Ability to (a) predict the impacts of the following on the (SF8 FPS) FIRE PROTECTION SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Fire in the plant (CFR: 41.5 / 43.5 / 45.3 / 45.13)	4.0	63
79	**(041) (SF4S SDS) STEAM DUMP/TURBINE BYPASS CONTROL SYSTEM**								**X**			**(041A2.06) Ability to (a) predict the impacts of the following on the (SF4S SDS) STEAM DUMP/TURBINE BYPASS CONTROL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: MT/G system (CFR: 41.5 / 43.5 / 45.3 / 45.13)**	**2.9**	**91**
80	**(068) (SF9 LRS) LIQUID RADWASTE SYSTEM**										**X**	**(G2.1.8) CONDUCT OF OPERATIONS (068) (SF9 LRS) LIQUID RADWASTE SYSTEM: Ability to coordinate personnel activities outside the control room (CFR: 41.10 / 43.1 / 45.5 / 45.12 / 45.13)**	**4.1**	**92**
81	**(034) (SF8 FHS) FUEL HANDLING EQUIPMENT SYSTEM**								**X**			**(034A2.01) Ability to (a) predict the impacts of the following on the (SF8 FHS) FUEL HANDLING EQUIPMENT SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Dropped and/or damaged fuel element (CFR: 41.4 / 41.5 / 43.7 /45.7)**	**3.6**	**93**
	(015) (SF7 NI) NUCLEAR INSTRUMENTATION SYSTEM													
	(016) (SF7 NNI) NONNUCLEAR INSTRUMENTATION SYSTEM													

	(027) (SF5 CIRS) CONTAINMENT IODINE REMOVAL SYSTEM														
	(028) (SF5 HRPS) HYDROGEN RECOMBINER AND PURGE CONTROL SYSTEM														
	(029) (SF8 CPS) CONTAINMENT PURGE SYSTEM														
	(035) (SF4P SG) STEAM GENERATOR SYSTEM														
	(045) (SF4S MTG) MAIN TURBINE GENERATOR SYSTEM														
	(050) (SF9 CRV*) CONTROL ROOM VENTILATION														
	(071) (SF9 WGS) WASTE GAS DISPOSAL SYSTEM														
	(072) (SF7 ARM) AREA RADIATION MONITORING SYSTEM														
	(075) (SF8 CW) CIRCULATING WATER SYSTEM														
	(079) (SF8 SAS**) STATION AIR SYSTEM														
K/A Category Totals:		1	0	1	1	1	0	1	3	1	1	2	Group Point Total:		12

Form 4.1-COMMON Common Examination Outline

ES-4.1-COMMON	COMMON Examination Outline (Palo Verde)		
Facility: Palo Verde		Date of Exam:	5/6/2024

Generic Knowledge and Abilities Outline (Tier 3) (RO/SRO)

Category	K/A #	Topic	Item #	RO IR	RO Q#	SRO-Only IR	SRO-Only Q#
1. Conduct of Operations	G2.1.2	(G2.1.2) CONDUCT OF OPERATIONS: Knowledge of operator responsibilities during any mode of plant operation (CFR: 41.10 / 43.1 / 45.13)	82	4.1	64		
	G2.1.23	(G2.1.23) CONDUCT OF OPERATIONS: Ability to perform general and/or normal operating procedures during any plant condition (CFR: 41.10 / 43.5 / 45.2 / 45.6)	83	4.3	65		
	G2.1.7	**(G2.1.7) CONDUCT OF OPERATIONS: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation (CFR 41.5 / 43.5 / 45.12 / 45.13)**	**84**			**4.7**	**94**
	G2.1.40	**(G2.1.40) CONDUCT OF OPERATIONS: Knowledge of refueling administrative requirements (CFR: 41.10 / 43.5 / 43.6 / 45.13)**	**85**			**3.9**	**95**
	Subtotal			N/A	2	N/A	**2**
2. Equipment Control	G2.2.6	(G2.2.6) EQUIPMENT CONTROL: Knowledge of the process for making changes to procedures (CFR: 41.10 / 43.3 / 45.13)	86	3	66		
	G2.2.23	(G2.2.23) EQUIPMENT CONTROL: Ability to track TS limiting conditions for operation (CFR: 41.10 / 43.2 / 45.13)	87	3.1	67		
	G2.2.19	**(G2.2.19) EQUIPMENT CONTROL: Knowledge of maintenance work order requirements (CFR: 41.10 / 43.5 / 45.13)**	**88**			**3.4**	**96**
	G2.2.36	**(G2.2.36) EQUIPMENT CONTROL: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operation (CFR: 41.10 / 43.2 / 45.13)**	**89**			**4.2**	**97**
	Subtotal			N/A	2	N/A	**2**
3. Radiation Control	G2.3.5	(G2.3.5) RADIATION CONTROL: Ability to use RMSs, such as fixed radiation monitors and alarms or personnel monitoring equipment (CFR: 41.11 / 41.12 / 43.4 / 45.9)	90	2.9	68		
	G2.3.11	**(G2.3.11) RADIATION CONTROL: Ability to control radiation releases (CFR: 41.11 / 43.4 / 45.10)**	**91**			**4.3**	**98**
	Subtotal			N/A	1	N/A	**1**
4. Emergency Procedures / Plan	G2.4.51	(G2.4.51) EMERGENCY PROCEDURES/PLAN: Knowledge of emergency operating procedure exit conditions (e.g., emergency condition no longer exists or severe accident guideline entry is required) (CFR: 41.10 / 43.5 /45.13)	92	3	69		
	G2.4.32	**(G2.4.32) EMERGENCY PROCEDURES/PLAN: Knowledge of operator response to loss of annunciators (CFR: 41.10 / 43.5 / 45.13)**	**93**			**4.0**	**99**
	G2.4.47	**(G2.4.47) EMERGENCY PROCEDURES/PLAN: Ability to diagnose and recognize trends in an accurate and timely manner using the appropriate control room reference material (reference potential) (CFR: 41.7 / 41.10 / 43.5 / 45.12)**	**94**			**4.2**	**100**
	Subtotal			N/A	1	N/A	**2**
Tier 3 Point Total				N/A	**6**	N/A	**7**

Form 4.1-COMMON Common Examination Outline

ES-4.1-COMMON	COMMON Examination Outline (Palo Verde)				
Facility: Palo Verde				Date of Exam:	5/6/2024

Theory (Tier 4) (RO)

Category	K/A #	Topic	Item #	RO IR	RO Q#
Reactor Theory	192006	(192006K1.01) FISSION PRODUCT POISONS (CFR: 41.1): Define fission product poison	95	2.6	70
	192007	(192007K1.05) FUEL DEPLETION AND BURNABLE POISONS (CFR: 41.1): Describe the effects of boration/dilution on reactivity during forced flow and natural circulation conditions	96	3.2	71
	192008	(192008K1.08) REACTOR OPERATIONAL PHYSICS (CFR: 41.1): (CRITICALITY) List parameters that should be monitored and controlled upon reaching criticality	97	3.7	72
	Subtotal			N/A	3
Thermodynamics	193003	(193003K1.25) STEAM (CFR: 41.14): Explain the usefulness of steam tables to the control room operator.	98	3.1	73
	193004	(193004K1.11) THERMODYNAMIC PROCESS (CFR: 41.14): (CONDENSERS) Describe the process of condensate depression (subcooling) and its effect on plant operation	99	2.5	74
	193009	(193009K1.03) CORE THERMAL LIMITS (CFR: 41.14): Explain local peaking factor	100	2.7	75
	Subtotal			N/A	3
Tier 4 Point Total				N/A	**6**

Form 4.1-1 Record of Rejected Knowledge and Abilities

Tier / Group	Randomly Selected K/A (OLD K/A)	Reason for Rejection
1 / 1 Q10	038 EK3.14	IA to Containment is only isolated on a CSAS signal, which would not occur during a SGTR since a CSAS only actuates on high Containment pressure. Reselected 038 EK3.01.
1 / 1 Q12	CE E06 EK3.12	A question can be written for the randomly selected KA, however the distractors for any question about this KA would lack any credible amount of plausibility. Reselected CE E06 EK3.05.
1 / 1 Q15	057 AA1.03	A loss of Class AC Instrument Bus power will not affect either Main or Auxiliary Feedwater. Main Feed is only impacted by a loss of Non-Class AC Instrument Bus power and Auxiliary Feed is only impacted by a loss of Class DC Control Power. Reselected 057 AA1.04.
1 / 1 Q16	062 AK3.01	Service water at PVNGS is considered either the Spray Pond System or the Plant Cooling Water System. The Spray Pond Pumps do not have isolation valves which automatically open or close. The Plant Cooling Water System indirectly does (really Circ Water System) however the intent of the KA would be lost if a question was written about Circ Water System valves automatically repositioning. Reselected 062 AK3.03.
1 / 1 Q17	065 AA2.11	PVNGS Instrument Air System uses air header pressure, not airflow meters. As such, 065 AA2.10 would have the same intent as the randomly selected KA but using the appropriate nomenclature for PVNGS. Reselected 065AA2.10.
2 / 1 Q30	*006 K4.03*	*Following review of several ECCS related operating and surveillance procedures, we were not able to find any design features, interlocks, or procedural direction to flush ECCS piping following transfers of boric acid. Reselected 006 K4.08.*
2 / 1 Q35	*012 G 2.2.13*	*Unable to find any information in any PVNGS tagging and clearance procedure which relates to RPS specific guidance, even as it relates to potential trip hazards while tagging out RPS related equipment. Reselected 012 G 2.2.2.*
2 / 1 Q52	076 A4.05	Intake screens at PVNGS are stationary and are not equipment that get operated (or monitored really). D/P across the screens is checked weekly (but not by Operations – Water Reclamation Facility checks this). If D/P is high, they call the Control Room to stop a Circ Water Pump so they can remove and clean the screen. Could ask a question about plant limitations with a pump removed from service but probably getting a bit disconnected from the KA at that point. Reselected 076 A4.01.

2 / 2 Q57	011 G 2.2.3	No differences exist on the Pressurizer Level Control System in any of the 3 units at PVNGS. Reselected 191002 K1.09 per CE direction.
2 / 2 Q63	086 A2.03	Operations department doesn't really operate fire equipment and on an A2 KA, there isn't a procedure or procedural action for them to take. Reselected 086 A2.05.
1 / 2 Q82	***028 G 2.2.7***	***The IPTE procedure at PVNGS is almost exclusively for evolutions which impact power production, plant protection or safeguards testing, high radiation or high temperature/energy systems. Additionally, the randomly selected KA doesn't lend itself to a Tier 1 question. Reselected 028 G 2.2.45 (SRO Only KA).***
2 / 1 Q90	**026 A2.05**	**PVNGS does not have Chemical Addition Tanks inside Containment (PV uses TSP on the Containment floor for mixing and recirculating post-LOCA). Reselected 026 A2.07.**
2 / 2 Q93	***072 A2.01***	***Of the 18 non-Tier 3 questions on the SRO exam, two randomly selected KAs were regarding Area Radiation Monitor failures (Q84 – 061 AA2.06, and Q93 – 072 A2.01). Given the sparce selection of area radiation monitor equipment that can be used to write a question at the SRO level, and the fact that 11% of the non-generic portion of the SRO exam would be about area radiation monitoring, I believe this is oversampling. Reselected a new T2G2 system (034 A2.01) – Selected Fuel Handling Equipment System since it was not already selected and it diversifies the 10CFR55.43 distribution on the SRO exam.***

Form 3.2-1 Administrative Topics Outline

Facility:	**PVNGS**	**Date of Examination:**	**4/29/24**
Examination Level:	**RO** [X] **SRO** [ ]	**Operating Test Number:**	**2024**

Administrative Topic (Step 1)	Activity and Associated K/A (Step 2)	Type Code (Step 3)
Conduct of Operations (A1) **K/A: 2.1.4** **IR: 3.3**	**JPM Description:** Determine the active status of an RO license and whether or not the shift can be taken over the next few days.	**D, R**
Conduct of Operations (A2) **K/A: 2.1.20** **IR: 4.6**	**JPM Description:** Perform a void check calculation for the 'A' Essential Chilled Water System per 40OP-9EC01, Essential Chilled Water Train A.	**M, R**
Equipment Control (A3) **K/A: 2.2.15** **IR: 3.9**	**JPM Description:** Calculate the expected level change in the RWT following an RCS drain down evolution per 40OP-9ZZ16, RCS Drain Operations.	**M, R**
Radiation Control **K/A:** **IR:**	**JPM Description:**	
Emergency Procedures/ Plan (A4) **K/A: 2.4.47** **IR: 4.2**	**JPM Description:** Determine the current RCS leak rate per 40AO-9ZZ02, Excessive RCS Leakrate, Appendix A, 15 Minute Leakrate Calculation.	**M, R**

Instructions for completing Form 3.2-1, "Administrative Topics Outline"

1. For each license level, determine the number of administrative job performance measures (JPMs) and topic areas as follows:

Topic	Number of JPMs	
	RO*	SRO and RO Retakes
Conduct of Operations	1 (or 2) **2**	2
Equipment Control	1 (or 0) **1**	1
Radiation Control	1 (or 0) **0**	1
Emergency Plan	1 (or 0) **1**	1
Total	**4**	**5**

*Reactor operators (RO) applicants do not need to be evaluated on every topic (i.e., "Equipment Control", "Radiation Control", or "Emergency Plan" can be omitted by doubling up on "Conduct of Operations"), unless the applicant is taking only the administrative topics part of the operating test (with a waiver or excusal of the other portions).

2. Enter the associated knowledge and abilities (K/A) statement and summarize the administrative activities for each JPM.

3. For each JPM, specify the type codes for location and source as follows:

   Location:

   (C)ontrol Room, (S)imulator, or Class(R)oom

   Source and Source Criteria:

   (P)revious two NRC exams (no more than one JPM that is **randomly selected** from last two NRC exams
   (D)irect from bank (no more than three for ROs, no more than four for senior reactor operators (SROs) and RO retakes)
   (N)ew of Significantly (M)odified from bank (no fewer than one)

A1: The applicant will be directed to determine whether or not a licensed RO is current in training and eligible to take the shift on December 31 and January 1 based on current LOCT cycle training status and watches stood in the 4th quarter of the current year. This is a bank JPM covering the Conduct of Operations KA category.

A2: The applicant will be directed to determine the void volume in the 'A' Essential Chilled Water System per 40OP-9EC01, Essential Chilled Water Train A. The applicant will be provided with initial and final readings for the void calculation and perform the associated portion of the procedure to calculate the changes in system levels, volumes and pressures to determine the total void volume in the system. This is a modified bank JPM covering the Conduct of Operations KA category.

A3: The applicant will be directed to determine the expected level change in the RWT following an RCS drain down evolution per 40OP-9ZZ16, RCS Drain Operations, Appendix F, Determination of Volume to be Drained. The applicant will be provided a starting point and ending point for the drain down, then will determine the initial and final volumes, convert the volume of water to be drained and determine the level change in the RWT (in % tank volume). This is a modified bank JPM covering the Equipment Control KA category.

A4: The applicant will be directed to perform a 15 minute leakrate calculation per 40AO-9ZZ02, Excessive RCS Leakrate, Appendix A, 15 Minute Leakrate Calculation. The applicant will be provided plant data (initial and 15 minutes later) and convert parameter changes into increases and decreases in RCS volume, then determine the total volume change over 15 minutes and convert into a gpm leakrate value. This is a modified bank JPM covering the Emergency Procedures / Plan KA category.

Form 3.2-1 Administrative Topics Outline

Facility:	**PVNGS**	**Date of Examination:**	**4/29/24**
Examination Level:	**RO** [ ] **SRO** [X]	**Operating Test Number:**	**2024**

Administrative Topic (Step 1)	Activity and Associated K/A (Step 2)	Type Code (Step 3)
Conduct of Operations (A5) **K/A: 2.1.5** **IR: 3.9**	**JPM Description:** Determine if minimum shift manning is met per 40DP-9OP02, Conduct of Operations.	**D, R**
Conduct of Operations (A6) **K/A: 2.1.39** **IR: 4.3**	**JPM Description:** Perform an online risk evaluation per 02DP-0RS01.	**M, R**
Equipment Control (A7) **K/A: 2.2.37** **IR: 4.6**	**JPM Description:** Evaluate the impact of an inadvertent Train A AFAS-1 on LCO 3.7.5, Auxiliary Feedwater System.	**N, R**
Radiation Control (A8) **K/A: 2.3.14** **IR: 3.8**	**JPM Description:** Determine the impacts and required actions following a loss of power to RU-145, Fuel Building Ventilation Exhaust Radiation Monitor, while conducting a fuel offload.	**N, R**
Emergency Procedures/ Plan (A9) **K/A: 2.4.41** **IR: 4.6**	**JPM Description:** Complete EP-0541, Palo Verde NAN Emergency Message Form.	**D, R**

Instructions for completing Form 3.2-1, "Administrative Topics Outline"

1. For each license level, determine the number of administrative job performance measures (JPMs) and topic areas as follows:

Topic	Number of JPMs	
	RO*	SRO and RO Retakes
Conduct of Operations	1 (or 2)	2
Equipment Control	1 (or 0)	1
Radiation Control	1 (or 0)	1
Emergency Plan	1 (or 0)	1
Total	**4**	**5**

*Reactor operators (RO) applicants do not need to be evaluated on every topic (i.e., "Equipment Control", "Radiation Control", or "Emergency Plan" can be omitted by doubling up on "Conduct of Operations"), unless the applicant is taking only the administrative topics part of the operating test (with a waiver or excusal of the other portions).

2. Enter the associated knowledge and abilities (K/A) statement and summarize the administrative activities for each JPM.

3. For each JPM, specify the type codes for location and source as follows:

   Location:

   (C)ontrol Room, (S)imulator, or Class(R)oom

   Source and Source Criteria:

   (P)revious two NRC exams (no more than one JPM that is **randomly selected** from last two NRC exams
   (D)irect from bank (no more than three for ROs, no more than four for senior reactor operators (SROs) and RO retakes)
   (N)ew of Significantly (M)odified from bank (no fewer than one)

A5: The applicant will be directed to determine if each unit is meeting minimum manning requirements. The applicant will be provided a complete manning sheet and unit conditions for each unit, then determine which unit(s) is(are) meeting or not meeting minimum manning requirements, and if not, explain why each unit is not meeting the requirements. This is a bank JPM covering the Conduct of Operations KA category.

A6: The applicant will be directed to determine the operational risk classification for an Essential Cooling Water Pump bearing replacement. The applicant will be informed that the 'B' EW Pump wiped a bearing during an IST 6 hours ago. Bearing replacement, and return to operable, is estimated by maintenance to have a 90% chance of being done in the next 30-48 hours, with a 10% chance it could take 48-60 hours. The applicant will determine the operational risk of this evolution using the applicable tables and notes contained in 02DP-0RS01, Online Integrated Risk, based on TS completion times and likelihood of exceeding 50% or 75% of said completion time. This is a modified bank JPM covering the Conduct of Operations KA category.

A7: The applicant will be directed to evaluate the impacts to LCO 3.7.5, Auxiliary Feedwater System, following an inadvertent Train 'A' AFAS-1 actuation and immediate operator actions taken in response to the actuation. The applicant will be provided a completed table of equipment which actuated (or failed to actuate) as well as the as-left condition for each component. Based on this information, the applicant will determine which condition(s) is(are) not met for LCO 3.7.5. This is a new JPM covering the Equipment Control KA category.

A8: The applicant will be directed to determine the impacts of a loss of power to RU-145, Fuel Building Ventilation Exhaust Radiation Monitor, while conducting a fuel offload. The applicant will refer to the Offsite Dose Calculation Manual and the TRM to determine whether or not the fuel offload may continue and what actions are required in response to the failure. This is a new JPM covering the Radiation Control KA category.

A9: The applicant will be directed to complete EP-0541, Palo Verde NAN Emergency Message Form, following the declaration of an ALERT EAL. The applicant will be provided with a screenshot of the meteorological data sheet and will have to determine which values are to be used for the NAN Message, as well as determine from the information in the cue that a release is in progress and whether or not the release is exceeding federal limits. This is a bank JPM covering the Emergency Procedure / Plan KA category.

Form 3.2-2 Control Room-Plant Systems Outline

Facility:	**PVNGS**		**Date of Examination:**	**4/29/24**
			Operating Test Number:	**2024**
Exam Level:	**[X] RO**	**[X] SRO-I**	**[X] SRO-U**	

System / JPM Type			Type Code	Safety Function
Control Room Systems				
S1	014 A2.04	Reset CEA positions following slipped CEA per 40AO-9ZZ11, CEA Malfunctions, Appendix D **(done on Ovation system in Sim A)**	**M, S**	**1**
S2 (RO Only)	013 A4.02	Reset SIAS actuation per Appendix 24, SIAS Check/Reset, Attachment 24-C, Resetting and Restoring SIAS	**EN, L, N, S**	**2**
S3	038 EA1.01	Lower SG #1 level per Appendix 33, SG 1 Level Reduction Checklist	**A, D, L**	**4P**
S4	059 A1.02	Reduce power in preparation for Main Turbine Control Valve testing	**A, N, S**	**4S**
S5	062 A4.07	Transfer NAN-S02 to MAN-X02 per 40OP-9NA03, 13.8kV Electrical System	**A, D, S**	**6**
S6	015 A4.02	Insert BD constants following inadvertent 'A' SIAS per 40OP-9SG03, Operating the SG Blowdown System	**N, S**	**7**
S7	008 A4.01	Cross-Tie NC-EW per 40AO-9ZZ03, Loss of Cooling Water	**A, M, S**	**8**
S8	050 A4.01	Verification of CRVIAS per 40AO-9ZZ26, Toxic Gas	**D, EN, S**	**9**
In-Plant Systems				
P1	062 A2.21	Energize PNA-D25 per Appendix 92, Energize PNA-D25	**D, E, L**	**6**
P2	026 A2.03	Perform Steps 19-22.1 of 40AO-9ZZ19, Control Room Fire, Appendix G, Upper Auxiliary Building Actions	**A, E, L, N, R**	**5**
P3	041 A4.02	Locally operate SBCV 1008 per Appendix 116, Operation of SBCS Valves, Attachment 116-D, Local Operation of SBCS 1008	**E, N**	**4S**

SRO-U (shaded in gray): S3 / S4 / S8 / P1 / P2

RO-Only: S2

Form 3.2-2 Instructions for Control Room-Plant Systems Outline

1. Determine the number of control room system and in-plant systems job performance measures (JPMs) to develop using the following table:

License Level	Control Room	In-Plant	Total
Reactor Operator (RO)	**8**	**3**	**11**
Senior Reactor Operator-Instant (SRO-I)	**7**	**3**	**10**
Senior Reactor Operator-Upgrade (SRO-U)	**2 or 3**	**3 or 2**	**5**

2. Select safety functions and system for each JPM as follows:

   Refer to Section 1.9 pf the applicable knowledge and abilities (K/A) catalog for the plant systems organized by safety function. For pressurized-water reactor operating tests, the primary and secondary systems listed under Safety Function 4, "Heat Removal from Reactor Core", in Section 1.9 of NUREG-1122 or NUREG-2103 may be treated as separate safety functions (i.e., two systems, one primary and one secondary, may be selected from Safety Function 4).

   From the safety function groupings identified in the K/A catalog, select the appropriate number of plant systems by safety functions to be evaluated based on the applicant's license level (see the table in step 1).

   The emergency and abnormal plant evolutions listed in Section 1.10 of the applicable K/A catalog may also be used to evaluate the applicable safety function (as specified for each emergency and abnormal plant evolution in the first tier of the written examination outlines in ES-4.1, "Preparing Written Examination Outlines").

   For RO/SRO-I applicants: Each of the control room systems JPMs and, separately, each of the in-plant systems JPMs must evaluate a different safety function, and the same system or evolution cannot be used to evaluate more than one safety function in each location. One of the control room systems JPMs must be an engineered safety feature.

   For the SRO-U applicants: Evaluate SRO-U applicants on five different safety functions. One of the control room systems JPMs must be an engineered safety feature, and the same system or evolution cannot be used to evaluate more than one safety function.

3. Select a task for each JPM that supports, either directly or indirectly and in a meaningful way, the successful fulfillment of the associated safety function. Select the task from the applicable K/A catalog or the facility licensee's site-specific task list. If this task has an associated K/A, the K/A should have an importance rating of at least 2.5 in the RO column. K/As that have importance ratings of less than 2.5 may be used if justified based on plant priorities; inform the NRC chief examiner if selecting K/As with an importance rating less than 2.5.

   The selected tasks must be different from the events and evolutions conducted during the simulator operating test and tasks tested on the written examination. A task that is similar to a simulator scenario event may be acceptable if the actions required to complete the task are significantly different from those required in response to the scenario event.

Apply the following specific task selection criteria:

- At least one of the tasks shall be related to a shutdown or low-power condition.
- Four to six of the tasks for RO and SRO-I applicants shall require execution of alternative paths within the facility licensee's operating procedures. Two to three of the tasks for SRO-U applicants shall require execution of alternative paths within the facility licensee's operating procedures.
- At least one alternate path JPM must be new or modified from the bank.
- At least one of the tasks conducted in the plant shall require the applicant to enter the radiologically controlled area. This provides an excellent opportunity for the applicant to discuss or demonstrate radiation control administrative subjects.

If it is not possible to develop or locate a suitable task for a selected system, return to step 2 and select a different system

4. For each JPM, specify the codes for type, source, and location:

Code	License Level Criteria					
	RO		SRO-I		SRO-U	
(A)lternate path	4-6	5	4-6	5	2-3	3
(C)ontrol room						
(D)irect from bank	≤ 9	4	≤ 8	4	≤ 4	3
(E)mergency or abnormal in-plant	≥ 1	3	≥ 1	3	≥ 1	2
(EN)gineered safety feature (for control room system)	≥ 1	2	≥ 1	1	≥ 1	1
(L)ow power/shutdown	≥ 1	3	≥ 1	2	≥ 1	2
(N)ew or (M)odified from bank (must apply to at least one alternate path JPM)	≥ 2	7 (3A)	≥ 2	6 (3A)	≥ 1	2 (2A)
(P)revious two exams (randomly selected)	≤ 3	0	≤ 3	0	≤ 2	0
(R)adiologically Controlled Area	≥ 1	1	≥ 1	1	≥ 1	1
(S)imulator						

S1: The applicant will be directed to reset CEA positions in Ovation following a slipped CEA per 40AO-9ZZ11, CEA Malfunctions, Appendix D, Resetting COLSS and PMS CEA Positions. This is a modified bank JPM covering Safety Function 1. **THIS JPM MUST BE PERFORMED IN SIMULATOR A (only one with Ovation Rod Control installed)**

S2: The applicant will be directed to reset the SIAS actuation (following an ESD which has been isolated) per Appendix 24, SIAS Check/Reset, Attachment 24-C, Resetting and Restoring SIAS. This is a new JPM covering Safety Function 2. This JPM will be performed only by the RO applicants.

S3: The applicant will be directed to reduce level in SG #1 to the normal post-trip band following a SGTR per Appendix 33, Steam Generator 1 Level Reduction Checklist. This is a bank alternate path JPM covering Safety Function 4P.

S4: The applicant will be directed to lower Reactor power from 100% to 94% using the Main Generator Load Limit Potentiometer in preparation for Main Turbine Control Valve testing. When the power reduction is in progress, Stator Water Cooling Heat Exchangers will become fouled, resulting in Stator Cooling low pressure and high temperature alarms. The applicant will address the ARP and start the standby Stator Cooling Water Pump. When the high temperature condition has been in for 70 seconds (alarm won't clear when standby pump is started), the applicant should recognize that the Main Turbine should have tripped and will manually trip the Main Turbine. The turbine trip will actuate an automatic Reactor Power Cutback, however a CEA will be stuck, resulting in an ATWS condition. The applicant will recognize the ATWS and manually trip the Reactor. This is a new alternate path JPM covering safety function 4S.

S5: The applicant will be directed to transfer 13.8kV Bus NAN-S02 from 13.8kV Bus NAN-S04 to Unit Aux Transformer MAN-X02 per 40OP-9NA03, 13.8kV Electrical System. Following the parallel with the alternate source, the normal supply breaker will fail to auto trip and the applicant will address the ARP and manually open the normal supply breaker prior to an automatic Main Turbine trip due to overheating. This is a bank alternate path JPM covering Safety Function 6.

S6: The applicant will be directed to insert zero blowdown constants in the Plant Computer (PC) and Core Monitoring Computer (CMC) per 40OP-9SG03, Operating the Steam Generator Blowdown System, following an inadvertent 'A' SIAS. This is a new JPM covering Safety Function 7.

S7: The applicant will be directed to cross-tie Nuclear Cooling Water with Train 'A' Essential Cooling Water following a loss of all Nuclear Cooling Water per 40AO-9ZZ03, Loss of Cooling Water, Appendix A, Cross-connect EW to NC. When aligning the cross-tie, NCN-UV-99, Nuclear Cooling Water Containment Header Return Valve will seize right after indicating mid-position (valve is required to be fully closed - ~ 20 second stroke time - before proceeding with the cross-tie to prevent an uncontrolled transfer of water between NC and EW) making completion of the cross-tie undoable. The applicant should recognize that since cooling water cannot be restored to the RCPs within 10 minutes of the loss of NC that the Reactor must be tripped, RCPs stopped, and RCP Bleedoff isolated. This is a modified alternate path JPM covering Safety Function 8.

S8: The applicant will be directed to respond to a toxic gas condition in the Control Building per 40AO-9ZZ26, Toxic Gas. The applicant will manually initiate a Control Room Ventilation Isolation Actuation Signal (CRVIAS) and ensure all components are in their actuated condition. A K-Relay failure will prevent some of the dampers from auto closing and will take action to manually isolate the Control Room Ventilation System. This is a bank JPM covering Safety Function 9.

P1: The applicant will be directed to simulate energizing Class 120 VAC Instrument Bus, PNA-D25 from Class 125 VDC Control Power Bus, PKA-M41, per Appendix 92, Energize PNA-D25. This is a bank JPM covering Safety Function 6.

P2: The applicant will be directed to complete 40AO-9ZZ19, Control Room Fire, Appendix G, Upper Auxiliary Building Actions. The steps to simulate will complete the isolation of the Upper Aux Building RCS Hot Leg sample path, then ensure the CS Header Isolation Valves are closed. The cue will indicate that the Control Room was evacuated due to a fire in the PPS Cabinet which resulted in spurious actuations. The 'B' CS Header Isolation Valve will be found open and will not be able to be closed locally, requiring alternate local isolation of the 'B' CS Header. This is a new alternate path JPM covering Safety Function 5.

P3: The applicant will be directed to locally open SBCS Valve 1008 per Appendix 116, Operations of SBCS Valves 1007 and 1008, Attachment 116-D, Local Operation of SGN-PV-1008. The applicant will simulate isolating IA to the valve, then removing and reinstalling the clevis on the actuator shaft to facilitate local valve operation. This is a new JPM covering Safety Function 4S.

Form 3.3-1	Scenario Outline

Facility: PVNGS	Scenario: 1	Test: 2024 NRC Exam
Examiners:	Operators:	
Initial Conditions: 100% power, MOC, Unit 2 is in a refueling outage, Unit 3 is performing a Main Turbine startup		
Turnover: Shift from 'B' EHC Pump to 'A' EHC Pump per 40OP-9CO01, Electro-Hydraulic Control System, Section 6.7, Shifting from Hydraulic Fluid Pump B to Hydraulic Fluid Pump A		

Event Number	Event Type*			Event Description
	CRS	OATC	BOP	
1	N		N	Shift running EHC Pumps
2	I	I, MC		RCP 1A Seal Injection Flow Controller, CHN-FIC-241, Output Fails High (30 second ramp)
3	C		C, MC	'A' Condenser Air Removal Pump Trip, 'D' FTAS
4	I, TS	I, MC		Pressurizer Pressure Transmitter PT-100X Fails High / Class Pressurizer Heater Trip
5	C, TS	C	C	CEA 66 Drop
6	C		C	Degraded Main Condenser Vacuum
7	C	C		Stuck CEAs on Reactor Trip
8	M	M	M	Loss of PKA-M41 / AFA-P01 Overspeed / AFB-P01 Sheared Shaft (Loss of All Feedwater)
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Tech Spec, (MC) Manual Control				

Actual	Target Quantitative Attributes
4	Malfunctions after EOP entry (1-2)
5	Abnormal events (2-4)
1	Major transients (1-2)
1	EOPs entered/requiring substantive actions (1-2)
0	Entry into a contingency EOP with substantive actions (1 per scenario set)
2	Pre-identified CTs (2 or more)

Form 3-3.1	Scenario Event Summary NRC Exam Scenario #1

2024 NRC Exam Scenario #1 Overview	
Event 1	Upon taking the shift, the crew will shift from 'B' EHC Pump running to 'A' EHC Pump running per 40OP-9CO01, Electro-Hydraulic Control System, Section 6.7, Shifting from Hydraulic Fluid Pump B to Hydraulic Fluid Pump B.
Event 2	After the pump shift is complete, output on CHN-FIC-241, RCP 1A Seal Injection Flow Controller, will fail high (30 second ramp). The OATC will address the ARP and take manual control of the Seal Injection Flow Controller to return seal injection flow to RCP 1A back to the normal control band.
Event 3	When seal injection flow has been restored, the 'A' Condenser Air Removal Pump will trip. The BOP will address the ARP and will manually start the 'D' Condenser Air Removal Pump.
Event 4	When the 'D' Air Removal Pump has been started, the controlling Pressurizer pressure control channel, PT-100X, will fail high. 15 seconds after the failure, the Train 'A' Class Pressurizer Heater bank supply breaker will trip. The OATC will address the ARP and select the unaffected pressure control channel to restore Pressurizer pressure. The CRS will address Technical Specifications due to the loss of the required heater bank.
Event 5	After control of Pressurizer pressure has been restored and the CRS has addressed Technical Specifications, CEA 66 will drop to the bottom of the core. The CRS will enter 40AO-9ZZ11, CEA Malfunctions, and direct the crew to commence a downpower. **NOTE: The CEA control systems are different in the two simulators. In Sim A, the crew will place CEAs in Standby by pressing the Standby Select pushbutton on an Ovation computer terminal, while in Sim B, CEAs will be placed in Standby by placing the Mode Control switch to SB (standby).** As part of the downpower, the BOP will lowering Main Turbine load using the Load Limit Potentiometer and the OATC will commence a boration to the suction of the Charging Pumps. The CRS will also address Technical Specifications due to the dropped CEA.
Event 6	When the crew has commenced a boration, the 'A' Shell of the Main Condenser will develop an air leak. The CRS will enter 40AO-9ZZ07, Loss of Condenser Vacuum, and the crew will dispatch AOs to look for the source of the air in-leakage. The BOP will ensure all Air Removal Pumps are running and align to all condenser shells. The CRS will likely direct a Turbine load reduction, however since a downpower is already in progress due to the dropped CEA, the CRS may direct a Reactor trip. In either case, the loss of vacuum will be unrecoverable and a Reactor trip will be required regardless of the initial decision by the CRS.
Event 7	On the Reactor trip, two full strength CEAs will fail to insert, requiring the OATC to commence an emergency boration per Appendix 103, RCS Makeup / Emergency Boration.
Event 8	A loss of Train 'A' Class 125 VDC Control Power Bus, PKA-M41, will also occur on the Reactor trip. This will require the crew to shift control power for the (soon to be) only available feed pump in order to restore feed (AFN-P01 will be the only available feed pump). When the crew starts Turbine-Driven Aux Feed Pump, AFA-P01, it will trip on overspeed, placing the unit in a loss of all feedwater condition. The CRS will transition to 40EP-9EO06, Loss of All Feedwater, following SPTAs, and direct the crew to perform Appendix 41, Local Operation of AFN-P01. In this appendix, an AO will be dispatched to transfer control power for AFN-P01 to the alternate source, and the BOP will be able to start the pump and restore feed. When feed has been restored, the scenario may be terminated.

Form 3-3.1	Critical Task Summary NRC Exam Scenario #1

Critical Task # 1: Commence borating to the RCS at a rate of ≥ 26 gpm within 15 minutes of the Reactor trip due to less than all full-strength CEAs being fully inserted

Initiating Cue: The crew will have indication of the stuck CEAs from the Rod Bottom Light for the CEA failing to illuminate on the trip as well as the CPDS (CEA Position Display System) indicating two CEAs failed to insert on the reactor trip. Step 2.c of SPTAs directs performing an emergency boration if less than all CEAs fully insert into the core.

Performance Feedback: When the crew has aligned a boration flowpath and has at least one Charging Pump running, confirmation that the boration is in progress can be seen using the CVCS System Diagram on any ERFDADS display, as well as monitoring a trend in RWT level (should be slowly lowering as water is pumped into the RCS).

Success Path: The success path for a post-trip emergency boration is using Appendix 103, RCS Makeup / Emergency Boration. In this case, the crew will likely perform Attachment 103-D, CHE-HV-536 / RWT > 73% / No PC Cleanup.

Measurable Performance Standard: The OATC will commence a boration by performing the following:

- Ensure CHE-HV-532 is OPEN
- Ensure at least one Charging Pump is running
- Place CHN-HS-527 in CLOSE
- Ensure CHN-FIC-210X is in MANUAL with 0% output
- Place CHN-HS-210 in MANUAL
- Open CHE-HV-536
- Close CHN-UV-501

Form 3-3.1	Critical Task Summary NRC Exam Scenario #1

Critical Task # 2: Operate Auxiliary Spray, ADVs, and/or SBCS as needed, and restore feedwater to at least one SG to prevent lifting a Primary Safety Valve

Initiating Cue: The crew will have indication of a loss of Main Feedwater when both MFP trip lights are light (due to the loss of Main Condenser vacuum), then they will have indication of no discharge pressure from AFB-P01 and lower than normal amperage when started (sheared shaft), the AFA-P01 overspeed light will illuminate when it trips on overspeed, and no control power will be (initially) available to AFN-P01 due to the loss of PKA-M41 (alarm on B01). Procedurally, SPTAs directs restoration of maintenance of SG level at 45-60% NR, and 40EP-9EO06, Loss of All Feedwater, directs restoration of feedwater using an applicable appendix, in this case, Appendix 41, Local Operation of AFN-P01.

Performance Feedback: When the crew has restored control power to AFN-P01, the green and red breaker indicating lights will be on (as appropriate) in the Control Room, and when feed has been initiated, feed flow can be read on any ERFDADS terminal in the Control Room. Verification that a Primary Safety Valve did NOT lift during the recovery can be verified by viewing a Primary Safety Valve position trend on any ERFDADS terminal.

Success Path: The success path for restoring feed will be dispatch an AO to transfer control power to the alternate source per Appendix 41, Local Operation of AFN-P01, then opening suction valves CTA-HV-1 and CTA-HV-4 and starting AFN-P01 from the Control Room. Once started, the BOP will open at least one Downcomer Valve to commence feeding at least one SG.

Measurable Performance Standard: Successful completion of this Critical Task can be confirmed by restoring feed to at least one SG prior to a Primary Safety Valve lifting. This may be accomplished by using any combination of Auxiliary Spray, ADVs, SBCS, and ultimately the restoration of feedwater to at least one SG.

NOTE: (Per NUREG-1021) If an operator or the Crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a Critical Task identified in the post-scenario review

Form 3-3.1	Driver Set-Up Instructions NRC Exam Scenario #1

Driver Setup Instructions	
	Reset to IC-611
	Run scenario file “2024 NRC Scn #1”

Form 3-3.1	Scenario File Description NRC Exam Scenario #1

Scenario File
IMF mfRD03D IMF mfRD03F IMF mfED16A e:RPSCHC d:5 IMF cmCPFW07AFBP01_1 IMF cmCNCV04CHNFIC241_1 k:2 r:30 f:100.0 IMF cmDPMC03ARNP01D_5 k:3 MMF cmDPMC03ARNP01A_6 k:3 d:5 c:0 IMF cmTRRC03RCNPT100X_1 k:4 r:1 i:2247.89 f:2500 IMF cmBKRC09RCEB2_6 k:4 d:20 IMF mfRD02I k:5 f:100 IMF mfMC01A k:6 r:60 f:1.8 IMF mfFW22 k:8

Form 3-3.1	Crew Turnover Sheet NRC Exam Scenario #1

Plant Conditions:

- Unit 1 is operating at 100% power
- Unit 2 is in a refueling outage
- Unit 3 is performing a Main Turbine startup

Equipment Out of Service:

- None

Planned Shift Activities:

- Shift from ‘B’ EHC Pump to ‘A’ EHC Pump per 40OP-9CO01, Electro-Hydraulic Control System, Section 6.7, Shifting from Hydraulic Fluid Pump B to Hydraulic Fluid Pump A

Form 3.3-1	Scenario Outline

Facility: PVNGS	Scenario: 2	Test: 2024 NRC Exam
Examiners:	Operators:	
Initial Conditions: 100% power, MOC, Unit 2 is in a refueling outage, Unit 3 is performing a Main Turbine startup		
Turnover: Shift from 'A' and 'C' Reactor Cavity fans running to 'B' and 'D' Reactor Cavity Fans running per 40OP-9HC01, Containment HVAC, Section 6.3, Reactor Cavity HVAC Startup and Shifting		

Event Number	Event Type*			Event Description
	CRS	OATC	BOP	
1	N		N	Shift running Reactor Cavity Fans
2	C	C		RCP 2A Oil Reservoir Level Low
3	TS			'A' CS Header Isolation Valve, SIA-UV-672, Blown Fuse
4	I	I	I	Control Channel NI #2 Fails Low
5	I, TS		I	Train 'B' Loss of Power Relays 727-3 and 727-7 Fail
6	C, TS	C		SGTL SG #2
7	M	M	M	SGTR SG #2
8	C	C, MC		Train 'A' Sequencer Failure / 'B' HPSI Pump Degraded
9	I		I, MC	RRS Tavg Fails High
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Tech Spec, (MC) Manual Control				

Actual	Target Quantitative Attributes
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	Entry into a contingency EOP with substantive actions (1 per scenario set)
2	Pre-identified CTs (2 or more)

Form 3-3.1	Scenario Event Summary NRC Exam Scenario #2

2024 NRC Exam Scenario #2 Overview	
Event 1	Upon taking the shift, the BOP will shift from 'A' and 'C' Reactor Cavity Fans running to 'B' and 'D' Reactor Cavity Fans running per 40OP-9HC01, Containment HVAC, Section 6.3, Reactor Cavity HVAC Startup and Shifting.
Event 2	When the 'B' and 'D' fans are running, 4A15A, RCP COMM TRBL, will annunciate due to low oil level in the 2A RCP oil reservoir. The OATC will address the ARP and commence raising level in the oil reservoir.
Event 3	When level has been restored in oil reservoir, the fuses for the 'A' CS Header Isolation Valve, SIA-UV-672, will blow. The CRS will address Technical Specifications for the inoperable valve.
Event 4	When the CRS has addressed Technical Specifications, Control Channel NI #2 will fail low. The CRS will enter 40AO-9ZZ16, RRS Malfunctions, and direct the crew to take action to stabilize the plant, and select the unaffected Control Channel NI at the RRS Cabinet.
Event 5	When Control Channel NI #1 has been selected at the RRS cabinet, a failure of the Train 'B' LOP-3 channel will occur. The OATC will address the alarm response for the failed LOP relay and the CRS will address Technical Specifications. To comply with the required actions of the impacted LCO, the BOP will bypass the failed LOP relay at the BOP-ESFAS cabinet.
Event 6	When the LOP relay has been bypassed, a SGTL will develop on SG #2. The CRS will enter 40AO-9ZZ02, Excessive RCS Leakrate, and direct the OATC to start all available Charging Pumps and isolate letdown.
Event 7	When the 'E' Charging Pump is started the SGTL will degrade into a SGTR. The OATC will isolate letdown (if not already done) and determine a manual Reactor trip is required. The crew should trip the Reactor and initiate SIAS and CIAS.
Event 8	The 'A' Sequencer will stall, requiring the crew to manually start the Train 'A' SIAS actuated equipment, and must start the 'A' HPSI Pump to establish adequate SI flow since the 'B' HPSI Pump is degraded.
Event 9	RRS Tavg will also fail low on the Reactor trip, resulting in maximum main feed flow to both SGs. The BOP will have to take manual control of feed to ensure level does not rise to 91% which would actuate an MSIS on high SG level. Following SPTAs, the CRS will transition to 40EP-9EO04, Steam Generator Tube Rupture, and direct the crew to commence a controlled cooldown to lower Thot to < 540°F and isolate SG #2. When SG #2 has been isolated, the scenario may be terminated.

Form 3-3.1	Critical Task Summary NRC Exam Scenario #2

Critical Task # 1: Establish adequate SI flow to meet Appendix 2, Figures, flow requirements within 15 minutes of RCS pressure lowering below 1837 psia

Initiating Cue: The crew will have indication SIAS having actuated on each ERFDADS terminal in the Control Room as well as a red SIAS alarm on the upper section of B05. 40EP-9EO04, Steam Generator Tube Rupture, Steps 5.a and 5.b directs checking the HPSI Pumps have started and that SI flow is adequate per Appendix 2, Figures. The crew can see that the 'B' HPSI Pump is running however it is not producing any discharge pressure (degraded discharge head) and the 'A' HPSI Pump did not start due to the failure of the 'A' Sequencer.

Performance Feedback: When the crew starts the 'A' HPSI Pump, the crew can verify SI flow on either B02 or on any ERFDADS terminal in the Control Room. The flow can be compared to Appendix 2, Figures, (located on the vertical section of B02), and determine flow is adequate based on current RCS pressure.

Success Path: 40EP-9EO04, Steam Generator Tube Rupture, Step 5.a, Contingency Action a.1, directs starting idle HPSI and LPSI Pumps as necessary. Starting the 'A' HPSI Pump will establish adequate SI flow for current plant conditions.

Measurable Performance Standard: In order to start the 'A' HPSI Pump, the crew will:

- Place SIA-HS-1, HPSI Pump A, to START

A laminated copy of Appendix 2, Figures, is on the vertical section of B02 where the crew can compare SI flow to minimum required flow to ensure successful restoration of the inventory control safety function.

Form 3-3.1	Critical Task Summary NRC Exam Scenario #2

Critical Task # 2: Reset MSIS setpoints, control the overfeeding condition, and control the cooldown rate as needed when preparing to isolate SG #2 to prevent an unnecessary release to the environment

Initiating Cue: Preventing MSIS during a SGTR is necessary to prevent a release to the environment. MSIS can actuate on either high SG level (91% NR – not adjustable) or low SG pressure (960 psia – variable). Level control is directed in SPTAs (maintain 45-60% NR) and the SPTA pressure band is 1140-1200 psia. In the SGTR EOP, direction is provided to reset MSIS setpoints as needed (performed at B05 in the Control Room) during the controlled cooldown. The cooldown to a Thot < 540°F is performed as a prerequisite to isolate the ruptured SG.

Performance Feedback: Control of SG level can be monitored on any ERFDADS terminal in the Control Room. SG pressure can be monitored on any ERFDADS terminal and the MSIS setpoint can be monitored on B05 on any of the four SG pressure instruments (to confirm reset of the MSIS setpoint). Actuation (or preventing the actuation) of MSIS can be monitored by the presence or absence of the MSIS alarm on B05.

Success Path: SG level control (due to the overfeeding event) can be accomplished by taking manual control of the Downcomer valves on the DFCWS screen and controlling the feedrate manually. SG pressure will lower as the cooldown to < 540°F is conducted. Resetting the MSIS setpoints is performed by depressing each of the four LO SG PRESS SETPOINT RESET pushbuttons on B05 (each time a button is depressed, the MSIS setpoint lowers to 200 psia below current SG pressure).

Measurable Performance Standard: Successful completion of the Critical Task can be confirmed by the absence of an MSIS signal as indicated by the MSIS alarm on B05, as well as the position of MSIS actuated components, specifically the MSIVs.

NOTE: (Per NUREG-1021) If an operator or the Crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a Critical Task identified in the post-scenario review

Form 3-3.1	Driver Set-Up Instructions NRC Exam Scenario #2

Driver Setup Instructions	
	Reset to IC-612
	Run scenario file “2024 NRC Scn #2”

Form 3-3.1	Scenario File Description NRC Exam Scenario #2

Scenario File
IMF mfRP07A e:RPSCHC IMF cmCPSI01SIBP02_3 f:90 IMF mfRX01 e:RPSCHC d:30 f:100 IMF mfRC03C k:2 f:10 IMF cmMVRH03SIAUV672_1 k:3 IMF mfNI02C k:4 r:1 f:0 IOR doED_ZLS047273DS_W1 k:5 f:OFF IOR doED_ZLS047277DS_W1 k:5 f:OFF IMF mfAN_1C18D3 k:5 f:Alarm_ON IOR doRP_ZLSABC02BLOP3_W1 k:5 f:ON IMF mfTH06B k:6 r:4:00 f:75

Form 3-3.1	Crew Turnover Sheet NRC Exam Scenario #2

Plant Conditions:

- Unit 1 is operating at 100% power

Equipment Out of Service:

- None

Planned Shift Activities:

- Shift from ‘A’ and ’C’ Reactor Cavity fans running to ‘B’ and ‘D’ Reactor Cavity Fans running per 40OP-9HC01, Containment HVAC, Section 6.3, Reactor Cavity HVAC Startup and Shifting

Form 3.3-1	Scenario Outline

Facility: PVNGS	Scenario: 3	Test: 2024 NRC Exam
Examiners:	Operators:	
Initial Conditions: 50% power, MOC, Unit 2 is in a refueling outage, Unit 3 is performing a Main Turbine startup		
Turnover: Remove Train 'A' CPIAS module from bypass per 40OP-9SA01, BOP ESFAS Modules Operation, Section 6.9, Removing BOP ESFAS Modules from Bypass		

Event Number	Event Type*			Event Description
	CRS	OATC	BOP	
1	N		N	Remove 'A' CPIAS Module from Bypass
2	C	C, MC		Pressurizer Level Controller, RCN-LIC-110, Output Fails High (1 minute ramp)
3	I, TS		I	RCS Pressure Transmitter, RCC-PI-101C, Fails Low
4	C	C, MC		'A' Charging Pump Trip, 'E' Charging Pump FTAS
5	C		C, MC	'B' Plant Cooling Water Pump Trip, 'A' FTAS
6	I, TS	I	I	Inadvertent 'A' CSAS Leg 1-3
7	I	I		VCT Level Transmitter, LT-227, Fails Low
8	M	M	M	ESD from SG #1 Inside Containment
9	C	C		'A' CS Header Isolation Valve Seized / 'B' CS Pump Sheared Shaft
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Tech Spec, (MC) Manual Control				

Actual	Target Quantitative Attributes
2	Malfunctions after EOP entry (1-2)
6	Abnormal events (2-4)
1	Major transients (1-2)
1	EOPs entered/requiring substantive actions (1-2)
1	Entry into a contingency EOP with substantive actions (1 per scenario set)
2	Pre-identified CTs (2 or more)

Form 3-3.1	Scenario Event Summary NRC Exam Scenario #3

2024 NRC Exam Scenario #3 Overview	
Event 1	Upon taking the shift, the BOP will remove the 'A' CPIAS BOP-ESFAS module from bypass per 40OP-9SA01, BOP ESFAS Modules Operation, Section 6.9, Removing BOP ESFAS Modules from Bypass.
Event 2	When the 'A' CPIAS module is removed from bypass, Pressurizer Level Controller, RCN-LIC-110, output will fail high (1 minute ramp). The OATC will address the ARP and take manual control of the output to restore letdown flow to the appropriate flow for current plant conditions.
Event 3	When letdown flow has been returned to normal, RCS pressure transmitter, RCC-PI-101C, will fail low. The CRS will address Technical Specifications and direct the BOP to bypass the appropriate bistables at the PPS cabinet.
Event 4	When the BOP has bypassed the affected bistables, the 'A' Charging Pump will trip. The OATC will address the ARP and will change the order of running Charging Pumps in order to start the 'E' Charging Pump. If the 'E' Charging Pump is not started within ~ 2 minutes of the loss of 'A' Charging Pump, letdown will isolate on high temperature.
Event 5	When the 'E' Charging Pump has been started, the 'B' Plant Cooling Water Pump will trip. The 'A' Plant Cooling Water Pump will fail to auto start. The BOP will address the ARP and the CRS may enter 40AO-9ZZ03, Loss of Cooling Water, and the BOP will start the 'B' Plant Cooling Water Pump.
Event 6	When the 'B' Plant Cooling Water Pump has been started, an inadvertent Train 'A' CSAS (Leg 1-3) will occur. The CRS will enter 40AO-9ZZ17, Inadvertent PPS-ESFAS Actuations, and direct the crew to override equipment as needed and will address Technical Specifications.
Event 7	When Technical Specifications have been addressed, VCT Level Transmitter, LT-227, will fail low. This will cause an automatic boration to commence. The OATC will address the ARP and coordinate with field operators to reposition equipment in the control room and open breakers in the field to override automatic equipment repositioning due to the transmitter failure (in order to stop the boration).
Event 8	When the boration has been stopped, an ESD will occur on SG #1 inside Containment. The Reactor will either be manually tripped or will automatically trip on high containment pressure or low pressurizer pressure.
Event 9	The 'A' CS Header Isolation will be seized and the 'B' CS Pump will have a sheared shaft, requiring the CRS to transition to the Functional Recovery procedure in order to align the 'B' LPSI Pump to the CS header to provide CS flow into Containment. When CS flow has been established, the scenario may be terminated.

Form 3-3.1	Critical Task Summary NRC Exam Scenario #3

Critical Task # 1: Secure all 4 RCPs within 30 minutes of the unrecoverable loss of cooling water to the RCPs

Initiating Cue: A CSAS actuation will isolate cooling water to the RCPs. CSAS will actuate when Containment pressure exceeded 8.5 psig, which will happen in the first few minutes post-ESD. The loss of cooling water to the RCPs is also cued by the RCP LO NCW FLOW alarms on B04. Securing the RCPs is procedurally directed in SPTAs (step actually says to isolate controlled bleedoff from ANY RCP which does not have Nuclear Cooling Water supplied to it and bleedoff is interlocked with each RCP such that the pump must be stopped in order to secure bleedoff).

Performance Feedback: The crew can confirm the RCPs were stopped by the GREEN light being illuminated and the RED light being off for each RCP breaker position indication after each pump is secured.

Success Path: When CSAS actuates and the crew has indication of the loss of cooling water to the RCPs, a member of the crew will have to take each of the 4 RCP handswitches to the OFF position within 30 minutes to prevent RCS leakage via seal degradation.

Measurable Performance Standard: Successful completion of this Critical Task can be verified by each of the four RCP handswitches being taken to the OFF position prior to 30 minutes elapsing from the initiation of CSAS (either manual actuation or automatic actuation, whichever happens first).

Form 3-3.1	Critical Task Summary NRC Exam Scenario #3

Critical Task # 2: Establish CS flow within 30 minutes of CSAS actuation

Initiating Cue: CSAS actuates when Containment pressure exceeds 8.5 psig. The crew has indication of CS header flow on any ERFDADS terminal in the Control Room. Due to the 'A' CS Header Isolation Valve being seized closed and the 'B' CS Pump sheared shaft, both trains of CS will indicate 0 gpm flow. The failure to meet the Containment Temperature and Pressure Control safety function will cue the CRS to transition to the Functional Recovery procedure and identify the success path for recover of the CTPC safety function (aligning 'B' LPSI for CS).

Performance Feedback: When LPSI is providing CS flow, the normal CS flow indication is not available on ERFDADS, however the crew can trend Containment pressure as well as the change in RWT level to indicate that the LPSI to CS lineup was successful in establishing CS flow.

Success Path: The Functional Recovery procedure will provide a list of options to recover the CTPC safety function based on plant conditions and available plant equipment. The CRS should go to CTPC-2, Containment Spray, and since the 'A' CS Header Isolation Valve is seized closed, should identify 'B' LPSI through the 'B' CS Header Isolation Valve is the correct path to recover the safety function.

Measurable Performance Standard: To align 'B' LPSI for CS flow, the OATC will:

- Ensure the 'B' LPSI Pump is running
- Ensure SIB-HV-307 is CLOSED
- Ensure SIB-HV-695 is OPEN
- Ensure SIB-671 is OPEN
- Ensure SIB-HV-694 is OPEN

NOTE: (Per NUREG-1021) If an operator or the Crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a Critical Task identified in the post-scenario review

Form 3-3.1	Driver Set-Up Instructions NRC Exam Scenario #3

Driver Setup Instructions	
	Reset to IC-613
	Run scenario file “2024 NRC Scn #3”

Form 3-3.1	Scenario File Description NRC Exam Scenario #3

Scenario File
IMF cmMVRH03SIAUV672_6 IMF cmCPRH05SIBP03_1 IMF cmCNCV19RCNLIC110_1 k:2 r:60 f:100.0 IMF cmTRRX06RCCPT101C_1 k:3 r:1 i:2253.35 f:1500 IMF cmDPCV06CHAP01_6 k:4 IMF cmDPCV06CHEP01_5 k:4 IMF cmCPSW01PWNP01A_5 k:5 IMF cmCPSW01PWNP01B_6 k:5 d:5 IMF mfRP06G1 k:6 IMF cmTRCV05CHNLT227_1 k:7 r:1 i:52.646 f:0 IMF mfMS01A k:8 r:120 f:20

Form 3-3.1	Crew Turnover Sheet NRC Exam Scenario #3

Plant Conditions:

- Unit 1 is operating at 50% power
- Unit 2 is in a refueling outage
- Unit 3 is performing a Main Turbine startup

Equipment Out of Service:

- None

Planned Shift Activities:

- Remove Train ‘A’ CPIAS module from bypass per 40OP-9SA01, BOP ESFAS Modules Operation, Section 6.9, Removing BOP ESFAS Modules from Bypass

Form 3.3-1	Scenario Outline

Facility: PVNGS	Scenario: 4	Test: 2024 NRC Exam
Examiners:	Operators:	
Initial Conditions: 50% power, MOC, Unit 2 is in a refueling outage, Unit 3 is performing a Main Turbine startup		
Turnover: Start two additional Cooling Tower Fans per Cooling Tower per 40OP-9CW03, Cooling Tower Operations, Section 6.1, Starting Cooling Tower Fans		

Event Number	Event Type*			Event Description
	CRS	OATC	BOP	
1	N		N	Start Two Cooling Tower Fans per Tower
2	C	C, MC		'A' Reactor Makeup Water Trip, 'B' FTAS
3	I, TS		I	'D' RWT Level Transmitter, CHD-LI-203D, Fails Low
4	C	C	C	ECC Directed Turbine Unloading (100 MW)
5	I	I	I	Turbine Load Index #2 Fails High
6	C, TS	C, MC	C	Train 'A' Class 4kV Bus Supply Transformer, NBN-X03, Fault / 'A' EDG Output Breaker Fails to Auto Close
7	M	M	M	Large Break Loss of Coolant Accident
8	C		C, MC	CSAS Fails to Auto Actuate
9	C	C		'A' Spray Pond Pump Trip (Rx Trip + 2 min) / 'B' HPSI Sheared Shaft
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Tech Spec, (MC) Manual Control				

Actual	Target Quantitative Attributes
2	Malfunctions after EOP entry (1-2)
5	Abnormal events (2-4)
1	Major transients (1-2)
1	EOPs entered/requiring substantive actions (1-2)
1	Entry into a contingency EOP with substantive actions (1 per scenario set)
2	Pre-identified CTs (2 or more)

Form 3-3.1	Scenario Event Summary NRC Exam Scenario #4

2024 NRC Exam Scenario #4 Overview	
Event 1	Upon taking the shift, the crew will start two additional Cooling Tower Fans per tower per 40OP-9CW03, Cooling Tower Operations, Section 6.1, Starting Cooling Tower Fans.
Event 2	When the Cooling Tower Fans have been started, the 'A' Reactor Makeup Water Pump will trip and the 'B' Pump will fail to auto start. The OATC will address the ARP and start the 'B' Reactor Makeup Water Pump.
Event 3	When the 'B' Reactor Makeup Water Pump has been started, the 'D' RWT Level Transmitter, CHD-LI-203D, will fail low. The CRS will address Technical Specifications direct the BOP to bypass the affected bistable as the PPS cabinet.
Event 4	When the affected bistable has been bypassed, the ECC will call and direct Palo Verde to reduce Main Turbine Load by 100 MW within the next 15 minutes for grid stability. The CRS will enter 40AO-9ZZ25, ECC Directed Turbine Unloading, and the crew will reduce load by 100 MW.
Event 5	When turbine load has been reduced, Turbine Load Index #2 will fail high. The CRS will enter 40AO-9ZZ16, RRS Malfunctions, and direct the BOP to select TLI #1 at the RRS cabinet.
Event 6	When TLI #1 has been selected, Train 'A' Class 4kV Bus PBA-S03 Supply Transformer, NBN-X03, will relay causing a loss of power to the bus. The CRS will enter 40AO-9ZZ12, Degraded Electrical Power, as a result of the transformer fault. The 'A' EDG Output Breaker will also fail to auto close, requiring the crew to manually close the breaker to re-energize the bus. As a result, Charging flow will go from 88 gpm to 44 gpm, leaving the crew ~ 2 minutes to start another Charging Pump or letdown will auto isolate. If letdown isolates, the CRS will also enter 40AO-9ZZ05, Loss of Charging or Letdown to either setup for extended operations with letdown isolated or to restore letdown. The CRS will also address Technical Specifications for the failure of the transformer and the EDG output breaker.
Event 7	When Technical Specifications have been addressed, a large break LOCA will occur resulting in a Reactor trip, and a SIAS, CIAS, and MSIS actuations.
Event 8	CSAS will fail to automatically actuate and the BOP will manually actuate CSAS from B05 to establish CS flow.
Event 9	Two minutes after the Reactor trip, the 'A' Spray Pond will trip requiring the OATC to dispatch an AO to trip the 'A' EDG locally. The 'B' HPSI Pump will also trip, resulting in no HPSI flow. The CRS will have to transition to the Functional Recovery procedure and direct the crew to align offsite power via the 'B' Class 4kV Bus to the 'A' Class 4kV bus in order to start the 'A' HPSI Pump and establish HPSI flow. When SI flow has been established, the scenario may be terminated.

Form 3-3.1	Critical Task Summary NRC Exam Scenario #4

Critical Task # 1: Establish CS flow within 15 minutes of exceeding 8.5 psig inside Containment

Initiating Cue: The crew will have indication of Containment pressure on any ERFDADS terminal in the Control Room as well as multiple Containment pressure indications on the control boards. SPTA Step 9.b.2 contains contingency actions to ensure CSAS is actuated if Containment pressure is 8.5 psig or more.

Performance Feedback: When the crew takes at least two channels of CSAS to the CSAS INITIATE position, CSAS will actuate. The crew can further confirm CSAS was successfully actuated by observing the CS Header Isolation Valve positions, and CS flow on any ERFDADS terminal in the Control Room.

Success Path: When the need for a CSAS actuation is recognized by the crew, manual actuation of CSAS can be performed by placing at least two of the CSAS handswitches on B05 to the CSAS INITIATE position.

Measurable Performance Standard: Successful completion of this Critical Task can be confirmed by the red CSAS alarm on the upper section of B05 and CS flow of > 4350 gpm on each train of CS as confirmed on any ERFDADS terminal. In order to actuate CSAS, a member of the crew must take at least two of the CSAS actuation handswitches on B05 to the CSAS INITIATE position.

Form 3-3.1	Critical Task Summary NRC Exam Scenario #4

Critical Task # 2: Establish adequate SI flow per Appendix 2, Figures, within 30 minutes of exceeding 3.0 psig in Containment or RCS pressure < 1837 psia, whichever occurs first

Initiating Cue: The crew will have indication SIAS having actuated on each ERFDADS terminal in the Control Room as well as a red SIAS alarm on the upper section of B05. 40EP-9EO03, Loss of Coolant Accident, Step 5.a and 5.b, directs checking the HPSI Pumps have started and that SI flow is adequate per Appendix 2, Figures. The loss of power on Train 'A' and the indications of a sheared shaft on the 'B' HPSI Pump will alert the crew that in order to achieve adequate SI flow, Train 'A' power must be restored, which is done in the Functional Recovery procedure.

Performance Feedback: The crew will have indication that power has been restored to Train 'A' Class 4kV power by voltage indication on the control boards as well as on all ERFDADS terminals in the Control Room. When the 'A' HPSI Pump is started, SI flow indications will be available on B02 as well as on all ERFDADS terminals.

Success Path: 40EP-9EO09, Functional Recovery, provides steps in MVAC-1, Offsite Power, to restore power to PBA-S03, then both MVAC-1 and IC-2, SI, provide direction to ensure equipment needed to restore safety functions is started, in this case, 'A' HPSI Pump.

Measurable Performance Standard: In order to restore power to PBA-S03, the crew will:

- Place PBA-SS-S03K to ON
- Close PBA-S03K

In order to start the 'A' HPSI Pump, the crew will:

- Place SIA-HS-1, HPSI Pump A, to START

A laminated copy of Appendix 2, Figures, is on the vertical section of B02 where the crew can compare SI flow to minimum required flow to ensure successful restoration of the inventory control safety function.

NOTE: (Per NUREG-1021) If an operator or the Crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a Critical Task identified in the post-scenario review

Form 3-3.1	Driver Set-Up Instructions NRC Exam Scenario #4

Driver Setup Instructions	
	Reset to IC-614
	Run scenario file “2024 NRC Scn #4”

Form 3-3.1	Scenario File Description NRC Exam Scenario #4

Scenario File
imf cmBSRP01BSCNTPRHHAT_1 imf cmBSRP01BSCNTPRHHBT_1 imf cmBSRP01BSCNTPRHHCT_1 imf cmBSRP01BSCNTPRHHDT_1 IMF cmCPSI01SIBP02_1 IMF cmCPCC08SPAP01_6 e:RPSCHC d:120 IMF cmCPCV10CHNP03B_5 k:2 MMF cmCPCV10CHNP03A_2 k:2 d:5 IMF cmTRCV07CHDLT203D_1 k:3 r:1 i:94.9399 f:0 IMF cmTRMS03MTNPT11B_1 k:5 r:1 i:334.444 f:839 IMF cmBKEG02PBAS03B_2 k:6 IMF mfED10A k:6 d:5 IMF mfTH01A k:7 f:10

Form 3-3.1	Crew Turnover Sheet NRC Exam Scenario #4

Plant Conditions:

- Unit 1 is operating at 50% power
- Unit 2 is in a refueling outage
- Unit 3 is performing a Main Turbine startup

Equipment Out of Service:

- None

Planned Shift Activities:

- Start two additional Cooling Tower Fans per Cooling Tower per 40OP-9CW03, Cooling Tower Operations, Section 6.1, Starting Cooling Tower Fans

Form 3.4-1 Events and Evolutions Checklist - Crew A

Facility: PVNGS	Date of Exam: 4/29/2024	Operating Test Number: 2024

APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM		
		1			2			3			4						
		POSITION			POSITION			POSITION			POSITION						
		S	A	B	S	A	B	S	A	B	S	A	B				
		R	T	O	R	T	O	R	T	O	R	T	O		RO	SRO-I	SRO-U
		O	C	P	O	C	P	O	C	P	O	C	P				
U1	RX													0	1	1	0
	NOR	1									1			2	1	1	1
	I/C	2,3,4,5,6,7									2,3,4,5,6,8,9			13	4	4	2
RX+NOR+I/C	MAJ	8									7			2	2	2	1
	Man. Ctrl.													0	1	1	0
15	TS	4,5									3,6			4	0	2	2
R1	RX													0	1	1	0
	NOR												1	1	1	1	1
	I/C		2,4,5,7										3,4,5,6,8	9	4	4	2
RX+NOR+I/C	MAJ		8										7	2	2	2	1
	Man. Ctrl.		2,4										8	3	1	1	0
10	TS													0	0	2	2
R2	RX													0	1	1	0
	NOR			1										1	1	1	1
	I/C			3,5,6								2,4,5,6,9		8	4	4	2
RX+NOR+I/C	MAJ			8								7		2	2	2	1
	Man. Ctrl.			3								2,6		3	1	1	0
9	TS													0	0	2	2

Form 3.4-1 Events and Evolutions Checklist - Crew B

Facility: PVNGS		Date of Exam: 4/29/2024																	
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM		
		1			2			3			4						
		POSITION			POSITION			POSITION			POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		RO	SRO-I	SRO-U
U2 RX+NOR +I/C	RX													0	1	1	0
	NOR	1									1			2	1	1	1
	I/C	2,3,4,5,6,7									2,3,4,5,6,8,9			13	4	4	2
	MAJ	8									7			2	2	2	1
	Man. Ctrl.													0	1	1	0
15	TS	4,5									3,6			4	0	2	2
R3 RX+NOR +I/C	RX													0	1	1	0
	NOR												1	1	1	1	1
	I/C		2,4,5,7										3,4,5,6,8	9	4	4	2
	MAJ		8										7	2	2	2	1
	Man. Ctrl.		2,4										8	3	1	1	0
10	TS													0	0	2	2
R4 RX+NOR +I/C	RX													0	1	1	0
	NOR			1										1	1	1	1
	I/C			3,5,6								2,4,5,6,9		8	4	4	2
	MAJ			8								7		2	2	2	1
	Man. Ctrl.			3								2,6		3	1	1	0
9	TS													0	0	2	2

Form 3.4-1 Events and Evolutions Checklist - Crew C

Facility: PVNGS		Date of Exam: 4/29/2024													Operating Test Number: 2024			
APPLICANT	EVENT TYPE	Scenarios													TOTAL	MINIMUM		
		1			2			3			4							
		POSITION			POSITION			POSITION			POSITION							
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP			RO	SRO-I	SRO-U
U3 RX+NOR +I/C	RX													0		1	1	0
	NOR	1									1			2		1	1	1
	I/C	2,3,4,5,6,7									2,3,4,5,6,8,9			13		4	4	2
	MAJ	8									7			2		2	2	1
	Man. Ctrl.													0		1	1	0
15	TS	4,5									3,6			4		0	2	2
R5 RX+NOR +I/C	RX													0		1	1	0
	NOR												1	1		1	1	1
	I/C		2,4,5,7										3,4,5,6,8	9		4	4	2
	MAJ		8										7	2		2	2	1
	Man. Ctrl.		2,4										8	3		1	1	0
10	TS													0		0	2	2
R6 RX+NOR +I/C	RX													0		1	1	0
	NOR			1										1		1	1	1
	I/C			3,5,6								2,4,5,6,9		8		4	4	2
	MAJ			8								7		2		2	2	1
	Man. Ctrl.			3								2,6		3		1	1	0
9	TS													0		0	2	2

Form 3.4-1 Events and Evolutions Checklist - Crew D

Facility: PVNGS		Date of Exam: 4/29/2024													Operating Test Number: 2024			
APPLICANT	EVENT TYPE	Scenarios													TOTAL	MINIMUM		
		1			2			3			4							
		POSITION			POSITION			POSITION			POSITION							
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP			RO	SRO-I	SRO-U
U4 RX+NOR +I/C	RX													0		1	1	0
	NOR	1									1			2		1	1	1
	I/C	2,3,4,5,6,7									2,3,4,5,6,8,9			13		4	4	2
	MAJ	8									7			2		2	2	1
	Man. Ctrl.													0		1	1	0
15	TS	4,5									3,6			4		0	2	2
R7 RX+NOR +I/C	RX													0		1	1	0
	NOR												1	1		1	1	1
	I/C		2,4,5,7										3,4,5,6,8	9		4	4	2
	MAJ		8										7	2		2	2	1
	Man. Ctrl.		2,4										8	3		1	1	0
10	TS													0		0	2	2
R8 RX+NOR +I/C	RX													0		1	1	0
	NOR			1										1		1	1	1
	I/C			3,5,6								2,4,5,6,9		8		4	4	2
	MAJ			8								7		2		2	2	1
	Man. Ctrl.			3								2,6		3		1	1	0
9	TS													0		0	2	2

Form 3.4-1 Events and Evolutions Checklist - Crew E

Facility: PVNGS	Date of Exam: 4/29/2024	Operating Test Number: 2024

APPLICANT	EVENT TYPE	Scenarios 1 POSITION SRO	1 ATC	1 BOP	2 POSITION SRO	2 ATC	2 BOP	3 POSITION SRO	3 ATC	3 BOP	4 POSITION SRO	4 ATC	4 BOP	TOTAL	MINIMUM RO	MINIMUM SRO-I	MINIMUM SRO-U
I1	RX													0	1	1	0
	NOR	1											1	2	1	1	1
	I/C	2,3,4,5,6,7											3,4,5,6,8	11	4	4	2
RX+NOR+I/C	MAJ	8											7	2	2	2	1
	Man. Ctrl.												8	1	1	1	0
13	TS	4,5												2	0	2	2
I2	RX													0	1	1	0
	NOR										1			1	1	1	1
	I/C		2,4,5,7								2,3,4,5,6,8,9			11	4	4	2
RX+NOR+I/C	MAJ		8								7			2	2	2	1
	Man. Ctrl.		2,4											2	1	1	0
12	TS										3,6			2	0	2	2
R9	RX													0	1	1	0
	NOR			1										1	1	1	1
	I/C			3,5,6								2,4,5,6,9		8	4	4	2
RX+NOR+I/C	MAJ			8								7		2	2	2	1
	Man. Ctrl.			3								2,6		3	1	1	0
9	TS													0	0	2	2

Form 3.4-1 Events and Evolutions Checklist - Crew F

Facility: PVNGS		Date of Exam: 4/29/2024													Operating Test Number: 2024			
APPLICANT	EVENT TYPE	Scenarios													TOTAL	MINIMUM		
		1			2			3			4							
		POSITION			POSITION			POSITION			POSITION							
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP			RO	SRO-I	SRO-U
I3	RX														0	1	1	0
	NOR	1											1		2	1	1	1
	I/C	2,3,4,5,6,7											3,4,5,6,8		11	4	4	2
RX+NOR+I/C	MAJ	8											7		2	2	2	1
	Man. Ctrl.												8		1	1	1	0
13	TS	4,5													2	0	2	2
I4	RX														0	1	1	0
	NOR										1				1	1	1	1
	I/C		2,4,5,7								2,3,4,5,6,8,9				11	4	4	2
RX+NOR+I/C	MAJ		8								7				2	2	2	1
	Man. Ctrl.		2,4												2	1	1	0
12	TS										3,6				2	0	2	2
R10	RX														0	1	1	0
	NOR			1											1	1	1	1
	I/C			3,5,6								2,4,5,6,9			8	4	4	2
RX+NOR+I/C	MAJ			8								7			2	2	2	1
	Man. Ctrl.			3								2,6			3	1	1	0
9	TS														0	0	2	2

Form 3.4-1 Events and Evolutions Checklist - Crew G

Facility: PVNGS		Date of Exam: 4/29/2024													Operating Test Number: 2024			
APPLICANT	EVENT TYPE	Scenarios													TOTAL	MINIMUM		
		1			2			3			4							
		POSITION			POSITION			POSITION			POSITION							
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP			RO	SRO-I	SRO-U
I5	RX														0	1	1	0
	NOR	1									1				2	1	1	1
	I/C	2,3,4,5,6,7							2,4,6,7,9		2,3,4,5,6,8,9				18	4	4	2
RX+NOR+I/C	MAJ	8							8		7				3	2	2	1
	Man. Ctrl.								2,4						2	1	1	0
20	TS	4,5									3,6				4	0	2	2
R11	RX														0	1	1	0
	NOR									1			1		2	1	1	1
	I/C		2,4,5,7							3,5,6			3,4,5,6,8		12	4	4	2
RX+NOR+I/C	MAJ		8							8			7		3	2	2	1
	Man. Ctrl.		2,4							5			8		4	1	1	0
14	TS														0	0	2	2
R12	RX														0	1	1	0
	NOR			1											1	1	1	1
	I/C			3,5,6								2,4,5,6,9			8	4	4	2
RX+NOR+I/C	MAJ			8								7			2	2	2	1
	Man. Ctrl.			3								2,6			3	1	1	0
9	TS														0	0	2	2

Form 3.4-1 Events and Evolutions Checklist - Crew H

Facility: PVNGS		Date of Exam: 4/29/2024													Operating Test Number: 2024			
APPLICANT	EVENT TYPE	Scenarios													TOTAL	MINIMUM		
		1			2			3			4							
		POSITION			POSITION			POSITION			POSITION							
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP			RO	SRO-I	SRO-U
I6	RX														0	1	1	0
	NOR	1									1				2	1	1	1
	I/C	2,3,4,5,6,7							2,4,6,7,9		2,3,4,5,6,8,9				18	4	4	2
RX+NOR+I/C	MAJ	8							8		7				3	2	2	1
	Man. Ctrl.								2,4						2	1	1	0
20	TS	4,5									3,6				4	0	2	2
R13	RX														0	1	1	0
	NOR									1			1		2	1	1	1
	I/C		2,4,5,7							3,5,6			3,4,5,6,8		12	4	4	2
RX+NOR+I/C	MAJ		8							8			7		3	2	2	1
	Man. Ctrl.		2,4							5			8		4	1	1	0
14	TS														0	0	2	2
R14	RX														0	1	1	0
	NOR			1											1	1	1	1
	I/C			3,5,6								2,4,5,6,9			8	4	4	2
RX+NOR+I/C	MAJ			8								7			2	2	2	1
	Man. Ctrl.			3								2,6			3	1	1	0
9	TS														0	0	2	2