

Facility: Palo Verde														Date of Exam: April 2018													
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 & Abnormal Plant Evolutions	1	1	3	4	N/A			3	4	N/A			3	18			6										
	2	2	2	1				1	1				2	9			4										
	Tier Totals	3	5	5				4	5				5	27			10										
2. Plant Systems	1	3	3	3	2	1	2	2	3	3	3	3	28			5											
	2	1	1	0	1	1	1	1	1	1	1	1	10			3											
	Tier Totals	4	4	3	3	2	3	3	4	4	4	4	38			8											
3. Generic Knowledge and Abilities Categories					1 3		2 3		3 2		4 2		10		1	2	3	4	7								
<p>Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category).</p> <p>2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ± 1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.</p> <p>3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted with justification; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.</p> <p>4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.</p> <p>5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.</p> <p>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</p> <p>7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.</p> <p>8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in a category other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.</p> <p>9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.</p> <p>G* Generic K/As</p>																											

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000007 Reactor Trip / 1					X		Ability to determine or interpret the following as they apply to a reactor trip: (CFR 41.7 / 45.5 / 45.6) EA2.03 Reactor trip breaker position	4.2	1
CE/E02 Reactor Trip Recovery / 1				X			Ability to operate and / or monitor the following as they apply to the (Reactor Trip Recovery) (CFR: 41.7 / 45.5 / 45.6) EA1.2 Operating behavior characteristics of the facility.	3.3	2
000008 Pressurizer Vapor Space Accident / 3						X	2.2.37 Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)	3.6	3
000009 Small Break LOCA / 3			X				Knowledge of the reasons for the following responses as the apply to the small break LOCA: (CFR 41.5 / 41.10 / 45.6 / 45.13) EK3.07 Increasing indication on CCWS process monitor: indicates in-leakage of radioactive liquids	3.3	4
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4		X					Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: (CFR 41.7 / 45.7) AK2.07 RCP seals	2.9	5
000022 Loss of Rx Coolant Makeup / 2	X						Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup: (CFR 41.8 / 41.10 / 45.3) AK1.01 Consequences of thermal shock to RCP seals	2.8	6
000025 Loss of RHR System / 4						X	2.4.31 Knowledge of annunciator alarms, indications, or response procedures. (CFR: 41.10 / 45.3)	4.2	7
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3				X			Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: (CFR 41.7 / 45.5 / 45.6) AA1.01 PZR heaters, sprays, and PORVs	4.0	8
000029 ATWS / 1			X				Knowledge of the reasons for the following responses as the apply to the ATWS: (CFR 41.5 / 41.10 / 45.6 / 45.13) EK3.12 Actions contained in EOP for ATWS	4.4	9
000038 Steam Gen. Tube Rupture / 3									
000040 Steam Line Rupture / 4									

CE/E05 Excess Steam Demand / 4					X		Ability to determine and interpret the following as they apply to the (Excess Steam Demand) (CFR: 43.5 / 45.13) EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.4	10
000054 Loss of Main Feedwater / 4					X		Ability to operate and / or monitor the following as they apply to the Loss of Main Feedwater (MFW): (CFR 41.7 / 45.5 / 45.6) AA1.03 AFW auxiliaries, including oil cooling water supply	3.5	11
CE/E06 Loss of Feedwater / 4			X				Knowledge of the interrelations between the (Loss of Feedwater) and the following: (CFR: 41.7 / 45.7) EK2.2 Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.5	12
000055 Station Blackout / 6				X			Knowledge of the reasons for the following responses as they apply to the Station Blackout: (CFR 41.5 / 41.10 / 45.6 / 45.13) EK3.02 Actions contained in EOP for loss of offsite and onsite power	4.3	13
000056 Loss of Off-site Power / 6						X	Ability to determine and interpret the following as they apply to the Loss of Offsite Power: (CFR: 43.5 / 45.13) AA2.68 CVCS letdown flow	2.7	14
000057 Loss of Vital AC Inst. Bus / 6						X	Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: (CFR: 43.5 / 45.13) AA2.16 Normal and abnormal PZR level for various modes of plant operation	3.0	15
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4				X			Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: (CFR 41.4, 41.8 / 45.7) AK3.01 The conditions that will initiate the automatic opening and closing of the SWS isolation valves to the nuclear service water coolers	3.2*	16
000065 Loss of Instrument Air / 8						X	2.2.37 Ability to determine operability and/or availability of safety related equipment (CFR: 41.7 / 43.5 / 45.12)	3.6	17
000077 Generator Voltage and Electric Grid Disturbances / 6			X				Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following: (CFR: 41.4, 41.5, 41.7, 41.10 / 45.8) AK2.06 Reactor power	3.9	18
K/A Category Totals:	1	3	4	3	4	3	Group Point Total:	18/6	

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1			X				Knowledge of the reasons for the following responses as they apply to the Continuous Rod Withdrawal: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.02 Tech-Spec limits on rod operability	3.2	19
000003 Dropped Control Rod / 1				X			Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: (CFR 41.7 / 45.5 / 45.6) AA1.05 Reactor power – turbine power	4.1	20
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2		X					Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following: (CFR 41.7 / 45.7) AK2.03 Controllers and positioners	2.6	21
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7									
000036 Fuel Handling Accident / 8	X						Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents: (CFR 41.8 / 41.10 / 45.3) AK1.01 Radiation exposure hazards	3.5	22
000037 Steam Generator Tube Leak / 3	X						Knowledge of the operational implications of the following concepts as they apply to Steam Generator Tube Leak: (CFR 41.8 / 41.10 / 45.3) AK1.02 Leak rate vs. pressure drop	3.5	23
000051 Loss of Condenser Vacuum / 4						X	2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)	4.2	24
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8									
000068 Control Room Evac. / 8		X					Knowledge of the interrelations between the Control Room Evacuation and the following (CFR 41.7 / 45.7): AK2.01 Auxiliary shutdown panel layout	3.9	26
000069 Loss of CTMT Integrity / 5						X	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	4.1	25
000074 Inad. Core Cooling / 4									
000076 High Reactor Coolant Activity / 9									
CE/A13 Natural Circulation Operations / 4									

CE/A11 RCS Overcooling / 4					X		Ability to determine and interpret the following as they apply to the (RCS Overcooling) (CFR: 43.5 / 45.13) AA2.2 Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.0	27
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:	2	2	1	1	1	2	Group Point Total:		9/4

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)										Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
003 Reactor Coolant Pump						X						Knowledge of the effect of a loss or malfunction on the following will have on the RCPS: (CFR: 41.7 / 45/5) K6.04 Containment isolation valves affecting RCP operation	2.8	28
003 Reactor Coolant Pump											X	2.4.1 Knowledge of EOP entry conditions and immediate action steps (CFR: 41.10 / 43.5 / 45.13)	4.6	33
004 Chemical and Volume Control										X		Ability to manually operate and/or monitor in the control room: (CFR: 41/7 / 45.5 to 45.8) A4.14 Ion exchangers and demineralizers	2.8	29
004 Chemical and Volume Control						X						Knowledge of the effect of a loss or malfunction on the following CVCS components: (CFR: 41.7 / 45.7) K6.17 Flow paths for emergency boration	4.4	30
005 Residual Heat Removal											X	2.2.38 Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)	3.6	31
006 Emergency Core Cooling							X					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: (CFR: 41.5 / 45.5) A1.17 ECCS flow rate	4.2	32
007 Pressurizer Relief/Quench Tank	X											Knowledge of the physical connections and/or cause-effect relationships between the PRTS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.03 RCS	3.0	34
008 Component Cooling Water										X		Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5) A4.01 CCW indications and controls	3.3	35
010 Pressurizer Pressure Control	X											Knowledge of the physical connections and/or cause-effect relationships between the PZR PCS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.06 CVCS	2.9	36
012 Reactor Protection			X									Knowledge of the effect that a loss or malfunction of the RPS will have on the following: (CFR: 41.7 / 45.6) K3.01 CRDS	3.9	37

013 Engineered Safety Features Actuation			X													Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: (CFR: 41.7 / 45.6) K3.02 RCS	4.3	38
013 Engineered Safety Features Actuation				X												Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.13 MFW isolation/reset	3.7	39
022 Containment Cooling										X						Ability to monitor automatic operation of the CCS, including: (CFR: 41.7 / 45.5) A3.01 Initiation of safeguards mode of operation	4.1	40
026 Containment Spray											X					Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.03 Failure of ESF	4.1	41
039 Main and Reheat Steam					X											Knowledge of the operational implications of the following concepts as they apply to the MRSS: (CFR: 41.5 / 45.7) K5.08 Effect of steam removal on reactivity	3.6	42
059 Main Feedwater			X													Knowledge of the effect that a loss or malfunction of the MFW will have on the following: (CFR: 41.7 / 45.6) K3.02 AFW system	3.6	43
061 Auxiliary/Emergency Feedwater		X														Knowledge of bus power supplies to the following: (CFR: 41.7) K2.01 AFW system MOVs	3.2*	44
062 AC Electrical Distribution		X														Knowledge of bus power supplies to the following: (CFR: 41.7) K2.01 Major system loads	3.3	45
063 DC Electrical Distribution												X				2.4.6 Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)	4.0	46
063 DC Electrical Distribution											X					Ability to monitor automatic operation of the DC electrical system, including: (CFR: 41.7 / 45.5) A3.01 Meters, annunciators, dials, recorders, and indicating lights	2.7	47
064 Emergency Diesel Generator		X														Knowledge of bus power supplies to the following: (CFR: 41.7) K2.02 Fuel oil pumps	2.8*	48

073 Process Radiation Monitoring								X					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRM system controls including: (CFR: 41.5 / 45.7)	3.2	49
													A1.01 Radiation levels		
073 Process Radiation Monitoring								X					Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.5	50
													A2.01 Erratic or failed power supply		
076 Service Water									X				Ability to monitor automatic operation of the SWS, including: (CFR: 41.7 / 45.5)	3.7	51
													A3.02 Emergency heat loads		
076 Service Water								X					Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45/3 / 45/13)	3.5*	52
													A2.01 Loss of SWS		
078 Instrument Air				X									Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)	3.1*	53
													K4.03 Securing of SAS upon loss of cooling water		
078 Instrument Air									X				Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)	3.1	54
													A4.01 Pressure gauges		
103 Containment	X												Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.6	55
													K1.08 SIS, including action of safety injection reset		
K/A Category Point Totals:	3	3	3	2	1	2	2	3	3	3	3	3	Group Point Total:		28/5

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)											Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#	
001 Control Rod Drive											X	2.4.50 Ability to verify system alarm setpoints and operate controls identified in the alarm response manual. (CFR: 41.10 / 43.5 / 45.3)	4.2	56	
002 Reactor Coolant									X			Ability to monitor automatic operation of the RCS, including: (CFR: 41.7 / 45.5) A3.03 Pressure, temperatures, and flows	4.4	57	
011 Pressurizer Level Control		X										Knowledge of bus power supplies to the following: (CFR: 41.7) K2.02 PZR heaters	3.1	58	
014 Rod Position Indication				X								Knowledge of RPIS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.5 / 45.7) K4.03 Rod bottom lights	3.2	59	
015 Nuclear Instrumentation					X							Knowledge of the operational implications of the following concepts as they apply to the NIS: (CFR: 41.5 / 45.7) K5.05 Criticality and its indications	4.1	60	
016 Non-Nuclear Instrumentation															
017 In-Core Temperature Monitor															
027 Containment Iodine Removal															
028 Hydrogen Recombiner and Purge Control						X						Knowledge of the effect of a loss or malfunction on the following will have on the HRPS: (CFR: 41.7 / 45.7) K6.01 Hydrogen recombiners	2.6	61	
029 Containment Purge															
033 Spent Fuel Pool Cooling															
034 Fuel Handling Equipment															
035 Steam Generator	X											Knowledge of the physical connections and/or cause-effect relationships between the S/GS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.14 ESF	3.9	63	
041 Steam Dump/Turbine Bypass Control										X		Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8) A4.08 Steam dump valves	3.0	64	
045 Main Turbine Generator															
055 Condenser Air Removal															

056 Condensate									X					Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.04 Loss of Condensate Pumps	2.6	62
068 Liquid Radwaste																
071 Waste Gas Disposal																
072 Area Radiation Monitoring									X					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ARM system controls including: (CFR: 41.5 / 45.5) A1.01 Radiation levels	3.4	65
075 Circulating Water																
079 Station Air																
086 Fire Protection																
K/A Category Point Totals:	1	1	0	1	1	1	1	1	1	1	1	1	1	Group Point Total:		10/3

Facility: Palo Verde		Date of Exam: April 2018				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.21	Ability to verify the controlled procedure copy. (CFR: 41.10 / 45.10 / 45.13)	3.5*	66		
	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2 / 45.6)	4.3	67		
	2.1.34	Knowledge of primary and secondary plant chemistry limits. (CFR: 41.10 / 43.5 / 45.12)	2.7	68		
	Subtotal					
2. Equipment Control	2.2.6	Knowledge of the process for making changes to procedures. (CFR: 41.10 / 43.3 / 45.13)	3.0	69		
	2.2.40	Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)	3.4	70		
	2.2.43	Knowledge of the process used to track inoperable alarms. (CFR: 41.10 / 43.5 / 45.13)	3.0	71		
	Subtotal					
3. Radiation Control	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (CFR: 41.12 / 43.4 / 45.10)	3.4	72		
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 43.4 / 45.9)	2.9	73		
	Subtotal					
4. Emergency Procedures / Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps. (CFR: 41.10 / 43.5 / 45.13)	4.6	74		
	2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc. (CFR: 41.7 / 43.5 / 45.12)	4.0	75		
	Subtotal					
Tier 3 Point Total				10		7

Q #	Tier/Group	Randomly Selected K/A	Reason for Rejection
5	1 / 1	011 EK1.01	Operational implications of reflux boiling during a large break LOCA could not be asked in a question with plausible distractors due to the lack of ability to control plant parameters during a large break LOCA. Reselected 015/17 AK2.07.
7	1 / 1	025 2.4.41	Knowledge of the emergency action level thresholds and classifications is SRO level knowledge. Reselected 025 2.4.31.
8	1 / 1	027 AA1.05	PVNGS does not have backup power supplies for pressurizer heaters. Reselected 027 AA1.01.
17	1 / 1	065 2.2.3	There are no design, procedural, or operational differences between the units for the Instrument Air system. Reselected 065 2.2.37.
20	1 / 2	005 AA1.04	No specific direction exists for adjusting reactor and/or turbine power for a stuck CEA, with the exception of MODE 3 in 6 hours. This evolution would be conducted at the discretion of the CRS so conclusively saying one answer is right and the other answers would be wrong is not really possible. Since the original KA was more appropriate for a dropped CEA (which would also meet the original KA since a dropped CEA is inoperable), reselected 003 AA1.04. Only difference in KAs is dropped CEA vs. inoperable/stuck CEA.
22	1 / 2	036 AK1.03	After several attempts to write a question about indications of approaching criticality following a fuel handling incident, we determined that we (1) don't have procedural guidance for approaching criticality following a fuel handling incident, and (2) were unable to create plausible distractors for this concept. Reselected 036 AK1.01.
26	1 / 2	076 AK2.01	KA overlaps with question 85. All other AK2 items for 076, High Reactor Coolant Activity, are < 2.5. Reselected 068 (Control Room Evacuation), AK2.01.
33	2 / 1	007 2.4.34	There are no specific RO actions taken outside of the control room during an emergency related to the Pressurizer Relief/Quench Tank. Due to having a question about a lifted PZR relief and an additional 007 question, replaced KA with 003 G 2.4.1.
35	2 / 1	008 A4.02	There are no operations or monitoring points in the control room related to the filling and/or venting of the CCW system. Replaced with 008 A4.01.

41	2 / 1	026 A2.08	The KAs for questions 40 and 41 both required containment pressures having to do with either a CSAS actuation or securing of Containment Spray resulting in a cueing issue for one of the two questions. Replaced the KA on question 41 in order to avoid a cueing issue on either question. Reselected 026 A2.03.
46	2 / 1	063 2.4.11	All operations having to do with DC distribution while operating in the EOP network are directed from either the EOP or the EOP Standard Appendices. Reselected 063 G 2.4.11.
62	2 / 2	034 A2.03	Using procedures to correct, control or mitigate the misposition of a fuel element could be RO level knowledge if the KA was asking about the impact in a general sense, however the KA is asking for how to respond specifically to the impact to the Refueling Machine/Equipment which is SRO level knowledge and solely and SRO job function at PVGS. Reselected 056 A2.04
64	2 / 2	068 A4.03	PVNGS is a zero liquid release plant, therefore the KA does not apply. Reselected 041 (Steam Dump/Turbine Bypass Control) A4.08.

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		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 & Abnormal Plant Evolutions	1												18	3		3	6										
	2												2		2	4											
	Tier Totals												5		5	10											
2. Plant Systems	1												3		2	5											
	2												1		2	3											
	Tier Totals												4		4	8											
3. Generic Knowledge and Abilities Categories				1		2		3		4		10		1		2	3	4	7								
Note:		<p>1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category).</p> <p>2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ± 1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.</p> <p>3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted with justification; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.</p> <p>4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.</p> <p>5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.</p> <p>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</p> <p>7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.</p> <p>8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in a category other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.</p> <p>9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.</p>																									
G*		Generic K/As																									

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000007 Reactor Trip / 1									
CE/E02 Reactor Trip Recovery / 1									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4					X		Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: (CFR: 43.5 / 45.13) AA2.01 Proper amperage of running LPI/decay heat removal/RHR pump(s)	2.9	76
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3						X	2.1.32 Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	4.0	77
000029 ATWS / 1						X	2.4.18 Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)	4.0	78
000038 Steam Gen. Tube Rupture / 3									
000040 Steam Line Rupture / 4					X		Ability to determine and interpret the following as they apply to the Steam Line Rupture: (CFR: 43.5 / 45.13) AA2.03 Difference between steam line rupture and LOCA	4.7	79
CE/E05 Excess Steam Demand / 4									
000054 Loss of Main Feedwater / 4									
CE/E06 Loss of Feedwater / 4									
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6									
000057 Loss of Vital AC Inst. Bus / 6					X		Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: (CFR: 43.5 / 45.13) AA2.18 The indicator, valve, breaker, or damper position which will occur on a loss of power	3.1	80
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4									
000065 Loss of Instrument Air / 8									
000077 Generator Voltage and Electric Grid Disturbances / 6						X	2.4.31 . (CFR: 41.10 / 45.3)	4.1	81
K/A Category Totals:					3	3	Group Point Total:		18/6

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#	
000001 Continuous Rod Withdrawal / 1										
000003 Dropped Control Rod / 1										
000005 Inoperable/Stuck Control Rod / 1										
000024 Emergency Boration / 1										
000028 Pressurizer Level Malfunction / 2										
000032 Loss of Source Range NI / 7										
000033 Loss of Intermediate Range NI / 7						X	2.1.7 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)	4.7	82	
000036 Fuel Handling Accident / 8										
000037 Steam Generator Tube Leak / 3										
000051 Loss of Condenser Vacuum / 4					X		Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: (CFR: 43.5 / 45.13) AA2.02 Conditions requiring reactor and/or turbine trip	4.1	83	
000059 Accidental Liquid RadWaste Rel. / 9										
000060 Accidental Gaseous Radwaste Rel. / 9										
000061 ARM System Alarms / 7										
000067 Plant Fire On-site / 8						X	2.1.20 Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	84	
000068 Control Room Evac. / 8										
000069 Loss of CTMT Integrity / 5										
000074 Inad. Core Cooling / 4										
000076 High Reactor Coolant Activity / 9					X		Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: (CFR: 43.5 / 45.13) AA2.01 Location or process point that is causing an alarm	3.2	85	
CE/A13 Natural Circulation Operations / 4										
CE/A11 RCS Overcooling / 4										
CE/A16 Excess RCS Leakage / 2										
CE/E09 Functional Recovery										
K/A Category Point Totals:					2	2	Group Point Total:		9/4	

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)										Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
003 Reactor Coolant Pump														
004 Chemical and Volume Control														
005 Residual Heat Removal														
006 Emergency Core Cooling														
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water														
010 Pressurizer Pressure Control														
012 Reactor Protection														
013 Engineered Safety Features Actuation														
022 Containment Cooling														
026 Containment Spray														
039 Main and Reheat Steam														
059 Main Feedwater														
061 Auxiliary/Emergency Feedwater														
062 AC Electrical Distribution											X	2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (CFR: 41.5 / 41.7 / 43.2)	4.2	86
063 DC Electrical Distribution								X				Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Grounds	3.2*	87
064 Emergency Diesel Generator														
073 Process Radiation Monitoring								X				Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.02 Detector failure	3.2	88
076 Service Water											X	2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 41.10 / 43.5 / 45.12)	4.2	89

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ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)											Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
001 Control Rod Drive														
002 Reactor Coolant														
011 Pressurizer Level Control														
014 Rod Position Indication														
015 Nuclear Instrumentation											X	2.4.18 Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)	4.0	92
016 Non-Nuclear Instrumentation														
017 In-Core Temperature Monitor														
027 Containment Iodine Removal											X	2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc. (CFR: 41.7 / 43.5 / 45.12)	4.6	91
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment														
035 Steam Generator														
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator														
055 Condenser Air Removal														
056 Condensate														
068 Liquid Radwaste														
071 Waste Gas Disposal								X				Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.09 Stuck-open relief valve	3.5*	93
072 Area Radiation Monitoring														
075 Circulating Water														
079 Station Air														
086 Fire Protection														
K/A Category Point Totals:								1			2	Group Point Total:		10/3

Facility: Palo Verde			Date of Exam: April 2018			
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.4	Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, “no-solo” operation, maintenance of active license status, 10CFR55, etc. (CFR: 41.10 / 43.2)	3.8	94		
	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management. (CFR: 41.1 / 43.6 / 45.6)	4.6	95		
	Subtotal					
2. Equipment Control	2.2.17	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 / 43.3 / 45.13)	3.8	96		
	2.2.39	Knowledge of less than or equal to one hour Technical Specification action statements for systems. (CFR: 41.7 / 41.10 / 43.2 / 45.13)	4.5	97		
	Subtotal					
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)	3.7	98		
	Subtotal					
4. Emergency Procedures / Plan	2.4.38	Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required. (CFR: 41.10 / 43.5 / 45.11)	4.4	99		
	2.4.37	Knowledge of the lines of authority during implementation of the emergency plan. (CFR: 41.10 / 45.13)	4.1	100		
	Subtotal					
Tier 3 Point Total				10		7

Q #	Tier/Group	Randomly Selected K/A	Reason for Rejection
78	1 / 1	029 G 2.4.1	EOP entry conditions and immediate actions steps are RO knowledge. Reselected 029 G 2.4.18.
81	1 / 1	077 G 2.4.34	There are no RO tasks performed outside the control room during Generator Voltage and Grid Disturbances at PVNGS. Reselected 077 G 2.4.31.
92	2 / 2	028 G 2.4.18	Very similar KA to question 61 on the RO exam. Kept G 2.4.18 but reselected system 015, Nuclear Instrumentation.
94	3	G 2.1.13	Questions regarding access control are primarily general employee training. Control of vital area keys is performed by multiple groups depending on situations/conditions. For example, the procedure allows security to issue keys during an emergency situation, however the term "emergency situation" is not defined. Some procedures list some people who can issue keys while other procedures list a subset of those people, making a question about who controls which keys somewhat difficult to make appeal proof. Reselected G 2.1.4.
96	3	G 2.2.7	Conduct of special or infrequent tests procedure at PVNGS is a collection of philosophical strategies and approaches which do not lend themselves to a written exam question which has one conclusively correct and three plausible yet incorrect answers. Reselected G 2.2.17.
98	3	G 2.3.5	Ability to use RM systems and personnel monitoring equipment is generic plant worker knowledge and/or RO level knowledge. Reselected G 2.3.4.
100	3	G 2.4.46	Understanding what causes alarms to come in (verify alarms are consistent with plant conditions) is RO knowledge. Reselected G 2.4.37.

Administrative Topics Outline

Facility: PVNGS		Date of Examination: 4/13/18
Examination Level	RO	Operating Test Number: 2018 NRC
Administrative Topic (see Note)	Type Code*	Describe Activity to be Performed
(A1)	N, R	JPM: Determine the void volume in the Train 'A' EC System K/A: G 2.1.20 – Ability to interpret and execute procedure steps. IR: 4.6
(A2)	D, R	JPM: Determine the time until SDC must be in service K/A: G 2.1.25 – Ability to interpret reference materials, such as graphs, curves, tables, etc. IR: 3.9
(A3)	N, R	JPM: Calculate Containment Sump in-leakage K/A: G 2.2.12 – Knowledge of surveillance procedures. IR: 3.7
(A4)	M, R	JPM: Determine total dose for task, hold point extension approval, and radiological posting requirements K/A: G 2.3.4 – Knowledge of radiation exposure limits under normal or emergency conditions IR: 3.2
Emergency Plan		
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
*Type Codes & Criteria:		
(C)ontrol room, (S)imulator, or Class(R)oom		
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (1)		
(N)ew or (M)odified from bank (≥ 1) (3)		
(P)revious 2 exams (≤ 1; randomly selected) (0)		

Administrative Topics Outline
Task Summary

- A1 The applicant will determine the void volume in the Train 'A' Essential Chiller Water System, per 40OP-9EC01, Essential Chilled Water Train A, Section 6.15, Void Checking Essential Chilled Water System Train A. This is a new JPM.
- A2 The applicant will determine the time until SDC must be placed in service using post-trip parameters and Standard Appendix 4, CST Level vs Time to Shutdown Cooling. This is a bank JPM.
- A3 The applicant will utilize various Containment Sump level readings to determine Containment Sump in-leakage using 40ST-9RD01, Containment Sump Hourly Check. This is a new JPM.
- A4 The applicant will determine the total dose to be received during performance of a task in the RCA and determine the required authorization for the exposure hold point extension per 75DP-9RP01, Radiation Exposure and Access Control, and determine the required radiological posting for the area per 75RP-0RP01, Radiological Posting and Labeling. This is a modified bank JPM.

Administrative Topics Outline

Facility: PVNGS		Date of Examination: 4/13/18
Examination Level	SRO	Operating Test Number: 2018 NRC
Administrative Topic (see Note)	Type Code*	Describe Activity to be Performed
(A5)	M, R	<p>JPM: Determine compliance with fatigue rules</p> <p>K/A: G 2.1.5 – Ability to use procedures related to shift staffing, such as minimum crew compliment, overtime limitations, etc.</p> <p>IR: 3.9</p>
(A6)	D, R	<p>JPM: Times for required actions following slipped CEA</p> <p>K/A: 2.1.25 – Ability to interpret reference materials, such as graphs, curves, tables, etc.</p> <p>IR: 4.2</p>
(A7)	D, R	<p>JPM: MSIV operability determination</p> <p>K/A: G 2.2.40 – Ability to apply Technical Specifications for a system.</p> <p>IR: 4.7</p>
(A8)	N, R	<p>JPM: PAR evaluation following a release related General Emergency declaration</p> <p>K/A: G 2.3.14 – Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.</p> <p>IR: 3.8</p>
(A9)	N, R	<p>JPM: Classify the EAL following an emergency</p> <p>K/A: G 2.4.29 – Knowledge of the emergency plan.</p> <p>IR: 4.4</p>

Administrative Topics Outline

Task Summary

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

*Type Codes & Criteria:	(C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (2) (N)ew or (M)odified from bank (≥ 1) (3) (P)revious 2 exams (≤ 1 ; randomly selected) (0)
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- A5 The applicant will review the past 7 days worked for 3 ROs and determine which, if any, of them is available to work the next day by comparing their work history to Personal Fatigue Rules per 01DP-0AP17, Managing Personnel Fatigue. This is a modified bank JPM (modified from a 2015 NRC Exam SRO JPM).
- A6 The applicant will determine maximum completion times for initial and subsequent power reductions and minimum required CEA withdrawal times using various graphs and tables following a slipped CEA per 40AO-9ZZ11, CEA Malfunctions. This is a bank JPM.
- A7 The applicant will evaluate the operability of MSIVs based on valve actuator accumulator pressures over the course of two hours, and determine the impacted LCO conditions, using Technical Specifications. This is a bank JPM.
- A8 The applicant will evaluate the status of a radiological release and meteorological conditions to make a Protective Area Recommendation per EP-0803E, PAR Flowchart. This is a new JPM.
- A9 The applicant will classify an emergency event using EP-0901, Classifications, and the EAL classification charts. This is a new JPM.

Facility:	PVNGS	Date of Examination:	04/13/18
Exam Level:	RO SRO(I) SRO (U)	Operating Test No.:	2018 NRC
Control Room Systems (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U, including 1 ESF)			
System / JPM Title		Type Code*	Safety Function
S1 (RO Only)	014 - Reset CEA positions in the Plant Computer and Core Monitoring Computer per 40AO-9ZZ11	N, S	1
S2	013 - Reset Train 'A' and Train 'B' AFAS-1 and AFAS-2 actuations per Standard Appendix 27	EN, L, N, S	2
S3	010 - Take manual control of Pressurizer Spray prior to an automatic reactor trip following a controller failure per the alarm response procedure	A, N, S	3
S4	003 - Restore Seal Injection following an extended loss of letdown per 40AO-9ZZ05, Loss of Charging or Letdown	A, D, S	4P
S5	EPE 011 - Vent the RCS to Containment per Standard Appendix 15, RCS Void Control	A, D, L, S	5
S6	062 - Transfer 13.8 kV Bus NAN-S02 to MAN-X02 per 40OP-9NA03, 13.8 kV Electrical System	A, D, S	6
S7	015 - Adjust Linear Power NI to correspond with calorimetric power indication per 40ST-9NI01, Adjustable Power Signal Calibrations	N, S	7
S8	008 - Cross-Tie Train 'A' EW to NC with the 'A' EW Pump tripping during evolution	A, M, S	8
In-Plant Systems (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	APE 054 - Cross-Tie AFW to Fire Protection Water per Standard Appendix 118, Cross-Connect FP to AF	E, N	4S
P2	CE A16 - Minimize Release to Environment during a SGTR – Align Turbine Building Sumps to LRS per 40AO-9ZZ02, Excessive RCS Leakrate	D, E	2
P3	067 – Align SDC for service following a Control Room Fire	A, D, E, R	4P

RO: Will perform all simulator and in-plant JPMs

SRO(I): Will perform all simulator and in-plant JPMs with the exception of **S-1**

SRO(U): Will perform **S-2, S-6, S-8, P-1, P-3**

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.	
* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 (6) / 4-6 (6) / 2-3 (3)
(C)ontrol room	
(D)irect from bank	≤ 9 (5) / ≤ 8 (5) / ≤ 4 (2)
(E)mergency or abnormal in-plant	≥ 1 (3) / ≥ 1 (3) / ≥ 1 (2)
(EN)gineered safety feature	≥ 1 (1) / ≥ 1 (1) / ≥ 1 (1) (control room system)
(L)ow Power / Shutdown	≥ 1 (2) / ≥ 1 (2) / ≥ 1 (1)
(N)ew or (M)odified from bank including 1(A)	≥ 2 (6 – 2A) / ≥ 2 (5 – 2A) / ≥ 1 (3 – 1A)
(P)revious 2 exams	≤ 3 (0) / ≤ 3 (0) / ≤ 2 (0) (randomly selected)
(R)CA	≥ 1 (1) / ≥ 1 (1) / ≥ 1 (1)
(S)imulator	

NRC JPM Examination Summary Description

- S1 The applicant will reset CEA positions in the Plant Monitoring Computer and Core Monitoring Computer following a CEA slip to 50" withdrawn per 40AO-9ZZ11, CEA Malfunctions. This is a new JPM covered by Safety Function 1.
- S2 The applicant will reset Train 'A' and Train 'B' AFAS-1 and AFAS-2 per Standard Appendix 27-E, AFAS Reset and Restoration. This is a new JPM covered by Safety Function 2.
- S3 The applicant will begin by placing the Pressurizer in Boron Equalization. The alternate path will occur one minute after placing the Pressurizer Pressure Controller in AUTO. The controller output will fail to 100% causing both Main Spray valves to go full open. The applicant will either take prompt and prudent action to close the spray valves or address the ARP to close the spray valves. This is a new JPM covered by Safety Function 3.
- S4 The applicant will restore RCP Seal Injection following an extended loss of letdown per 40AO-9ZZ05, Loss of Charging or Letdown. The alternate path will occur when the differential pressure controller fails to 0% output when placed in auto, requiring the operator to take manual controller of differential pressure to establish 6.0 – 7.5 gpm of seal injection flow to each RCP. This is a bank JPM covered by Safety Function 4P.
- S5 The applicant will attempt to vent the Reactor Vessel Head to the Reactor Drain Tank following a loss of coolant accident per Standard Appendix 15, RCS Void Control. The alternate path will occur when the vent valves to the RDT will not open and the applicant will have to open alternate valves to align the vent path to containment. This is a bank JPM covered by Safety Function 5.

- S6 The applicant will transfer 13.8 kV Bus NAN-S02 from 13.8 kV Bus NAN-S04 to Unit Aux Transformer MAN-X02 per 40OP-9NA03, 13.8 kV 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 high temperature on Unit Aux Transformer. This is a bank JPM covered by Safety Function 6.
- S7 The applicant will perform a post-maintenance NI alignment for the linear power NI per 40ST-9NI01, Adjustable Power Signal Calibrations. This is a new JPM covered by Safety Function 7.
- S8 The applicant will cross-tie Train 'A' Essential Cooling Water system to supply Nuclear Cooling Water non-essential loads following a complete loss of NC per 40AO-9ZZ03, Loss of Cooling Water. The alternate path occurs when the 'A' EW Pump trips, rendering the cross-tie impossible and requiring a reactor trip. This is a modified bank JPM covered by Safety Function 8.
- P1 The applicant will simulate field actions to align the Fire Protection system to the Auxiliary Feedwater system to supply emergency feedwater to the SGs per Standard Appendix 118, Cross-Connect FP to AF. This is a new JPM covered by Safety Function 4S.
- P2 The applicant will simulate aligning Turbine Building Sumps to the Liquid Radwaste System following a SGTL per 40AO-9ZZ02, Excessive RCS Leakrate. This is a bank JPM covered by Safety Function 2.
- P3 The applicant will simulate locally aligning SDC valves per 40AO-9ZZ19, Control Room Fire, Appendix W, Placing SDC Train B in Service. One of the valves will fail to reposition at the MCC requiring the applicant to locally operate the valve to complete the lineup. This is a new JPM covered by Safety Function 4P.

Facility: Palo Verde	Scenario: 1	Test: 2018 NRC Exam
Examiners: _____	Operators: _____	

Initial Conditions: 100% power, MOC, 'A' HPSI Pump OOS		
Turnover: Raise SIT 1A pressure to ~ 615 psig, and maintain steady state power.		

Event Number	Event Type*	Event Description
1	N (OATC, CRS)	Raise 1A SIT Pressure
2	I (ALL), TS (CRS)	Inadvertent Train 'A' CIAS
3	I (ALL)	Turbine Load Index (TLI) Instrument #1 Fails Low
4	C (ALL), TS (CRS)	30 gpm SGTL on SG #1
5	C (BOP, CRS)	Stator Cooling Pump trips; Standby pump fails to Auto-Start
6	M (ALL)	Main Turbine Trip / Stuck Open SG Safety on SG #1
7	C (OATC, CRS)	CEA 14 Sticks out on Reactor Trip – Borate the RCS
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification		

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

Facility: Palo Verde	Scenario: 2	Test: 2018 NRC Exam
Examiners: _____	Operators: _____	
_____	_____	
_____	_____	
Initial Conditions: 100% Power, MOC, HPSI 'A' OOS.		
Turnover: Exercise CEA 66 following ACTM card replacement		

Event Number	Event Type*	Event Description
1	N (OATC)	Exercise CEA 66
2	TS (CRS)	RU-1 Inlet CIV HCA-UV-46 Fails Closed
3	C (BOP, CRS)	Loss of Condenser Vacuum
4	I (OATC), TS (CRS)	PZR Level Transmitter LT-110X Fails Low
5	C (ALL)	Loss of NNN-D16
6	M (ALL)	ESD Outside Containment on SG #2
7	C (OATC)	ATWS – Actions at B01 are successful at shutting down the reactor
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification		

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

Facility:	Palo Verde	Scenario: 3	Test:	2018 NRC Exam
Examiners:	_____	Operators:	_____	
	_____		_____	
	_____		_____	
Initial Conditions: 100% Power, MOC, HPSI 'A' OOS				
Turnover: Shift RCN-LIC-110, Pressurizer Level Control, from Local/Auto to Remote/Auto				

Event Number	Event Type*	Event Description
1	N (OATC)	Place Pressurizer Level Controller in Remote/Auto
2	C (BOP)	TCW Pump Sheared Shaft, Standby Pump fails to Auto-Start
3	C (ALL), TS (CRS)	LOP on PBB-S04 / 'B' EDG Breaker Fails to Auto Close
4	C (BOP), TS (CRS)	UV Relay 727-4 Fails
5	C (ALL)	EHC Load Control Circuit fails to 80%
6	M (ALL)	Loss of Offsite Power / 'B' EDG Overspeed Trip
7	C (OATC)	PBA-S03 Normal Supply Breaker Fails to Auto Open
8	M (ALL)	SGTR on SG #1 (2 minutes post-trip)
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification		

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

Facility: Palo Verde	Scenario: 4	Test: 2018 NRC Exam
Examiners:	Operators:	
_____	_____	_____
_____	_____	_____
_____	_____	_____
Initial Conditions: 1.5-2.5%, MOC, no MFPs in service, 'A' HPSI Pump OOS		
Turnover: Start AFB-P01 for a vibration measurement, shift the order of Charging Pumps from 1-2-3 to 2-3-1, and maintain steady state power.		

Event Number	Event Type*	Event Description
1	N (BOP), TS (CRS)	Start AFB-P01 for Vibration Test, AFB-P01 O/C Trip
2	N (OATC)	Change the order of Charging Pumps from 1-2-3 to 2-3-1
3	C (OATC, CRS)	Gas Binding of the 'E' Charging Pump
4	I (BOP), TS (CRS)	'C' RWT Transmitter Fails Low
5	C (ALL)	Loss of Non-Class Instrument Bus NNN-D11
6	M (ALL)	Large Break LOCA
7	C (ATC)	'B' HPSI Pump Fails To Auto Start on SIAS
8	C (BOP)	CSAS Fails to Auto Actuate
*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification		

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