Facility: Palo Verde Date of Examination: Nov. 8-12, 2010

Examination Level: RO [X] SRO [ ] Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations A-1	R, M	Shutdown Margin Calculation K/A 2.1.37 RO 4.3 SRO 4.6 K/A 2.1.20 RO 4.6 SRO 4.6
Conduct of Operations A-2	R,D	Complete PDIL entry logs for the Regulating Group and Part Strength CEAs K/A 2.1.18 RO 3.6 SRO 3.8
Equipment Control A-3	R,N	Perform 40ST-9RC08, Backup RCS leakrate calculation K/A 2.2.12 RO 3.7 SRO 4.1
Radiation Control A-4	R,N	Perform RCA Tasks K/A 2.3.13 RO 3.4 SRO 3.8
Emergency Procedures/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.

Facility: Palo Verde Date of Examination: Nov. 8-12, 2010

Examination Level: RO [ ] SRO [X] Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations A-5	R, M	Review a Shutdown Margin Calculation, identify errors and determine required action(s) K/A 2.1.37 RO 4.3 SRO 4.6
Conduct of Operations A-6	R,N	Determine if shift manning meets requirements of Tech Specs and Station procedures K/A 2.1.5 RO2.9 SRO 3.9
Equipment Control A-7	R,D	Determine status of Main Steam Safety valves (LCO) and any required actions. K/A 2.2.22 RO 4.0 SRO 4.7
Radiation Control A-8	R,P	Determine dose, hold points and permission to exceed those hold points. K/A 2.3.4 RO 3.2 SRO 3.7
Emergency Procedures/Plan A-9	R, N	Classify an event K/A 2.4.41 RO 2.9 SRO 4.6

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.

Facility: Palo Verde	Date of Examination: Nov. 8-12, 2010
Exam Level: RO [X] SRO-I [ ] SRO-U [ ]	Operating Test No.: _____

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
JS-1 Respond to a Steam Generator Tube Leak (K/A 4.2.037 AA1.13 RO 3.9 SRO 4.0)	S,N	4S
JS-2 Perform a Boration of the RCS (K/A 3.1 004 A4.01 RO 3.8 SRO 3.9)	S,A,D	1
JS-3 Implement LOCA instructions and contingencies (K/A 3.2 006 A3.08 RO 4.2 SRO 4.3)	S,L,N,A,EN	2
JS-4 Perform a BDAS Alarm check (K/A 3.7.015.A3.03 RO 3.9 SRO 3.9)	S, D,L	5
JS-5. Implement SGTR instructions and contingencies (K/A 4.2 037 AK3.07 RO 4.2 SRO 4.1)	S,D,A,L,P	4P
JS-6. Restore Containment Cooling following inadvertent SIAS (K/A 3.5.022-A4.01 RO 3.6 SRO 3.6)	S,D, L	7
JS-7 Perform Diesel Generator Test (K/A 3.6 064 A4.01 RO 4.0 SRO 4.3)	S, N	6
JS-8 Operate the Pressurizer Pressure Control System (K/A 4.2.027.A1.01 RO 4.0 SRO 3.9)	S,D,P	3
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
JP-1 Perform Event Control Actions for a Control Room Fire (K/A 4.2.068.AA1.10 RO 3.7 SRO 3.9)	A,M,E	6
JP-2 Respond to a Control Room Fire (K/A 4.2 026 AA1.03 RO 3.6 SRO 3.6)	R, N, E	8
JP-3 Perform Actions per 40AO-9ZZ24, Deliberate Acts against PVNGS (K/A 3.4 061 A2.05 RO 3.1 SRO 3.4)	N, E, A	4S

@ 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

Facility: Palo Verde		Date of Examination: Nov. 8-12, 2010
Exam Level: RO ☐ SRO-I ☒ SRO-U ☐		Operating Test No.: _____
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
JS-1 Respond to a Steam Generator Tube Leak (K/A 4.2.037 AA1.13 RO 3.9 SRO 4.0)	S,N	4S
JS-2 Perform a Boration of the RCS (K/A 3.1 004 A4.01 RO 3.8 SRO 3.9)	S,A,D	1
JS-3 Implement LOCA instructions and contingencies (K/A 3.2 006 A3.08 RO 4.2 SRO 4.3)	S,L,N,A,EN	2
JS-4 Perform a BDAS Alarm check (K/A 3.7.015.A3.03 RO 3.9 SRO 3.9)	S, D,L	5
JS-5. Implement SGTR instructions and contingencies (K/A 4.2 037 AK3.07 RO 4.2 SRO 4.1)	S,D,A,L,P	4P
JS-6. Restore Containment Cooling following inadvertent SIAS (K/A 3.5.022-A4.01 RO 3.6 SRO 3.6)	S,D, L	7
JS-7 Perform Diesel Generator Test (K/A 3.6 064 A4.01 RO 4.0 SRO 4.3)	S, N	6
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
JP-1 Perform Event Control Actions for a Control Room Fire (K/A 4.2.068.AA1.10 RO 3.7 SRO 3.9)	A,M,E	6
JP-2 Respond to a Control Room Fire (K/A 4.2 026 AA1.03 RO 3.6 SRO 3.6)	R, N, E	8
JP-3 Perform Actions per 40AO-9ZZ24, Deliberate Acts against PVNGS (K/A 3.4 061 A2.05 RO 3.1 SRO 3.4)	N, E, A	4S
@ 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	

Facility: Palo Verde Date of Examination: Nov. 8-12, 2010

Exam Level: RO ☐ SRO-I ☐ SRO-U [X] Operating Test No.: _____

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
JS-1 Respond to a Steam Generator Tube Leak (K/A 4.2.037 AA1.13 RO 3.9 SRO 4.0)	S,N	4S
JS-2 Perform a Boration of the RCS (K/A 3.1 004 A4.01 RO 3.8 SRO 3.9)	S,A,D	1
JS-3 Implement LOCA instructions and contingencies (K/A 3.2 006 A3.08 RO 4.2 SRO 4.3)	S,L,N,A,EN	2

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

JP-1 Perform Event Control Actions for a Control Room Fire (K/A 4.2.068.AA1.10 RO 3.7 SRO 3.9)	A,M,E	6
JP-2 Respond to a Control Room Fire (K/A 4.2 026 AA1.03 RO 3.6 SRO 3.6)	R, N, E	8

@ 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

Facility: PVNGS Scenario No.: 1 Op-Test No: 2010

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC-101 (2% power, MOC).

Turnover: Unit 1 is at 2% power (250 EFPD) following a Short notice outage of 5 days. Power is being held steady while waiting for the Mode 2 to 1 Mode Change checklist to be completed.

Event No.	Malf. No.	Event Type*	Event Description
1	Imf cmCNCV01CHEPDIC240_2	C RO/SRO	Charging Header DP controller fails in the AUTO mode
2	Imf mfSB01C	I CO/SRO (TS)	Core Protection Calculator failure
3	Imf cmTRCV19RCALT110X_4	I RO/SRO (TS)	RCA-LT-110X Pressurizer level transmitter fails low.
4	Imf mfCPTP04TCNP01A_6 (In setup) Imf cmCPTP04TCNP01B_5	C CO/SRO	Turbine Cooling Water pump trip (Standby fails to auto start) **(40AO-9ZZ03, Loss of Cooling Water)**
5	Imf mfRP06H1 Imf mfRP06H2	C CO/RO/SRO (TS)	Inadvertent CSAS Train 'B' **(40AO-9ZZ17, Inadvertent PPS-ESFAS Actuations)**
6	Imf cmCNMS19SGNPIC1010_1 Imf MS12A		SBCV 1001 fails to 100% open. (Trip Initiator)
7	(In setup) Imf CMMVFW08AFBUV34_6	C CO/SRO	B Train AF valve to SG 1 fails to open.
8	Imf mfTH01B	M ALL	Large Break LOCA **(40EP-9EO03)**
9	Scenario file "noSICI"	C CO/SRO	SIAS fails to initiate **CRITCAL TASK – Initiate SI flow when the SIAS setpoint has been exceeded.**
10	Imf cmMVRH03SIAUV672_6	C RO/SRO	CS 'A' header isolation fails to open (B CS pump stopped due to Inadvertent CSAS earlier) **CRITCAL TASK –Initiate CS flow when the CSAS setpoint has been exceeded.**
End point			The scenario will end when CS and SI is established.

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	8
2. Malfunctions after EOP entry (1–2)	4
3. Abnormal events (2–4)	2
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	0
7. Critical tasks (2–3)	2

Facility: PVNGS Scenario No.: 2 Op-Test No: 2010

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC-102 (100% power, MOC).

Turnover: Unit 1 is at 100% power (250 EFPD). Stator Cooling Pump 'A' is tagged out for schedule maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1	In setup Imf cmAVCV11CHAUV560_4	N RO/SRO (TS)	Pump the RDT, CH-UV-560 fails to close when securing lineup
2	Imf mfNI02A	I RO/CO/SRO	Control Channel Power Instrument #1 fails low affecting the Reactor Regulating System and the Digital Feedwater Control System **(40AO-9ZZ16, RRS Malfunctions)**
3	Imf cmTRCV05CHNLT227_4	C RO/SRO	VCT level transmitter CHN-LT-227 fails low
4	Imf RD02D	R - RO N - CO/SRO (TS)	Power Reduction due to slipped CEA **(40AO-9ZZ11, CEA Malfunctions)** **CRITICAL TASK – Commence a power reduction within 10 minutes.**
5	Imf RD02J Scenario file "atws"	M ALL	Twelve Finger CEA slips (ATWS) **CRITICAL TASK – Ensure SPTA Reactivity control contingency actions are taken**
6	Imf ED02	C ALL	On the Trip a Loss of Offsite power occurs
7	(In setup) Imf EG05A	C RO/SRO	SP A fails to auto start
8	Imf EG17		DG 'A' trips on loss of lube oil
9	(In setup) Imf mfFW22 Imf FW21B	C ALL	Turbine Driven Aux Feedwater pump AFA-P01 trips on overspeed and Motor Driven Aux Feedwater pump AFB-P01 trips on an 86 lockout **(40EP-9EO09 Functional Recovery Procedure)**
End point			Restore feed to at least one SG **CRITICAL TASK – Establish a feed source to at least one Steam Generator**

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	9
2. Malfunctions after EOP entry (1–2)	2
3. Abnormal events (2–4)	2
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	1
7. Critical tasks (2–3)	3

Facility: PVNGS Scenario No.: 3 Op-Test No: 2010

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC-103 (100% power, MOC)

Turnover: Unit 1 is at 100% power (250 EFPD). Stator Cooling Pump 'A' is tagged out for schedule maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1	None	N RO/SRO	Shift Charging Pumps to 2-3-1.
2	Imf mfCMTRRX09RCBPDT125B_4	I CO/SRO (TS)	RCBPDT125B (SG RCS DP Transmitter) fails low
3	(In setup) imf mfBKEG03PBBS04B_2	C RO/SRO (TS)	Loss of PBB-S04 – DG breaker fails to auto close **(40AO-9ZZ12, Degraded Electrical)**
4	Imf mfEG04	C CO/SRO	Main Generator AC Regulator failure
5	IMF MC01A	R - RO N- CO/SRO	Loss of condenser vacuum **(40AO-9ZZ07, Loss of Vacuum)**
6	IMF mfMS01A	M ALL	Steam Line Leak (ESD) inside containment (Trip Initiator) **(40EP-9EO06, Excess Steam Demand)**
7	Scenario file "noMSIS"	C CO/SRO	MSIS fails to automatically initiate **CRITICAL TASK – Ensure MSIS is actuated when the MSIS setpoint has been exceeded.**
8	(In setup) Imf mfSI01A mfRP07B	C RO/SRO	HPSI A Trips and the B BOP/ESFAS sequencer fails requiring the RO to start all B train pumps **CRITICAL TASK – Ensure SI flow when SIAS setpoint has been exceeded**
9	Scenario file "noDP1SG"	C CO/SRO	SG DP Lockout fails requiring the CO to manually stop feeding the SG that is faulted inside containment. **CRITICAL TASK – Ensure SG isolated when AFAS DP lockout has been exceeded.**
End point			Scenario ends when crew has caught RCS rebound and a HPSI pump is running

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	7
2. Malfunctions after EOP entry (1–2)	3
3. Abnormal events (2–4)	2
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	0
7. Critical tasks (2–3)	3

Facility: Palo Verde REV 2

Date Of Exam: 11/05/2010

Tier	Group	RO K/A Category Points												SRO-Only Points				
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2			G*	Total
1. Emergency & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A		3	18	0			0	0
	2	1	2	2				1	2			1	9	0			0	0
	Tier Totals	4	5	5				4	5			4	27	0			0	0
2. Plant Systems	1	3	2	3	3	2	2	4	3	2	2	2	28	0			0	0
	2	1	1	1	1	1	1	1	1	1	1	0	10	0		0	0	0
	Tier Totals	4	3	4	4	3	3	5	4	3	3	2	38	0			0	0
3. Generic Knowledge And Abilities Categories		1			2			3			4		10	1	2	3	4	0
		3			3			2			2			0	0	0	0	

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).

2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.

3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.

4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.

5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.

6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.

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

8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.

9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

PWR RO Examination Outline

Facility: Palo Verde

ES - 401 **Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1** **Form ES-401-2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
000008 Pressurizer Vapor Space Accident / 3						X	2.2.40 - Ability to apply Technical Specifications for a system.	3.4	1
000009 Small Break LOCA / 3			X				EK3.10 - Observation of PZR level	3.4	1
000011 Large Break LOCA / 3		X					EK2.02 - Pumps	2.6*	1
000015/000017 RCP Malfunctions / 4						X	2.4.11 - Knowledge of abnormal condition procedures.	4.0	1
000022 Loss of Rx Coolant Makeup / 2					X		AA2.02 - Charging pump problems	3.2	1
000025 Loss of RHR System / 4				X			AA1.22 - Obtaining of water from BWST for LPI system	2.9*	1
000027 Pressurizer Pressure Control System Malfunction / 3		X					AK2.03 - Controllers and positioners	2.6	1
000029 ATWS / 1				X			EA1.11 - Manual opening of the CRDS breakers	3.9*	1
000038 Steam Gen. Tube Rupture / 3					X		EA2.01 - When to isolate one or more S/Gs	4.1	1
000040 Steam Line Rupture - Excessive Heat Transfer / 4						X	2.4.46 - Ability to verify that the alarms are consistent with the plant conditions.	4.2	1
000055 Station Blackout / 6	X						EK1.02 - Natural circulation cooling	4.1	1
000057 Loss of Vital AC Inst. Bus / 6				X			AA1.01 - Manual inverter swapping	3.7*	1
000058 Loss of DC Power / 6					X		AA2.01 - That a loss of dc power has occurred; verification that substitute power sources have come on line	3.7	1
000062 Loss of Nuclear Svc Water / 4			X				AK3.03 - Guidance actions contained in EOP for Loss of nuclear service water	4.0	1
000065 Loss of Instrument Air / 8			X				AK3.04 - Cross-over to backup air supplies	3.0	1
CE/E02 Reactor Trip - Stabilization - Recovery / 1	X						EK1.2 - Normal, abnormal and emergency operating procedures associated with Reactor Trip or Safety Injection /Rediagnosis	3.0	1
CE/E05 Steam Line Rupture - Excessive Heat Transfer / 4	X						EK1.1 - Components, capacity, and function of emergency systems	3.0	1
CE/E06 Loss of Main Feedwater / 4		X					EK2.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.3	1
K/A Category Totals:	**3**	**3**	**3**	**3**	**3**	**3**	**Group Point Total:**		**18**

PWR RO Examination Outline

Facility: Palo Verde

ES - 401 **Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2** **Form ES-401-2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
000003 Dropped Control Rod / 1					X		AA2.01 - Rod position indication to actual rod position	3.7	1
000024 Emergency Boration / 1	X						AK1.02 - Relationship between boron addition and reactor power	3.6	1
000032 Loss of Source Range NI / 7		X					AK2.01 - Power supplies, including proper switch positions	2.7*	1
000051 Loss of Condenser Vacuum / 4			X				AK3.01 - Loss of steam dump capability upon loss of condenser vacuum	2.8*	1
000061 ARM System Alarms / 7			X				AK3.02 - Guidance contained in alarm response for ARM system	3.4	1
000067 Plant Fire On-site / 9				X			AA1.08 - Fire fighting equipment used on each class of fire	3.4	1
000068 Control Room Evac. / 8						X	2.4.6 - Knowledge of EOP mitigation strategies.	3.7	1
CE/A13 Natural Circ. / 4					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	2.7	1
CE/A16 Excess RCS Leakage / 2		X					EK2.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.2	1
K/A Category Totals:	**1**	**2**	**2**	**1**	**2**	**1**	**Group Point Total:**		**9**

PWR RO Examination Outline

REV 2

Facility: Palo Verde

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
003 Reactor Coolant Pump	X											K1.04 - CVCS	2.6*	1
004 Chemical and Volume Control			X									K3.07 - PZR level and pressure	3.8	1
005 Residual Heat Removal						X						K6.03 - RHR heat exchanger	2.5	1
005 Residual Heat Removal		X										K2.01 - RHR pumps	3.0	1
006 Emergency Core Cooling								X				A2.12 - Conditions requiring actuation of ECCS	4.5	1
006 Emergency Core Cooling				X								K4.06 - Recirculation of minimum flow through pumps	2.7	1
007 Pressurizer Relief/Quench Tank							X					A1.01 -Maintaining quench tank water level within limits	2.9	1
008 Component Cooling Water			X									K3.01 - Loads cooled by CCWS	3.4	1
008 Component Cooling Water								X				A2.04 - PRMS alarm	3.3	1
010 Pressurizer Pressure Control										X		A4.02 - PZR heaters	3.6	1
010 Pressurizer Pressure Control				X								K4.03 -Over pressure control	3.8	1
012 Reactor Protection					X							K5.02 - Power density	3.1*	1
013 Engineered Safety Features Actuation		X										K2.01 -ESFAS/safeguards equipment control	3.6*	1
013 Engineered Safety Features Actuation									X			A3.02 - Operation of actuated equipment	4.1	1
022 Containment Cooling							X					A1.04 - Cooling water flow	3.2	1
026 Containment Spray								X				A2.04 - Failure of spray pump	3.9	1
039 Main and Reheat Steam	X											K1.02 - Atmospheric relief dump valves	3.3	1
039 Main and Reheat Steam											X	2.4.46 - Ability to verify that the alarms are consistent with the plant conditions.	4.2	1
059 Main Feedwater			X									K3.04 - RCS	3.6	1
059 Main Feedwater							X					A1.03 -Power level restrictions for operation of MFW pumps and valves	2.7*	1
061 Auxiliary/Emergency Feedwater				X								K4.06 - AFW startup permissives	4.0*	1
062 AC Electrical Distribution							X					A1.01 - Significance of D/G load limits	3.4	1
063 DC Electrical Distribution											X	2.4.34 - Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	1

PWR RO Examination Outline

Facility: Palo Verde

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
064 Emergency Diesel Generator						X						K6.08 - Fuel oil storage tanks	3.2	1
073 Process Radiation Monitoring					X							K5.03 - Relationship between radiation intensity and exposure limits	2.9*	1
076 Service Water										X		A4.01 - SWS pumps	2.9	1
078 Instrument Air									X			A3.01 - Air pressure	3.1	1
103 Containment	X											K1.02 - Containment isolation/containment integrity	3.9	1
K/A Category Totals:	**3**	**2**	**3**	**3**	**2**	**2**	**4**	**3**	**2**	**2**	**2**	**Group Point Total:**		**28**

PWR RO Examination Outline

REV 2

Facility: Palo Verde

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
002 Reactor Coolant						X						K6.02 - RCP	3.6	1
015 Nuclear Instrumentation										X		A4.03 - Trip bypasses	3.8	1
017 In-core Temperature Monitor	X											K1.01 - Plant computer	3.2*	1
028 Hydrogen Recombiner and Purge Control		X										K2.01 -Hydrogen recombiners	2.5*	1
033 Spent Fuel Pool Cooling							X					A1.01 - Spent fuel pool water level	2.7	1
035 Steam Generator									X			A3.01 - S/G water level control	4.0	1
041 Steam Dump/Turbine Bypass Control								X				A2.02 - Steam valve stuck open	3.6	1
055 Condenser Air Removal			X									K3.01 - Main condenser	2.5	1
071 Waste Gas Disposal					X							K5.04 - Relationship of hydrogen/oxygen concentrations to flammability	2.5	1
075 Circulating Water				X								K4.01 - Heat sink	2.5	1
K/A Category Totals:	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**Group Point Total:**		**10**

Generic Knowledge and Abilities Outline (Tier 3)

PWR RO Examination Outline

REV 2

Facility: Palo Verde

Form ES-401-3

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.15	Knowledge of administrative requirements for temporary management directives, such as standing orders, night orders, Operations memos, etc.	2.7	1
	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	1
	2.1.30	Ability to locate and operate components, including local controls.	4.4	1
		Category Total:		**3**
Equipment Control	2.2.1	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	4.5	1
	2.2.22	Knowledge of limiting conditions for operations and safety limits.	4.0	1
	2.2.39	Knowledge of less than or equal to one hour Technical Specification action statements for systems.	3.9	1
		Category Total:		**3**
Radiation Control	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personal monitoring equipment, etc.	2.9	1
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	1
		Category Total:		**2**
Emergency Procedures/Plan	2.4.3	Ability to identify post-accident instrumentation.	3.7	1
	2.4.37	Knowledge of the lines of authority during implementation of the emergency plan.	3.0	1
		Category Total:		**2**
		Generic Total:		**10**

PVNGS License Examination
Record of Rejected K/As

Exam Date 11/05/10

PVNGS Form ES-401-4

Tier / Group	Randomly Selected K/As	Reason for Rejection
RO Exam		
1/1	2.1.45	Not on ES-401 4.D.1.b paragraph for acceptable generic T1 or T2 generic KAs. Replaced with 2.1.27.
2/1	2.2.41	Not on ES-401 4.D.1.b paragraph for acceptable generic T1 or T2 generic KAs. Replaced with 2.4.34.
2/1	022 A2.05	Could not write a psychometrically correct question. Replaced with 022 A1.04
1/2	005 AK1.06	Tech Spec Basis is SRO level. Replaced with 003 AA2.01
1/2	036 AK2.01	Fuel Handling at PVNGS is SRO/LSRO Knowledge. Replaced with 032 AK2.01
1/2	2.2.25	Tech Spec Basis is SRO level. Replaced with CE/A EK2.1
1/1	2.1.27	T1 Generic does not relate with the system. Replaced with 2.2.40
2/1	025 K5.02	Ice Condensers not installed at PVNGS. Replaced with 026 A2.04
2/1	012 A4.07	Similar to another question on RO exam. Replaced with 010 A4.02
2/1	2.2.42	Similar to another question on SRO exam. Replaced with 2.4.46
2/1	059 K3.02	Similar to another question on RO exam. Replaced with 061 A4.06
2/1	2.1.19	T1 Generic does not relate with the system. Replaced with 059 A1.03
2/1	063 K3.01	Similar to another question on SRO exam. Replaced with 059 K3.04
2/1	103 A2.05	PVNGS does not have and Emergency CTMT Entry procedure. Replaced with 103 K1.02
2/2	072 K3.02	Similar to another question on RO exam. Replaced with 055 K3.01
2/2	014 A1.04	RPIS does not relate to PD. Replaced with 033 A1.01
2/2	068 K5.03	No operational implications. Replaced with 071 K5.04
3	2.4.30	Off site notifications is SRO level. Replaced with2.1.25
1/1	2.4.31	SRO Level per NRC Comment. Replaced with 2.4.46

Facility: Palo Verde REV 2

Date Of Exam: 11/05/2010

Tier	Group	RO K/A Category Points												SRO-Only Points				
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2			G*	Total
1. Emergency & Abnormal Plant Evolutions	1	0	0	0	N/A			0	0	N/A		0	0	3			3	6
	2	0	0	0				0	0			0	0	2			2	4
	Tier Totals	0	0	0				0	0			0	0	5			5	10
2. Plant Systems	1	0	0	0	0	0	0	0	0	0	0	0	0	3			2	5
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2		1	3
	Tier Totals	0	0	0	0	0	0	0	0	0	0	0	0	5			3	8
3. Generic Knowledge And Abilities Categories		1		2		3		4					0	1	2	3	4	7
		0		0		0		0						2	1	2	2	

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).

2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.

3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.

4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.

5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.

6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.

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

8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.

9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

PWR SRO Examination Outline

Facility: Palo Verde

ES - 401 **Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1** **Form ES-401-2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
000009 Small Break LOCA / 3						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.	4.4	1
000015/000017 RCP Malfunctions / 4					X		AA2.10 - When to secure RCPs on loss of cooling or seal injection	3.7	1
000056 Loss of Off-site Power / 6						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.	4.4	1
000058 Loss of DC Power / 6						X	2.1.20 - Ability to interpret and execute procedure steps.	4.6	1
CE/E02 Reactor Trip - Stabilization - Recovery / 1					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	3.7	1
CE/E05 Steam Line Rupture - Excessive Heat Transfer / 4					X		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations	4.0	1
K/A Category Totals:	**0**	**0**	**0**	**0**	**3**	**3**	**Group Point Total:**		**6**

PWR SRO Examination Outline

Facility: Palo Verde

ES - 401 **Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2** **Form ES-401-2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	KA Topic	Imp.	Points
000028 Pressurizer Level Malfunction / 2					X		AA2.10 - Whether the automatic mode for PZR level control is functioning improperly, necessity of shift to manual modes	3.4	1
000037 Steam Generator Tube Leak / 3						X	2.4.30 - Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	4.1	1
000069 Loss of CTMT Integrity / 5						X	2.4.46 - Ability to verify that the alarms are consistent with the plant conditions.	4.2	1
000074 Inad. Core Cooling / 4					X		EA2.02 - Availability of main or auxiliary feedwater	4.6	1
K/A Category Totals:	**0**	**0**	**0**	**0**	**2**	**2**	**Group Point Total:**		**4**

PWR SRO Examination Outline

Facility: Palo Verde

ES - 401 **Plant Systems - Tier 2 / Group 1** **Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
004 Chemical and Volume Control								X				A2.06 - Inadvertent boration/dilution	4.3	1
013 Engineered Safety Features Actuation								X				A2.03 -Rapid depressurization	4.7	1
039 Main and Reheat Steam								X				A2.05 - Increasing steam demand, its relationship to increases in reactor power	3.6	1
059 Main Feedwater											X	2.4.4 - Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.7	1
073 Process Radiation Monitoring											X	2.2.40 - Ability to apply Technical Specifications for a system.	4.7	1
K/A Category Totals:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**2**	**Group Point Total:**		**5**

PWR SRO Examination Outline

Facility: Palo Verde

ES - 401 **Plant Systems - Tier 2 / Group 2** **Form ES-401-2**

Sys/Evol # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	KA Topic	Imp.	Points
002 Reactor Coolant											X	2.4.41 - Knowledge of the emergency action level thresholds and classifications.	4.6	1
002 Reactor Coolant								X				A2.03 - Loss of forced circulation	4.3	1
056 Condensate								X				A2.05 - Condenser tube leakage	2.5*	1
K/A Category Totals:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**1**	**Group Point Total:**		**3**

Generic Knowledge and Abilities Outline (Tier 3)

PWR SRO Examination Outline

REV 2

Facility: Palo Verde

Form ES-401-3

Generic Category	KA	KA Topic	Imp.	Points
Conduct of Operations	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	3.9	1
	2.1.14	Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc.	3.1	1
		Category Total:		**2**
Equipment Control	2.2.6	Knowledge of the process for making changes to procedures.	3.6	1
		Category Total:		**1**
Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.7	1
	2.3.11	Ability to control radiation releases.	4.3	1
		Category Total:		**2**
Emergency Procedures/Plan	2.4.6	Knowledge of EOP mitigation strategies.	4.7	1
	2.4.8	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	4.5	1
		Category Total:		**2**
		Generic Total:		**7**

PVNGS License Examination
Record of Rejected K/As

Exam Date 11/05/10

PVNGS Form ES-401-4

Tier / Group	Randomly Selected K/As	Reason for Rejection
SRO Exam		
1/1	4.2 062 AA2.04	PVNGS Loss of Cooling Water Procedure does not address temperatures, it only addresses flow. Replaced with 4.2 015 AA2.01
2/2	2.4.28	PVNGS does not have a CTMT Iodine Removal system. Replaced with 2.2.21
1/1	015 AA2.01	AOP does not apply to cause of RCP failure. Replaced with 015 AA2.10
1/1	027 AA2.02	Normal Values of RCS not SRO level. Replaced withCE/E05 EA2.1
1/1	2.2.23	Not in Generic T1 ES 401 list. Replaced with 2.2.44
2/1	005 AA2.01	Stuck or Inop rod actions not SRO level. Replaced with 051 AA2.02
2/1	2.1.6	Not in Generic T2 ES 401 list. Replaced with 2.4.46
1/2	2.3.5	Not in Generic T1 ES 401 list. Replaced with 2.4.30
2/2	2.2.21	Not in Generic T2 ES 401 list. Replaced with 2.4.41
2/2	001 A2.13	Not SRO level. Replaced with 056 A2.05
2/1	2.4.44	Not SRO level. Replaced with 2.2.40
3	2.3.15	Trouble writing SRO level question. Replaced with 2.3.4