PVNGS License Examination
Administrative Topics Outline

PVNGS Form ES-301-1

Facility: ***Palo Verde*** Examination Level: **RO**	Date of Examination: **7/21/03** Operating Test Number: **PVNGS RO**	
Administrative Topic (see Note)	**Describe activity to be performed:**	**K/A # IMP**
Conduct of Operations	Ability to execute procedure steps. (Candidate will be required to complete a power change reactivity balance worksheet for a power ascension) *Scheduled as Admin Task RA1-1. (New)* *Can be performed in classroom or simultor.*	2.1.20 4.3
Conduct of Operations	Ability to use plant computer to obtain and evaluate parametric information on system or component status. With COLSS Out of Service, the Candidate will be required to use CPC values to determine that the status of ASI/LHR/DNBR/AZTILT is not satisfactory and inform the SRO. *Scheduled as Admin Task RA1-2.* *Can be performed in classroom or simultor.*	2.1.19 3.0
Equipment Control	Perform a Tech Review of a Permit. Tech Review a Permit and determine three errors. *Schedule as Admin JPM RA2. (New)* *To be performed in the classroom.*	2.2.13 3.6
Radiation Control	Verify administrative and radiological entry requirements per the RWP (Candidate will be required to demonstrate the proper method for verifying qualifications and identify the proper REP, task, and dose settings/limits for the particular job assignment.) *Scheduled as Admin JPM RA3.* (*New*) *To be performed in the classroom.*	2.3.1 2.6
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.		

PVNGS License Examination
Control Room/In-Plant Systems Outline

PVNGS Form ES301-2

Facility: **PVNGS**		Date of Examination: **7/21/03**	
Exam Level: **RO**		Operating Test No.: **RO**	
Control Room Systems (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)			
JPM #	System/JPM Title	Type Code*	Safety Function
JS1	In order to Emergency Borate, operate HPSI pumps in lieu of Charging pumps (SI030)	S D L A 4.2.024AK3.02 4.2/4.4	2
JS2	Direct Containment Hydrogen Control (HP004)	S D (L) 3.5.028.A4.03 3.1/3.3	5
JS3	Perform Actions for Rapid Turbine Unloading as directed by AOP (New Procedure)	S **N** 3.4.045A4.02 2.7/2.6	4 (Secondary)
JS4	RC/Operate PZR Press Control System (RC008)	S D A 3.3.010.A4.01 3.7/3.5	3
JS5	Transfer 13.8KV bus S01 From 13.8KV Bus S03 to the Unit Auxiliary Transformer MAN-X02 (NA001)	S D 3.6.062.K1.04 3.7/4.2	6
JS6	Given the need to remove a RU monitor from service, bypass a BOP ESFAS module in accordance with 40OP-9SA01	S **N** 3.7.016.A4.01 3.9/2.8	7
JS7	Dilute the RCS (CH001)	S **M** A 3.1.004A4.07 3.9/3.7	1
JS8	Loss of NCW, RCPs are tripped, and Seal Bleedoff Isolated (NC006)	S D A 3.8.008A2.01 3.3/3.6	8
In-Plant Systems (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
JP1	DG/Perform event control action for CR Fire (Time Critical) (PRA Significant) (DG008)	P **M** A 4.2.068.AA1.10 3.7/3.9 4.2.068.AA1.31 3.9/4.0	6
JP2	Transfer CEA's to the hold bus. (Time Critical) (SF032)	P D R 3.1.001.A2.14 3.7/3.9	1
JP3	Remote operation of AFA at the Remote S/D Panel (PRA Significant) (AF002)	P D 4.2.068AK3.07 4.0/4.3	4 (Secondary)
*Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate Path, (C)ontrol Room, (P)lant, (S)imulator, (L)ow Power, (R)CA			

PVNGS License Examination
Administrative Topics Outline

PVNGS Form ES-301-1

Facility: ***Palo Verde***	Date: **7/21/03**
Examination Level: **SRO**	Operating Test Number: **SRO**

Administrative Topic (see Note)	**Describe activity to be performed:**	**K/A IMP**
Conduct of Operations	Knowledge of conditions and limitations in the facility license. (Candidate will be required to review a completed Safety Function Determination Worksheet and Tracking Sheet and annotate three significant errors) *Scheduled as Admin JPM SA1-1. (AD008)* *Can be performed in classroom or simultor.*	2.1.10 3.9
Conduct of Operations	Ability to use plant computer to obtain and evaluate parametric information on system or component status. With COLSS Out of Service, the Candidate will be required to use CPC values to determine that the status of ASI/LHR/DNBR/AZTILT is not satisfactory and correlate the T.S. criteria. *Scheduled as Admin JPM SA1-2* *Can be performed in classroom or simultor.*	2.1.19 3.0
Equipment Control	Review Shutdown Margin Surveillance Test; identify three (3) errors and Direct Boration. *Schedule as Admin JPM SA2. (LOCT 99 Audit Exam)* *Can be performed in classroom or simultor.*	2.2.12 3.4
Radiation Control	Knowledge of the process for performing a containment purge. (To be performed in classroom) *Candidate will be asked to review a Gaseous release permit and identify three errors.* *Schedule as SRO Admin JPM SA3. (New)* *To be performed in the classroom.*	2.3.9 3.4
Emergency Plan	Ability to take action called for in the Emergency Plan, including acting as Emergency Coordinator. (Candidate will classify event and perform initial Emergency Coordinator duties.) *Scheduled as Admin JPM SA4. (New)* *To be performed in Simulator.*	2.4.38 4.0
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.		

PVNGS License Examination
Control Room/In-Plant Systems Outline

PVNGS Form ES301-2

Facility: **PVNGS**		Date of Examination: **7/21/03**	
Exam Level: **SRO**		Operating Test No.: **SRO**	
Control Room Systems (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)			
JPM #	System/JPM Title	Type Code*	Safety Function
JS1	In order to Emergency Borate, operate HPSI pumps in lieu of Charging pumps (SI030)	S D L A 4.2.024AK3.02 4.2/4.4	2
JS2	Direct Containment Hydrogen Control (HP004)	S D (L) 3.5.028.A4.03 3.1/3.3	5
JS3	Perform Actions for Rapid Turbine Unloading as directed by AOP (New Procedure)	S **N** 3.4.045A4.02 2.7/2.6	4 (Secondary)
In-Plant Systems (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
JP1	DG/Perform event control action for CR Fire (Time Critical) (PRA Significant) (DG008)	P **M** A 4.2.068.AA1.10 3.7/3.9 4.2.068.AA1.31 3.9/4.0	6
JP2	Transfer CEA's to the hold bus. (Time Critical) (SF032)	P D R 3.1.001.A2.14 3.7/3.9	1

Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate Path, (C)ontrol Room, (P)lant, (S)imulator, (L)ow Power, (R)CA

Facility: PVNGS Scenario No.: 1 Op-Test No: 2003

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC #16, 50% power, MOC.

Turnover: The following equipment is out of service: HPSI pump "A" (6 hours); PW pump "A" (20 hours); DG "A" (2 hours). MFP "B" has been started and is ready to be placed in service to support increasing plant power to 100%.

Event No.	Malf. No.	Event Type*	Event Description
1		N (CO)	Place 'B MFP in service (CRS to direct and CO to perform)
2		R (ALL)	Power increase (CRS to direct and RO/CO to coordinate and perform)
3	TR01:MTNP T11A 100	I (CO) *AOP*	TLI instrument fails high (CO to diagnose and perform actions and CRS to direct actions and refer to Tech Specs).
4	CV03A	C (RO) *AOP*	CHN-UV-110P Flow control valve fails closed causing a loss of letdown (RO to diagnose and perform actions and CRS to direct recovery)
5	RD02A RD02G	C (ALL) *AOP*	CEA drops into core Five minutes later a second CEA drops into core (RO to diagnose and CRS to direct reactor trip)
6	ATWS	C (ALL)	Reactor Protection system failure to open Reactor Trip Switchgear breakers (**PRA Significant**) (Crew to diagnose and take action and CRS to Direct response) (Critical Task to trip reactor by opening L03 and L10)
7	RV02:SGEP SV554	M (ALL)	Main steam safety valve on #2 SG fails open (after reactor trip EOP is entered) (Crew to diagnose and take actions and CRS to diagnose ESD and direct stabilization). (Critical task to stop feeding and steaming #2 SG) (Critical Task to control RCS parameters to prevent lifting Pressurizer Safeties)
End point			Crew stabilizes heat removal on #1 SG

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

Facility: PVNGS Scenario No.: 2 Op-Test No: 2003

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC #20, 100% power, MOC.

Turnover: The following equipment is out of service: HPSI pump "B" (6 hours); PW pump "B" (20 hours); DG "B" has just completed a surveillance test run and is to be shutdown and placed in standby.

Event No.	Malf. No.	Event Type*	Event Description
1	DG06	N (CO)	Remove DG 'B' from service/DG trips (CRS to direct/refer to Tech Specs and CO to perform and diagnose)
2	MC01A 3	R (ALL) *AOP*	Condenser vacuum degrades requiring downpower (CO to diagnose and perform actions and CRS to direct stabilization)
3	CN01:CHNF IC 241 100	I (RO) *AOP*	Seal Injection flow controller fails valve closed (RO to diagnose and perform actions and CRS to direct recovery)
4	ED02	C (ALL)	Grid disturbance results in a Loss of Offsite power (Crew to diagnose and perform actions and CRS to direct actions)
5	RD03G RD03L	C (RO)	Two CEAs fail to fully insert (RO to diagnose and perform actions and CRS to direct boration) (Critical Task to establish boration to meet safety function requirements prior to completion of the SPTA's)
6	FW21B	C (CO)	Loss of Feedwater (CO to diagnose and perform actions and CRS to direct recovery)
7	FW22	M (ALL)	Loss of All Feedwater (Crew/CRS to diagnose and CRS to direct transition to FRP) Crew transitions to FRP and cross ties PBA-S03 to PBB-S04 (CO to perform actions and CRS to diagnose and direct actions) (Critical Task to establish feedwater to a SG prior to lifting primary safeties) **(PRA Significant)**
End point			Crew stabilizes plant with AFB feeding at least one SG.

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

Facility: PVNGS Scenario No.: 3 Op-Test No: 2003

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC #20, 100% power, MOC.

Turnover: The following equipment is out of service: HPSI pump "A" (6 hours); PW pump "A" (20 hours); DG "A" (2 hours). A leak in "A" low pressure feedwater heater string requires a downpower to 80%.

Event No.	Malf. No.	Event Type*	Event Description
1		R (All)	Downpower to 80% power. (CRS to direct and RO/CO to coordinate and perform)
2	RP06H1	I (RO) *AOP*	Inadvertent CSAS actuation (RO to diagnose and perform actions and CRS to direct and addresses Technical Specifications)
3	TC13	C (All) *AOP*	Turbine Trip/ Load Reject/Reactor Power Cutback (Crew to diagnose and perform actions and CRS to direct stabilization)
4	RD11B	C (All)	Control rods continue to insert/Manual Reactor Trip (Crew to diagnose and perform actions and CRS to direct reactor trip)
5	TR01: SGNPT1024	I (CO)	Steam bypass control system instrument failure (CO to diagnose and perform actions and CRS to direct stabilization) (Critical Task to control RCS parameters to prevent lifting Pressurizer Safeties)
6	ED02	M (All)	Loss of Off-Site Power on Reactor Trip (Crew to diagnose and CRS to direct actions) (Critical Task to establish feed to S/G's for level control)
7	EG06B	C (CO)	"B" DG Fails **(PRA Significant)** (CO to diagnose and CRS to direct transition to Blackout)
End point			CRS directs powering PBA-S03 with gas turbine generator

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

PVNGS Form ES-401-2

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	K	A	A 2	G *	Total
1. Emergency & Abnormal Plant Evolutions	1	1	2	3				4	5			3	18			5	2	7
	2	3	2	1				1	1			1	9			3	2	5
	Tier Totals	4	4	4				5	6			4	27			8	4	12
2. Plant Systems	1	3	3	3	3	2	2	3	2	3	2	2	28			3	1	4
	2	0	0	0	1	2	0	1	1	1	2	2	10			2		2
	Tier Totals	3	3	3	4	4	2	4	3	4	4	4	38			5	1	6
3. Generic Knowledge and Abilities Categories		1			2			3			4			1	2	3	4	
		2			3			2			3		10	2	2	1	2	7

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier of the RO outline (i.e. the "Tier Totals" in each K/A category shall not be less than two). Refer to Section D.1.c for additional guidance regarding SRO sampling.
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. Select topics from many systems and evolutions; avoid selecting more than two K/A topics from a given system or evolution unless they are related to plant specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6. * 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. The SRO K/As must also be linked to 10 CFR 55.43 or an SRO-level learning objective.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) 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; summarize all the SRO-only knowledge and non-A2 ability categories in the columns labeled "K" and "A". Use duplicate pages for RO and SRO-only exams.
8. For Tier 3, enter the K/A numbers, descriptions, importance ratings, and point totals on Form ES-401-3.
9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.

E/APE #/Name/Safety Function	K 1	K 2	K 3	A 1	A 2	G	Number	K/A Topics	Imp.	RO #	SRO #
000007/E02 Reactor Trip – Recovery /1		1					EK2.02	Knowledge of the interrelations between a reactor trip and the following: Breakers, relays and disconnects	2.6	1	
000007/E02 Reactor Trip – Recovery /1					1		EA2.1	Ability to determine and interpret the following as they apply to the (Reactor Trip Recovery) Facility conditions and selection of appropriate procedures during abnormal and emergency operations (43.5)	3.7		1
000008 Pzr Vapor Space Accident /3				1			AA1.06	Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident: Control of PZR level	3.6	1	
000009 Small Break LOCA /3			1				EK3.03	Knowledge of the reasons for the following responses as they apply to the small break LOCA: Reactor trip and safety initiation	4.1	1	
000011 Large Break LOCA /3		1					EK2.02	Knowledge of the interrelations between the Large Break LOCA and the following: Pumps	2.6	1	
000011 Large Break LOCA /3						1	**2.1.7**	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation (43.5)	4.4		1
000015/17 RCP Malfunctions /4					1		AA2.08	Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): When to secure RCPs on high bearing temperature	3.4	1	
000022 Loss of Rx Coolant Makeup /2	1						AK1.03	Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Pump Makeup: Relationship between charging flow and PZR level	3.0	1	
000025 Loss of RHR System /4				1			AA1.03	Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: LPI pumps	3.4	1	
000026 Loss of Comp. Cooling Water /8					1		AA2.06	Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: The length of time after the loss of CCW flow to a component before that component	2.8	1	
000027 Pzr Press. Ctrl. Sys. Malf. /3					1		AA2.15	Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: Actions to be taken if PZR pressure instrument fails high	3.7	1	
000027 Pzr Press. Ctrl. Sys. Malf. /3					1		AA2.11	Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: RCS Pressure (43.5)	4.1		1
000029 ATWS /1					1		EA2.02	Ability to determine or interpret the following as they apply to a ATWS: Reactor trip alarm	4.2	1	
000029 ATWS /1						1	**2.4.1**	Knowledge of EOP entry conditions and immediate action steps (43.5)	4.3		1
000038 SG Tube Rupture/3				1			EA1.27	Ability to operate and monitor the following as they apply to a SGTR: Steam dump valve status lights and indicators	3.9	1	
000038 SG Tube Rupture/3					1		EA2.02	Ability to determine or interpret the following as they apply to a SGTR: Existence of an S/G tube rupture and its potential consequences (43.5)	4.8		1
000040/E05 Steam Line Rupture /4				1			AA1.04	Ability to operate and / or monitor the following as they apply to the Steam Line Rupture: Isolation of all steam lines from header	4.3	1	
000054 E06 Loss of Feedwater /4					1		EA2.2	Ability to determine and interpret the following as they apply to the (Loss of Feedwater) Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments (43.5)	4.1		1
000055 Station Blackout /6						1	**2.4.4**	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures	4.0	1	
000056 /Loss of Off Site Power /6			1				AK3.01	Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: Order and time to initiation of power for the load sequencer	3.5	1	
000057 Loss of Vital AC Instrument Bus /6						1	**2.1.23**	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	3.9	1	
000057 Loss of Vital AC Instrument Bus /6					1		AA2.17	Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: System and component status, using local or remote controls (43.5)	3.4		1

E/APE #/Name/Safety Function	K 1	K 2	K 3	A 1	A 2	G	Number	K/A Topics	Imp.	# RO	# SRO
000058 Loss of DC Power /6						1	**2.1.20**	Ability to execute procedure steps.	4.3	1	
000062 Loss of Nuclear Service Water /4			1				AK3.03	Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water Guidance actions contained in EOP for Loss of nuclear service water	4.0	1	
000065 Loss of Instrument Air /8					1		AA2.06	Ability to determine and interpret the following as they apply to the Loss of Instrument Air: When to trip reactor if instrument air pressure is de-creasing	3.6	1	
K/A Category Totals	1	2	3	4	10	5		Group Point Total		18	7

E/APE #/Name/Safety Function	K 1	K 2	K 3	A 1	A 2	G	Number	K/A Topics	Imp.	RO #	SRO #
000001 Continuous Rod Withdrawal /1					1		AA2.02	Ability to determine and interpret the following as they apply to the Continuous Rod Withdrawal: Position of emergency boration valve (43.5)	4.2		1
000003 Dropped Control Rod /1					1		AA2.01	Ability to determine and interpret the following as they apply to the Dropped Control Rod: Rod position indication to actual rod position (43.5)	3.9		1
000005 Inoperable/Stuck Control Rod /1				1			AA1.01	Ability to operate and / or monitor the following as they apply to the Inoperable / Stuck Control Rod: CRDS	3.6	1	
000024 Emergency Boration /1											
000028 /Pzr Level Malfunction /2		1					AK2.02	Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following: Sensors and detectors	2.6	1	
000032 Loss of Source Range NI /7						1	**2.4.10**	Knowledge of annunciator response procedures.	3.0	1	
000033 Loss of Intermediate Range NI /7					1		AA2.02	Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Indications of unreliable intermediate-range channel operation (43.5)	3.6		1
000036 /Fuel Handling Accident /8											
000037 SG Tube Leak /3						1	**2.4.7**	Knowledge of event based EOP mitigation strategies (43.5)	3.8		1
000051 Loss of Condenser vacuum /4					1		AA2.02	Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: Conditions requiring reactor and/or turbine trip	3.9	1	
000059 Accidental Liquid RadWaste Rel. /9			1				AK3.04	Knowledge of the reasons for the following responses as they apply to the Accidental Liquid Radwaste Release: Actions contained in EOP for accidental liquid radioactive-waste release	3.8	1	
000060 Accidental Gaseous Radwaste Rel./9											
000061 ARM System Alarms /7											
000067 Plant Fire on Site /8	1						AK1.02	Knowledge of the operational implications of the following concepts as they apply to Plant Fire on Site: Fire fighting	3.1	1	
000068 Control Room Evac. /8						1	**2.4.34**	Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications (43.5)	3.6		1
000069 Loss of CTMT Integrity /5		1					AK2.03	Knowledge of the interrelations between the Loss of Containment Integrity and the following: Personnel access hatch and emergency access hatch	2.8	1	
000074 Inadequate Core Cooling /4	1						EK1.07	Knowledge of the operational implications of the following concepts as they apply to the Inadequate Core Cooling : Definition of saturated steam	2.8	1	
000076 High Reactor Coolant Activity /9											
A11 RCS Overcooling/PTS /4											
A13 Natural Circulation /4											
A16 /Excessive RCS Leakage /2	1						AK1.2	Knowledge of the operational implications of the following concepts as they apply to the (Excess RCS Leakage) Normal, abnormal and emergency operating procedures associated with (Excess RCS Leakage).	3.0	1	
E09 /Functional Recovery											
K/A Category Totals	3	2	1	1	4	3		Group Point Total		9	5

System #/Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Number	K/A Topics	Imp.	RO #	SRO #
003 Reactor Coolant Pump		1										K2.01	Knowledge of bus power supplies to the following: RCPS	3.1	1	
004 Chemical and Volume Control									1			A3.02	Ability to monitor automatic operation of the CVCS, including: Letdown isolation	3.6	2	
004 Chemical and Volume Control						1						K6.17	Knowledge of the effect of a loss or malfunction on the following CVCS components: Flow paths for emergency boration	4.4		
005 Residual Heat Removal		1										K2.01	Knowledge of bus power supplies to the following: RHR pumps	3.0	1	
005 Residual Heat Removal								1				A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: RHR (43.5)	3.1		1
006 Emergency Core Cooling								1				A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of flow path	3.9	1	
007 Pressurizer Relief/Quench Tank	1											K1.01	Knowledge of the physical connections and/or cause-effect relationships between the PRTS and the following systems: Containment system	2.9	1	
008 Component Cooling Water							1					A1.02	Ability to predict and/or monitor changes in parameters to prevent exceeding design limits) associated with operating the CCWS controls including: CCW temperature	2.9	1	
010 Pressurizer Pressure Control										1		A4.01	Ability to manually operate and/or monitor in the control room: PZR spray valve	3.7	1	
012 Reactor Protection					1							K5.01	Knowledge of the operational implications of the following concepts as the apply to the RPS: DNB	3.3	1	
013 ESFAS											1	**2.4.20**	Knowledge of operational implications of EOP warnings, cautions, and notes	3.3	2	
013 ESFAS						1						K6.01	Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: Sensors and detectors	2.7		
022 Containment Cooling			1									K3.02	Containment equipment subject to damage by high or low temperature, humidity, and pressure Containment instrumentation	3.0	1	
026 Containment Spray							1					A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: Containment temperature	3.6	2	
026 Containment Spray	1											K1.01	Knowledge of the physical connections and/or cause-effect relationships between the CSS and the following systems: ECCS	4.2		

System #/Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Number	K/A Topics	Imp.	RO #	SRO #
039 Main and Reheat Steam									1			A3.02	Ability to monitor automatic operation of the MRSS, including: Isolation of the MRSS	3.1	1	
056 Condensate								1				A2.04	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 mal-functions or operations: Loss of condensate pumps	2.6	1	
059 Main Feedwater			1									K3.04	Knowledge of the effect that a loss or malfunction of the MFW will have on the following: RCS	3.6	2	
059 Main Feedwater				1								K4.02	Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: Automatic turbine/reactor trip runback	3.3		
061 Auxiliary Feedwater				1								K4.14	Knowledge of AFW design feature(s) and/or interlock(s) which provide for the following: AFW automatic isolation	3.5	1	
062 AC Electrical Distribution		1										K2.01	Knowledge of bus power supplies to the following: Major system loads.	3.3	1	
062 AC Electrical Distribution								1				A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Causes and significance of grounds (43.5)	2.6		1
063 DC Electrical Distribution							1					A1.01	Ability to predict and/or monitor changes in parameters associated with operating the dc electrical system controls including: Battery capacity as it is affected by discharge rate	2.5	1	
063 DC Electrical Distribution											1	**2.2.3**	(multi-unit) Knowledge of the design, procedural, and operational differences between units. (43.5)	3.3		1
064 Emergency Diesel Generator				1								K4.02	Knowledge of ED/G system design feature(s) and/or inter-lock(s) which provide for the following: Trips for ED/G while operating (normal or emergency)	3.9	1	
073 Process Radiation Monitoring					1							K5.03	Knowledge of the operational implications as they apply to concepts as they apply to the PRM system: Relationship between radiation intensity and exposure limits	2.9	1	
076 Service Water										1		A4.01	Ability to manually operate and/or monitor in the control room: SWS pumps	2.9	2	
076 Service Water	1											K1.05	Knowledge of the physical connections and/or cause- effect relationships between the SWS and the following systems: D/G	3.8		
078 Instrument Air									1			A3.01	Ability to monitor automatic operation of the IAS, including: Air Pressure	3.1	1	

System #/Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Number	K/A Topics	Imp.	RO #	SRO #
078 Instrument Air								1				A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the IAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Air dryer and filter malfunctions (43.5)	2.9		1
103 Containment											1	**2.3.11**	Ability to control radiation releases	2.7		
103 Containment			1									K3.02	Knowledge of the effect that a loss or malfunction of the containment system will have on the following: Loss of containment integrity under normal operations	3.8	2	
K/A Category Point totals	3	3	3	3	2	2	3	5	3	2	3		Group Point Total		28	4

System #/Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Number	K/A Topics	Imp.	RO #	SRO #
001 Control Rod Drive					1							K5.02	Knowledge of the following operational implications as they apply to the CRDS: Definitions of differential rod worth and integral rod worth; their applications	2.9	1	
002 Reactor Coolant										1		A4.03	Ability to manually operate and/or monitor in the control room: Indications and controls necessary to recognize and correct saturation conditions	4.3	1	
011 Pressurizer Level Control											1	**2.1.32**	Ability to explain and apply all system limits and precautions	3.4	1	
014 Rod Position Indication								1				A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the RPIS; and (b) based on those on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Dropped rod (43.5)	4.1		1
015 Nuclear Instrumentation									1			A3.04	Ability to monitor automatic operation of the NIS, including: Maximum disagreement allowed between channels	3.3	1	
016 Non-Nuclear Instrumentation																
017 In-Core Temperature Monitor										1		A4.02	Ability to manually operate and/or monitor in the control room: Temperature values used to determine RCS/RCP operation during inadequate core cooling (i.e., if applicable, average of five highest values)	3.8	1	
027 Containment Iodine Removal																
028 H2 Recombiner and Purge Control																
029 Containment Purge																
033 Spent Fuel Pool Cooling											1	**2.2.30**	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.5	1	
034 Fuel Handling Equipment							1					A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Fuel Handling System operating the controls including: Water level in the Refueling canal	2.9	1	
035 Steam Generator								1				A2.06	Ability to (a) predict the impacts of the following mal-functions or operations on the SG; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Small break LOCA (43.5)	4.6		1
041 Steam Dump/Turbine Bypass Control				1								K4.18	Knowledge of SDS design feature(s) and/or interlock(s) which provide for the following: Turbine trip	3.4	1	
045 Main Turbine Generator																
055 Condenser Air Removal																
068 Liquid Radwaste																

System #/Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Number	K/A Topics	Imp.	RO #	SRO #
071 Waste Gas Disposal																
072 Area Radiation Monitoring																
075 Circulating Water								1				A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the circulating water system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of circulating water pumps	2.5	1	
079 Station Air																
086 Fire Protection					1							K5.03	Knowledge of the operational implication of the following concepts as they apply to the Fire Protection System: Effect of water spray on electrical components	3.1	1	
K/A Category Point totals				1	2		1	3	1	2	2		Group Point Total		10	2

PVNGS Form ES-401-3

Category	K/A #	Topic	RO		SRO-Only	
			Imp.	#	Imp.	#
1. Conduct of Operations	2.1.11	Knowledge of less than one hour technical specification action statements for systems	3.0	1		
	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation	3.9	1		
	2.1.1	Knowledge of conduct of operations requirements (43.3)			3.8	1
	2.1.6	Ability to supervise and assume a management role during plant transients and upset conditions (43.5)			4.3	1
	Subtotal			2		2
2. 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	3.7	1		
	2.2.12	Knowledge of surveillance procedures	3.0	1		
	2.2.30	Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.5	1		
	2.2.13	Knowledge of tagging and clearance procedures. (43.5)			3.8	1
	2.2.18	Knowledge of the process for managing maintenance activities during shutdown operations. (43.5)			3.6	1
	Subtotal			3		2
3. Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements	2.6	1		
	2.3.9	Knowledge of the process for performing a containment purge	2.5	1		
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. (43.4)			3.1	1
	Subtotal			2		1
4. Emergency Procedures / Plan	2.4.5	Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.	2.9	1		
	2.4.18	Knowledge of the specific bases for EOPs.	2.7	1		
	2.4.48	Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions	3.5	1		
	2.4.4	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (43.2)			4.3	1
	2.4.26	Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage. (43.5)			3.3	1
	Subtotal			3		2
Tier 3 Point Total				10		7

Justification for selection of Tier 3 items not cross-referenced to 10CFR55.43 in NUREG-1122

1) **2.1.1 Knowledge of conduct of operations requirement.**

   This KA is not specifically linked to a 10CFR55.43 item. In accordance with step 2 of ES-401 Attachment 2, all of the KAs in Section 2 of the K/A Catalog are eligible for random selection for Tier 3 of the exam. Per step 3 of this attachment, a psychometrically sound question related to this subject can be written at the SRO level and therefore this KA can not be eliminated based simply on the fact that it is not cross reference to a 10CFR55.43 item in the K & A Catalog. 10CFR55.43 item 3 has been linked to this KA as relating to the best match for this KA topic.

2) **2.2.13 Knowledge of tagging and clearance procedures.**

   This KA is not specifically linked to a 10CFR55.43 item. Per attachment 2 of ES-401 step 3, a psychometrically sound question related to this subject can be written at the SRO level and therefore this KA can not be eliminated based simply on the fact that it is not cross reference to a 10CFR55.43 item in the K & A Catalog. 10CFR55.43 item 5 has been linked to this KA as relating to the best match for this KA topic.

PVNGS License Examination
Record of Rejected K/As

PVNGS Form ES-401-4

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1	**4.2.057AA2.11 (SRO)**	**MFP indicator power comes from Non-Class Instrument power instead of Class Instrument Power.**
2/2	**3.5.027.A2.01**	**No Containment Iodine Removal System is available at PVNGS**