

Facility: <u>CPSES</u>		Date of Examination: <u>11/2002</u>
Examination Level: <u>RO</u>		Operating Test Number: _____
Administrative Topic/Subject Description	Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions	
A.1	Conduct of Operations	<b>ROA1 (BANK)</b> -G2.1.20 Ability to execute procedure steps. (3.9/4.0) --Perform a Quadrant Power Tilt Ratio Calculation
	Conduct of Operations	<b>ROA2 (NEW)</b> -G2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (2.8/3.1) --Given the plant data, Calculate an RCS Leak Rate
A.2	Equipment Control	<b>ROA3 (NEW)</b> -G2.2.13 Knowledge of tagging and clearance procedures. (3.6/3.8) --Identify errors in faulted tag
A.3	Radiation Control	<b>ROA4 (NEW)</b> -G2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure. (2.9/3.3) --Interpret a Faulted Survey Map to Determine Entry Requirements.
A.4	Emergency Plan	<b>ROA5 (NEW)</b> -G2.4.39 Knowledge of RO's responsibilities in emergency plan implementation. (3.3/3.1) --Make the necessary communications for a given accident.

Facility: <u>CPSES</u>		Date of Examination: <u>11/2002</u>
Examination Level: <u>SRO</u>		Operating Test Number: _____
Administrative Topic/Subject Description	Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions	
A.1	Conduct of Operations	<b>SROA1(BANK)</b> -G2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (3.9/4.0) --Perform Shutdown Margin Calculation
	Conduct of Operations	<b>SROA2(BANK)</b> -G2.1.25 Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data. (2.8/3.1) --Perform Calorimetric Heat Balance (blow down heat balance)
A.2	Equipment Control	<b>SROA3(NEW)</b> -G2.2.23 Ability to track limiting conditions for operations. (2.6/3.8) --Given a sequence of events, Determine the end of time of an LCO including any extensions.
A.3	Radiation Control	<b>SROA4(NEW)</b> -G2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure. (2.9/3.3) --Interpret a Faulted Survey Map to Determine Entry Requirements.
A.4	Emergency Plan	<b>SROA5.1(MODIFIED)</b> -G2.4.41 Knowledge of EAL thresholds and classifications. (2.3/4.1) --Following Scenario-1, classify the event and make protective action recommendation.
		<b>SROA5.2(MODIFIED)</b> -G2.4.41 Knowledge of EAL thresholds and classifications. (2.3/4.1) --Following Scenario-2, classify the event and make protective action recommendation.
		<b>SROA5.3(MODIFIED)</b> -G2.4.41 Knowledge of EAL thresholds and classifications. (2.3/4.1) --Following Scenario-3, classify the event and make protective action recommendation.

Facility: <u>CPSES</u>	Date of Examination: <u>11/2002</u>	
Exam Level: <u>RO/SRO(I)</u>	Operating Test No.: _____	
<b>B.1 Control Room Systems</b>		
System / JPM Title	Type Code*	Safety Function
a. <b>JPMS1:</b> Reactor Coolant Pump / Start and Stop a RCP	D, S, A, L	4 (Primary)
b. <b>JPMS2:</b> CCS / Restore CCS after SI	D, S, L	5
c. <b>JPMS3:</b> CVCS / Rx M/U Water Malfunction	D, S, A	1
d. <b>JPMS4:</b> CCW / Shift CCW pumps, CCW pump trip	M, S, A	8
e. <b>JPMS5:</b> NIS / Respond to IR NIS Malfunction	D, C, L, A	7
f. <b>JPMS6:</b> ECCS / Fill SI Accumulators	M, C, A	2
g. <b>JPMP1:</b> PZR Pressure Control / Place Failed Pressurizer Pressure Channel in Trip Condition	D, C	3
<b>B.2 Facility Walk-Through</b>		
a. <b>JPMP1:</b> Fire Protection / PEO #1 actions to achieve hot shutdown after fire in the control room	D, P, L	8
b. <b>JPMP2:</b> Main Steam and MFW / Locally Isolate a Ruptured S/G	D, P, L	4 (Secondary)
c. <b>JPMP3:</b> EDG / Perform a Local Emergency Start of a DG	D, P, R	6
* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA		

Facility: <u>CPSES</u>	Date of Examination: <u>11/2002</u>	
Exam Level: <u>SRO</u>	Operating Test No.: _____	
<b>B.1 Control Room Systems</b>		
System / JPM Title	Type Code*	Safety Function
a. <b>JPMS5:</b> NIS / Respond to IR NIS Malfunction	D, C, L, A	7
b. <b>JPMS6:</b> ECCS / Fill SI Accumulators	M, C, A	2
c.		
d.		
e.		
f.		
g.		
<b>B.2 Facility Walk-Through</b>		
a. <b>JPMP1:</b> Fire Protection / PEO #1 actions to achieve hot shutdown after fire in the control room	D, P, L	8
b. <b>JPMP2:</b> Main Steam and MFW / Locally Isolate a Ruptured S/G	D, P, L	4 (Secondary)
c. <b>JPMP3:</b> EDG / Perform a Local Emergency Start of a DG	D, P, R	6
* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA		

Facility:	<b>CPSES</b>	Scenario No.:	<b>1</b>	Op-Test No.:	<b>11/2002</b>
Examiners:	Howard Bundy	Operators:			
	Mike Murphy				
	Tom Stetka				
	Fred Sanchez				
Note:	(NEW) SRO Admin A.5-1, Emerg. Class. is to be done in conjunction with this Scenario. (PRELOAD - MET Tower Data → wind 105) <b>Time (T) = 0 at end of power increase → as directed by Chief Examiner</b>				
Initial Conditions:	Full power steady state; BOL; Equilibrium Xenon; Severe thunderstorm warning and high winds issued and ABN-907, Section 5 completed. EDG 1-01 is out of service for maintenance (12 hours into LCO). (IC Info.: EGR06 - DG1 out of service)				
Turnover:	The plant has been at 100% power for the last 15 days. A power reduction to 76% is required to perform MSIV testing. The load reduction should be initiated as soon as the shift change is completed.				
Event No.	Malf. No.	Event Type*	Event Description		
1 T=0		N (SRO) R (RO)	Reduce power to 76%		
2 T=15	RX05A	I (SRO) I (RO)	Pressurizer level transmitter LT-459 fails low [value=0, ramp over 1 min]		
3 T=22	TC05A	C (SRO) C (BOP)	#1 Main turbine control valve fails closed		
4 T=30	ED06G	C (ALL)	Loss of 1D3 bus		
5 T=33  T=35	RC03D	C (RO) C (SRO)	RCP 4 vibration - initial severity @ 9 mils and ramp severity to 25 mils over 30 min. High vib. alarm on RCP 4 (shaft) alarms at 15 mils & increasing @ approx 0.5 mils/min.  Manual Rx Scram due to high RCP 1-04 vibrations, no SI. Enter EOP-0.0A and then transition to EOS-0.1A.		
6 T=44	ED01	M (ALL)	Lighting strike in switchyard - loss of offsite power. EDG 1-02 starts and loads (E19 triggers automatically when the reactor is tripped)		
7 T=50	EG07B	C (ALL)	EDG 1-02 trips (overspeed) - loss of all power. Transition to ECA-0.0A and possibly ABN-601.		
T=60			EDG 1-02 is restarted after S/G depressurization has started per ECA-0.0A.		

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

Facility:	<b>CPSES</b>	Scenario No.:	<b>2</b>	Op-Test No.:	<b>11/2002</b>
Examiners:	Howard Bundy	Operators:			
	Mike Murphy				
	Tom Stetka				
	Fred Sanchez				
Note:	(NEW) SRO Admin A.5-2, Emerg. Class. is to be done in conjunction with this Scenario. <b>Time (T) = 0 at end of power increase → as directed by Chief Examiner</b>				
Initial Conditions:	730 - 740 MWE and steady. (RP01 - Failure of automatic reactor trip; RP13C - Manual reactor trip failure<booth>; TC07C - Automatic main turbine trip failure<booth>.)				
Turnover:	The previous shift just completed turbine valve testing and the shift has been directed to return to 100% (8%/hr< rate of increase <10%/hr). Diesel Generator 1 should be returned to service in about 1 hour.				
Event No.	Malf. No.	Event Type*	Event Description		
1 T=0		N (SRO) R (RO) N (BOP)	Increase reactor power back to 100%		
2 T=15	RX04C	I (SRO) I (RO)	S/G 3 Level Transmitter LT-553 fails low ( <b>If RO or BOP goes to place bistables in trip, start Event 3</b> )		
3 T=30	TP04A	C (SRO) C (RO)	Main Feedwater pump A TPCW blockage [value=100%, ramp over 5 min]		
**4 T=40	FW03B	M (ALL)	Feedwater pump B trips; failure of automatic and manual reactor trip; failure of automatic main turbine trip.		
***5	SG01C	M (ALL)	Steam generator tube rupture [value=750 gpm, insert when reactor is tripped]		

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

\*\* = insert in conjunction with S/D or trip of "A" MFP

\*\*\* = insert when reactor is tripped.

Facility:	<b>CPSES</b>	Scenario No.:	<b>3</b>	Op-Test No.:	<b>11/2002</b>
Examiners:	Howard Bundy	Operators:			
	Mike Murphy				
	Tom Stetka				
	Fred Sanchez				
Note:	(BANK) This scenario is an unused spare from the 2001 CPSES exam				
Initial Conditions:	20% power and steady.				
Turnover:	No equipment is out of service. Train A equipment is in service. FWP repairs have been completed by the previous shift. You have been directed to return to 100% power @8%/hr not to exceed 10%/hr.				
Event No.	Malf. No.	Event Type*	Event Description		
1 T=0		N (SRO) N (BOP) R (RO)	Increase Reactor power back to 100%		
2** T=15	MS13A	I (RO) I (SRO)	MSL 1 Press Instrument PI-2325 fails high (100%)		
3 T=22	FW16	C (RO) C (BOP) C (SRO)	Lowering vacuum on main condenser due to loss of vacuum breaker water seal (6% severity)		
4 T=32	RX15A	C (RO) C (SRO)	Pzr spray flow control valve failure (PCV-455B) @ 60% severity. RXR96 is PCV-455B CTRL driver card - remove then delete malfunction		
5 T=45	TC06C MS07A MS10A1 @100%	M (ALL)	Main turbine spurious trip and MSIV #1 closes causing SG1 Safety MS-021 to fail open		

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

\*\* Note - Initiate after Chief Examiner determines power increase is sufficient

Facility:	<b>CPSES</b>	Scenario No.:	<b>4</b>	Op-Test No.:	<b>11/2002</b>
Examiners:	Howard Bundy	Operators:			
	Mike Murphy				
	Tom Stetka				
	Fred Sanchez				
Note:	(NEW)				
Initial Conditions:	20% Turbine Load at BOL				
Turnover:	Plant Startup in Progress following a routine refueling outage. No equipment is out of service. IPO-003A, Power Operations is complete through step 5.3.9. Starting at step 5.4, Establishing 100% Turbine Load, continue the plant startup in accordance with IPO-003A.				
Event No.	Malf. No.	Event Type*	Event Description		
1 T=0		R (RO) N (BOP) N (SRO)	Increase turbine load in accordance with IPO003A, Power Operations <b>When operator starts dilution, insert malfunction CV16A</b>		
2 T=15	CV16A	I (RO) I (SRO)	LT-112 Fails within the auto makeup range		
3 T=25	RC03C	C (RO) C (SRO)	RCP 3 shaft high vibration		
4 T=35	RC09C2	M (ALL)	Reactor coolant system loop #3 cold leg rupture (double ended shear)		
5 T=35		C (ALL)	Rx will not trip in manual or automatic. Go to FRS-0.1A, "Response to Nuclear Power Generation/ATWT"		
6 T=35	SI04B	C (RO)	Train B SI Pump failure		

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

### Preload Information

T=0:

- RP01 Auto Rx trip failure
- RP15E Rx trip breakers jammed closed



Facility:	<b>CPSES</b>	Scenario No.:	<b>5</b>	Op-Test No.:	<b>11/2002</b>
Examiners:	Howard Bundy	Operators:			
	Mike Murphy				
	Tom Stetka				
	Fred Sanchez				
Note:	(BANK) This Scenario is an unused backup from the 1999 CPSES Exam				
Initial Conditions:	Full power steady state; BOL; Equilibrium Xenon (I/C Info: EG06, DG1 Out of Service.)				
Turnover:	The plant has been at 100% power for the last 15 days. Diesel Generator 1 is out of service for injector replacement; Diesel Generator 1 should be returned to service in about 1 hour. Shift order directs you to shift CCP's to add oil to CCP1-01.				
Event No.	Malf. No.	Event Type*	Event Description		
1 T=0		N (RO) N (SRO)	SWAP Charging Pumps		
2 T=10		I (BOP) I (SRO)	Steam Generator Pressure Transmitter PT-2325 fails high [Value = 100]		
3 T=20		C (BOP) C (SRO) R (RO)	Heater drain pump 1-02 trips/auto turbine runback. <b>Annunciator ALB-9A Window 8.2</b>		
4 T=32		M (ALL)	Loss of all off-site power. Mechanical failure causes spurious trip of diesel generator 2 breaker [Initiate 5 minutes after diesel starts] [Return diesel generator to service 15 minutes after the reactor trip]		

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

Facility:	<b>CPSES</b>	Scenario No.:	<b>6(SPARE)</b>	Op-Test No.:	<b>11/2002</b>
Examiners:	Howard Bundy	Operators:			
	Mike Murphy				
	Tom Stetka				
	Fred Sanchez				
Note:	(NEW)				
Initial Conditions:	50% Turbine Load at EOL (IC20; MS08B; MSIV 2 fails to close; Need to update operator aid to 25 psig in VCT)				
Turnover:	Plant startup in progress following a routine refueling outage. No equipment is out of service. IPO-003A, Power Operations, is complete through step 5.4.22. Starting at step 5.4.23, Establishing 100% Turbine Load, continue the plant startup in accordance with IPO-003A. Control Bank D at 170 steps, 517 MWE, 1554 ppm RCS boron Conc., Xenon at equilibrium conditions, Target power change ramp rate of 8%, MAX ramp rate of 10%.				
Event No.	Malf. No.	Event Type*	Event Description		
1 T=0		R (RO) N (BOP) N (SRO)	Increase turbine load in accordance with IPO-003A, Power Operation Note: Examiner must initiate Event 2		
2 T=15	CV15	C (SRO) C (RO)	PCV-131, "Letdown Pressure Control Valve" fails closed.		
3 T=23	IA01A	C (ALL)	Instrument air leak - IA Receiver 1-01 relief valve lifting (Severity = 1500 scfm leak)		
4 T=30	RP06A	I (SRO) I (RO)	Loop 1 N16 fails high ( <b>Start Event 5 prior to RO/BOP placing bistables in trip</b> )		
5 T=46	RD01D	C (RO) C (SRO)	Control bank continuous rod withdrawal (Control Bank D)		
6	MS02 MS08B	M (ALL)	Main steam line leak outside containment downstream of SG 2 MSIV; SG 2 MSIV, HV-2334A, fails to close. (Insert at 1.13 x 10E7 lbm/hour) <b>EXAMINER NOTE: INSERT AFTER TRANSITION TO EOS-0.1A.</b>		

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

## *ES-401 - 4 PWR RO*

<b>TIER</b>	<b>GROUP</b>	<b>K1</b>	<b>K2</b>	<b>K3</b>	<b>K4</b>	<b>K5</b>	<b>K6</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>	<b>G</b>	<b>G1</b>	<b>G2</b>	<b>G3</b>	<b>G4</b>	<b>Total</b>
<b>1</b>	1	4	1	2				5	3			1					16
	2	2	3	5				2	4			1					17
	3							2	1								3
		6	4	7				9	8				2				
<b>2</b>	1	6		2	3		1	2	4	3	1	1					23
	2	1	1	2	5	2		1	4	2	1	1					20
	3	2	1		2	1	1		1								8
		9	2	4	10	3	2	3	9	5	2	2					
<b>3</b>	1												3				3
	2													4			4
	3														2		2
	4															4	4
																	13

1. Ensure that at least two topics from every K/A are sampled within each tier (i.e., the Tier Totals in each K/A category shall not be less than two).
2. Actual point totals must match those specified in the table.
3. Select topics from many systems - avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6. The generic 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.
7. On the following pages enter the K/A numbers, a brief description of each topic, the topics importance ratings for the license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

*ES-401 PWR RO (continued)*

<i>TIER</i>	<i>GROUP</i>	<i>Category</i>		<i>GROUP_Total</i>	<i>TIER_Total</i>
1	1	<i>A1</i>	5		
		<i>A2</i>	3		
		<i>G</i>	1		
		<i>K1</i>	4		
		<i>K2</i>	1		
		<i>K3</i>	2		
				16	
1	2	<i>A1</i>	2		
		<i>A2</i>	4		
		<i>G</i>	1		
		<i>K1</i>	2		
		<i>K2</i>	3		
		<i>K3</i>	5		
				17	
1	3	<i>A1</i>	2		
		<i>A2</i>	1		
				3	
					<i>Tier Total: 36</i>
2	1	<i>A1</i>	2		
		<i>A2</i>	4		
		<i>A3</i>	3		
		<i>A4</i>	1		
		<i>G</i>	1		
		<i>K1</i>	6		
		<i>K3</i>	2		
		<i>K4</i>	3		
		<i>K6</i>	1		
				23	
2	2	<i>A1</i>	1		
		<i>A2</i>	4		
		<i>A3</i>	2		
		<i>A4</i>	1		
		<i>G</i>	1		
		<i>K1</i>	1		
		<i>K2</i>	1		
		<i>K3</i>	2		
		<i>K4</i>	5		
		<i>K5</i>	2		
				20	
2	3	<i>A2</i>	1		
		<i>K1</i>	2		
		<i>K2</i>	1		
		<i>K4</i>	2		
		<i>K5</i>	1		
		<i>K6</i>	1		

*ES-401 PWR RO (continued)*

<i>TIER</i>	<i>GROUP</i>	<i>Category</i>		<i>GROUP_Total</i>	<i>Tier Total: 51</i> <i>TIER_Total</i>
<b>3</b>	<b>1</b>	<i>G1</i>	3	3	
<b>3</b>	<b>2</b>	<i>G2</i>	4	4	
<b>3</b>	<b>3</b>	<i>G3</i>	2	2	
<b>3</b>	<b>4</b>	<i>G4</i>	4	4	
					<i>Tier Total: 13</i>

*Check of Tier Totals*

1	A1	9	Sat
1	A2	8	Sat
1	G	2	Sat
1	K1	6	Sat
1	K2	4	Sat
1	K3	7	Sat
2	A1	3	Sat
2	A2	9	Sat
2	A3	5	Sat
2	A4	2	Sat
2	G	2	Sat
2	K1	9	Sat
2	K2	2	Sat
2	K3	4	Sat
2	K4	10	Sat
2	K5	3	Sat
2	K6	2	Sat
3	G1	3	Sat
3	G2	4	Sat
3	G3	2	Sat
3	G4	4	Sat

**ES401-4 OUTLINE**

Tier	1	Group 1			
		A1			
		4.1.074	Inadequate Core Cooling		
		4.1.074.EA1.26	Ability to operate and monitor the following as they apply to a Inadequate Core Cooling: Reactor building emergency sump isolation valve control switches and indicators	3.8	1
		4.1.074	Inadequate Core Cooling		
		4.1.074.EA1.24	Ability to operate and monitor the following as they apply to a Inadequate Core Cooling: Turbine bypass valve hand/automatic controls, indicators, and set points	3.6	1
		4.2.005	Inoperable/Stuck Control Rod		
		4.2.005.AA1.03	Ability to operate and / or monitor the following as they apply to the Inoperable / Stuck Control Rod: Metroscope	3.4	1
		4.2.067	Plant Fire on Site		
		4.2.067.AA1.05	Ability to operate and / or monitor the following as they apply to the Plant Fire on Site: Plant and control room ventilation systems	3	1
		4.2.068	Control Room Evacuation		
		4.2.068.AA1.14	Ability to operate and / or monitor the following as they apply to the Control Room Evacuation: Reactor trip breakers and switches	4.2	1
		A2			
		4.2.068	Control Room Evacuation		
		4.2.068.AA2.10	Ability to determine and interpret the following as they apply to the Control Room Evacuation: Source range count rate	4.2	1
		4.2.076	High Reactor Coolant Activity		
		4.2.076.AA2.04	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: Process effluent radiation chart recorder	2.6	1
		4.2.076	High Reactor Coolant Activity		
		4.2.076.AA2.03	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: RCS radioactivity level meter	2.5	1
		G			
		4.2.027G	Generic KA for Pressurizer Pressure Control System Malfunction (2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions)	3.9	1
		K1			
		4.2.067	Plant Fire on Site		
		4.2.067.AK1.01	Knowledge of the operational implications of the following concepts as they apply to Plant Fire on Site: Fire	2.9	1
		4.5.E09	Natural Circulation Operations		
		4.5.E09.EK1.02	Knowledge of the operational implications of the following concepts as they apply to the (Natural Circulation Operations) Normal, abnormal and emergency operating procedures associated with (Natural Circulation Operations).	3.3	1
		4.2.069	Loss of Containment Integrity		
		4.2.069.AK1.01	Knowledge of the operational implications of the following concepts as they apply to Loss of Containment Integrity: Effect of pressure on leak rate	2.6	1
		4.1.055	Station Blackout		
		4.1.055.EK1.02	Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : Natural circulation cooling	4.1	1

K2

4.2.068	Control Room Evacuation			
4.2.068.AK2.03	Knowledge of the interrelations between the Control Room Evacuation and the following: Controllers and positioners	2.9	1	

K3

4.2.051	Loss of Condenser Vacuum			
4.2.051.AK3.01	Knowledge of the reasons for the following responses as they apply to the Loss of Condenser Vacuum: Loss of steam dump capability upon loss of condenser vacuum	2.8	1	
4.5.E07	Saturated Core Cooling			
4.5.E07.EK3.01	Knowledge of the reasons for the following responses as they apply to the (Saturated Core Cooling) Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	3.1	1	

Tier **1** Group **2**A1

4.1.029	Anticipated Transient Without Scram (ATWS)			
4.1.029.EA1.03	Ability to operate and monitor the following as they apply to a ATWS: Charging pump suction valves from VCT operating switch	3.5	1	
4.5.E02	SI Termination			
4.5.E02.EA1.01	Ability to operate and / or monitor the following as they apply to the (SI Termination) Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	4	1	

A2

4.2.061	Area Radiation Monitoring (ARM) System Alarms			
4.2.061.AA2.03	Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Set points for alert and high alarms	3	1	
4.1.038	Steam Generator Tube Rupture			
4.1.038.EA2.11	Ability to determine or interpret the following as they apply to a SGTR: Local radiation reading on main steam lines	3.7	1	
4.1.009	Small Break LOCA			
4.1.009.EA2.01	Ability to determine or interpret the following as they apply to a small break LOCA: Actions to be taken, based on RCS temperature and pressure, saturated and superheated	4.2	1	
4.5.E02	SI Termination			
4.5.E02.EA2.01	Ability to determine and interpret the following as they apply to the (SI Termination) Facility conditions and selection of appropriate procedures during abnormal and emergency	3.3	1	

G

4.1.011G	Generic KA for Large Break LOCA (2.4.18 Knowledge of the specific bases for EOPs)	2.7	1	
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K1

4.5.E04	LOCA Outside Containment			
4.5.E04.EK1.01	Knowledge of the operational implications of the following concepts as they apply to the (LOCA Outside Containment) Components, capacity, and function of emergency systems.	3.5	1	
4.5.E02	SI Termination			
4.5.E02.EK1.02	Knowledge of the operational implications of the following concepts as they apply to the (SI Termination) Normal, abnormal and emergency operating procedures associated with (SI Termination)	3.4	1	



K2

4.2.001	Continuous Rod Withdrawal			
	4.2.001.AK2.05	Knowledge of the interrelations between the Continuous Rod Withdrawal and the following: Rod motion lights	2.9	1
4.5.E01	Rediagnosis			
	4.5.E01.EK2.01	Knowledge of the interrelations between the (Reactor Trip or Safety Injection/Rediagnosis) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.3	1
4.5.E01	Rediagnosis			
	4.5.E01.EK2.02	Knowledge of the interrelations between the (Reactor Trip or Safety Injection/Rediagnosis) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the	3.5	1

K3

4.5.E16	High Containment Radiation			
	4.5.E16.EK3.01	Knowledge of the reasons for the following responses as they apply to the (High Containment Radiation) Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	2.9	1
4.5.E01	Rediagnosis			
	4.5.E01.EK3.02	Knowledge of the reasons for the following responses as they apply to the (Reactor Trip or Safety Injection/Rediagnosis) Normal, abnormal and emergency operating procedures associated with (Reactor Trip or Safety Injection/Rediagnosis).	3	1
4.5.E03	LOCA Cooldown and Depressurization			
	4.5.E03.EK3.04	Knowledge of the reasons for the following responses as they apply to the (LOCA Cooldown and Depressurization) RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.	3.5	1
4.5.E05	Loss of Secondary Heat Sink			
	4.5.E05.EK3.01	Knowledge of the reasons for the following responses as they apply to the (Loss of Secondary Heat Sink) Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	3.4	1
4.2.008	Pressurizer Vapor Space Accident			
	4.2.008.AK3.03	Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: Actions contained in EOP for PZR vapor space accident/ LOCA	4.1	1

Tier **1** Group **3**A1

4.2.028	Pressurizer Level Control Malfunction			
	4.2.028.AA1.07	Ability to operate and / or monitor the following as they apply to the Pressurizer Level Control Malfunctions: Charging pumps maintenance of PZR level (including manual backup)	3.3	1
4.2.065	Loss of Instrument Air			
	4.2.065.AA1.05	Ability to operate and / or monitor the following as they apply to the Loss of Instrument Air: RPS	3.3	1

A2

4.2.056	Loss of Off-Site Power			
	4.2.056.AA2.02	Ability to determine and interpret the following as they apply to the Loss of Offsite Power: ESF load sequencer status lights	3.5	1

Tier	Group						
2	1	<u>A1</u>					
		3.5.022	Containment Cooling System				
			3.5.022.A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Containment pressure	3.6	1	
		3.7.015	Nuclear Instrumentation System				
			3.7.015.A1.08	Ability to predict and/or monitor changes in parameters to prevent exceeding design limits) associated with operating the NIS controls including: Changes in RCS temperature	3.3	1	
		<u>A2</u>					
		3.2.004	Chemical and Volume Control System				
			3.2.004.A2.19	Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High secondary and primary concentrations of chloride, fluoride, sodium and solids	2.8	1	
		3.4.059	Main Feedwater System				
			3.4.059.A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Feeding a dry S/G	2.9	1	
		3.7.072	Area Radiation Monitoring System				
			3.7.072.A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the ARM system- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Erratic or	2.7	1	
		3.5.022	Containment Cooling System				
			3.5.022.A2.06	Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of CCS pump	2.8	1	
		<u>A3</u>					
		3.4.061	Auxiliary / Emergency Feedwater System				
			3.4.061.A3.02	Ability to monitor automatic operation of the AFW, including: RCS cooldown during AFW operations	4	1	
		3.2.004	Chemical and Volume Control System				
			3.2.004.A3.12	Ability to monitor automatic operation of the CVCS, including: Interpretation of letdown demineralizer flow-divert valve position indicating lights	3	1	
		3.4.003	Reactor Coolant Pump System				
			3.4.003.A3.01	Ability to monitor automatic operation of the RCPS, including: Seal injection flow	3.3	1	
<u>A4</u>							
3.4.059	Main Feedwater System						
	3.4.059.A4.10	Ability to manually operate and monitor in the control room: ICS	3.9	1			
<u>G</u>							
	3.9.068G	Generic KA for Liquid Radwaste System (2.3.4 Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized)	2.5	1			
<u>K1</u>							
3.7.015	Nuclear Instrumentation System						
	3.7.015.K1.03	Knowledge of the physical connections and/or cause-effect relationships between the NIS and the following systems: CRDS	3.1	1			

3.7.015	Nuclear Instrumentation System			
3.7.015.K1.08	Knowledge of the physical connections and/or cause-effect relationships between the NIS and the following systems: RCS (pump start)	2.6	1	
3.4.003	Reactor Coolant Pump System			
3.4.003.K1.01	Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: RCP lube oil	2.6	1	
3.4.003	Reactor Coolant Pump System			
3.4.003.K1.10	Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: RCS	3.0	1	
3.5.022	Containment Cooling System			
3.5.022.K1.02	Knowledge of the physical connections and/or cause-effect relationships between the CCS and the following systems: SEC/remote monitoring systems	3.7	1	
3.7.017	In-Core Temperature Monitor System			
3.7.017.K1.02	Knowledge of the physical connections and/or cause effect relationships between the ITM system and the following systems: RCS	3.3	1	

**K3**

3.5.022	Containment Cooling System			
3.5.022.K3.02	Containment equipment subject to damage by high or low temperature, humidity, and pressure Containment instrumentation readings	3	1	
3.4.003	Reactor Coolant Pump System			
3.4.003.K3.03	Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: Feedwater and emergency feedwater	2.8	1	

**K4**

3.4.061	Auxiliary / Emergency Feedwater System			
3.4.061.K4.01	Knowledge of AFW design feature(s) and/or interlock(s) which provide for the following: Water sources and priority of use	3.9	1	
3.2.013	Engineered Safety Features Actuation System			
3.2.013.K4.12	Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following Safety injection block	3.7	1	
3.5.022	Containment Cooling System			
3.5.022.K4.03	Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: Automatic containment isolation	3.6	1	

**K6**

3.2.013	Engineered Safety Features Actuation System			
3.2.013.K6.01	Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: Sensors and detectors	2.7	1	

Tier **2** Group 2

**A1**

3.7.012	Reactor Protection System			
3.7.012.A1.01	Ability to predict and/or monitor Changes in parameters (to prevent exceeding design limits) associated with operating the RPS controls including: Trip set point adjustment	2.9	1	

**A2**

3.8.029	Containment Purge System			
3.8.029.A2.01	Ability to (a) predict the impacts of the following mal- functions or operations on the Containment Purge System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Maintenance or other activity taking place inside containment	2.9	1	

3.6.062	A.C. Electrical Distribution				
3.6.062.A2.09	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: Consequences of exceeding current limitations	2.7	1		
3.7.073	Process Radiation Monitoring System				
3.7.073.A2.01	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: Erratic or	2.5	1		
3.2.011	Pressurizer Level Control System				
3.2.011.A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of Loss of one, two or three charging pumps	3.5	1		
<b>A3</b>					
3.4.055	Condenser Air Removal System				
3.4.055.A3.03	Ability to monitor automatic operation of the CARS, including: Automatic diversion of CARS exhaust	2.5	1		
3.5.026	Containment Spray System				
3.5.026.A3.01	Ability to monitor automatic operation of the CSS, including: Pump starts and correct MOV positioning	4.3	1		
<b>A4</b>					
3.8.029	Containment Purge System				
3.8.029.A4.04	Ability to manually operate and/or monitor in the control room: Containment evacuation signal	3.5	1		
<b>G</b>					
3.8.079G	Generic KA for Station Air System (2.2.22 Knowledge of limiting conditions for operations and safety limits)	3.4	1		
<b>K1</b>					
3.7.016	Non-Nuclear Instrumentation System				
3.7.016.K1.10	Knowledge of the physical connections and/or cause-effect relationships between the NNIS and the following systems: CCS	3.1	1		
<b>K2</b>					
3.2.006	Emergency Core Cooling System				
3.2.006.K2.02	Knowledge of bus power supplies to the following: Valve operators for accumulators	2.5	1		
<b>K3</b>					
3.4.035	Steam Generator System				
3.4.035.K3.01	Knowledge of the effect that a loss or malfunction of the S/GS will have on the following: RCS	4.4	1		
3.7.016	Non-Nuclear Instrumentation System				
3.7.016.K3.08	Knowledge of the effect that a loss or malfunction of the NNIS will have on the following: PZR PCS	3.5	1		
<b>K4</b>					
3.4.035	Steam Generator System				
3.4.035.K4.06	Knowledge of S/GS design feature(s) and/or interlock(s) which provide for the following: S/G System	3.1	1		
3.4.035	Steam Generator System				
3.4.035.K4.05	Knowledge of S/GS design feature(s) and/or interlock(s) which provide for the following: Amount of reserve water in S/G	3.7	1		

3.7.073	Process Radiation Monitoring System			
	3.7.073.K4.01	Knowledge of PRM system design feature(s) and/or interlocks which provide for the following: Release termination when radiation exceeds set point	4	1
3.8.029	Containment Purge System			
	3.8.029.K4.03	Knowledge of design feature(s) and/or interlock(s) which provide for the following: Automatic purge isolation	3.2	1
3.8.086	Fire Protection System			
	3.8.086.K4.01	Knowledge of design feature(s) and/or interlock(s) which provide for the following: Adequate supply of water for FPS	3.1	1

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K5

3.8.086	Fire Protection System			
	3.8.086.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
3.3.010	Pressurizer Pressure Control System			
	3.3.010.K5.02	Knowledge of the operational implications of the following concepts as they apply to the PZR PCS: Constant enthalpy expansion through a valve	2.6	1

Tier **2** Group **3**

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A2

3.8.008	Component Cooling Water System			
	3.8.008.A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: PRMS alarm	3.3	1

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K1

3.4.076	Service Water System			
	3.4.076.K1.07	Knowledge of the physical connections and/or cause-effect relationships between the SWS and the following systems: Secondary closed cooling water	2.5	1
3.4.045	Main Turbine Generator System			
	3.4.045.K1.06	Knowledge of the physical connections and/or cause-effect relationships between the MT/G system and the following systems: RCS, during steam valve test	2.6	1

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K2

3.4.076	Service Water System			
	3.4.076.K2.01	Knowledge of bus power supplies to the following: Service water	2.7	1

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K4

3.5.007	Pressurizer Relief Tank / Quench Tank System			
	3.5.007.K4.01	Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: Quench tank cooling	2.6	1
3.4.045	Main Turbine Generator System			
	3.4.045.K4.47	Knowledge of MT/G system design feature(s) and/or inter-lock(s) which provide for the following: Turbine trip upon reactor trip	4	1

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K5

3.5.028	Hydrogen Recombiner and Purge Control System			
	3.5.028.K5.02	Knowledge of the operational implications of the following concepts as they apply to the HRPS: Flammable hydrogen	3.4	1

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K6

3.5.028	Hydrogen Recombiner and Purge Control System			
	3.5.028.K6.01	Knowledge of the effect of a loss or malfunction on the following will have on the HRPS: Hydrogen recombiners	2.6	1

Tier	<b>3</b>	Group 1			
		G1			
		2.1.16			
			2.1.16	Conduct of Operations: Ability to operate plant phone, paging system, and two-way radio.	2.9 1
		2.1.18			
			2.1.18	Conduct of Operations: Ability to make accurate, clear and concise logs, records, status boards, and reports.	2.9 1
		2.1.24			
			2.1.24	Conduct of Operations: Ability to obtain and interpret station electrical and mechanical drawings.	2.8 1
Tier	<b>3</b>	Group 2			
		G2			
		2.2.3			
			2.2.3	Equipment Control (multi-unit) Knowledge of the design, procedural, and operational differences between units.	3.1 1
		2.2.11			
			2.2.11	Equipment Control Knowledge of the process for controlling temporary changes.	2.5 1
		2.2.23			
			2.2.23	Equipment Control Ability to track limiting conditions for	2.6 1
		2.2.22			
			2.2.22	Equipment Control Knowledge of limiting conditions for operations and safety limits.	3.4 1
Tier	<b>3</b>	Group 3			
		G3			
		2.3.2			
			2.3.2	Radiation Control Knowledge of facility ALARA program.	2.5 1
		2.3.4			
			2.3.4	Radiation Control Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5 1
Tier	<b>3</b>	Group 4			
		G4			
		2.4.39			
			2.4.39	Emergency Procedures / Plan Knowledge of the RO's responsibilities in emergency plan implementation.	3.3 1
		2.4.46			
			2.4.46	Emergency Procedures / Plan Ability to verify that the alarms are consistent with the plant conditions.	3.5 1
		2.4.47			
			2.4.47	Emergency Procedures / Plan Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	3.4 1
		2.4.25			
			2.4.25	Emergency Procedures / Plan Knowledge of fire protection procedures.	2.9 1

## *ES-401 - 3 PWR SRO*

<b>TIER</b>	<b>GROUP</b>	<b>K1</b>	<b>K2</b>	<b>K3</b>	<b>K4</b>	<b>K5</b>	<b>K6</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>	<b>G</b>	<b>G1</b>	<b>G2</b>	<b>G3</b>	<b>G4</b>	<b>Total</b>
<b>1</b>	1	6	4	3				6	4			1					24
	2	1		7				2	5			1					16
	3							1	2								3
		7	4	10				9	11				2				
<b>2</b>	1	3		2	3		1	2	3	3	1	1					19
	2	1	1	2	2	3	1	1	3	1	1	1					17
	3	1	1		1				1								4
		5	2	4	6	3	2	3	7	4	2	2					
<b>3</b>	1												6				6
	2													4			4
	3														2		2
	4															5	5
																5	17

1. Ensure that at least two topics from every K/A are sampled within each tier (i.e., the Tier Totals in each K/A category shall not be less than two).
2. Actual point totals must match those specified in the table.
3. Select topics from many systems - avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6. The generic 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.
7. On the following pages enter the K/A numbers, a brief description of each topic, the topics importance ratings for the license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

*ES-401 PWR SRO (continued)*

<i>TIER</i>	<i>GROUP</i>	<i>Category</i>		<i>GROUP_Total</i>	<i>TIER_Total</i>
<b>1</b>	<b>1</b>				
		<i>A1</i>	6		
		<i>A2</i>	4		
		<i>G</i>	1		
		<i>K1</i>	6		
		<i>K2</i>	4		
		<i>K3</i>	3		
				24	
<b>1</b>	<b>2</b>				
		<i>A1</i>	2		
		<i>A2</i>	5		
		<i>G</i>	1		
		<i>K1</i>	1		
		<i>K3</i>	7		
				16	
<b>1</b>	<b>3</b>				
		<i>A1</i>	1		
		<i>A2</i>	2		
				3	
					<i>Tier Total: 43</i>
<i>TIER</i>	<i>GROUP</i>	<i>Category</i>		<i>GROUP_Total</i>	<i>TIER_Total</i>
<b>2</b>	<b>1</b>				
		<i>A1</i>	2		
		<i>A2</i>	3		
		<i>A3</i>	3		
		<i>A4</i>	1		
		<i>G</i>	1		
		<i>K1</i>	3		
		<i>K3</i>	2		
		<i>K4</i>	3		
		<i>K6</i>	1		
				19	
<b>2</b>	<b>2</b>				
		<i>A1</i>	1		
		<i>A2</i>	3		
		<i>A3</i>	1		
		<i>A4</i>	1		
		<i>G</i>	1		
		<i>K1</i>	1		
		<i>K2</i>	1		
		<i>K3</i>	2		
		<i>K4</i>	2		
		<i>K5</i>	3		
		<i>K6</i>	1		
				17	
<b>2</b>	<b>3</b>				
		<i>A2</i>	1		
		<i>K1</i>	1		
		<i>K2</i>	1		
		<i>K4</i>	1		
				4	



<i>TIER</i>	<i>GROUP</i>	<i>Category</i>		<i>GROUP_Total</i>	<i>Tier Total: 40</i> <i>TIER_Total</i>
<b>3</b>	<b>1</b>	<i>G1</i>	6	6	
<b>3</b>	<b>2</b>	<i>G2</i>	4	4	
<b>3</b>	<b>3</b>	<i>G3</i>	2	2	
<b>3</b>	<b>4</b>	<i>G4</i>	5	5	
					<i>Tier Total: 17</i>

*Check of Tier Totals*

1	A1	9	Sat
1	A2	11	Sat
1	G	2	Sat
1	K1	7	Sat
1	K2	4	Sat
1	K3	10	Sat
2	A1	3	Sat
2	A2	7	Sat
2	A3	4	Sat
2	A4	2	Sat
2	G	2	Sat
2	K1	5	Sat
2	K2	2	Sat
2	K3	4	Sat
2	K4	6	Sat
2	K5	3	Sat
2	K6	2	Sat
3	G1	6	Sat
3	G2	4	Sat
3	G3	2	Sat
3	G4	5	Sat

**ES401-3 OUTLINE**Tier **1** Group **1**A1

4.1.029	Anticipated Transient Without Scram (ATWS)		
4.1.029.EA1.03	Ability to operate and monitor the following as they apply to a ATWS: Charging pump suction valves from VCT operating switch	3.2	1
4.1.074	Inadequate Core Cooling		
4.1.074.EA1.24	Ability to operate and monitor the following as they apply to a Inadequate Core Cooling: Turbine bypass valve hand/automatic controls, indicators, and set points	3.8	1
4.2.005	Inoperable/Stuck Control Rod		
4.2.005.AA1.03	Ability to operate and / or monitor the following as they apply to the Inoperable / Stuck Control Rod: Metroscope	3.4	1
4.5.E02	SI Termination		
4.5.E02.EA1.01	Ability to operate and / or monitor the following as they apply to the (SI Termination): Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.9	1
4.2.068	Control Room Evacuation		
4.2.068.AA1.14	Ability to operate and / or monitor the following as they apply to the Control Room Evacuation: Reactor trip breakers and switches	4.4	1
4.2.067	Plant Fire on Site		
4.2.067.AA1.05	Ability to operate and / or monitor the following as they apply to the Plant Fire on Site: Plant and control room ventilation systems	3.1	1

A2

4.2.068	Control Room Evacuation		
4.2.068.AA2.10	Ability to determine and interpret the following as they apply to the Control Room Evacuation: Source range count rate	4.4	1
4.5.E02	SI Termination		
4.5.E02.EA2.01	Ability to determine and interpret the following as they apply to the (SI Termination) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.2	1
4.2.076	High Reactor Coolant Activity		
4.2.076.AA2.04	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: Process effluent radiation chart recorder	3	1
4.2.076	High Reactor Coolant Activity		
4.2.076.AA2.03	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: RCS radioactivity	3	1

G

4.2.027G	Generic KA for Pressurizer Pressure Control System Malfunction (2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions)	4.1	1
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K1

4.5.E02	SI Termination		
4.5.E02.EK1.02	Knowledge of the operational implications of the following concepts as they apply to the (SI Termination) Normal, abnormal and emergency operating procedures associated with (SI Termination).	3.9	1

4.2.067	Plant Fire on Site			
4.2.067.AK1.01	Knowledge of the operational implications of the following concepts as they apply to Plant Fire on Site: Fire classifications, by type	3.9	1	
4.1.055	Station Blackout			
4.1.055.EK1.02	Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : Natural circulation cooling	4.4	1	
4.5.E04	LOCA Outside Containment			
4.5.E04.EK1.01	Knowledge of the operational implications of the following concepts as they apply to the (LOCA Outside Containment) Components, capacity, and function of emergency systems.	3.9	1	
4.5.E09	Natural Circulation Operations			
4.5.E09.EK1.02	Knowledge of the operational implications of the following concepts as they apply to the (Natural Circulation Operations) Normal, abnormal and emergency operating procedures associated with (Natural Circulation Operations).	3.7	1	
4.2.069	Loss of Containment Integrity			
4.2.069.AK1.01	Knowledge of the operational implications of the following concepts as they apply to Loss of Containment Integrity: Effect of pressure on leak rate	3.1	1	

K2

4.5.E01	Rediagnosis			
4.5.E01.EK2.02	Knowledge of the interrelations between the (Reactor Trip or Safety Injection/Rediagnosis) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.8	1	
4.5.E01	Rediagnosis			
4.5.E01.EK2.01	Knowledge of the interrelations between the (Reactor Trip or Safety Injection/Rediagnosis) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.5	1	
4.2.068	Control Room Evacuation			
4.2.068.AK2.03	Knowledge of the interrelations between the Control Room Evacuation and the following: Controllers and positioners	3.1	1	
4.2.001	Continuous Rod Withdrawal			
4.2.001.AK2.05	Knowledge of the interrelations between the Continuous Rod Withdrawal and the following: Rod motion lights	3.1	1	

K3

4.5.E01	Rediagnosis			
4.5.E01.EK3.02	Knowledge of the reasons for the following responses as they apply to the (Reactor Trip or Safety Injection/Rediagnosis) Normal, abnormal and emergency operating procedures associated with (Reactor Trip or Safety	3.9	1	
4.2.051	Loss of Condenser Vacuum			
4.2.051.AK3.01	Knowledge of the reasons for the following responses as they apply to the Loss of Condenser Vacuum: Loss of steam dump capability upon loss of condenser vacuum	3.1	1	
4.5.E07	Saturated Core Cooling			
4.5.E07.EK3.01	Knowledge of the reasons for the following responses as they apply to the (Saturated Core Cooling) Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	3.7	1	

Tier **1** Group **2**A1


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4.2.065	Loss of Instrument Air			
4.2.065.AA1.05	Ability to operate and / or monitor the following as they apply to the Loss of Instrument Air: RPS	3.3	1	
4.1.038	Steam Generator Tube Rupture			
4.1.038.EA1.37	Ability to operate and monitor the following as they apply to a SGTR: Controlling of thermal shock during PZR spray	3.4	1	

A2


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4.2.061	Area Radiation Monitoring (ARM) System Alarms			
4.2.061.AA2.03	Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Set points for alert and high alarms	3.3	1	
4.5.E05	Loss of Secondary Heat Sink			
4.5.E05.EA2.02	Knowledge of the reasons for the following responses as they apply to the (Loss of Secondary Heat Sink) Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	4.3	1	
4.1.038	Steam Generator Tube Rupture			
4.1.038.EA2.11	Ability to determine or interpret the following as they apply to a SGTR: Local radiation reading on main steam lines	3.9	1	
4.1.009	Small Break LOCA			
4.1.009.EA2.01	Ability to determine or interpret the following as they apply to a small break LOCA: Actions to be taken, based on RCS temperature and pressure, saturated and superheated	4.8	1	
4.2.060	Accidental Gaseous Radwaste Release			
4.2.060.EA2.04	Ability to determine and interpret the following as they apply to the Accidental Gaseous Radwaste: The effects on the power plant of isolating a given radioactive- gas leak	3.4	1	

G


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4.1.011G	Generic KA for Large Break LOCA (2.4.18 Knowledge of the specific bases for EOPs)	3.6	1	
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K1


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4.5.E16	High Containment Radiation			
4.5.E16.EK1.03	Knowledge of the operational implications of the following concepts as they apply to the (High Containment Radiation) Annunciators and conditions indicating signals, and remedial actions associated with the (High Containment Radiation).	3.3	1	

K3


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4.5.E11	Loss of Emergency Coolant Recirculation			
4.5.E11.EK3.02	Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation) Normal, abnormal and emergency operating procedures associated with (Loss of Emergency Coolant	4	1	
4.5.E16	High Containment Radiation			
4.5.E16.EK3.01	Knowledge of the reasons for the following responses as they apply to the (High Containment Radiation) Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	3.1	1	

4.5.E05	Loss of Secondary Heat Sink			
4.5.E05.EK3.01	Knowledge of the reasons for the following responses as they apply to the (Loss of Secondary Heat Sink) Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	3.8	1	
4.5.E03	LOCA Cooldown and Depressurization			
4.5.E03.EK3.04	Knowledge of the reasons for the following responses as they apply to the (LOCA Cooldown and Depressurization) RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.	3	1	
4.2.008	Pressurizer Vapor Space Accident			
4.2.008.AK3.03	Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: Actions contained in EOP for PZR vapor space accident/ LOCA	4.6	1	
4.2.022	Loss of Reactor Coolant Makeup			
4.2.022.AK3.03	Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Pump Makeup: Performance of lineup to establish excess letdown after determining need	3.3	1	
4.2.032	Loss of Source Range Nuclear Instrumentation			
4.2.032.AK3.02	Knowledge of the reasons for the following responses as they apply to the Loss of Source Range Nuclear Instrumentation: Guidance contained in EOP for loss of source-range nuclear instrumentation	4.1	1	

Tier **1** Group **3**A1

4.2.028	Pressurizer Level Control Malfunction			
4.2.028.AA1.07	Ability to operate and / or monitor the following as they apply to the Pressurizer Level Control Malfunctions: Charging pumps maintenance of PZR level (including manual backup)	3.3	1	

A2

4.2.028	Pressurizer Level Control Malfunction			
4.2.028.AA2.14	Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: The effect on indicated PZR levels, given a change in ambient pressure and temperature of reflux boiling	2.8	1	
4.2.056	Loss of Off-Site Power			
4.2.056.AA2.02	Ability to determine and interpret the following as they apply to the Loss of Offsite Power: ESF load sequencer status	3.6	1	

Tier **2** Group **1**A1

3.7.015	Nuclear Instrumentation System			
3.7.015.A1.08	Ability to predict and/or monitor changes in parameters to prevent exceeding design limits) associated with operating the NIS controls including: Changes in RCS temperature	3.4	1	
3.5.022	Containment Cooling System			
3.5.022.A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Containment pressure	3.8	1	

<u>A2</u>			
3.4.059	Main Feedwater System		
3.4.059.A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Feeding a dry S/G	3.4	1
3.2.004	Chemical and Volume Control System		
3.2.004.A2.19	Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High secondary and primary concentrations of chloride, fluoride, sodium and solids	3.5	1
3.5.022	Containment Cooling System		
3.5.022.A2.06	Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of CCS pump	3.2	1
<u>A3</u>			
3.4.061	Auxiliary / Emergency Feedwater System		
3.4.061.A3.02	Ability to monitor automatic operation of the AFW, including: RCS cooldown during AFW operations	4	1
3.5.026	Containment Spray System		
3.5.026.A3.01	Ability to monitor automatic operation of the CSS, including: Pump starts and correct MOV positioning	4.5	1
3.2.004	Chemical and Volume Control System		
3.2.004.A3.12	Ability to monitor automatic operation of the CVCS, including: Interpretation of letdown demineralizer flow-divert valve position indicating lights	2.7	1
<u>A4</u>			
3.4.059	Main Feedwater System		
3.4.059.A4.10	Ability to manually operate and monitor in the control room:	3.8	1
<u>G</u>			
3.9.068G	Generic KA for Liquid Radwaste System (2.3.4 Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized)	3.1	1
<u>K1</u>			
3.5.022	Containment Cooling System		
3.5.022.K1.02	Knowledge of the physical connections and/or cause-effect relationships between the CCS and the following systems: SEC/remote monitoring systems	3.5	1
3.7.015	Nuclear Instrumentation System		
3.7.015.K1.03	Knowledge of the physical connections and/or cause-effect relationships between the NIS and the following systems:	3.1	1
3.4.003	Reactor Coolant Pump System		
3.4.003.K1.01	Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: RCP lube oil	2.8	1
<u>K3</u>			
3.4.003	Reactor Coolant Pump System		
3.4.003.K3.03	Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: Feedwater and emergency feedwater	3.1	1

3.5.022	Containment Cooling System			
3.5.022.K3.02	Containment equipment subject to damage by high or low temperature, humidity, and pressure	Containment instrumentation readings	3.3	1

K4

3.2.013	Engineered Safety Features Actuation System			
3.2.013.K4.12	Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following	Safety injection block	3.9	1
3.5.022	Containment Cooling System			
3.5.022.K4.03	Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following:	Automatic containment isolation	4	1
3.4.061	Auxiliary / Emergency Feedwater System			
3.4.061.K4.01	Knowledge of AFW design feature(s) and/or interlock(s) which provide for the following:	Water sources and priority of use	4.2	1

K6

3.2.013	Engineered Safety Features Actuation System			
3.2.013.K6.01	Knowledge of the effect of a loss or malfunction on the following will have on the	ESFAS: Sensors and detectors	3.1	1

Tier **2** Group 2A1

3.7.012	Reactor Protection System			
3.7.012.A1.01	Ability to predict and/or monitor Changes in parameters (to prevent exceeding design limits) associated with operating the RPS controls including:	Trip set point adjustment	3.4	1

A2

3.8.029	Containment Purge System			
3.8.029.A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the Containment Purge System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Maintenance or other activity taking place inside containment	3.6	1
3.2.011	Pressurizer Level Control System			
3.2.011.A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of	Loss of one, two or three charging pumps	3.7	1
3.6.062	A.C. Electrical Distribution			
3.6.062.A2.09	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:	Consequences of exceeding current limitations	3	1

A3

3.4.055	Condenser Air Removal System			
3.4.055.A3.03	Ability to monitor automatic operation of the CARS, including:	Automatic diversion of CARS exhaust	2.7	1

A4

3.8.029	Containment Purge System			
3.8.029.A4.04	Ability to manually operate and/or monitor in the control room:	Containment evacuation signal	3.6	1



<u>G</u>			
3.8.079G	Generic KA for Station Air System (2.2.22 Knowledge of limiting Conditions for operations and safety limits)	4.1	1
<u>K1</u>			
3.7.016	Non-Nuclear Instrumentation System		
3.7.016.K1.10	Knowledge of the physical connections and/or cause-effect relationships between the NNIS and the following systems:	3.1	1
<u>K2</u>			
3.2.006	Emergency Core Cooling System		
3.2.006.K2.02	Knowledge of bus power supplies to the following: Valve operators for accumulators	2.9	1
<u>K3</u>			
3.4.035	Steam Generator System		
3.4.035.K3.01	Knowledge of the effect that a loss or malfunction of the S/GS will have on the following: RCS	4.6	1
3.7.016	Non-Nuclear Instrumentation System		
3.7.016.K3.08	Knowledge of the effect that a loss or malfunction of the NNIS will have on the following: PZR PCS	3.7	1
<u>K4</u>			
3.8.086	Fire Protection System		
3.8.086.K4.01	Knowledge of design feature(s) and/or interlock(s) which provide for the following: Adequate supply of water for FPS	3.7	1
3.7.073	Process Radiation Monitoring System		
3.7.073.K4.01	Knowledge of PRM system design feature(s) and/or interlocks which provide for the following: Release termination when radiation exceeds set point	4.3	1
<u>K5</u>			
3.3.010	Pressurizer Pressure Control System		
3.3.010.K5.02	Knowledge of the operational implications of the following concepts as they apply to the PZR PCS: Constant enthalpy expansion through a valve	3	1
3.5.028	Hydrogen Recombiner and Purge Control System		
3.5.028.K5.02	Knowledge of the operational implications of the following concepts as they apply to the HRPS: Flammable hydrogen concentration	3.9	1
3.8.086	Fire Protection System		
3.8.086.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	3.4	1
<u>K6</u>			
3.5.028	Hydrogen Recombiner and Purge Control System		
3.5.028.K6.01	Knowledge of the effect of a loss or malfunction on the following will have on the HRPS: Hydrogen recombiners	3.1	1
Tier <b>2</b> Group <b>3</b>			
<u>A2</u>			
3.8.008	Component Cooling Water System		
3.8.008.A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: PRMS alarm	3.5	1

<u>K1</u>			
3.4.045	Main Turbine Generator System		
3.4.045.K1.06	Knowledge of the physical connections and/or cause-effect relationships between the MT/G system and the following systems: RCS, during steam valve test	2.6	1
<u>K2</u>			
3.4.076	Service Water System		
3.4.076.K2.01	Knowledge of bus power supplies to the following: Service	2.7	1
<u>K4</u>			
3.4.045	Main Turbine Generator System		
3.4.045.K4.47	Knowledge of MT/G system design feature(s) and/or inter-lock(s) which provide for the following: Turbine trip upon reactor trip	4.3	1

Tier **3** Group 1

<u>G1</u>			
2.1.19			
2.1.19	Conduct of Operations: Ability to use plant computer to obtain and evaluate parametric information on system or component STATUS	3	1
2.1.22			
2.1.22	Conduct of Operations: Ability to determine Mode of	3.3	1
2.1.24			
2.1.24	Conduct of Operations: Ability to obtain and interpret station electrical and mechanical drawings.	3.1	1
2.1.18			
2.1.18	Conduct of Operations: Ability to make accurate, clear and concise logs, records, status boards, and reports.	3	1
2.1.6			
2.1.6	Conduct of Operations: Ability to supervise and assume a management role during plant transients and upset	4.3	1
2.1.16			
2.1.16	Conduct of Operations: Ability to operate plant phone, paging system, and two-way radio.	2.8	1

Tier **3** Group 2

<u>G2</u>			
2.2.23			
2.2.23	Equipment Control Ability to track limiting conditions for operations.	3.8	1
2.2.3			
2.2.3	Equipment Control (multi-unit) Knowledge of the design, procedural, and operational differences between units.	3.3	1
2.2.22			
2.2.22	Equipment Control Knowledge of limiting conditions for operations and safety limits.	4.1	1
2.2.11			
2.2.11	Equipment Control Knowledge of the process for controlling temporary changes.	3.4	1

Tier **3** Group **3**G3


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2.3.2				
2.3.2	Radiation Control Knowledge of facility ALARA program.	2.9	1	
2.3.4				
2.3.4	Radiation Control Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	3.1	1	

Tier **3** Group **4**G4


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2.4.25				
2.4.25	Emergency Procedures / Plan Knowledge of fire protection procedures.	3.4	1	
2.4.39				
2.4.39	Emergency Procedures / Plan Knowledge of the RO's responsibilities in emergency plan implementation.	3.1	1	
2.4.46				
2.4.46	Emergency Procedures / Plan Ability to verify that the alarms are consistent with the plant conditions.	3.6	1	
2.4.43				
2.4.43	Emergency Procedures / Plan Knowledge of emergency communications systems and techniques.	3.5	1	
2.4.47				
2.4.47	Emergency Procedures / Plan Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	3.7	1	