

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1	051 AK2.02	Changed to AK3.01 due to low importance of initial choice, AK2.02.
1/1	055 EK3.01	Changed to EK2.07 to maintain even K&A distribution due to change in KA category in 051, Loss of Condenser Vacuum.
1/1	057 K1	Changed KA category to K3 due to lack of KA's in K1 category.
1/1	074 EK3.03	Changed to EK1.1.01 to maintain even K&A distribution due to change in KA category in 057, Loss of Vital AC Elect. Inst. Bus.
2/1	004 A3.16	Rejected since this is not applicable to ANO-1, Unit does not have emergency borate valves.
2/1	059 K5.02	Rejected since this is not applicable to ANO-1, Unit does not suffer from shrink and swell. After further consideration the entire category was rejected due to low KA's.
2/2	062 A1.01	Changed to K2.01 to maintain even K&A distribution due to change in KA category in 086, Fire Protection.
2/2	086 K2	Changed KA category to K6 due to lack of KA's in K2 category.



Facility: <u>ANO Unit 1</u>		Date of Examination: <u>8-19-02</u>
Examination Level (circle one): <u>RO</u> SRO		Operating Test Number: <u>1</u>
Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Conduct of Operations 2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation. NEW ADMIN JPM (A1JPM-RO-RCS2)
	2.1.3	Knowledge of shift turnover practices. NEW CLOSED REFERENCE QUESTION
	2.1.20	Ability to execute procedure steps. NEW OPEN REFERENCE QUESTION
A.2	Equipment Control 2.2.12	Knowledge of surveillance procedures. ADMIN JPM (A1JPM-RO-SURV2)
A.3	Radiation Control 2.3.11	Ability to control radiation releases. ADMIN JPM (A1JPM-RO-RAD1)
A.4	Emergency Procedures/Plan 2.4.43	Knowledge of emergency communications systems and techniques. NEW ADMIN JPM (A1JPM-RO-COMM2)

Facility: <u>ANO UNIT 1</u>		Date of Examination: <u>08/19/02</u>	
Exam Level (circle one) <u>RO</u> / SRO(I) / SRO(U)		Operating Test No.: <u>1</u>	
<b>B.1 Control Room Systems</b>			
	System / JPM Title	Type Code*	Safety Function
a.	ANO-1-JPM-R0-CRD03 Transfer Group 4 to Aux Power Supply	D/S/A	1
b.	ANO-1-JPM-RO-EOP10 Perform actions required to correct ICC	D/S/L	2
c.	ANO-1-JPM-R0-MFW04 Place second MFP in service	N/S/A	4 (Secondary)
d.	ANO-1-JPM-RO-AOP29 Perform actions for a loss of DHR	N/S/L	4 (Primary)
e.	ANO-1-JPM-R0-QT001 Transfer Quench Tank Contents to a CWRT	D/S	5
f.	ANO-1-JPM-RO-EOP09 Energize Bus A2 from Bus A4 during Degraded Power	D/S/A/L	6
g.	ANO-1-JPM-RO-ICW01 Shift ICW Pumps	D/S	8
<b>B.2 Facility Walk-Through</b>			
a.	ANO-1-JPM-R0-CRD04 De-energize one CRD because of High Temperature	D	1
b.	ANO-1-JPM-R0-AOP07 Remote Shutdown WCO Duties, 1203.009 Section 1D	D/R	2
c.	ANO-1-JPM-R0-ED019 Synchronize and power Y02 from Y01	D/A/L	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			

# ANO Unit One PWR RO Examination Outline

Facility: ANO, Unit One		Date of Exam: Aug. 16, 2002						Exam Level: RO					
Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1	2	2	4				3	2			3	16
	2	4	2	3				3	2			3	17
	3	0	0	0				1	1			1	3
	Tier Totals	6	4	7				7	5			7	36
2. Plant Systems	1	1	2	2	3	2	2	2	2	3	2	2	23
	2	2	1	2	2	3	2	1	2	2	1	2	20
	3	1	1	1	0	0	1	1	1	0	1	1	8
	Tier Totals	4	4	5	5	5	5	4	5	5	4	5	51
3. Generic Knowledge and Abilities					Cat 1		Cat 2		Cat 3		Cat 4		13
					5	3	3	2					

<i>Temp Total</i>	<i>Average</i>	<i>Std. Dev.</i>
16		
17		
3		
36	6.00	1.26
23		
20		
8		
51	4.64	0.50
13		
100	9.09	6.01

<b>K/A/G/ Totals</b>	10	8	12	5	5	5	11	10	5	4	25	100
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**PWR RO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group1**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1						1	2.4.11 Knowledge of abnormal condition procedures.	3.4	1
000015/17 RCP Malfunctions / 4									0
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4		1					B/W EK2.2 Knowledge of the interrelations between the (Natural Circulation Cooldown) 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.	4.0	1
000024 Emergency Boration / 1					1		AA2.01 Ability to determine and interpret the following as they apply to the Emergency Boration: Whether boron flow and/or MOVs are malfunctioning, from plant conditions.	3.8	1
000026 Loss of Component Cooling Water / 8			1				AK3.02 Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS.	3.6	1
000027 Pressurizer Pressure Control System Malfunction / 3				1			AA1.01 Ability to operate and/or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: PZR heaters, sprays, and PORV's.	4.0	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4			1				B/W EK3.3 Knowledge of the reasons for the following responses as they apply to the (Excessive Heat Transfer): Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.	4.2	1
CE/A11; W/E08 RCS Overcooling - PTS / 4							Not applicable.		0
000051 Loss of Condenser Vacuum / 4			1				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
000055 Station Blackout / 6		1					EK2.07 Knowledge of the interrelations between the Station Blackout and the following: Breakers, relays, and disconnects. *Justification for K/A <2.5 Importance: Knowledge of the link between breakers and a Station Blackout is paramount to restoration of power to the unit.	*2.2	1

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## PWR RO Examination Outline

### Emergency and Abnormal Plant Evolutions - Tier1/Group1

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points	QID
000057 Loss of Vital AC Elec. Inst. Bus / 6			1				AK 3.01 Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital ac electrical instrument bus.	4.1	1	414
000062 Loss of Nuclear Service Water / 4						1	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.	3.9	1	418
000067 Plant Fire On-site / 9						1	2.4.27 Knowledge of fire in the plant procedure.	3.0	1	14
000068 (BW/A06) Control Room Evac. / 8				1			B/W A06 AA1.1 Ability to operate and / or monitor the following as they apply to the (Shutdown Outside Control Room ): Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	4.3	1	15
000069 (W/E14) Loss of CTMT Integrity / 5				1			AA1.01 Ability to operate and / or monitor the following as they apply to the Loss of Containment Integrity: Isolation valves, dampers, and electropneumatic devices.	3.5	1	419
000074 (W/E06&E07) Inad. Core Cooling / 4	1						EK1.01 Knowledge of the operational implications of the following concepts as they apply to the Inadequate Core Cooling: Methods of calculating subcooling margin.	4.3	1	420
BW/E03 Inadequate Subcooling Margin / 4					1		B/W EA2.1 Ability to determine and interpret the following as they apply to the Inadequate Subcooling Margin): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.0	1	421
000076 High Reactor Coolant Activity / 9									0	
BW/A02&A03 Loss of NNI-X/Y / 7	1						B/W A02 AK1.3 Knowledge of the operational implications of the following concepts as they apply to the (Loss of NNI-X): Annunciators and conditions indicating signals, and remedial actions associated with the (Loss of NNI-X).	3.8	1	20
<b>K/A Category Totals:</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>Group Point Total = 16</b>		<b>16</b>	

**PWR RO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points	QID
000001 Continuous Rod Withdrawal / 1				1			AA1.02 Ability to operate and/or monitor the following as they apply to the Continuous Rod Withdrawal: Rod in-out-hold switch.	3.6	1	422
000003 Dropped Control Rod / 1									0	
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1		1					B/W E02 EK2.2 Knowledge of the interrelations between the (Vital System Status Verification) 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.	4.2	1	415
BW/A01 Plant Runback / 1									0	
BW/A04 Turbine Trip / 4		1					B/W AK2.1 Knowledge of the interrelations between the (Turbine Trip) 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	423
000008 Pressurizer Vapor Space Accident / 3	1						AK1.01 Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident: Thermodynamics and flow characteristics of open or leaking valves.	3.2	1	RO 27
000009 Small Break LOCA / 3			1				EK3.21 Knowledge of the reasons for the following responses as they apply to the small break LOCA: Actions contained in EOP for small break LOCA/leak.	4.2	1	372
000011 Large Break LOCA / 3						1	2.4.6 Knowledge symptom based EOP mitigation strategies.	3.1	1	337
W/E04 LOCA Outside Containment / 3							Not applicable.		0	
BW/E08; W/E03 LOCA Cooledown/Depress. / 4									0	
W/E11 Loss of Emergency Coolant Recirc. / 4							Not applicable.		0	
W/E01 & E02 Rediagnosis & SI Termination / 3							Not applicable.		0	
000022 Loss of Reactor Coolant Makeup / 2									0	
000025 Loss of RHR System / 4	1						AK1.01 Knowledge of the operational implications of the following concepts as they apply to a Loss of Residual Heat Removal System: Loss of RHRS during all modes of operation.	3.9	1	164
000029 Anticipated Transient w/o Scram / 1			1				EK3.12 Knowledge of the reasons for the following responses as they apply to the ATWS: Actions contained in EOP for ATWS.	4.4	1	35

**PWR RO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points	QID
000032 Loss of Source Range NI / 7			1				AK3.01 Knowledge of the reasons for the following responses as they apply to the Loss of Source Range Nuclear Instrumentation: Startup termination on source-range loss.	3.2	1	184
000033 Loss of Intermediate Range NI / 7	1						AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of Intermediate Range Nuclear Instrumentation: Effects of voltage changes on performance.	2.7	1	RO 425
000037 Steam Generator Tube Leak / 3					1		AA2.11 Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: When to isolate one or more S/Gs.	3.8	1	426
000038 Steam Generator Tube Rupture / 3						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	364
000054 (CE/E06) Loss of Main Feedwater / 4				1			AA1.04 Ability to operate and / or monitor the following as they apply to the Loss of Main Feedwater (MFW): HPI, under total feedwater loss conditions.	4.4	1	365
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4					1		B/W EA2.1 Ability to determine and interpret the following as they apply to the (Inadequate Heat Transfer): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.2	1	186
000058 Loss of DC Power / 6	1						AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: Battery charger equipment and instrumentation.	2.8	1	187
000059 Accidental Liquid RadWaste Rel. / 9				1			AA1.01 Ability to operate and / or monitor the following as they apply to the Accidental Liquid Radwaste Release: Radioactive liquid monitor.	3.5	1	167
000060 Accidental Gaseous Radwaste Rel. / 9						1	2.3.11 Ability to control radiation releases. <b>(Replaced by Plant Specific Priority in T2G3)</b>	2.7	1	424
000061 ARM System Alarms / 7									0	
W/E16 High Containment Radiation / 9							Not applicable.		0	
CE/E09 Functional Recovery							Not applicable.		0	
K/A Category Totals:	4	2	3	3	2	3	Group Point Total = 17		17	

**PWR RO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group3**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2									0
000036 (BW/A08) Fuel Handling Accident / 8									0
000056 Loss of Off-site Power / 6				1			AA1.10 Ability to operate and/or monitor the following as they apply to the Loss of Offsite Power: Auxiliary/emergency feedwater pump (motor driven).	4.3	1
000065 Loss of Instrument Air / 8					1		AA2.05 Ability to determine and interpret the following as they apply to the Loss of Instrument Air: When to commence plant shutdown if instrument air pressure is decreasing.	3.4	1
BW/E13&E14 EOP Rules and Enclosures									0
BW/A05 Emergency Diesel Actuation / 6									0
BW/A07 Flooding / 8						1	2.4.11 Knowledge of abnormal condition procedures. <b>(Replaced by Plant Specific Priority in T2G3)</b>	3.4	1
CE/A16 Excess RCS Leakage / 2							Not applicable.		0
W/E13 Steam Generator Over-pressure / 4							Not applicable.		0
W/E15 Containment Flooding / 5							Not applicable.		0
K/A Category Totals:	0	0	0	1	1	1	Group Point Total = 3		3

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## PWR RO Examination Outline

### Plant Systems - Tier 2/Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points	QID
001 Control Rod Drive		1						1				K2.06 Knowledge of bus power supplies to the following: Circuit breakers. *Justification for <2.5 Importance: Knowledge of power supplies to the CRDMs is essential in understanding the implications of malfunctions of these components upon a system that directly affects core reactivity.  A2.06 Ability to (a) predict the impacts of the following malfunction or operations on the CRDS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Effects of transient xenon on reactivity.	2.4  3.4	2	429  52
003 Reactor Coolant Pump		1					1					K2.01 Knowledge of bus power supplies to the following: RCPs.  A1.05 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCPS controls including: RCS flow.	3.1  3.4	2	2  264
004 Chemical and Volume Control			1						1			K3.05 Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: PZR LCS.  A3.11 Ability to monitor automatic operation of the CVCS, including: Charging/letdown.	3.8  3.6	2	189  191
013 Engineered Safety Features Actuation				1								K4.10 Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following: Safeguards equipment control reset.	3.3	1	430
015 Nuclear Instrumentation								1	1			A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Power supply loss or erratic operation.  A3.03 Ability to monitor automatic operation of the NIS, including: Verification of proper functioning/operability.	3.5  3.9	2	431  58
017 In-core Temperature Monitor			1									K3.01 Knowledge of the effect that a loss or malfunction of the ITM system will have on the following: Natural circulation indications.	3.5	1	194

## PWR RO Examination Outline

### Plant Systems - Tier 2/Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points	QID
022 Containment Cooling							1				1	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		RO
												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	2	433 416
025 Ice Condenser												Not applicable.		0	
056 Condensate	1					1						K1.03 Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: MFW.	2.6		
												K6.10 Knowledge of the effect of a loss or malfunction of the following will have on the Condensate System components: Pumps. *Justification for <2.5 Importance: Knowledge of the effect of malfunctions in secondary systems is important to plant safety since secondary transients may cause primary transients.	*1.6	2	RO 434 261
059 Main Feedwater				1					1			A3.07 Ability to monitor automatic operation of the MFW, including: ICS.	3.4		63
												K4.02 Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: Automatic turbine trip/reactor trip runback.	3.3	2	RO 255
061 Auxiliary/Emergency Feedwater					1							K5.01 Knowledge of the operational implications of the following concepts as they apply to the AFW: Relationship between AFW flow and RCS heat transfer.	3.6	1	435
068 Liquid Radwaste										1	1	A4.03 Ability to manually operate and/or monitor in the control room: Stoppage of release if limits exceeded. <b>(Replaced by Plant Specific Priority in T2G3)</b>	3.9		222
												2.1.32 Ability to explain and apply all system limits and precautions.	3.4	2	RO 436

## PWR RO Examination Outline

### Plant Systems - Tier 2/Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points	QID											
071 Waste Gas Disposal					1	1						K5.04 Knowledge of the operational implications of the following concepts as they apply to the Waste Gas Disposal System: Relationship of hydrogen/oxygen concentrations to flammability.	2.5		RO											
												K6.10 Knowledge of the effect of a loss or malfunction of the following will have on the Waste Gas Disposal System components: Surge and decay tanks. *Justification for <2.5 Importance: The surge and decay tanks are the primary storage components in the WGS and knowledge of their loss or malfunction is vital to the understanding of system operation.	*2.3	2	437 439											
072 Area Radiation Monitoring				1							1	K4.01 Knowledge of ARM design feature(s) and/or interlock(s) which provide for the following: Containment ventilation isolation. <b>(Replaced by Plant Specific Priority in T2G3)</b>	3.3		RO											
												A4.01 Ability to manually operate and/or monitor in the control room: Alarm and interlock setpoint checks and adjustments.	3.0	2	299 379											
K/A Category Totals:													1	2	2	3	2	2	2	2	3	2	2	Group Point Total = 23		23

**PWR RO Examination Outline**  
**Plant Systems - Tier2/Group2**

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points	QID
002 Reactor Coolant											1	2.1.28 Knowledge of the purpose and function of major system components and controls.	3.2	1	440
006 Emergency Core Cooling					1							K5.02 Knowledge of the operational implications of the following concepts as they apply to ECCS: Relationship between accumulator volume and pressure.	2.8	1	197
010 Pressurizer Pressure Control					1							K5.01 Knowledge of the operational implications of the following concepts as they apply to the PZR PCS: Determination of condition of fluid in PZR, using steam tables.	3.5	1	441
011 Pressurizer Level Control				1								K4.01 Knowledge of PZR LCS design feature(s) and/or interlock(s) which provide for the following: Operation of the PZR heater cutout at low level.	3.3	1	RO 73
012 Reactor Protection	1											K1.01 Knowledge of the physical connections and/or cause-effect relationships between the RPS and the following systems: 120V vital/instrument power system.	3.4	1	85
014 Rod Position Indication							1					A1.02 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RPIS controls including: Control rod position indication on control room panels.	3.2	1	442
016 Non-nuclear Instrumentation									1			A3.01 Ability to monitor automatic operation of the NNIS, including: Automatic selection of NNIS inputs to control systems.	2.9	1	77
026 Containment Spray				1								K4.06 Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: Iodine scavenging via the CSS.	2.8	1	RO 444
029 Containment Purge	1											K1.04 Knowledge of the physical connections and/or cause-effect relationships between the Containment Purge System and the following systems: Purge system.	3.0	1	RO 311
033 Spent Fuel Pool Cooling								1				A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal spent fuel pool water level or loss of water level.	3.1	1	200
035 Steam Generator								1				A2.05 Ability to (a) predict the impacts of the following malfunctions or operations on the S/GS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Unbalanced flows to the S/Gs.	3.2	1	443
039 Main and Reheat Steam											1	2.2.2 Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.	4.0	1	445

**PWR RO Examination Outline**  
**Plant Systems - Tier2/Group2**

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points	QID										
055 Condenser Air Removal						1						K6.02 Knowledge of the effect of a loss or malfunction of the following will have on the CARS components: Vacuum pumps. *Justification for <2.5 Importance: The knowledge of the operation of the CARS is important to the ability to maintain a secondary heat sink in the condenser.	*1.6	1	RO 446										
062 AC Electrical Distribution		1										K2.01 Knowledge of bus power supplies to the following: Major system loads.	3.3	1	140										
063 DC Electrical Distribution			1									K3.01 Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: ED/G.	3.7	1	224										
064 Emergency Diesel Generator									1			A3.04 Ability to monitor automatic operation of the ED/G system, including: Number of starts available with an air compressor.	3.1	1	447										
073 Process Radiation Monitoring					1							K5.03 Knowledge of the operational implications of the following concepts as they apply to the PRM system: Relationship between radiation intensity and exposure limits.	2.9	1	448										
075 Circulating Water			1									K3.02 Knowledge of the effect that a loss or malfunction of the circulating water system will have on the following: Main condenser. *Justification for <2.5 Importance: The knowledge of the effects of the CWS on the secondary heat sink is important to overall plant operation.	*2.1	1	RO 205										
079 Station Air										1		A4.01 Ability to manually operate and/or monitor in the control room: Cross-tie valves with IAS.	2.7	1	102										
086 Fire Protection						1						K6.04 Knowledge of the effect of a loss or malfunction of the following will have on the Fire Protection System: Fire, smoke, and heat detectors.	2.6	1	151										
K/A Category Totals:													2	1	2	2	3	2	1	2	2	1	2	Group Point Total = 20	20

**PWR RO Examination Outline**  
**Plant Systems - Tier2/Group3**

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points	QID
005 Residual Heat Removal											1	2.4.10 Knowledge of annunciator response procedures.	3.0	1	449
007 Pressurizer Relief/Quench Tank								1				A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the PRTS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Stuck open PORV or code safety.	3.9	1	208
008 Component Cooling Water														0	
027 Containment Iodine Removal												Not applicable.		0	
028 Hydrogen Recombiner and Purge Control			1									K3.01 Knowledge of the effect that a loss or malfunction of the HRPS will have on the following: Hydrogen concentration in containment.	3.3	1	210
034 Fuel Handling Equipment	1											K1.04 Knowledge of the physical connections and/or cause-effect relationships between the Fuel Handling System and the following systems: NIS.	2.6	1	RO 450
041 Steam Dump/Turbine Bypass Control						1						K6.03 Knowledge of the effect of a loss or malfunction on the following will have on the SDS: Controller and positioners, including ICS, S/G, CRDS.	2.7	1	108
045 Main Turbine Generator														0	
076 Service Water										1		A4.02 Ability to manually operate and/or monitor in the control room: SWS valves.	2.6	1	RO 46
078 Instrument Air		1										K2.01 Knowledge of bus power supplies to the following: Instrument air compressor.	2.7	1	RO 170
103 Containment							1					A3.01 Ability to monitor automatic operation of the containment system, including: Containment isolation.	3.9	1	104
														0	
<b>K/A Category Totals:</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>		<b>Group Point Total = 8</b>	<b>8</b>	

**PWR RO Examination Outline**  
**Plant Systems - Tier2/Group3**

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points	QID
005 Residual Heat Removal											1	2.4.10 Knowledge of annunciator response procedures.	3.0	1	449
007 Pressurizer Relief/Quench Tank								1				A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the PRTS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Stuck open PORV or code safety.	3.9	1	208
008 Component Cooling Water														0	
027 Containment Iodine Removal												Not applicable.		0	
028 Hydrogen Recombiner and Purge Control			1									K3.01 Knowledge of the effect that a loss or malfunction of the HRPS will have on the following: Hydrogen concentration in containment.	3.3	1	210
034 Fuel Handling Equipment	1											K1.04 Knowledge of the physical connections and/or cause-effect relationships between the Fuel Handling System and the following systems: NIS.	2.6	1	RO 450
041 Steam Dump/Turbine Bypass Control						1						K6.03 Knowledge of the effect of a loss or malfunction on the following will have on the SDS: Controller and positioners, including ICS, S/G, CRDS.	2.7	1	108
045 Main Turbine Generator														0	
076 Service Water										1		A4.02 Ability to manually operate and/or monitor in the control room: SWS valves.	2.6	1	RO 46
078 Instrument Air		1										K2.01 Knowledge of bus power supplies to the following: Instrument air compressor.	2.7	1	RO 170
103 Containment							1					A3.01 Ability to monitor automatic operation of the containment system, including: Containment isolation.	3.9	1	104
														0	
<b>K/A Category Totals:</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>		<b>Group Point Total = 8</b>	<b>8</b>	

**PWR RO Examination Outline  
Plant Systems - Tier2/Group3**

Plant-Specific Priorities			
System/Topic	Recommended Replacement for.....	Reason	Points
045 K1.12 Knowledge of the physical connections and/or cause-effect relationships between the MT/G System and the following systems: Load control system in "following mode."  KA Importance Value = 2.1	060 2.3.11 (T1G2)	This item relates to ICS and has more importance to overall plant operation at ANO than the Accidental Gaseous Radwaste Release topic. *Justification for <2.5 KA: The knowledge of the effects of the ICS on the secondary heat sink is important to overall plant operation.	1
059 K1.07 Knowledge of the physical connections and/or cause-effect relationships between the MFW and the following systems: ICS.  KA Importance Value = 3.2	B/W A07 2.4.11 (T1G3)	This item relates to ICS and has more importance to overall plant operation at ANO than the Flooding procedure topic.	1
016 K4.03 Knowledge of NNIS design feature(s) and/or interlock(s) which provide for the following: Input to control systems.  KA Importance Value = 2.8	068 A4.03 (T2G1)	This item relates to ICS and has more importance to overall plant operation at ANO than the Liquid Radwaste topic it replaces, the Liquid Radwaste topic is still tested with another KA.	1
015 K3.04 Knowledge of the effect that a loss or malfunction of the NIS will have on the following: ICS.  KA Importance Value = 3.4	072 K4.01 (T2G1)	This item relates to ICS and has more importance to overall plant operation at ANO than the Area Rad Monitor topic it replaces, the Area Rad Monitor topic is still tested with another KA.	1
Plant-Specific Priority Total: (limit 10)			4

Facility: ANO Unit One		Date of Exam: 2/11/01		Exam Level: RO		QID
Category	K/A #	Topic	Imp.	Points		
Conduct of Operations	2.1 .1	Knowledge of conduct of operations requirements.	3.7	1		244
	2.1 .11	Knowledge of less than one hour technical specification action statements for systems.	3.0	1		113
	2.1.21	Ability to obtain and verify controlled procedure copy.	3.1	1	RO	389
	2.1.29	Knowledge of how to conduct and verify valve lineups.	3.4	1	RO	245
	2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	3.4	1		161
	2.1.					
	Total				5	
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	RO	232
	2.2.13	Knowledge of tagging and clearance procedures.	3.6	1		247
	2.2.12	Knowledge of surveillance procedures.	3.0	1	RO	233
	2.2.					
	2.2.					
	2.2.					
	Total				3	
Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	2.6	1		121
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5	1		122
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	1		234
	2.3.					
	2.3.					
	2.3.					
	Total				3	
Emergency Procedures / Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps.	4.3	1	RO	126
	2.4.35	Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications.	3.3	1	RO	451
	2.4.					
	2.4.					
	2.4.					
	2.4.					
	Total				2	
Tier 3 Point Total (RO)					13	





Facility: <u>ANO Unit 1</u>		Date of Examination: <u>08/19/02</u>
Examination Level (circle one): RO / <u>(SRO)</u>		Operating Test Number: <u>1</u>
Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Conduct of Operations 2.1.4	Knowledge of shift staffing requirements.  NEW ADMIN JPM (A1JPM-SRO-QUAL1)
	Conduct of Operations 2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.  ADMIN JPM (A1JPM-SRO-PROC1)
A.2	Equipment Control 2.2.17	Knowledge of the process for managing maintenance activities during power operations.  NEW ADMIN JPM (A1JPM-SRO-MNTC1)
A.3	Radiation Control	2.3.1 Knowledge of 10CFR 20 and related facility radiation control requirements.  OPEN REFERENCE QUESTION
		2.3.2 Knowledge of facility ALARA program.  OPEN REFERENCE QUESTION
A.4	Emergency Procedures/Plan 2.4.38	Ability to take actions called for in the emergency plan, including (if required) supporting or acting as emergency coordinator.  NEW ADMIN JPM (A1JPM-SRO-EAL7)

Facility: <u>ANO UNIT 1</u>		Date of Examination: <u>08/19/02</u>
Exam Level (circle one): RO / SRO(I) / <u>SRO(U)</u>		Operating Test No.: <u>1</u>
B.1 Control Room Systems		
	System / JPM Title	Type Code*      Safety Function
a.	ANO-1-JPM-R0-CRD03 Transfer Group 4 to Aux Power Supply	D/S/A      1
b.	ANO-1-JPM-RO-AOP29 Perform actions for a loss of DHR	N/S/L      4 (Primary)
c.	ANO-1-JPM-R0-MFW04 Place second MFP in service	N/S/A      4 (Secondary)
B.2 Facility Walk-Through		
a.	ANO-1-JPM-R0-AOP07 Remote Shutdown WCO Duties, 1203.009 Section 1D	D/R      2
b.	ANO-1-JPM-R0-ED019 Synchronize and power Y02 from Y01	D/A/L      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		

# ANO Unit One PWR SRO Examination Outline

Facility: ANO, Unit One		Date of Exam: Aug. 16, 2002						Exam Level: SRO					
Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1	3	3	6				4	3			5	24
	2	3	2	3				3	3			2	16
	3	0	1	0				1	0			1	3
	Tier Totals	6	6	9				8	6			8	43
2. Plant Systems	1	1	2	2	1	1	1	2	3	3	2	1	19
	2	1	1	2	1	3	1	0	2	3	1	2	17
	3	0	0	0	0	0	1	0	2	0	0	1	4
	Tier Totals	2	3	4	2	4	3	2	7	6	3	4	40
3. Generic Knowledge and Abilities					Cat 1		Cat 2		Cat 3		Cat 4		
					6	4	3	4			17		

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5	24
4	16
1	3
2	19
2	17
1	4
10	17

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K/A/G/ Totals	8	9	13	2	4	3	10	13	6	3	29
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100      25  
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Total

**PWR SRO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group1**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1				1			AA1.02 Ability to operate and/or monitor the following as they apply to the Continuous Rod Withdrawal: Rod in-out-hold switch.	3.4	1
000003 Dropped Control Rod / 1						1	2.1.12 Ability to apply Technical Specifications for a system.	3.6	1
000005 Inoperable/Stuck Control Rod / 1						1	2.4.11 Knowledge of abnormal condition procedures.	3.6	1
000011 Large Break LOCA / 3						1	2.4.6 Knowledge symptom based EOP mitigation strategies.	4.0	1
W/E04 LOCA Outside Containment / 3							Not applicable.		0
W/E02 & E02 Rediagnosis & SI Termination / 3							Not applicable.		0
000015/17 RCP Malfunctions / 4		1					AK2.08 Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: CCWS.	2.6	1
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4	1	1					B/W EK1.2 Knowledge of the operational implications of the following concepts as they apply to the (Natural Circulation Cooldown): Normal, abnormal and emergency operating procedures associated with (Natural Circulation Cooldown).  B/W EK2.2 Knowledge of the interrelations between the (Natural Circulation Cooldown) 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.	4.0 4.0	2
000024 Emergency Boration / 1					1		AA2.01 Ability to determine and interpret the following as they apply to the Emergency Boration: Whether boron flow and/or MOVs are malfunctioning, from plant conditions.	4.1	1
000026 Loss of Component Cooling Water / 8			1				AK3.02 Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS.	3.9	1
000029 Anticipated Transient w/o Scram / 1			1				EK3.12 Knowledge of the reasons for the following responses as they apply to the ATWS: Actions contained in EOP for ATWS.	4.7	1

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**PWR SRO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group1**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4			1				B/W EK3.3 Knowledge of the reasons for the following responses as they apply to the (Excessive Heat Transfer): Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.	3.8	1
CE/A11; W/E08 RCS Overcooling - PTS / 4							Not applicable.		0
000051 Loss of Condenser Vacuum / 4			1				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
000055 Station Blackout / 6		1					EK2.07 Knowledge of the interrelations between the Station Blackout and the following: Breakers, relays, and disconnects. *Justification for K/A <2.5 Importance: Knowledge of the link between breakers and a Station Blackout is paramount to restoration of power to the unit.	*2.4	1
000057 Loss of Vital AC Elec. Inst. Bus / 6			1				AK 3.01 Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital ac electrical instrument bus.	4.4	1
000059 Accidental Liquid RadWaste Rel. / 9				1			AA1.01 Ability to operate and / or monitor the following as they apply to the Accidental Liquid Radwaste Release: Radioactive-liquid monitor.	3.5	1
000062 Loss of Nuclear Service Water / 4						1	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.0	1
000067 Plant Fire On-site / 9						1	2.4.27 Knowledge of fire in the plant procedure.	3.5	1
000068 (BW/A06) Control Room Evac. / 8				1			B/W A06 AA1.1 Ability to operate and / or monitor the following as they apply to the (Shutdown Outside Control Room ): Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	4.2	1

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**PWR SRO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group1**

<b>E/APE # / Name / Safety Function</b>	<b>K1</b>	<b>K2</b>	<b>K3</b>	<b>A1</b>	<b>A2</b>	<b>G</b>	<b>K/A Topic(s)</b>	<b>Imp.</b>	<b>Points</b>
000069 (W/E14) Loss of CTMT Integrity / 5				1			AA1.01 Ability to operate and / or monitor the following as they apply to the Loss of Containment Integrity: Isolation valves, dampers, and electropneumatic devices.	3.7	1
000074 (W/E06&E07) Inad. Core Cooling / 4	1						EK1.01 Knowledge of the operational implications of the following concepts as they apply to the Inadequate Core Cooling: Methods of calculating subcooling margin.	4.7	1
BW/E03 Inadequate Subcooling Margin / 4			1		1		B/W EK3.1 Knowledge of the reasons for the following responses as they apply to the (Inadequate Subcooling Margin): 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.  B/W EA2.1 Ability to determine and interpret the following as they apply to the Inadequate Subcooling Margin): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.8  4.0	2
000076 High Reactor Coolant Activity / 9					1		AA2.02 Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: Corrective actions required for high fission product activity in RCS.	3.4	1
BW/A02&A03 Loss of NNI-X/Y / 7	1						B/W A02 AK1.3 Knowledge of the operational implications of the following concepts as they apply to the (Loss of NNI-X): Annunciators and conditions indicating signals, and remedial actions associated with the (Loss of NNI-X).	3.8	1
<b>K/A Category Totals:</b>	<b>3</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>5</b>	<b>Group Point Total = 24</b>		<b>24</b>

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**PWR SRO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points			
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1		1					B/W E02 EK2.2 Knowledge of the interrelations between the (Vital System Status Verification) 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.	4.2	1			
BW/A01 Plant Runback / 1			1				AK3.2 Knowledge of the reasons for the following responses as they apply to the (Plant Runback): Normal, abnormal and emergency operating procedures associated with (Plant Runback).	3.6	1	SRO	62	
BW/A04 Turbine Trip / 4		1					B/W AK2.1 Knowledge of the interrelations between the (Turbine Trip) 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			
000008 Pressurizer Vapor Space Accident / 3									0			
000009 Small Break LOCA / 3			1				EK3.21 Knowledge of the reasons for the following responses as they apply to the small break LOCA: Actions contained in EOP for small break LOCA/leak.	4.5	1			
BW/E08; W/E03 LOCA Cooldown - Depress. / 4	1						EK1.2 Knowledge of the operational implications of the following concepts as they apply to the (LOCA Cooldown): Normal, abnormal and emergency operating procedures associated with (LOCA Cooldown).	3.8	1	SRO	182	
W/E11 Loss of Emergency Coolant Recirc. / 4							Not applicable.		0			
000022 Loss of Reactor Coolant Makeup / 2				1			AA1.01 Ability to operate and / or monitor the following as they apply to the Loss of Reactor Coolant Pump Makeup: CVCS letdown and charging.	3.3	1	SRO	32	
000025 Loss of RHR System / 4	1						AK1.01 Knowledge of the operational implications of the following concepts as they apply to a Loss of Residual Heat Removal System: Loss of RHRS during all modes of operation.	4.3	1			
000027 Pressurizer Pressure Control System Malfunction / 3				1			AA1.01 Ability to operate and/or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: PZR heaters, sprays, and PORV's.	3.9	1			

**PWR SRO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group2**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000032 Loss of Source Range NI / 7			1				AK3.01 Knowledge of the reasons for the following responses as they apply to the Loss of Source Range Nuclear Instrumentation: Startup termination on source-range loss.	3.6	1
000033 Loss of Intermediate Range NI / 7									0
000037 Steam Generator Tube Leak / 3					1		AA2.11 Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: When to isolate one or more S/Gs.	3.8	1
000038 Steam Generator Tube Rupture / 3						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.	3.8	1
000054 (CE/E06) Loss of Main Feedwater / 4				1			AA1.04 Ability to operate and / or monitor the following as they apply to the Loss of Main Feedwater (MFW): HPI, under total feedwater loss conditions.	4.5	1
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4					1		B/W EA2.1 Ability to determine and interpret the following as they apply to the (Inadequate Heat Transfer): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.4	1
000058 Loss of DC Power / 6	1						AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: Battery charger equipment and instrumentation.	3.1	1
000060 Accidental Gaseous Radwaste Rel. / 9						1	2.3.11 Ability to control radiation releases. <b>(Replaced by Plant Specific Priority in T2G3)</b>	3.2	1
000061 ARM System Alarms / 7					1		AA2.05 Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Need for area evacuation; check against existing limits.	4.2	1
W/E16 High Containment Radiation / 9							Not applicable.		0
000065 Loss of Instrument Air / 8									0
CE/E09 Functional Recovery							Not applicable.		0
<b>K/A Category Totals:</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>		<b>Group Point Total = 16</b>	<b>16</b>

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**PWR SRO Examination Outline**  
**Emergency and Abnormal Plant Evolutions - Tier1/Group3**

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2									0
000036 (BW/A08) Fuel Handling Accident / 8		1					B/W AK2.1 Knowledge of the interrelations between the (Refueling Canal Level Decrease) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.8	1
000056 Loss of Off-site Power / 6				1			AA1.10 Ability to operate and/or monitor the following as they apply to the Loss of Offsite Power: Auxiliary/emergency feedwater pump (motor driven).	4.3	1
BW/E13&E14 EOP Rules and Enclosures									0
BW/A05 Emergency Diesel Actuation / 6									0
BW/A07 Flooding / 8						1	2.4.11 Knowledge of abnormal condition procedures. <b>(Replaced by Plant Specific Priority in T2G3)</b>	3.6	1
CE/A16 Excess RCS Leakage / 2							Not applicable.		0
W/E13 Steam Generator Over-pressure / 4							Not applicable.		0
W/E15 Containment Flooding / 5							Not applicable.		0
K/A Category Totals:	0	1	0	1	0	1		Group Point Total = 3	3

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**PWR SRO Examination Outline**  
**Plant Systems - Tier2/Group1**

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points
001 Control Rod Drive		1						1				K2.06 Knowledge of bus power supplies to the following: Circuit breakers.  A2.06 Ability to (a) predict the impacts of the following malfunction or operations on the CRDS- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Effects of transient xenon on reactivity.	2.8 3.7	2
003 Reactor Coolant Pump		1					1					K2.01 Knowledge of bus power supplies to the following: RCPs.  A1.05 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCPS controls including: RCS flow.	3.1 3.5	2
004 Chemical and Volume Control			1						1			K3.05 Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: PZR LCS.  A3.02 Ability to monitor automatic operation of the CVCS, including: Letdown isolation.	4.2 3.6	2
013 Engineered Safety Features Actuation				1								K4.10 Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following: Safeguards equipment control reset.	3.7	1
014 Rod Position Indication							1					A1.02 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RPIS controls including: Control rod position indication on control room panels.	3.6	1
015 Nuclear Instrumentation								1	1			A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Power supply loss or erratic operation.  A3.03 Ability to monitor automatic operation of the NIS, including: Verification of proper functioning/operability.	3.9 3.9	2
017 In-core Temperature Monitor														0

QID

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**PWR SRO Examination Outline**  
**Plant Systems - Tier2/Group1**

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points
022 Containment Cooling											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.	3.8	1
025 Ice Condenser												Not applicable.		0
026 Containment Spray								1				A2.04 Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure of spray pump.	4.2	1
056 Condensate	1											K1.03 Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: MFW.	2.6	1
059 Main Feedwater									1			A3.07 Ability to monitor automatic operation of the MFW, including: ICS.	3.5	1
061 Auxiliary/Emergency Feedwater					1							K5.01 Knowledge of the operational implications of the following concepts as they apply to the AFW: Relationship between AFW flow and RCS heat transfer.	3.9	1
063 DC Electrical Distribution			1									K3.01 Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: ED/G.	4.1	1
068 Liquid Radwaste										1		A4.03 Ability to manually operate and/or monitor in the control room: Stoppage of release if limits exceeded. <b>(Replaced by Plant Specific Priority in T2G3)</b>	3.8	1
071 Waste Gas Disposal						1						K6.10 Knowledge of the effect of a loss or malfunction of the following will have on the Waste Gas Disposal System components: Surge and decay tanks.	2.5	1
072 Area Radiation Monitoring										1		A4.01 Ability to manually operate and/or monitor in the control room: Alarm and interlock setpoint checks and adjustments.	3.3	1
<b>K/A Category Totals:</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>		<b>Group Point Total = 19</b>	<b>19</b>

QID

SRO

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## PWR SRO Examination Outline

### Plant Systems - Tier2/Group2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points
002 Reactor Coolant											1	2.1.28 Knowledge of the purpose and function of major system components and controls.	3.3	1
006 Emergency Core Cooling					1							K5.02 Knowledge of the operational implications of the following concepts as they apply to ECCS: Relationship between accumulator volume and pressure.	2.9	1
010 Pressurizer Pressure Control					1							K5.01 Knowledge of the operational implications of the following concepts as they apply to the PZR PCS: Determination of condition of fluid in PZR, using steam tables.	4.0	1
011 Pressurizer Level Control				1								K4.03 Knowledge of PZR LCS design feature(s) and/or interlock(s) which provide for the following: Density compensation of PZR level.	2.9	1
012 Reactor Protection	1											K1.01 Knowledge of the physical connections and/or cause-effect relationships between the RPS and the following systems: 120V vital/instrument power system.	3.1	1
016 Non-nuclear Instrumentation									1			A3.01 Ability to monitor automatic operation of the NNIS, including: Automatic selection of NNIS inputs to control systems.	2.9	1
027 Containment Iodine Removal												Not applicable.		0
028 Hydrogen Recombiner and Purge Control			1									K3.01 Knowledge of the effect that a loss or malfunction of the HRPS will have on the following: Hydrogen concentration in containment.	4.0	1
029 Containment Purge														0
033 Spent Fuel Pool Cooling								1				A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal spent fuel pool water level or loss of water level.	3.5	1
034 Fuel Handling Equipment			1									K4.03 Knowledge of design feature(s) and/or interlock(s) which provide for the following: Overload protection.	3.3	1

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## PWR SRO Examination Outline

### Plant Systems - Tier2/Group2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points
035 Steam Generator								1				A2.05 Ability to (a) predict the impacts of the following malfunctions or operations on the S/GS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Unbalanced flows to the S/Gs.	3.4	1
039 Main and Reheat Steam											1	2.2.2 Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.	3.5	1
055 Condenser Air Removal														0
062 AC Electrical Distribution		1										K2.01 Knowledge of bus power supplies to the following: Major system loads.	3.4	1
064 Emergency Diesel Generator									1			A3.04 Ability to monitor automatic operation of the ED/G system, including: Number of starts available with an air compressor.	3.5	1
073 Process Radiation Monitoring					1							K5.03 Knowledge of the operational implications of the following concepts as they apply to the PRM system: Relationship between radiation intensity and exposure limits.	3.1	1
075 Circulating Water														0
079 Station Air										1		A4.01 Ability to manually operate and/or monitor in the control room: Cross-tie valves with IAS.	2.7	1
086 Fire Protection						1						K6.04 Knowledge of the effect of a loss or malfunction of the following will have on the Fire Protection System: Fire, smoke, and heat detectors.	2.9	1
103 Containment									1			A3.01 Ability to monitor automatic operation of the containment system, including: Containment isolation.	4.2	1
<b>K/A Category Totals:</b>	1	1	2	1	3	1	0	2	3	1	2	<b>Group Point Total = 17</b>		17

QID

## PWR SRO Examination Outline

### Plant Systems - Tier2/Group3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic	Imp.	Points
005 Residual Heat Removal											1	2.4.10 Knowledge of annunciator response procedures.	3.1	1
007 Pressurizer Relief/Quench Tank								1				A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the PRTS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Stuck open PORV or code safety.	4.2	1
008 Component Cooling Water								1				A2.04 Ability to (a) predict the impacts of the following malfunction 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.	3.2	1
041 Steam Dump/Turbine Bypass Control						1						K6.03 Knowledge of the effect of a loss or malfunction on the following will have on the SDS: Controller and positioners, including ICS, S/G, CRDS.	2.9	1
045 Main Turbine Generator														0
076 Service Water														0
078 Instrument Air														0
K/A Category Totals:	0	0	0	0	0	1	0	2	0	0	1	Group Point Total = 4		4
<b>Plant-Specific Priorities</b>														
System/Topic	Recommended Replacement for.....					Reason					Points			
045 K1.12 Knowledge of the physical connections and/or cause-effect relationships between the MT/G System and the following systems: Load control system in "following mode." KA Importance Value = 2.1	060 2.3.11 (T1G2)					This item relates to ICS and has more importance to overall plant operation at ANO than the Accidental Gaseous Radwaste Release topic. *Justification for <2.5 KA: The knowledge of the effects of the ICS on the secondary heat sink is important to overall plant operation.					1			
059 K1.07 Knowledge of the physical connections and/or cause-effect relationships between the MFW and the following systems: ICS. KA Importance Value = 3.2	B/W A07 2.4.11 (T1G3)					This item relates to ICS and has more importance to overall plant operation at ANO than the Flooding procedure topic.					1			

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SRO

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4 SRO only  
4

**PWR SRO Examination Outline**

**Plant Systems - Tier2/Group3**

<p>016 K4.03 Knowledge of NNIS design feature(s) and/or interlock(s) which provide for the following: Input to control systems.</p> <p>KA Importance Value = 2.9</p>	<p>068 A4.03 (T2G1)</p>	<p>This item relates to ICS and has more importance to overall plant operation at ANO than the Liquid Radwaste topic it replaces, the Liquid Radwaste topic is still tested with another KA.</p>	<p align="right">1</p>
<p>Plant-Specific Priority Total: (limit 10)</p>			<p align="right">3</p>

Based on NUREG 1021 Rev. 8 Form ES-401-5

Facility: ANO, Unit One		Date of Exam: 8/16/02		Exam Level: SRO	
Category	K/A #	Topic	Imp.	Points	
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements.	3.8	1	
	2.1.4	Knowledge of shift staffing requirements.	3.4	1	SRO 407
	2.1.11	Knowledge of less than one hour technical specification action statements for systems.	3.8	1	
	2.1.12	Ability to apply technical specifications for a system.	4.0	1	SRO 457
	2.1.22	Ability to determine Mode of Operation.	3.3	1	SRO 458
	2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4.0	1	
	Total			6	
Equipment Control	2.2.6	Knowledge of the process for making changes in procedures as described in the safety analysis report.	3.3	1	SRO 459
	2.2.11	Knowledge of the process for controlling temporary changes.	3.4	1	SRO 117
	2.2.13	Knowledge of tagging and clearance procedures.	3.8	1	
	2.2.29	Knowledge of SRO fuel handling responsibilities.	3.8	1	SRO 354
	2.2.				
	Total			4	
Radiation Control	2.3.1	Knowledge of 10 CFR: 20 and related facility radiation control requirements.	3.0	1	
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	3.1	1	
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	3.3	1	
	2.3.				
	2.3.				
	Total			3	
Emergency Procedures/ Plan	2.4.16	Knowledge of EOP implementation hierarchy and coordination with other support procedures.	4.0	1	SRO 331
	2.4.30	Knowledge of which events related to system operations/status should be reported to outside agencies.	3.6	1	SRO 411
	2.4.33	Knowledge of the process used to track inoperable alarms.	2.8	1	SRO 460
	2.4.41	Knowledge of the emergency action level thresholds and classifications.	4.1	1	SRO 129
	2.4.				
	Total			4	
<b>Tier 3 Point Total (SRO)</b>				<b>17</b>	

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Facility: ANO-1	Scenario No.: 1	Op-Test No.: 2002-1	Page of
Examiners:		Operators:	
<p><b>Initial Conditions:</b></p> <ul style="list-style-type: none"> <li>• ~70% Power from 40% power after repair to "A" Main Feedwater Pump</li> <li>• # 1 EDG is out of service for online maintenance. Day 1 of an expected 2 day outage.</li> <li>• 2 control rods are stuck and will not insert when/if the reactor trips.</li> <li>• ICS runbacks are disabled due to a design discrepancy in the STAR module.</li> </ul>			
<p><b>Turnover:</b></p> <ul style="list-style-type: none"> <li>• Power escalation to 100%. ~70% Power from 40% power after repair to "A" Main Feedwater Pump.</li> <li>• # 1 EDG is out of service for online maintenance. Day 1 of an expected 2 day outage.</li> <li>• Severe thunderstorm warnings for Pope, Johnson, and Yell counties for next 2 hours.</li> </ul>			
Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N	Place the Heater Drain Pumps (P8A & P8B) in service
2	IMF MS131 .06 R1:00	C	Main Steam leak inside the containment building. (OTSG Operating Range Level tap)
3	N/A	R	Power escalation to 100% at ~30%/Hr.
4	IMF TR568 100 R3:00	I	"A" OTSG Operating Range Level Transmitter fails High.
5	IMF FW074	C (R)	"A" Main Feedwater Pump trips
6	ICM CV1008_a .10 IOR -DO HS1008_R FALSE	C	Pressurizer Spray valve fails to seat and leaks by.
7	MMF MS131 .2	M	Main Steam Line rupture inside containment.
8	IMF RD369 IMF RD377	C	2 control rods stick in the fully withdrawn position and will not drop into the core.

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

Facility: ANO-1		Scenario No.: 2		Op-Test No.: 2002-1		Page of	
Examiners:				Operators:			
Initial Conditions:							
<ul style="list-style-type: none"> <li>100% power, equilibrium xenon.</li> <li>#1 EDG is out of service for online maintenance. Day 1 of an expected 2 day outage.</li> </ul>							
Turnover:							
<ul style="list-style-type: none"> <li>100% power, equilibrium xenon.</li> <li>#1 EDG is out of service for online maintenance. Day 1 of an expected 2 day outage.</li> <li>Severe thunderstorm warnings for Pope, Johnson, and Yell counties for next 2 hours.</li> </ul>							
Event No.	Malf. No.	Event Type*	Event Description				
1	IMF NI240	I	Nuclear Instrumentation (NI5) drifts high				
2	N/A	N	Chemistry reports that routine RCS sampling backup sample reveals 55 ppmb difference between RCS and pressurizer boron concentrations. Equalize boron.				
3	IOR -AI TIC4026_S 1	C	ACW control valve for turbine lube oil coolers fails closed due to input failure				
4	CAE file caemable	R	The Mablevale substation experiences storm damage causing the breakers in the switchyard supplying that line to open. The dispatcher requests an emergency power reduction to ~600 MWe to maintain system integrity.				
5	IOR -DI ICC0009_L FALSE	C	The ULD toggle switch will not lower demand.				
6	IMF ED183 IMF DG176 IOR -DI CSI-DG2_S	M C	Loss of offsite power occurs. Reactor trip. #2 EDG fails to autostart and the pushbutton on C10 fails to start the EDG. STATION BLACKOUT				
7	IMF FW611	C	EFIC/EFW fill rate control failure.				

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

Facility: ANO-1	Scenario No.: 3	Op-Test No.: 2002-1	
Page of			
Examiners:		Operators:	
<p><b>Initial Conditions:</b></p> <ul style="list-style-type: none"> <li>• 100% power, equilibrium xenon.</li> <li>• #1 EDG is out of service for online maintenance. Day 1 of an expected 2 day outage.</li> <li>• RPS is failed and will not automatically actuate when setpoint is reached.</li> <li>• The Reactor Trip pushbutton on C03 will not work when depressed</li> </ul>			
<p><b>Turnover:</b></p> <ul style="list-style-type: none"> <li>• ~97% power from power escalation. Holding for performance of NI calibration adjustment to align NIs with Heat Balance power. Then continue to ~100% power operations.</li> <li>• #1 EDG is out of service for online maintenance. Day 1 of an expected 2 day outage.</li> </ul>			
Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N	Place ICS in "MANUAL" for performance of NI calibration. Then return ICS to "AUTO" when calibration completed.
2	IMF TR051 0 R3:00 D0	I	Selected Pressurizer Level transmitter fails low.
3	IMF CV018	C	"D" RCP first stage seal failure
4	N/A	R	Power reduction to secure "D" RCP
5	IMF RX599	C	"B" main feed pump fails to respond to ICS demand signal
6	IMF CV022 IMF CV026 IMF RC005 .	M	"D" RCP 2 <sup>nd</sup> stage seal failure "D" RCP 3 <sup>rd</sup> stage seal failure LOCA into the Containment Building
7	IMF CV095	C	ES HPI pump trips on high bearing temperature requiring HPI to be supplied from the operating Makeup Pump. (P36B or C)

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

Facility: ANO-1		Scenario No.: 4		Op-Test No.: 2002-1		Page of	
Examiners:				Operators:			
Initial Conditions:							
<ul style="list-style-type: none"> <li>100% power, equilibrium xenon.</li> <li>#1 EDG is out of service for online maintenance. Day 2 of an expected 2 day outage.</li> <li>RPS is failed and will not actuate automatically when setpoint is reached.</li> </ul>							
Turnover:							
<ul style="list-style-type: none"> <li>100% power, equilibrium xenon.</li> <li>#1 EDG is out of service for online maintenance. Day 2 of an expected 2 day outage.</li> <li>#1 EDG is running at ~2750 Kw for operability test following maintenance on the governor.</li> </ul>							
Event No.	Malf. No.	Event Type*	Event Description				
1	IMF TR556	I	"B" main feed flow transmitter drifts low slowly				
2	IOR -DI CS3-DG1_W02 TRUE	N C	Secure the #1 EDG as per the surveillance test for completion of the operability test. As load is reduced by the operator, the governor fails and continues to reduce load without a command.				
3	IMF MC088 3000 R4:00	C R	Main Condenser vacuum leak				
4	IMF RC002 .5 R20:00	M R	Tube rupture in the "B" OTSG				
5	RMF EDB0125 FALSE	C	Switchyard breaker B0125 (feed for SU #1 transformer) opens rendering SU#1 transformer unavailable.				
6	IMF TC245	C	Main Turbine trips >43% power. Requires manual Reactor trip.				
7	IOR -DI 152-111/CS_T TRUE	C	SU#2 feeder breaker to A1 bus trips on Rx. Trip. Loss of A1 and A3 buses				

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