

Facility: Millstone Unit 2 (MP2)														Date of Exam: October 2014			
Tier	Group	RO K/A Category Points												SRO-Only Points			
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total	
1. Emergency & Abnormal Plant Evolutions	1	2	3	3	N/A			5	2	N/A		3	18				
	2	2	2	2				1	1			1	9				4
	Tier Totals	4	5	5				6	3			4	27				10
2. Plant Systems	1	2	3	5	3	2	1	3	3	3	1	2	28				
	2	1	1	0	3	1	2	0	1	0	1	0	10				3
	Tier Totals	3	4	5	6	3	3	3	4	3	2	2	38				8
3. Generic Knowledge and Abilities Categories					1		2		3		4		10				
					2		3		2		3						7

## Note:

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

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1				X			<b>EA1.2 Ability to operate and / or monitor the following as they apply to the (Reactor Trip Recovery):</b> Operating behavior characteristics of the facility.	3.3	1
000008 Pressurizer Vapor Space Accident / 3			X				<b>AK3.01 Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident:</b> Why PZR level may come back on scale if RCS is saturated.	3.7	2
000009 Small Break LOCA / 3	X						<b>EK1.01 Knowledge of the operational implications of the following concepts as they apply to the small break LOCA:</b> Natural circulation and cooling, including reflux boiling	4.2	3
000011 Large Break LOCA / 3						X	<b>2.4.9 Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.</b>	3.8	4
000015/17 RCP Malfunctions / 4					X		<b>AA2.01 Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow):</b> Cause of RCP failure	3.0	5
000022 Loss of Rx Coolant Makeup / 2			X				<b>AK3.02 Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup:</b> Actions contained in SOPs and EOPs for RCPs, loss of makeup, loss of charging, and abnormal charging	3.5	6
000025 Loss of RHR System / 4		X					<b>AK2.05 Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following:</b> Reactor building sump	2.6	7
000026 Loss of Component Cooling Water / 8	-	-	-	-	-	-	Randomly Deselected	-	-
000027 Pressurizer Pressure Control System Malfunction / 3	-	-	-	-	-	-	Randomly Deselected	-	-
000029 ATWS / 1						X	<b>2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.</b>	4.3	8
000038 Steam Gen. Tube Rupture / 3						X	<b>2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.</b>	4.4	9

000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4		X					<b>EK2.2 Knowledge of the interrelations between the (Excess Steam Demand) and the following:</b> 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	3.7	10
000054 (CE/E06) Loss of Main Feedwater / 4				X			<b>EA1.3 Ability to operate and / or monitor the following as they apply to the (Loss of Feedwater):</b> Desired operating results during abnormal and emergency situations	3.2	11
000055 Station Blackout / 6				X			<b>EA1.04 Ability to operate and monitor the following as they apply to a Station Blackout:</b> Reduction of loads on the battery	3.5	12
000056 Loss of Off-site Power / 6	X						<b>AK1.04 Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power:</b> Definition of saturation conditions, implication for the systems	3.1	13
000057 Loss of Vital AC Inst. Bus / 6				X			<b>AA1.02 Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus:</b> Manual control of PZR level	3.8	14
000058 Loss of DC Power / 6				X			<b>AA1.03 Ability to operate and / or monitor the following as they apply to the Loss of DC Power:</b> Vital and battery bus components	3.1	15
000062 Loss of Nuclear Svc Water / 4					X		<b>AA2.06 Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water:</b> The length of time after the loss of SWS flow to a component before that component may be damaged	2.8	16
000065 Loss of Instrument Air / 8			X				<b>AK3.03 Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air:</b> Knowing effects on plant operation of isolating certain equipment from instrument air	2.9	17
W/E04 LOCA Outside Containment / 3	-	-	-	-	-	-	Removed for CE Plant	-	-
W/E11 Loss of Emergency Coolant Recirc. / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
000077 Generator Voltage and Electric Grid Disturbances / 6		X					<b>AK2.02 Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following:</b> Breakers, relays	3.1	18
K/A Category Totals:	2	3	3	5	2	3	Group Point Total:	18/6	

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRQ)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1						X	<b>2.4.46 Ability to verify that the alarms are consistent with the plant conditions.</b>	4.2	19
<del>000003 Dropped Control Rod / 1</del>	-	-	-	-	-	-	Randomly Deselected	-	-
000005 Inoperable/Stuck Control Rod / 1	X						<b>AK1.01 Knowledge of the operational implications of the following concepts as they apply to Inoperable / Stuck Control Rod: Axial power imbalance</b>	3.1	20
<del>000024 Emergency Boration / 1</del>	-	-	-	-	-	-	Randomly Deselected	-	-
<del>000028 Pressurizer Level Malfunction / 2</del>	-	-	-	-	-	-	Randomly Deselected	-	-
000032 Loss of Source Range NI / 7			X				<b>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</b>	3.2	21
<del>000033 Loss of Intermediate Range NI / 7</del>	-	-	-	-	-	-	Randomly Deselected	-	-
000036 (BW/A08) Fuel Handling Accident / 8			X				<b>AK3.03 Knowledge of the reasons for the following responses as they apply to the Fuel Handling Incidents: Guidance contained in EOP for fuel handling incident</b>	3.7	22
<del>000037 Steam Generator Tube Leak / 3</del>	-	-	-	-	-	-	Randomly Deselected	-	-
000051 Loss of Condenser Vacuum / 4	X						<b>AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of Condenser Vacuum: Relationship of condenser vacuum to circulating water, flow rate, and temperature</b>	2.4 (LER 2010 003, IR 20100 05, IR 20110 02)	23
<del>000059 Accidental Liquid RadWaste Rel. / 9</del>	-	-	-	-	-	-	Randomly Deselected	-	-
<del>000060 Accidental Gaseous Radwaste Rel. / 9</del>	-	-	-	-	-	-	Randomly Deselected	-	-
000061 ARM System Alarms / 7				X			<b>AA1.01 Ability to operate and / or monitor the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Automatic actuation</b>	3.6	24
<del>000067 Plant Fire On-site / 8</del>	-	-	-	-	-	-	Randomly Deselected	-	-
<del>000068 (BW/A06) Control Room Evac. / 8</del>	-	-	-	-	-	-	Randomly Deselected	-	-

000069 (W/E14) Loss of CTMT Integrity / 5					X		<b>AA2.02 Ability to determine and interpret the following as they apply to the Loss of Containment Integrity:</b> Verification of automatic and manual means of restoring integrity	3.9	25
000074 (W/E06&E07) Inad. Core Cooling / 4		X					<b>EK2.05 Knowledge of the interrelations between the and the following Inadequate Core Cooling:</b> LPI pumps	3.9	26
000076 High Reactor Coolant Activity / 9	-	-	-	-	-	-	Randomly Deselected	-	-
W/E01 & E02 Rediagnosis & SI Termination / 3	-	-	-	-	-	-	Removed for CE Plant	-	-
W/E13 Steam Generator Over-pressure / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
W/E15 Containment Flooding / 5	-	-	-	-	-	-	Removed for CE Plant	-	-
W/E16 High Containment Radiation / 9	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/A01 Plant Runback / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/A02&A03 Loss of NNI-X/Y / 7	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/A04 Turbine Trip / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/A05 Emergency Diesel Actuation / 6	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/A07 Flooding / 8	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/E03 Inadequate Subcooling Margin / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/E08; W/E03 LOCA Cutdown—Depress. / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4		X					<b>AK2.1 Knowledge of the interrelations between the (Natural Circulation Operations) and the following:</b> Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.0	27
BW/E13&E14 EOP Rules and Enclosures	-	-	-	-	-	-	Removed for CE Plant	-	-
CE/A11; W/E08 RCS Overcooling—PTS / 4	-	-	-	-	-	-	Randomly Deselected	-	-
CE/A16 Excess RCS Leakage / 2	-	-	-	-	-	-	Randomly Deselected	-	-
CE/E09 Functional Recovery	-	-	-	-	-	-	Randomly Deselected	-	-
K/A Category Point Totals:	2	2	2	1	1	1	Group Point Total:	9/4	

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)											Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
003 Reactor Coolant Pump (RCPS)		X										<b>K2.02 Knowledge of bus power supplies to the following: CCW pumps</b>	2.5	28
003 Reactor Coolant Pump (RCPS)									X			<b>A3.05 Ability to monitor automatic operation of the RCPS, including: RCP lube oil and bearing lift pumps</b>	2.7	29
004 Chemical and Volume Control (CVCS)								X				<b>A2.22 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: Mismatch of letdown and charging flows.</b>	3.2	30
005 Residual Heat Removal (RHRS)			X									<b>K3.07 Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: Refueling operations</b>	3.2	31
006 Emergency Core Cooling (ECCS)							X					<b>A1.15 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: RWST level and temperature</b>	3.3	32
007 Pressurizer Relief/Quench Tank (PRTS)					X							<b>K5.02 Knowledge of the operational implications of the following concepts as the apply to PRTS: Method of forming a steam bubble in the PZR</b>	3.1	33
008 Component Cooling Water (CCWS)			X									<b>K3.01 Knowledge of the effect that a loss or malfunction of the CCWS will have on the following: Loads cooled by CCWS</b>	3.4	34
010 Pressurizer Pressure Control (PZR PCS)						X						<b>K6.03 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: PZR sprays and heaters</b>	3.2	35

012 Reactor Protection (RPS)									X						<b>A2.07 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of dc control power</b>	3.2	36
013 Engineered Safety Features Actuation (ESFAS)				X											<b>K4.03 Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following: Main Steam Isolation System</b>	3.9	37
013 Engineered Safety Features Actuation (ESFAS)				X											<b>K4.07 Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following: Power Supply Loss</b>	3.7	38
022 Containment Cooling (CCS)	X														<b>K1.01 Knowledge of the physical connections and/or cause effect relationships between the CCS and the following systems: SWS/cooling system</b>	3.5	39
022 Containment Cooling (CCS)								X							<b>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</b>	3.6	40
025 Ice Condenser	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MP2 does not have system	-	-
026 Containment Spray (CSS)				X											<b>K4.05 Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: Prevention of material from clogging nozzles during recirculation</b>	2.8	41
039 Main and Reheat Steam (MRSS)	X														<b>K1.01 Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: S/G</b>	3.1	42
059 Main Feedwater (MFW)														X	<b>2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.</b>	4.2	43
061 Auxiliary/Emergency Feedwater (AFW)									X						<b>A3.03 Ability to monitor automatic operation of the AFW, including: AFW S/G level control on automatic start</b>	3.9	44

062 AC Electrical Distribution											X		<b>A4.03 Ability to manually operate and/or monitor in the control room:</b> Synchroscope, including an understanding of running and incoming voltages	2.8	45
063 DC Electrical Distribution		X											<b>K2.01 Knowledge of bus power supplies to the following:</b> Major DC loads	2.9	46
064 Emergency Diesel Generator (ED/G)										X			<b>A2.13 Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:</b> Consequences of opening auxiliary feeder bus (ED/G sub supply)	2.6	47
064 Emergency Diesel Generator (ED/G)			X										<b>K3.03 Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following:</b> ED/G (manual loads)	3.6	48
073 Process Radiation Monitoring (PRM)								X					<b>A1.01 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRM system controls including:</b> Radiation levels	3.2	49
073 Process Radiation Monitoring (PRM)					X								<b>K5.01 Knowledge of the operational implications as they apply to concepts as they apply to the PRM system:</b> Radiation theory, including sources, types, units, and effects	2.5	50
076 Service Water (SWS)		X											<b>K2.01 Knowledge of bus power supplies to the following:</b> Service water	2.7	51
076 Service Water (SWS)												X	<b>2.2.22 Knowledge of limiting conditions for operations and safety limits.</b>	4.0	52
078 Instrument Air (IAS)			X										<b>K3.01 Knowledge of the effect that a loss or malfunction of the IAS will have on the following:</b> Containment air system	3.1	53
078 Instrument Air (IAS)			X										<b>K3.02 Knowledge of the effect that a loss or malfunction of the IAS will have on the following:</b> Systems having pneumatic valves and controls	3.4	54
103 Containment											X		<b>A3.01 Ability to monitor automatic operation of the containment system, including:</b> Containment isolation	3.9	55
K/A Category Point Totals:	2	3	5	3	2	1	3	3	3	1	2		Group Point Total:		28/5





ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRQ)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#	
001 Control Rod Drive	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-	
002 Reactor Coolant	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-	
011 Pressurizer Level Control (PZR LCS)						X						<b>K6.03 Knowledge of the effect of a loss or malfunction on the following will have on the PZR LCS:</b> Relationship between PZR level and PZR heater control circuit.	2.9	56	
014 Rod Position Indication	-	-	-	X	-	-	-	-	-	-	-	K4.06 Knowledge of RPS design features and/or interlocks which provide for the following: individual and group misalignment.	3.4	59	
015 Nuclear Instrumentation (NIS)						X						<b>K6.04 Knowledge of the effect of a loss or malfunction on the following will have on the NIS:</b> Bistables and logic circuits.	3.1	57	
016 Non-nuclear Instrumentation	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-	
017 In-core Temperature Monitor	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-	
027 Containment Iodine Removal (CIRS)					X							<b>K5.01 Knowledge of the operational implications of the following concepts as they apply to the CIRS:</b> Purpose of charcoal filters	3.1	58	
028 Hydrogen Recombiner and Purge Control	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-	
029 Containment Purge (CPS)												<b>Rejected</b>			
033 Spent Fuel Pool Cooling (SFPCS)				X								<b>K4.01 Knowledge of design feature(s) and/or interlock(s) which provide for the following:</b> Maintenance of spent fuel level	2.9	60	
034 Fuel Handling Equipment	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-	
035 Steam Generator	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-	
041 Steam Dump System (SDS) and Turbine Bypass Control								X				<b>A2.02 Ability to (a) predict the impacts of the following malfunctions or operations on the SDS; and (b) based on those predictions or mitigate the consequences of those malfunctions or operations:</b> Steam valve stuck open	3.6	61	
045 Main Turbine Generator (MT/G)				X								<b>K4.11 Knowledge of MT/G system design feature(s) and/or interlock(s) which provide for the following:</b> T/G reactor trip	3.6	62	

055 Condenser Air Removal (CARS)	X																	<b>K1.06 Knowledge of the physical connections and/or cause effect relationships between the CARS and the following systems: PRM system</b>	2.6	63
056 Condensate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
068 Liquid Radwaste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
071 Waste Gas Disposal (WGDS)															X			<b>A4.26 Ability to manually operate and/or monitor in the control room:</b> Authorized waste gas release, conducted in compliance with radioactive gas discharge permit	3.1	64
072 Area Radiation Monitoring	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
075 Circulating Water		X																<b>K2.03 Knowledge of bus power supplies to the following:</b> Emergency/essential SWS pumps	2.6	65
079 Station Air	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
086 Fire Protection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
K/A Category Point Totals:	1	1	0	3	1	2	0	1	0	1	0							Group Point Total:		10/3

Facility:		Millstone Unit 2	Date of Exam:		October 2014	
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	66		
	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management.	4.3	67		
	Subtotal			2		
2. Equipment Control	2.2.6	Knowledge of the process for making changes to procedures.	3.0	68		
	2.2.13	Knowledge of tagging and clearance procedures.	4.1	69		
	2.2.22	Knowledge of limiting conditions for operations and safety limits.	4.0	70		
	Subtotal			3		
3. Radiation Control	2.3.12	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.2	71		
	2.3. 14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	72		
	Subtotal			2		
4. Emergency Procedures / Plan	2.4.4	Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5	73		
	2.4.46	Ability to verify that the alarms are consistent with the plant conditions.	4.2	74		
	2.4.18	Knowledge of the specific bases for EOPs.	3.3	75		
	Subtotal			3		
Tier 3 Point Total				10		7

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		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1												18	3	3	6		
	2					N/A				N/A			9	2	2	4		
	Tier Totals												27	5	5	10		
2. Plant Systems	1												28	3	2	5		
	2												10	K4 1	2	0	3	
	Tier Totals												38	5	2	8		
3. Generic Knowledge and Abilities Categories													10	1	2	3	4	7
														2	2	1	2	

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

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

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

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

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

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

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

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

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1	-	-	-	-	-	-	Randomly Deselected	-	-
000008 Pressurizer Vapor Space Accident / 3	-	-	-	-	-	-	Randomly Deselected	-	-
000009 Small Break LOCA / 3					X		<b>EA2.02 Ability to determine or interpret the following as they apply to a small break LOCA: Possible leak paths</b>	3.8	76
000011 Large Break LOCA / 3	-	-	-	-	-	X	<b>2.4.6 Knowledge of EOP Mitigation Strategies</b>	4.7	78
000015/17 RCP Malfunctions / 4					X		<b>AA2.10 Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): When to secure RCPs on loss of cooling or seal injection</b>	3.7	77
000022 Loss of Rx Coolant Makeup / 2	-	-	-	-	-	-	Randomly Deselected	-	-
000025 Loss of RHR System / 4	-	-	-	-	-	-	Randomly Deselected	-	-
000026 Loss of Component Cooling Water / 8						X	<b>2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.</b>	4.4	79
000027 Pressurizer Pressure Control System Malfunction / 3	-	-	-	-	-	-	Randomly Deselected	-	-
000029 ATWS / 1	-	-	-	-	-	-	Randomly Deselected	-	-
000038 Steam Gen. Tube Rupture / 3	-	-	-	-	-	-	Randomly Deselected	-	-
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4	-	-	-	-	-	-	Randomly Deselected	-	-
000054 (CE/E06) Loss of Main Feedwater / 4	-	-	-	-	-	-	Randomly Deselected	-	-
000055 Station Blackout / 6					X		<b>EA2.06 Ability to determine or interpret the following as they apply to a Station Blackout: Faults and lockouts that must be cleared prior to re-energizing buses</b>	4.1	80
000056 Loss of Off-site Power / 6	-	-	-	-	-	-	Randomly Deselected	-	-
000057 Loss of Vital AC Inst. Bus / 6	-	-	-	-	-	-	Randomly Deselected	-	-
000058 Loss of DC Power / 6						X	<b>2.4.30 Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.</b>	4.1	81
000062 Loss of Nuclear Svc Water / 4	-	-	-	-	-	-	Randomly Deselected	-	-
000065 Loss of Instrument Air / 8	-	-	-	-	-	-	Randomly Deselected	-	-

W/E04 LOCA Outside Containment / 3	-	-	-	-	-	-	Removed for CE Plant	-	-
W/E11 Loss of Emergency Coolant Recirc. / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
000077 Generator Voltage and Electric Grid Disturbances / 6	-	-	-	-	-	-	Randomly Deselected	-	-
K/A Category Totals:	0	0	0	0	3	3	Group Point Total:	18/6	

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 4	-	-	-	-	-	-	Randomly Deselected	-	-
000003 Dropped Control Rod / 1	-	-	-	-	-	-	Randomly Deselected	-	-
000005 Inoperable/Stuck Control Rod / 1	-	-	-	-	-	-	Randomly Deselected	-	-
000024 Emergency Boration / 1	-	-	-	-	-	-	Randomly Deselected	-	-
000028 Pressurizer Level Malfunction / 2	-	-	-	-	-	-	Randomly Deselected	-	-
000032 Loss of Source Range NI / 7	-	-	-	-	-	-	Randomly Deselected	-	-
000033 Loss of Intermediate Range NI / 7	-	-	-	-	-	-	Randomly Deselected	-	-
000036 (BW/A08) Fuel Handling Accident / 8	-	-	-	-	-	-	Randomly Deselected	-	-
000037 Steam Generator Tube Leak / 3						X	<b>AA2.12 Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak:</b> Flow rate of leak	4.1	82
000051 Loss of Condenser Vacuum / 4	-	-	-	-	-	-	Randomly Deselected	-	-
000059 Accidental Liquid RadWaste Rel. / 9						X	<b>2.2.38 Knowledge of conditions and limitations in the facility license.</b>	3.6	83
000060 Accidental Gaseous Radwaste Rel. / 9	-	-	-	-	-	-	Randomly Deselected	-	-
000061 ARM System Alarms / 7	-	-	-	-	-	-	Randomly Deselected	-	-
000067 Plant Fire On-site / 8						X	<b>2.2.37 Ability to determine operability and/or availability of safety related equipment.</b>	4.6	84
000068 (BW/A06) Control Room Evac. / 8	-	-	-	-	-	-	Randomly Deselected	-	-
000069 (W/E14) Loss of CTMT Integrity / 5						X	<b>AA2.02 Ability to determine and interpret the following as they apply to the Loss of Containment Integrity:</b> Verification of automatic and manual means of restoring integrity K/A rejected due to overlap with RO exam.	4.4	84
000074 (W/E06&E07) Inad. Core Cooling / 4	-	-	-	-	-	-	Randomly Deselected	-	-
000076 High Reactor Coolant Activity / 9	-	-	-	-	-	-	Randomly Deselected	-	-
W/E01 & E02 Rediagnosis & SI Termination / 3	-	-	-	-	-	-	Removed for CE Plant	-	-
W/E13 Steam Generator Over-pressure / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
W/E15 Containment Flooding / 5	-	-	-	-	-	-	Removed for CE Plant	-	-
W/E16 High Containment Radiation / 9	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/A01 Plant Runback / 1	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/A02&A03 Loss of NNI-X/Y / 7	-	-	-	-	-	-	Removed for CE Plant	-	-



BW/A04 Turbine Trip / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/A05 Emergency Diesel Actuation / 6	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/A07 Flooding / 8	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/E03 Inadequate Subcooling Margin / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/E08; W/E03 LOCA Cooldown—Depress. / 4	-	-	-	-	-	-	Removed for CE Plant	-	-
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4	-	-	-	-	-	-	Randomly Deselected	-	-
BW/E13&E14 EOP Rules and Enclosures	-	-	-	-	-	-	Removed for CE Plant	-	-
CE/A11; W/E08 RCS Overcooling—PTS / 4	-	-	-	-	-	-	Randomly Deselected	-	-
CE/A16 Excess RCS Leakage / 2	-	-	-	-	-	-	Randomly Deselected	-	-
CE/E09 Functional Recovery						X	<b>EA2.1 Ability to determine and interpret the following as they apply to the (Functional Recovery):</b> Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	4.4	85
K/A Category Point Totals:	0	0	0	0	2	2	Group Point Total:	9/4	

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)										Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
003 Reactor Coolant Pump (RCPS)								X				A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Problems with RCP seals, especially rates of seal leak-off	3.9	86
004 Chemical and Volume Control (CVCS)								X				A2.15 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 or low PZR level	3.7	87
005 Residual Heat Removal (RHRS)	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
006 Emergency Core Cooling (ECCS)	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
007 Pressurizer Relief/Quench Tank (PRTS)	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
008 Component Cooling Water (CCWS)	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
010 Pressurizer Pressure Control (PZR PCS)	-	-	-	-	-	-	-	-	-	-	-	2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	4.2	89
012 Reactor Protection (RPS)	-	-	-	-	-	-	-	X	-	-	-	A2.02 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of instrument power K/A rejected due to overlap with RO exam.	3.9	88
013 Engineered Safety Features Actuation (ESFAS)	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
022 Containment Cooling (CCS)												Questioned rejected due to oversampling CCS.		

025 Ice Condenser	-	-	-	-	-	-	-	-	-	-	-	-	MP2 does not have system	-	-
026 Containment Spray (CSS)									X				<b>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:</b> Failure of automatic recirculation transfer	4.2	88
039 Main and Reheat Steam (MRSS)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
059 Main Feedwater (MFW)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
061 Auxiliary/Emergency Feedwater (AFW)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
062 AC Electrical Distribution												X	<b>2.2.40 Ability to apply Technical Specifications for a System.</b>	4.7	90
063 DC Electrical Distribution	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
064 Emergency Diesel Generator (ED/G)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
073 Process Radiation Monitoring (PRM)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
076 Service Water (SWS)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
078 Instrument Air (IAS)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
103 Containment	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
K/A Category Point Totals:	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:			28/5

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)											Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
001 Control Rod Drive	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
002 Reactor Coolant	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
011 Pressurizer Level Control (PZR-LCS)	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
014 Rod Position Indication	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
015 Nuclear Instrumentation (NIS)								X				<b>A2.05 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: Core void formation</b>	3.8	91
016 Non-nuclear Instrumentation	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
017 In-core Temperature Monitor	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
027 Containment Iodine Removal (CIRS)	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
028 Hydrogen Recombiner and Purge Control	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
029 Containment Purge (CPS)	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
033 Spent Fuel Pool Cooling (SFPCS)								X				<b>A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the SFPCS; 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</b>	3.5	92
034 Fuel Handling Equipment	-	-	X	-	-	-	-	-	-	-	-	<b>K3.01 Knowledge of the effect that a loss or malfunction of the Fuel Handling System will have on the following: Containment ventilation</b> K/A rejected due to overlap with RO exam.	2.9	93
034 Fuel Handling Equipment				X								<b>K4.02 Knowledge of design feature(s) and/or interlock(s) which provide for the following: Fuel movement</b>	3.3	93
035 Steam Generator	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
041 Steam Dump System (SDS) and Turbine Bypass Control	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-

045 Main Turbine Generator (MT/G)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
055 Condenser Air Removal (CARS)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
056 Condensate	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
068 Liquid Radwaste	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
071 Waste Gas Disposal (WGDS)	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
072 Area Radiation Monitoring	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
075 Circulating Water	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
079 Station Air	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
086 Fire Protection	-	-	-	-	-	-	-	-	-	-	-	-	Randomly Deselected	-	-
K/A Category Point Totals:	0	0	0	1	0	0	0	2	0	0	0	0	Group Point Total:	10/3	

Facility: Millstone Unit 2			Date of Exam:		October 2014	
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.			3.9	94
	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation.			4.4	95
	Subtotal					2
2. Equipment Control	2.2.1	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.			4.4	96
	2.2.37	Ability to determine operability and/or availability of safety related equipment.			4.6	97
	Subtotal					2
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.			3.7	98
	2.3.-	Randomly Deselected			-	-
	Subtotal					1
4. Emergency Procedures / Plan	2.4.22	Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.			4.4	99
	2.4.37	Knowledge of the lines of authority during implementation of the emergency plan.			4.1	100
	Subtotal					2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
SRO1/2 (Q#83)	069 AA2.02	K/A was also randomly selected on the RO exam. Reselected E/APE 000059 AA 2.03 Accidental Liquid Radwaste Release.
SRO 2/1 (Q#88)	012 A2.02	A similar K/A was randomly selected on the RO exam: RPS A2.07, Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of dc control power (RO Q#36) K/A would test similar concepts. Reselected Plant System 026 Containment Spray, A2.04
SRO 2/2 (Q#93)	034 K3.01	K/A tests similar concept, automatic purge isolation that appears on RO written exam in question #59 for the Fuel Handling Equipment System. Re-selected K4.02.
RO 3 (Q#73)	G2.4.6	Could not write a good RO question to 2.4.6 EOP mitigation strategies. Randomly selected 2.4.4 entry level conditions for EOP and abnormal procedures.
RO 3 (Q#74)	G2.4.13	Could not write a good RO question to 2.4.13 Knowledge of crew responsibilities. Randomly selected 2.4.46 Ability to verify that the alarms are consistent with the plant conditions.
SRO 1/2 (Q#84)	2.2.37	Could not write a discriminating SRO question for entry conditions for KA 2.4.4 AOPs, EOPs for Plant Fire system. Randomly selected 2.2.37.
RO 2/1 (Q#38)	013 K4.16	Could not find write a discriminating question for ESFAS "to avoid PTS". Randomly selected K4.07, Power supply loss.
RO 2/2 (Q#57)	015 A4.01	Could not find write a discriminating question for NIS "Selection of controlling channel." Randomly selected K6.04, Bistables and logic circuit.
RO 3 (Q#66)	G2.1.13	This K/A is performed by Security personnel at Millstone and not relevant for Reactor Operators. Randomly selected G 2.1.23.
RO 1/1 (Q#8)	029 G2.1.25	Could not write an ATWS question that was discriminating using the ability to interpret reference material. Randomly selected 2.1.23.
RO 1/1 (Q#9)	038 G2.1.31	Could not write a SGTR question that was discriminating using the ability to locate control room switches. Randomly selected 2.1.7.
RO 2/1 (Q#32)	006 A1.14	Could not write a discriminating question for monitoring controls for reactor level. Randomly selected A1.15.

Tier / Group	Randomly Selected K/A	Reason for Rejection
SRO 1/1 (Q#78)	011 G2.2.39	Knowledge of less than one hour TS is RO knowledge. Could not write a SRO only question. Re-selected 2.4.6.
SRO 2/1 (Q#90)	062 G2.2.42	Knowledge of entry level TS conditions is RO knowledge. Could not write a SRO only question. Re-selected 2.2.40.
RO 2/1 (Q#30)	004 A1.11	Could not write question to 004 A1.11. Re-selected 004 A2.22 Predict impact of mismatch of charging / letdown and mitigate.
RO 2/2 (Q#62)	045 K5.18	Could not find write a discriminating question for MT/G K5.18. Reselected 045 K4.11.
RO 3 (Q#70)	G2.2.35	Could not find write a discriminating question for G2.2.35. Reselected G2.2.22.
SRO (Q95)	G2.1.23	Could not find write a discriminating SRO question for G2.1.29. Reselected G2.1.23.
SRO (Q89)	System 022	Rejected question based on oversampling system. Reselected System 010 Pressurizer Pressure control.
RO Q 59	System 022	Rejected question based on oversampling system. Reselected System 014 Rod Position Indications.
SRO 83	AA2.03	KA changed due to could not write sro level question to ka. Selected generic.2.2.38 which was more appropriate for ODCM question.



Facility: Millstone Unit 2 Examination Level: <b>RO</b>		Date of Examination: October 2014 Operating Test Number: NRC
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations (RO-ADMIN-1)	R, M	2.1.20 Ability to execute procedure steps. (4.3) JPM: Calculate Time to Boil. <b>Modify</b> JPM-A2-R
Conduct of Operations (RO-ADMIN-2)	R, D	K/A System 001, A4.10: Determination of an ECP (3.9)  JPM: Manually calculate ECP use JPM 216 or create NEW JPM where RO reviews flawed ECP calculation. Determine impact (K/A 001 A2.12 Erroneous ECP calculation (4.1)).
Equipment Control (RO-ADMIN-3)	R, N	2.2.12 Knowledge of surveillance procedures (3.0)  JPM: Perform monthly borated water sources verification surveillance, SP 2601A. Document on SP 2601A-009.
Radiation Control (RO-ADMIN-4)	R, M	2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions. (3.5)  JPM: <b>Modify</b> JPM 238 or A3R or make a new one: Determine protective clothing and limits associated with performance of a task in the RCA
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank ( $\leq 3$ for ROs; $\leq 4$ for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		

Facility: Millstone Unit 2 Examination Level: <b>SRO</b>		Date of Examination: October 2014 Operating Test Number: NRC
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations SRO-ADMIN-1	R, D	K/A System 001, A4.10: Determination of an ECP (3.9)  JPM: Manually calculate ECP use JPM 216 or create NEW JPM where SRO reviews flawed ECP calculation. Determine impact (K/A 001 A2.12 Erroneous ECP calculation (4.1)).
Conduct of Operations SRO-ADMIN-2	R, D	2.1.36 Knowledge of procedures and limitations involved in core alterations. (4.1)  JPM: At the completion of this JPM, the examinee will have identified a loss of CTMT closure, entered appropriate TSAS and directed actions to suspend all operations involving movement of irradiated fuel assemblies in the containment (JPM A-08-02)
Equipment Control SRO-ADMIN-3	R,N	2.2.40 Ability to apply Technical Specifications for a system. (4.7)  JPM: Determine Technical Specification applicability and actions. (New- build around Aux Feed Water equipment).
Radiation Control SRO-ADMIN-4	R, P- 2009, M	2.3.6 Ability to approve release permits. (3.8)  JPM: Review and approve Liquid Radwaste Discharge Permit – <b>Modify</b> JPM.
Emergency Procedures/Plan SRO-ADMIN-5	R, M	2.4.41 Knowledge of the emergency action level thresholds and classifications. (4.6)  JPM: Classify event, Determine PAR, complete Incident Response Form (S/G Tube Leak, Gen Emergency, <b>Modify</b> JPM-182).
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank ( $\leq 3$ for ROs; $\leq 4$ for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		

Facility: Millstone Unit 2		Date of Examination: October 2014	
Exam Level: RO      SRO-I      SRO-U		Operating Test No.: NRC	
Control Room Systems <sup>@</sup> (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
JPM #	System / JPM Title	Type Code*	Safety Function
S-1	CRDS / Dropped CEA Recovery - Alt Path (JPM-208)	M, S, A	1
S-2	ESFAS / Reset Inadvertent SIAS - Alt Path	N, S, EN, A	2
S-3	PCS / PORV Switch Failure On OTCC (JPM 118)	D, S, A	3
S-4	RCS / Start RCP on Heatup – Alt Path (JPM 163).	D, S, L, A	4(P)
S-5	CCS / Shift CAR Units – Alt Path (JPM-160)	D, S, A	5
S-6	AC Distribution / Tie 480 Volt Busses (JPM-053)	D, S, L	6
S-7	PRMS / Adjust SJAЕ Rad Mon Setpoints (JPM-120)	D, S	7
S-8	SFPC / Restore SFP Clg Following LOCA – Alt Path	N, A, S, L	8
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
P-1	Appendix R Actions in Fire Area R-1	N, E RCA	6
P-2	MRSS / Local Operation of ADV (JPM-93)	D, E	4(S)
P-3	CVCS / Local Boration IAW AOP 2551	N, E, RCA	1
<p><sup>@</sup> All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>			
* Type Codes	Actual	Criteria for RO / SRO-I / SRO-U	
(A)lternate path	6/6/3	4-6 / 4-6 / 2-3	
(C)ontrol room			
(D)irect from bank	6/5/1	$\leq 9 / \leq 8 / \leq 4$	
(E)mergency or abnormal in-plant	3/3/2	$\geq 1 / \geq 1 / \geq 1$	
(EN)gineered safety feature	1/1/1	- / - / $\geq 1$ (control room system)	
(L)ow-Power / Shutdown	3/2/1	$\geq 1 / \geq 1 / \geq 1$	
(N)ew or (M)odified from bank include 1(A)	5/5/4	$\geq 2 / \geq 2 / \geq 1$	
(P)revious 2 exams	0/0/0	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	
(R)CA	2/2/1	$\geq 1 / \geq 1 / \geq 1$	
(S)imulator			

Facility: Millstone Unit 2		Date of Examination: October 2014	
Exam Level: RO <b>SRO-I</b> SRO-U		Operating Test No.: NRC	
Control Room Systems <sup>@</sup> (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
JPM #	System / JPM Title	Type Code*	Safety Function
S-1	CRDS / Dropped CEA Recovery - Alt Path (JPM-208)	M, S, A	1
S-2	ESFAS / Reset Inadvertent SIAS - Alt Path	N, S, EN, A	2
S-3	PCS / PORV Switch Failure On OTCC (JPM 118)	D, S, A	3
S-4	RCS / Start RCP on Heatup – Alt Path (JPM 163).	D, S, L, A	4(P)
S-5	CCS / Shift CAR Units – Alt Path (JPM-160)	D, S, A	5
S-7	PRMS / Adjust SJAE Rad Mon Setpoints (JPM-120)	D, S	7
S-8	SFPC / Restore SFP Clg Following LOCA – Alt Path	N, A, S, L	8
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
P-1	Appendix R Actions in Fire Area R-1	N, E RCA	6
P-2	MRSS / Local Operation of ADV (JPM-93)	D, E	4(S)
P-3	CVCS / Local Boration IAW AOP 2551	N, E, RCA	1
<p><sup>@</sup> All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>			
* Type Codes	Actual	Criteria for RO / SRO-I / SRO-U	
(A)lternate path	6/6/3	4-6 / 4-6 / 2-3	
(C)ontrol room			
(D)irect from bank	6/5/1	$\leq 9 / \leq 8 / \leq 4$	
(E)mergency or abnormal in-plant	3/3/2	$\geq 1 / \geq 1 / \geq 1$	
(EN)gineered safety feature	1/1/1	- / - / $\geq 1$ (control room system)	
(L)ow-Power / Shutdown	3/2/1	$\geq 1 / \geq 1 / \geq 1$	
(N)ew or (M)odified from bank include 1(A)	5/5/4	$\geq 2 / \geq 2 / \geq 1$	
(P)revious 2 exams	0/0/0	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	
(R)CA	2/2/1	$\geq 1 / \geq 1 / \geq 1$	
(S)imulator			

- S-1: The examinee will perform a CEA recovery following a dropped CEA. During CEA movement, the *CEDS TROUBLE* alarm comes in during CEA movement. This is modified alternate path JPM from the bank. (K/A: 000-003-AA1.02, IR 3.6/3.4)
  
- S-2: The examinee will perform a reset of Safety Injection Actuation Signal (SIAS) following an Inadvertent ESFAS Actuation using AOP 2571 Inadvertent ESFAS Actuation. This is a new JPM under the Engineered Safety Features Actuation System – Reactor Coolant System Inventory Control Safety Function. (K/A 013.A4.02, IR 4.3 / 4.4)
  
- S-3: Examinee performs opening of the PORVs by the contingency action of EOP 2540D, Success Path HR-3. This is an alternate path JPM directly from the bank. Based on JPM 118 (K/A 010 A4.03, IR 4.0/3.8)
  
- S-4: The examinee will start the fourth RCP, monitor critical RCP parameters including alarms and secure the RCP per OP 2301C and/or ARP 2590B-083, "RCP A Upper Oil Reservoir Oil Level Lo". This JPM is performed at shutdown conditions and is an alternate path JPM directly from the bank. Consider modifying type of alarm that comes in requiring RCP trip. (K/A 003 A2.02, IR 3.7/3.9)
  
- S-5: At the completion of this JPM, the examinee has successfully stopped and restarted an OPERABLE CAR Fan. This JPM is an alternate path. (K/A 022 A4.01, IR 3.6/3.6)
  
- S-6: The examiner will cross-tie 480 volt busses The examinee will cross-tie 480 volt busses (22A and 22B, with 22B supplying bus 22A) per OP 2344A, 480 Volt Load Centers, in preparation for tagging and replacement of Bus 22A Transformer. This is a shutdown JPM directly from the bank. (K/A 062-A4.01, IR 3.3/3.1)
  
- S-7: The examinee will change the setpoint of the SJAЕ Radmonitor (RM5099) a Chemistry approved SP2833-007 "SJAЕ Radmonitor MR 5099 & PPC Alarm Setpoint Change Request and OP2383C "Radiation Monitor Alarm Setpoint Control" Section 4.1. This JPM is directly from the bank. (K/A 071 A4.25, IR 3.2/3.2)
  
- S-8: The examinee will restore Spent Fuel Pool Cooling approximately 4 hours following a LOCA in accordance with step 55 of EOP 2532 LOCA and using EOP 2541, Appendix 42. This is a new Plant Systems JPM. It is performed at shutdown conditions and includes an alternate path with failure of pump to start. (K/A 033 A2.02, IR 2.7/3.0)
  
- P-1: The examinee will transfer control from the Control Room to the Fire Shutdown Panel, C-10 and secure the A Diesel Generator using AOP 2579A, Fire Procedure for Hot Standby Appendix R Fire Area R-1 due to a fire and evacuation of the Control Room. This is a new JPM that requires access into the RCA. (K/A APE-068-AA1.21, IR 3.9/4.1)
  
- P-2: The examinee will take local manual control of the "A" Atmospheric Dump Valve and open the valve to 25% using EOP 2541 Appendix 36 during loss of Instrument Air and Reactor trip. This JPM is directly from the bank. (K/A 039-A2.04, IR 3.4/3.7)
  
- P-3: The examinee will commence a manual boration to the RCS during a shutdown from outside the control room event (not due to fire). The examinee will perform steps in AOP 2551, Shutdown from Outside the Control Room. This is a new JPM in the RCA. (K/A 004-A2.14, IR 3.8/3.9))

Facility: Millstone Unit 2		Date of Examination: October 2014	
Exam Level: RO    SRO-I <b>SRO-U</b>		Operating Test No.: NRC	
Control Room Systems <sup>@</sup> (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
JPM #	System / JPM Title	Type Code*	Safety Function
S-1	CRDS / Dropped CEA Recovery - Alt Path (JPM-208)	M, S, A	1
S-2	ESFAS / Reset Inadvertent SIAS - Alt Path	N, S, EN, A	2
S-8	SFPC / Restore SFP Clg Following LOCA – Alt Path	N, A, S, L	8
In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
P-1	Appendix R Actions in Fire Area R-1	N, E RCA	6
P-2	MRSS / Local Operation of ADV (JPM-93)	D, E	4(S)
<p><sup>@</sup> All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>			
* Type Codes	Actual	Criteria for RO / SRO-I / SRO-U	
(A)lternate path	6/6/3	4-6 / 4-6 / 2-3	
(C)ontrol room			
(D)irect from bank	6/5/1	≤ 9 / ≤ 8 / ≤ 4	
(E)mergency or abnormal in-plant	3/3/2	≥ 1 / ≥ 1 / ≥ 1	
(EN)gineered safety feature	1/1/1	- / - / ≥ 1 (control room system)	
(L)ow-Power / Shutdown	3/2/1	≥ 1 / ≥ 1 / ≥ 1	
(N)ew or (M)odified from bank include 1(A)	5/5/4	≥ 2 / ≥ 2 / ≥ 1	
(P)revious 2 exams	0/0/0	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	
(R)CA	2/2/1	≥ 1 / ≥ 1 / ≥ 1	
(S)imulator			

Facility: Millstone Unit 2	Scenario No.: 3	Op-Test No.: NRC 2014
Examiners: _____	Operators: _____	SRO
_____	_____	ATC
_____	_____	BOP

Initial Conditions: 100% Power IC, BOL, Equilibrium Xenon, 1105 ppm Boron, SGBD @40gpm per Steam Generator, 24E aligned to 24C, Channel C Wide Range Containment Pressure safety instrument is OOS.

Turnover: 100% power, equilibrium Xenon, 1105 ppm Boron, blend ratio: 4.32:1.0, SGBD @ 40gpm per Steam Generator, 24E is aligned to 24C. Channel C Wide Range Containment Pressure (PI 8115) instrument is OOS. Entered TSAS 2 for 3.4.3.4 RPS Instrumentation and 3.4.3.4 ESAS Instrumentation 2 hours ago Prerequisites met for SP2606D 2-CS-4.1B Stroke and Timing IST. Perform IST at the start of this shift. High winds reported on Long Island Sound for the entire day.

**Critical Tasks:**

1. Manually Shutdown the reactor. The reactor must be manually tripped using the CEDM output breakers immediately (within 1 minute) when an automatic reactor trip fails and/or the manual push buttons do NOT work. (CT-1/SPTA-5)
2. Emergency borate following ATWS. Emergency Borate the RCS following Reactor Trip following the failure of more than one full-length CEA to insert on a reactor trip prior to exiting EOP 2525 Standard Post Trip Actions.
3. Initiate a plant cooldown. A plant cooldown at a rate of greater than 40°F/hr should be initiated within one hour, following an unisolable LOCA, until the condenser steam dump valves or ADVs are full open. (CT-3/LOCA-3)

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	Override for valve indication in Control Room.	N (ATC, BOP) TS (SRO)	Perform Surveillance Procedure SP-2606D to stroke test Containment Spray Valve CS-4.1B. Stroke time is out of specification (overriding one of the position lights on for a few additional seconds to make it look like the valve took longer to stroke).
2 (10 min)	RX01B RX02B Override proportional heater indication	I (ATC, SRO) TS (SRO)	Pressurizer Spray Valve Controller Failure, HIC-100F fails causing Spray Valve 100F to open 25%. During transient, Proportional Pressurizer heater Group 2 breaker trips open. (EN-49779). Must remove RX01B so operator can close spray valve.
3 (30 min)	SW09A	C (BOP, SRO)	Service Water Pump "A" strainer high D/P (4psid and rising)

Op-Test No.: NRC Scenario No.: 1513 Event No.: 1

Event Description: Raise Power to 100%

Time	Position	Applicant's Actions or Behavior
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4 (40 min)	FW39A	C (BOP, SRO) N (ATC)	High vibration on "A" SGFP (both HP/LP bearings >3mils, <5mils)
5 (43 min)		R (ATC)	Rapid power reduction to take "A" SGFP offline (~65% power)
6 (60 min)	TU02A RD1401, RD1402, RD1405, RD1406, RD1409, RD1414 RP27B RP04B RP04D	M (All)	Turbine High Vibration results in manual scram (greater than 12 mils sustained, ramp). Reactor Trip manual pushbuttons do not work (ATWS). 6 CEAs fail to insert on reactor trip (ATWS). Emergency Boration required.
7 (60min)	CH-514, CH-508, 509 overrides	C (ATC)	The normal Emergency Boration path is failed. CH-514, boric acid isolation valve and CH-508, CH-509 boric acid gravity feed isolation valves will NOT open. Must perform boration from RWST and charging pumps.
8 (61 min)	RC05A	C (ATC)	Pressurizer Safety Valve RC-200 fails to re-seat (25% severity)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			



Facility: Millstone Unit 2	Scenario No.: 4	Op-Test No.: NRC 2014	
Examiners: _____	Operators: _____	_____	
Initial Conditions: (IC 55) 100% Power, MOL, Equilibrium Xenon, 1065 ppm Boron, SGBD @40gpm per Steam Generator, 24E aligned to 24C.			
Turnover: 100% Power, BOL, Equilibrium Xenon, 1065 ppm Boron, SGBD @ 40gpm per Steam Generator, 24E aligned to 24C.			
<b>Critical Tasks:</b> <ol style="list-style-type: none"> <li>1. Manually trip the turbine or close MSIVs within 1 minute following a reactor trip and failure of automatic turbine trip.</li> <li>2. Isolate AFW to the affected SG #2 within 30 minutes following the generation of MSIS during an ESDE.</li> <li>3. Manually start "A" HPSI pump prior to reaching pressurizer low level alarm following a failure of "A" HPSI pump to actuate and a degraded of "C" HPSI pump.</li> </ol>			
Event No.	Malf. No.	Event Type*	Event Description
1 (+10 min)	RX04B	I (ATC, SRO)	Channel Y PZR Level transmitter, LT110Y (selected), fails low (55%, 2 minute ramp).
2 (+20 min)	TC06A	C (BOP, SRO) R (ATC)	No. 1 Turbine control valve failure. (~ 20MWe drop, 20% open total, 1 min ramp)
3 (+35 min)	RP09D	I (ATC, SRO) TS (SRO)	Spurious RPS low flow trip Channel "D"
4 (+40 min)	SG01A	C (All), TS (SRO)	No. 1 Steam Generator tube leak (75 gpd and rising more than 15 gpd/min ~ 0.12 gpm )
5 (+40 min)		R (All)	Rapid power reduction for Steam Generator Tube Leak
6 (+55 min)	SG02A	M (ATC, SRO)	No.1 SGTR exceeds charging pump capacity. Reactor trip required. (200 gpm)
7 (+55 min)	TC10H	C (BOP)	Turbine fails to trip on reactor trip
8 (+57 min)	MS02B	C (BOP, SRO)	Excessive Steam Demand Event outside containment on #2 Steam Generator, upstream of #2 MSIV. (1.5 million lbm/hr, no ramp. need SIAS to occur, do not want to lose NPSH to RCPs, 2 minute delay from reactor trip)
9 (+60 min)	ES03I SI05C	C (ATC, SRO)	"A" HPSI pump fails to start on SIAS (failure of ESAS Module AM 514). C HPSI pump is degraded (50%)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			
Target Quantitative Attributes (Per Scenario; See Section D.5.d)			Actual
1. Total malfunctions (5–8)			8
2. Malfunctions after EOP entry (1–2)			2
3. Abnormal events (2–4)			4
4. Major transients (1–2)			1
5. EOPs entered/requiring substantive actions (1–2)			1
6. EOP contingencies requiring substantive actions (0–2)			1
7. Critical tasks (2–3)			3