Facility: Millstone Unit 2 Date of Exam: 9/19/03

Tier	Group	RO K/A Category Points												SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	K	A	A 2	G *	Total
1. Emergency & Abnormal Plant Evolutions	1												18			3	4	7
	2												9			1	5	6
	Tier Totals												27			4	9	13
2. Plant Systems	1												28			1	2	3
	2												10			1	1	2
	Tier Totals												38			2	3	5
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7
														2	2	1	2	

Note:

1. Ensure that at least two topics from every K/A category are sampled within each tier of the RO outline (i.e., the "Tier Totals" in each K/A category shall not be less than two). Refer to Section D.1.c for additional guidance regarding SRO sampling.
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Select topics from many systems and evolutions; avoid selecting more than two K/A topics from a given system or evolution unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. The SRO K/As must also be linked to 10 CFR 55.43 or an SRO-level learning objective.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) for the applicable license level, and the point totals for each system and category. Enter the group and tier totals for each category in the table above; summarize all the SRO-only knowledge and non-A2 applicable categories in the columns labeled "K" and "A". Use duplicate pages for RO and SRO-only exams.
8. For Tier 3, enter the K/A numbers, descriptions, importance ratings, and point totals on Form ES-401-3.
9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2					X		AA2.02; Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: Charging pump problems.	3.7	1
000025 Loss of RHR System / 4						X	2.1.33; Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4.0	1
000026 Loss of Component Cooling Water / 8					X		AA2.02; Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: The cause of possible CCW loss.	3.6	1
000027 Pressurizer Pressure Control System Malfunction / 3						X	2.2.22; Knowledge of limiting conditions for operations and safety limits.	4.1	1
000029 ATWS / 1									
000038 Steam Gen. Tube Rupture / 3									
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4									
000054 (CE/E06) Loss of Main Feedwater /4						X	~~2.4.30~~; DESELECTED. Knowledge of which events related to system operations/status should be reported to outside agencies. The use of a question in this category will conflict with a previously selected JPM.		
000055 Station Blackout / 6									
000056 Loss of Offsite Power / 6									
000057 Loss of Vital AC Inst. Bus / 6					X		AA2.06; Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: AC instrument bus alarms for the inverter and alternate power source.	3.7	1
000058 Loss of DC Power / 6						X	2.1.2; Knowledge of operator responsibilities during all modes of operation.	4.0	1
000062 Loss of Nuclear Svc Water /4									
000065 Loss of Instrument Air / 8						X	2.1.32; Ability to explain and apply all system limits and precautions.	3.8	1
W/E04 LOCA Outside Containment / 3							Not applicable to Millstone 2		
W/E11 Loss of Emergency Coolant Recirc. / 4							Not applicable to Millstone 2		
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary heat Sink / 4							Not applicable to Millstone 2		
K/A Category Totals					3	4	Group Point Total:		7

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									
~~000003 Dropped Control Rod / 1~~						X	~~2.1.14; Knowledge of system status criteria which require the notification of plant personnel~~ **Deselected based on NRC Examiner Feedback**	~~3.3~~	~~1~~
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2					X		AA2.10; Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Whether the automatic mode for PZR level is functioning improperly, necessity to shift to manual modes.	3.4	1
000032 Loss of Source Range NI / 7						X	2.2.22; Knowledge of limiting conditions for operations and safety limits.	4.1	1
000033 Loss of Intermediate Range NI / 7									
000036 (BW/A08) Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4						X	2.4.49; Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0	1
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant fire on site / 9						X	2.2.25; DESELECTED. Knowledge of bases in technical bases for limiting conditions for operation and safety limits. Deselected. There are NO Technical Specifications associated with a fire on site. Unit 2 Technical Requirements Manual addresses this. **K/A *Reselected* based on NRC Examiner feedback.**	3.7	1
~~000067 Plant fire on site / 9~~						X	2.4.49; Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. **System K/A reselected to 051, Loss of Condenser Vacuum, based on NRC Examiner Feedback. K/A randomly selected moved to System # 051.**	~~4.0~~	~~1~~
000068 (BW/A06) Control Room Evac. / 8									
000069 (W/E14) Loss of CTMT Integrity / 5									
000074 (W/E06&E07) Inad. Core Cooling / 4									
000076 High Reactor Coolant Activity / 9									
W/E01 & E02 Rediagnosis & SI Termination / 3							Not applicable to Millstone 2		
W/E13 Steam Generator Over-pressure / 4							Not applicable to Millstone 2		
W/E15 Containment Flooding / 5							Not applicable to Millstone 2		
W/E16 High Containment Radiation / 9							Not applicable to Millstone 2		
BW/AO1 Plant Runback / 1							Not applicable to Millstone 2		
BW/A02&A03 Loss of NNI-X/Y /7							Not applicable to Millstone 2		

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
BW/A04 Turbine Trip / 4							Not applicable to Millstone 2		
BW/A05 Emergency Diesel Actuation / 6							Not applicable to Millstone 2		
BW/A07 Flooding / 8							Not applicable to Millstone 2		
BW/E03 inadequate Subcooling Margin /4							Not applicable to Millstone 2		
BW/E08; W/E03 LOCA Cooldown - Depress. / 4							Not applicable to Millstone 2		
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4									
BW/E13&E14 EOP Rules and Enclosures							Not applicable to Millstone 2		
CE/A11; W/E08 RCS Overcooling - PTS / 4									
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery						X	2.1.33; DESELECTED. Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications. The Functional Recovery procedures at Millstone 2 do NOT specifically address technical specifications. ***Reselected* based on NRC feedback.**	4.0	1
CE/E09 Functional Recovery						X	2.1.14; Knowledge of system status which require the notification of plant personnel.	3.3	1
K/A Category Point Totals:					1	4	Group Point Total:		6

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														
004 Chemical and Volume Control														
005 Residual Heat Removal														
006 Emergency Core Cooling														
~~007 Pressurizer Relief/Quench Tank~~											~~X~~	~~2.1.23; Ability to perform specific system and integrated plant procedures during all modes of operation.~~ **Deselected based on NRC feedback.**	~~4.0~~	~~1~~
008 Component Cooling Water														
010 Pressurizer Pressure Control														
012 Reactor Protection														
013 Engineered Safety Features Actuation								X				A2.01; Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions: LOCA	4.8	1
022 Containment Cooling														
025 Ice Condenser												Not applicable to Millstone 2		
026 Containment Spray														
039 Main and Reheat Steam														
056 Condensate														
059 Main Feedwater											X	2.4.49; Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0	1
061 Auxiliary/Emergency Feedwater														
062 AC Electrical Distribution														
063 DC Electrical Distribution														
064 Emergency Diesel Generator														
073 Process Radiation Monitoring														
076 Service Water														
078 Instrument Air														
103 Containment											X	2.4.4; Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.3	1
K/A Category Point Totals:								1			2	Group Point Total:		3

Plant Systems - Tier 2/Group 2 (RO/SRO)

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														
002 Reactor Coolant														
011 Pressurizer Level Control														
014 Rod Position Indication														
015 Nuclear Instrumentation											X	2.2.22; Knowledge of limiting conditions for operations and safety limits.	4.1	1
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor														
027 Containment Iodine Removal												Not applicable to Millstone 2		
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment								X				A2.03; Ability to (a) predict the impacts of the following malfunctions or operations on the Fuel Handling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions: Mispositioned Fuel Element.	4.0	1
035 Steam Generator														
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator														
055 Condenser Air Removal														
068 Liquid Radwaste														
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
075 Circulating Water														
079 Station Air														
086 Fire Protection														
K/A Category Point Totals:								1			1	Group Point Total:		2

Grayed out rows are not applicable to Millstone Unit Two (CE designed plant)

ES-401	Generic Knowledge and Abilities Outline (Tier 3)	Form ES-401-3

Facility: Millstone Unit 2 Date of Exam: 09/19/03

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.2	Knowledge of operator responsibilities during all modes of operation.			4.0	1
	~~2.1.13~~	~~Knowledge of facility requirements for controlling vital / controlled access.~~ ***Reselected*, based on NRC feedback, to K/A 2.1.25**			~~2.9~~	~~1~~
	2.1.25	Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.			3.1	1
	Subtotal					2
2. Equipment Control	~~2.2.10~~	~~Knowledge of the process for determining if the margin of safety, as defined in the basis of any technical specification is reduced by a proposed change, test, or experiment.~~ ***Reselected* per NRC guidance due to close proximity of knowledge requirement to selected K/A 2.2.14. New K/A 2.2.25**			~~3.3~~	~~1~~
	2.2.25	Knowledge of bases in technical specification for limiting conditions for operations and safety limits.			3.7	1
	2.2.14	Knowledge of the process for making configuration changes.			3.0	1
	Subtotal					2
3. Radiation Control	2.3.11	Ability to control radiation releases.			3.2	1
	Subtotal					1
4. Emergency Procedures / Plan	2.4.9	Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.			3.9	1
	2.4.25	Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.			3.4	1
	Subtotal					2
Tier 3 Target Point Total						7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1	2.4.30	000054 (CE/E06) Loss of Main Feedwater / 4; The use of a question in this category will conflict with a previously selected JPM. **Randomly reselected E/APE#000065 Loss of Instrument Air / 8, K/A 2.1.32.**
1/2	2.2.25	000067 Plant fire on site / 9; There are NO Technical Specifications associated with a fire on site. Unit 2 Technical Requirements Manual addresses this. Randomly reselected K/A 2.4.49. ***Reselected based on NRC Examiner comments***
1/2	2.1.33	CE/E09 Functional Recovery; The Functional Recovery procedures at Millstone 2 do NOT specifically address technical specifications. Randomly reselected K/A 2.1.14. ***Reselected based on NRC Examiner comments***
1/2	2.1.14	000003 Dropped Control Rod / 1; Knowledge of system status criteria which require the notification of plant personnel ***Deselected based on NRC Examiner Feedback***
1/2	2.4.49	~~000067 Plant fire on site / 9~~; 000051 Loss of Condenser Vacuum / 4; Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. ***System K/A reselected to 051, Loss of Condenser Vacuum, based on NRC Examiner Feedback. K/A randomly selected moved to System # 051.***
2/1	~~2.1.23~~	~~007 Pressurizer Relief/Quench Tank; Ability to perform specific system and integrated plant procedures during all modes of operation.~~ ***Deselected, based on NRC feedback, to 2.1.25.***
G G	~~2.1.13~~ 2.1.25	~~Knowledge of facility requirements for controlling vital / controlled access.~~ ***Reselected, based on NRC feedback, to K/A 2.1.25*** Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.
G G	~~2.2.10~~ 2.2.25	~~Knowledge of the process for determining if the margin of safety, as defined in the basis of any technical specification is reduced by a proposed change, test, or experiment.~~ ***Reselected per NRC guidance due to close proximity of knowledge requirement to selected K/A 2.2.14. New K/A 2.2.25*** Knowledge of bases in technical specification for limiting conditions for operations and safety limits.

OPERATING TEST NO.: 1

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			1		2		3		4	
			RO	BOP	RO	BOP	RO	BOP	RO	BOP
SRO-U	Reactivity	0	3	3	5		4			
	Normal	1*	N/A	N/A	N/A	N/A		2		
	Instrument/ Component	2*	1, 3, 4, 8	2	2, 3	1, 4, 8	3,8	1,6 9		
	Major	1	5, 7	6	5, 6	7	5	7		

Instructions: (1) Enter the operating test number and Form ES-301-D-1 event numbers for each evolution type.

(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. *Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.

(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _____

NRC Reviewer: _____

Facility: MP2 Scenario No.: ES03LU1 Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: 28% power, MOL, 1175 ppm Boron, Forcing PZR Sprays, 2 Charging Pumps operating, SGBD @ 25 gpm per SG, 24E aligned to 24D, TDAFP OOS for bearing replacement, "B" Charging Pump out to prevent auto start which may lift discharge reliefs.

Turnover: 28% power and holding for turnover. Shutdown three days ago for repair to small unisolable steam leak in the Turbine Building, MOL, 1175 ppm Boron, blend ratio is 3.5:1, Forcing PZR Sprays, 2 charging Pumps operating, "A" MFP in operation, Group 7 CEAs @ 152 steps, SGBD @ 25 gpm per SG, 24E aligned to 24D, TDAFP OOS for bearing replacement, in TSAS 3.7.1.2.a and TRM II, 3.0, item 2, "B" Charging Pump out to prevent auto start which may lift discharge reliefs. In TRM 7.1.1, Table 7.1.1-1 Item B, Action 1 and 2. No other equipment OOS and no surveillance in progress or due.

Event No.	Malf. No.	Event Type*	Event Description
1	CV06C	C	Failure of the Letdown Backpressure Controller.
2	WD03	I	CTMT Sump level transmitter fails to zero.
3	RC04	C, R	35 gpm RCS leak in CTMT requiring a rapid downpower.
4	RC12A	C	Oil leak in "A" RCP
5	RC11A RP07 RP-4A-D ED02	R, M	"A" RCP seizes and trips; results in failure of TCBs to open (ATWS). Successful manual reactor trip using CEDM MG output breakers. Loss of offsite power during the reactor trip.
6	FW30 FW20B	M	Degraded "A" AFW Pump and failure of "B" AFW Pump to start results in loss of all feedwater.
7	RC03A	M	Small break LOCA immediately after reactor trip
8	SI05A SI04C	C	Degraded "A" HPSI Pump and trip of "C" HPSI results in less than required SI flow.

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

Facility: MP2 Scenario No.: ES03LU2 Op-Test No.: 2

Examiners: _____ Operators: _____

Initial Conditions: 100% power, MOL, Eq. Xe., 821 ppm Boron, SGBD @ 25 gpm per SG, 24E aligned to 24D, "B" Charging Pump out to prevent auto start which may lift discharge reliefs.

Turnover: 100% power, MOL, Eq. Xe., 821 ppm Boron, blend ratio: 6.3:1 SGBD @ 25 gpm per SG, 24E aligned to 24D, "B" Charging Pump out to prevent auto start which may lift discharge reliefs. In TRM 7.1.1, Table 7.1.1-1 Item B, Action 1 and 2. No other equipment OOS and no surveillance in progress or due.

Event No.	Malf. No.	Event Type*	Event Description
1	RX10C	C	The Main Feedwater Flow transmitter fails low
2	RX6B	I	Channel "Y" Reactor Regulating System failure.
3	SI03A	C	Nitrogen leak on #1 SIT.
4	TC06A - D	I	All 4 main control valves close requiring a reactor trip.
5	TC04 RP28D, E, H ED02 EG08A	R, M	RCS temperature and pressure rise and reactor fails to automatically trip on high RCS pressure (ATWS). Successful manual reactor trip using manual push buttons. Loss of offsite power during the reactor trip. "A" DG output breaker fails to close resulting in the loss of one complete facility.
6	RC05A	M	Pressurizer safety valve sticks open after the trip resulting in a LOCA.
7	SG02B	M	Steam Generator Tube Rupture in #2 Steam Generator after the trip.
8	Sw01C	C	Loss of "C" Service Water Pump results in loss of cooling to the running Diesel Generator (only source of power).

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

Facility: Millstone 2 Date of Exam: 9/22/03 Scenario Numbers: 1 / 2 / Operating Test No.: 1

QUALITATIVE ATTRIBUTES	Initials a	Initials b*	Initials c#
1. The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	RA	TH	
2. The scenarios consist mostly of related events.	RA	DA	
3. Each event description consists of ☑ the point in the scenario when it is to be initiated ☑ the malfunction(s) that are entered to initiate the event ☑ the symptoms/cues that will be visible to the crew ☑ the expected operator actions (by shift position) ☑ the event termination point (if applicable)	RA	DA	
4. No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	RA	DA	
5. The events are valid with regard to physics and thermodynamics.	RA	DA	
6. Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	RA	DA	
7. If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	RA	DA	
8. The simulator modeling is not altered.	RA	DA	
9. The scenarios have been validated. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.	RA	DA	
10. Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.5 of ES-301.	RA	DA	
11. All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	RA	DA	
12. Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).	RA	DA	
13. The level of difficulty is appropriate to support licensing decisions for each crew position.	RA	DA	

TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4.D5.d)	Actual Attributes	--	--	--
1. Total malfunctions (5-8)	7 / 9 /	RA	DA	
2. Malfunctions after EOP entry (1-2)	4 / 6 /	RA	DA	
3. Abnormal events (2-4)	4 / 4 /	RA	DA	
4. Major transients (1-2)	3 / 4 /	RA	DA	
5. EOPs entered/requiring substantive actions (1-2)	1 / 1 /	RA	DA	
6. EOP contingencies requiring substantive actions (0-2)	2 / 2 /	RA	DA	
7. Critical tasks (2-3)	3 / 4 /	RA	DA	

Draft