

Draft Submittal  
(Pink Paper)

Senior Reactor Operator Written Exam

**MCGUIRE MAY 2008 EXAM - 50-369, 370/2008-301**  
**DRAFT RO/SRO WRITTEN OUTLINES**

Facility:		McGuire 2008 NRC Exam											Date of Exam:		5/12/2008			
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 & Plant Evolutions	1	3	3	3				3	3			3	18	3	3	6		
	2	1	2	1				2	2			1	9	2	2	4		
	Tier Totals	4	5	4				5	5			4	27	5	5	10		
2. Plant Systems	1	2	2	3	3	2	3	2	2	3	3	3	28	3	2	5		
	2	1	1	1	1	1	1	1	1	1	1	0	10	0	2	3		
	Tier Totals	3	3	4	4	3	4	3	3	4	4	3	38	5	3	8		
3. Generic Knowledge & Abilities Categories				1		2		3		4		10	1	2	3	4	7	
				3		3		2		2			1	2	2	2		

- Note:
- 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).
  - 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.
  - 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 that are not included on the outline should be added. Refer to section D.1.b of ES-401, for guidance regarding elimination of inappropriate K/A statements.
  - 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.
  - Absent a plant specific priority, only those KAs 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.
  - Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
  - \* 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/A's
  - 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. 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.
  - 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 10CFR55.43

McGuire 2008 NRC Exam  
Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
009 / Small Break LOCA / 3						X	2.1.27 - Conduct of Operations: Knowledge of system purpose and / or function.	4.0	76
026 / Loss of Component Cooling Water / 8						X	2.1.25 - Conduct of Operations: Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	77
029 / Anticipated Transient Without Scram (ATWS) / 1					X		EA2.01 - Ability to determine or interpret the following as they apply to a ATWS: Reactor nuclear instrumentation	4.7	78
055 / Station Blackout / 6					X		EA2.05 - Ability to determine or interpret the following as they apply to a Station Blackout: When battery is approaching fully discharged	3.7	79
056 / Loss of Off-site Power / 6					X		AA2.18 - Ability to determine and interpret the following as they apply to the Loss of Offsite Power: Reactor coolant temperature, pressure, and PZR level recorders	4.0	80
058 / Loss of DC Power / 6						X	2.4.21 - Emergency Procedures / Plan: Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	4.6	81
007 / Reactor Trip / 1						X	2.4.46 - Emergency Procedures / Plan: Ability to verify that the alarms are consistent with the plant conditions.	4.2	39
008 / Pressurizer Vapor Space Accident / 3				X			AA1.03 - Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident: Turbine bypass in manual control to maintain header pressure	2.8	40
009 / Small Break LOCA / 3		X					EK2.03 - Knowledge of the interrelations between the small break LOCA and the following: S/Gs	3.0	41
011 / Large Break LOCA / 3			X				EK3.06 - Knowledge of the reasons for the following responses as they apply to the Large Break LOCA: Actuation of Phase A and B during LOCA initiation	4.3	42
015 / 17 / Reactor Coolant Pump Malfunctions / 4				X			AA1.16 - Ability to operate and / or monitor the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Low power reactor trip block status lights	3.2	43
022 / Loss of Reactor Coolant Makeup / 2					X		AA2.04 - Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Pump Makeup: How long PZR level can be maintained within limits	2.9	44
025 / Loss of Residual Heat Removal System / 4		X					AK2.03 - Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: Service water or closed cooling water pumps	2.7	45
027 / Pressurizer Pressure Control System Malfunction / 3	X						AK1.03 - Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: Latent heat of vaporization/condensation	2.6	46
029 / Anticipated Transient Without Scram (ATWS) / 1		X					EK2.06 - Knowledge of the interrelations between the and the following an ATWS: Breakers, relays, and disconnects	2.9	47

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Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
055 / Station Blackout / 6			X				EK3.02 - Knowledge of the reasons for the following responses as they apply to the Station Blackout: Actions contained in EOP for loss of offsite and onsite power	4.3	48
056 / Loss of Off-site Power / 6				X			AA1.12 - Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: Reactor building cooling unit	3.2	49
057 / Loss of Vital AC Electrical Instrument Bus / 6			X				AK3.01 - 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	50
058 / Loss of DC Power / 6	X						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	51
062 / Loss of Nuclear Service Water / 4					X		AA2.06 - Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: The length of time after the loss of CCW flow to a component before that component may be damaged	2.8	52
065 / Loss of Instrument Air / 8					X		AA2.08 - Ability to determine and interpret the following as they apply to the Loss of Instrument Air: Failure modes of air-operated equipment	2.9	53
E04 / LOCA Outside Containment / 3	X						EK1.2 - Knowledge of the operational implications of the following concepts as they apply to the (LOCA Outside Containment): Normal, abnormal and emergency operating procedures associated with (LOCA Outside Containment).	3.5	54
E11 / Loss of Emergency Coolant Recirculation / 4						X	2.1.23 - Conduct of Operations: Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	55
E12 / Uncontrolled Depressurization of all Steam Generators / 4						X	2.1.20 - Conduct of Operations: Ability to interpret and execute procedure steps.	4.6	56
K/A Category Totals:	3	3	3	3	6	6	Group Point Total:	18/6	

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Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
003 / Dropped Control Rod / 1					X		AA2.02 - Ability to determine and interpret the following as they apply to the Dropped Control Rod: Signal inputs to rod control system	2.8	82
033 / Loss of Intermediate Range Nuclear Instrumentation / 7					X		AA2.05 - Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Nature of abnormality, from rapid survey of control room data	3.1	83
059 / Accidental Liquid RadWaste Release / 9						X	2.2.38 - Equipment Control: Knowledge of conditions and limitations in the facility license.	4.5	84
E06 / Degraded Core Cooling / 4						X	2.1.20 - Conduct of Operations: Ability to interpret and execute procedure steps.	4.6	85
005 / Inoperable/Stuck Control Rod / 1				X			AA1.02 - Ability to operate and / or monitor the following as they apply to the Inoperable / Stuck Control Rod: Rod selection switches	3.7	57
024 / Emergency Boration / 1					X		AA2.03 - Ability to determine and interpret the following as they apply to the Emergency Boration: Correlation between boric acid controller setpoint and boric acid flow	2.9	58
032 / Loss of Source Range Nuclear Instrumentation / 7	X						AK1.01 - Knowledge of the operational implications of the following concepts as Effects of voltage changes on performance	2.5	59
033 / Loss of Intermediate Range Nuclear Instrumentation / 7				X			AA1.02 - Ability to operate and / or monitor the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Level trip bypass	3.0	60
036 / Fuel Handling Incidents / 8		X					AK2.01 - Knowledge of the interrelations between the Fuel Handling Incidents and the following: Fuel handling equipment	2.9	61
067 / Plant Fire On-site / 8					X		AA2.12 - Ability to determine and interpret the following as they apply to the Plant Fire on Site: Location of vital equipment within fire zone	2.9	62
069 / Loss of Containment Integrity / 5			X				AK3.01 - Knowledge of the reasons for the following responses as they apply to the Loss of Containment Integrity: Guidance contained in EOP for loss of containment integrity	3.8	63
076 / High Reactor Coolant Activity / 9		X					AK2.01 - Knowledge of the interrelations between the High Reactor Coolant Activity and the following: Process radiation monitors	2.6	64
E02 / SI Termination / 3						X	2.4.8 - Emergency Procedures / Plan: Knowledge of how abnormal operating procedures are used in conjunction with EOP's.	3.8	65
K/A Category Totals:	1	2	1	2	4	3	Group Point Total:	9/4	

McGuire 2008 NRC Exam  
Written Examination Outline  
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q #
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010 Pressurizer Pressure Control								X				A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Heater failures	3.6	86
026 Containment Spray								X				A2.03 - 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 ESF	4.4	87
061 Auxillary/Emergency Feedwater											X	2.4.4 - Emergency Procedures / Plan: Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.7	88
073 Process Radiation Monitoring											X	2.2.4 - Equipment Control: (multi-unit license) Ability to explain the variations in control board layouts, systems, instrumentation and procedural actions between units at a facility.	3.6	89
076 Service Water								X				A2.02 - Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Service water header pressure	3.1	90
003 Reactor Coolant Pump	X											K1.08 - Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: Containment isolation	2.7	1
004 Chemical and Volume Control					X							K5.46 - Knowledge of the operational implications of the following concepts as they apply to the CVCS: Reason for going solid in PZR (collapsing steam bubble): make sure no steam is in PRT when PORV is opened to drain RCS	2.5	2
005 Residual Heat Removal		X										K2.03 - Knowledge of bus power supplies to the following: RCS pressure boundary motor-operated valves	2.7	3
006 Emergency Core Cooling										X		A4.01 - Ability to manually operate and/or monitor in the control room: Pumps	4.1	4
007 Pressurizer Relief/Quench Tank									X			A3.01 - Ability to monitor automatic operation of the PRTS, including: Components which discharge to the PRT	2.7	5
008 Component Cooling Water		X										K2.02 - Knowledge of bus power supplies to the following: CCW pump, including emergency backup	3.0	6
008 Component Cooling Water				X								K4.01 - Knowledge of CCWS design feature(s) and/or interlock(s) which provide for the following: Automatic start of standby pump	3.1	7

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Written Examination Outline  
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q #
010 Pressurizer Pressure Control	X											2.9	8
012 Reactor Protection									X			3.4	9
012 Reactor Protection						X						3.3	10
013 Engineered Safety Features Actuation				X								3.1	11
022 Containment Cooling								X				3.1	12
025 Ice Condenser						X						3.4	13
025 Ice Condenser					X							3.0	14
026 Containment Spray										X		4.0	15
026 Containment Spray			X									4.2	16
039 Main and Reheat Steam									X			3.8	17
039 Main and Reheat Steam				X								3.4	18
059 Main Feedwater							X					2.7	19
061 Auxillary/Emergency Feedwater			X									4.4	20
062 AC Electrical Distribution									X			3.5	21
063 DC Electrical Distribution							X					2.5	22

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 Written Examination Outline  
 Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q #
064 Emergency Diesel Generator						X						3.2	23
073 Process Radiation Monitoring								X				2.5	24
076 Service Water										X		2.7	25
076 Service Water			X									3.7	26
078 Instrument Air										X		3.8	27
103 Containment											X	3.2	28
K/A Category Totals:	2	2	3	3	2	3	2	5	3	3	5	Group Point Total: 28/5	

K6.08 - Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Fuel oil storage tanks

A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Erratic or failed power supply

2.4.30 - Emergency Procedures / Plan; 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.

K3.07 - Knowledge of the effect that a loss or malfunction of the SWS will have on the following: ESF loads

2.4.35 - Emergency Procedures / Plan: Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.

A4.01 - Ability to manually operate and/or monitor in the control room: Flow control, pressure control, and temperature control valves, including pneumatic valve controller



McGuire 2008 NRC Exam  
Written Examination Outline  
Plant Systems – Tier 2 Group 2

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q #
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015 Nuclear Instrumentation											X	2.1.7 - Conduct of Operations: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	91
028 Hydrogen Recombiner and Purge Control									X			A2.03 - Ability to (a) predict the impacts of the following malfunctions or operations on the HRPS; and (b) based on those predictions, use Procedures to correct, control, or mitigate the consequences of those malfunctions or operations: The hydrogen air concentration in excess of limit flame propagation or detonation with resulting equipment dam-age in containment	4.0	92
079 Station Air									X			A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the SAS; and (b) based on those predictions, use Procedures to correct, control, or mitigate the consequences of those malfunctions or operations:: Cross-connection with IAS	3.2	93
014 Rod Position Indication				X								K4.03 - Knowledge of RPIS design feature(s) and/or interlock(s) which provide for the following: Rod Bottom lights	3.2	29
017 In-core Temperature Monitor						X						K6.01 - Knowledge of the effect of a loss or malfunction of the following ITM system components: Sensors and detectors	2.7	30
015 Nuclear Instrumentation System		X										K2.01 - Knowledge of bus power supplies to the following: NIS channels, components, and interconnections	3.3	31
028 Hydrogen Recombiner and Purge Control	X											K1.01 - Knowledge of the physical connections and/or cause-effect relationships between the HRPS and the following systems: Containment annulus ventilation system (including pressure limits)	2.5	32
029 Containment Purge										X		A4.04 - Ability to manually operate and/or monitor in the control room: Containment Evacuation signal	3.5	33
033 Spent Fuel Pool Cooling			X									K3.01 - Knowledge of the effect that a loss or malfunction of the Spent Fuel Pool Cooling System will have on the following: Area ventilation systems	2.6	34
035 Steam Generator								X				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	35
041 Steam Dump/Turbine Bypass Control									X			A3.03 - Ability to monitor automatic operation of the SDS, including: Steam flow	2.7	36

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 Written Examination Outline  
 Plant Systems – Tier 2 Group 2

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q #
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071 Waste Gas Disposal							X					A1.06 - Ability to predict and/or monitor changes in parameters(to prevent exceeding design limits) associated with Waste Gas Disposal System operating the controls including: Ventilation system	2.5	37
086 Fire Protection					X							K5.03 - Knowledge of the operational implication of the following concepts as they apply to the Fire Protection System: Effect of water spray on electrical components	3.1	38
K/A Category Totals:	1	1	1	1	1	1	1	3	1	1	1	Group Point Total:	12/3	

Facility:		McGuire 2008 NRC Exam		Date:		5/12/2008	
Category	K/A #	Topic	RO		SRO-Only		
			IR	Q#	IR	Q#	
1. Conduct of Operations	2.1.35	Knowledge of the fuel-handling responsibilities of SRO's.			3.9	94	
	2.1.18	Ability to make accurate, clear and concise logs, records, status boards, and reports.	3.6	66			
	2.1.13	Knowledge of facility requirements for controlling vital / controlled access.	2.5	67			
	2.1.8	Ability to coordinate personnel activities outside the control room.	3.4	68			
	Subtotal			3		1	
2. Equipment Control	2.2.7	Knowledge of the process for conducting special or infrequent tests.			3.6	95	
	2.2.22	Knowledge of limiting conditions for operations and safety limits.			4.7	96	
	2.2.40	Ability to apply technical specifications for a system.	3.4	69			
	2.2.13	Knowledge of tagging and clearance procedures.	4.1	70			
	2.2.6	Knowledge of the process for making changes to procedures.	3.0	71			
Subtotal			3		2		
3. Radiation Control	2.3.14	Knowledge of radiation or containment hazards that may arise during normal, abnormal, or emergency conditions or activities.			3.8	97	
	2.3.6	Ability to approve release permits			3.8	98	
	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	72			
	2.3.11	Ability to control radiation releases.	3.8	73			
	Subtotal			2		2	
4. Emergency Procedures / Plan	2.4.46	Ability to verify that the alarms are consistent with the plant conditions.			4.2	99	
	2.4.8	Knowledge of how abnormal operating procedures are used in conjunction with EOP's.			4.5	100	
	2.4.17	Knowledge of EOP terms and definitions.	3.9	74			
	2.4.14	Knowledge of general guidelines for EOP usage.	3.8	75			
	Subtotal			2		2	
Tier 3 Point Total				10		7	