Draft Submittal
(Pink Paper)

1. Written Exam Sample outlines

MCGUIRE EXAM

50-369, 370/2002-301
FEBRUARY 11 - 15, 2002

ES-401 Form ES

Facility: McGuire		Date of Exam: 2/22/02						Exam Level: RO					
		K/A Category Points										Point	
Tier	Group	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	Target
1 Emergency & Abnormal Plant Evolutions	1	2	1	4				2	5			2	16	16
	2	4	2	5				2	2			2	17	17
	3	0	1	0				0	1			1	3	3
	Tier Totals	6	4	9				4	8			5	36	36
2 Plant Systems	1	4	2	4	3	1	2	0	4	1	1	1	23	23
	2	1	0	3	2	2	0	3	3	1	2	3	20	20
	3	0	1	0	1	0	1	0	3	1	1	0	8	8
	Tier Totals	5	3	7	6	3	3	3	10	3	4	4	51	51
3 Generic Knowledge and Abilities		Cat 1			Cat 2			Cat 3			Cat 4			
		4			3			3			3		13	13

Totals:

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., 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 ±1 from that specified in the table based on NRC revisions. The final exam must total 100 points.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a system 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 K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalogue, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topic's importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant specific priorities. Enter the Tier totals for each category in the Table above.

ES-401

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Points	Question
000005 Inoperable/Stuck Control Rod /1	1.05						Knowledge of the operational implications of the following concepts as they apply to the…calculation of minimum shutdown margin	3.3/4.1	1	869
000015/17 RCP Malfunctions / 4					2.09		Ability to determine and interpret…when to secure RCPs on high stator temperature	3.4/3.5	1	870
000024 Emergency Boration / 1			3.02				Knowledge of the reasons for the following responses …actions contained in EOP for emergency boration	4.2/4.4	1	181
000026 Loss of Component Cooling Water / 8						2.23	Ability to track limiting conditions for operations	2.6/3.8	1	896
000040 (W/E12) Steam Line Rupture - Excessive Heat Transfer / 4					2.02		Ability to determine and interpret…conditions requiring a reactor trip	4.6/4.7	1	593
W/E08 RCS Overcooling - PTS / 4			3.3				Knowledge for the reasons for the following responses…manipulation of controls required to obtain desired operating results during abnormal and emergency situations	3.7/3.8	1	888
000051 Loss of Condenser Vacuum / 4					2.02		Ability to determine and interpret…conditions requiring a reactor and/or turbine trip	3.9/4.1	1	453.1
000055 Station Blackout / 6	1.01						Knowledge of the operational implications of the following concepts …Effect of battery discharge rates on capacity	3.3/3.7	1	906
000057 Loss of Vital Ac Elec. Inst. Bus. / 6				1.04			Ability to operate and/or monitor …RWST and VCT valves	3.5/3.6	1	874
000062 Loss of Nuclear Service Water / 4			3.04				Knowledge of the reasons for the following responses ... Effect on the nuclear service water discharge flow header of a loss of CCW	3.5/3.7	1	894
000067 Plant Fire On-site / 9						3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure	2.9/3.3	1	908
000068 Control Room Evac. / 8				1.19			Ability to operate and/or monitor …boric acid transfer pump	3.7/3.9	1	905
000069 (W/E14) Loss of CTMT Integrity / 5							deselected			deselected
000074 (W/E06&E07) Inad. Core Cooling / 4		2.06					Knowledge of the interrelationships between…turbine bypass and atmospheric dump valves	3.5*/3.6	1	907
000076 High Reactor Coolant Activity / 9					2.01		Ability to determine and interpret…location or process point that is causing an alarm	2.7/3.2	1	380
K/A Category Totals:	2	1	4	2	5	2	Group Point Total:	16	16	16

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Points	Bank Question
000001 Continuous Rod Withdrawal / 1	1.21						Knowledge of the operational implications of the following concepts as they apply to the...Integral rod worth	2.9/3.2	1	913
000003 Dropped Control Rod / 1							deselected at random			deselected
000007 Reactor Trip - Stabilization - Recovery / 1		2.02					Knowledge of the interrelationships between...breakers, relays and disconnects	2.6/2.8	1	884
000008 Pressurizer Vapor Space Accident / 3				1.07			Ability to operate and/or monitor ...reseating of code safety and PORV	4.0/4.2	1	899
000009 Small Break LOCA / 3							deselected at random			deselected
000011 Large Break LOCA / 3			3.07				Knowledge of the reasons for the following responses ...Stopping charging pump bypass flow	3.5*/3.6*	1	387
W/E04 LOCA Outside Containment / 3			3.4				Knowledge for the reasons for the following responses...RO or SRO function within the control room team as appropriate to the assigned position in such as way that procedures are adhered to and the limitations in the facilities license and amendments are not violated	3.6/3.8	1	359.2
W/E03 LOCA Cooldown - Depress. / 4		2.1					Knowledge of the interrelationships between...components and functions of control and safety systems including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.6/4.0	1	571
W/E01&02 Rediagnosis and SI Termination / 3							deselected at random			deselected
000022 Loss of Reactor Coolant Makeup / 2					2.04		Ability to determine and interpret...how long pressurizer level can be maintained within limits	2.9/3.8	1	857
000025 Loss of RHR System / 4						1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior and instrument interpretation	3.7/4.4	1	710.1
000032 Loss of Source Range NI / 7	1.01						Knowledge of the operational implications of the following concepts as they apply to the...Effects of voltage changes on performance	2.5/3.1	1	903
000033 Loss of Intermediate Range NI / 7	1.01						Knowledge of the operational implications of the following concepts as they apply to the...Effects of voltage changes on performance	2.7/3.0	1	37.1
000037 Steam Generator Tube Leak / 3							deselected at random			deselected
000038 Steam Generator Tube Rupture / 3	1.02						Knowledge of the operational implications of the following concepts as they apply to the...leak rate vs. pressure drop	3.2/3.5	1	321
000054 Loss of Main Feedwater / 4							deselected at random			deselected
000058 Loss of DC Power / 6			3.02				Knowledge of the reasons for the following responses ...actions contained in EOP for loss of dc power	4.0/4.2	1	904
000059 Accidental Liquid Radwaste Rel. / 9							deselected at random			deselected
000060 Accidental Gaseous Radwaste Rel. / 9							deselected at random			deselected
000061 ARM System Alarms / 7				1.01			Ability to operate and/or monitor ...automatic actuation	3.6/3.6	1	398
W/E16 High Containment Radiation / 9			3.1				Knowledge for the reasons for the following responses...Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and	2.9/3.1	1	684
K/A Category Totals:	4	2	3	2	2	3	Group Point Total:	17	17	17

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Points	Question
000028 Pressurizer Level Malfunction / 2					2.02		Ability to determine and interpret...Pressurizer level as a function of power level or T-ave. including interpretation of malfunction	3.4/3.8	1	902
000038 Fuel Handling Accident / 8							randomly deselected			deselected
000065 Loss of Instrument Air / 8							randomly deselected			deselected
W/E 13 Steam Generator Over-pressure / 4							randomly deselected			deselected
W/E 15 Containment Flooding / 5		2.2					Knowledge of the interrelationships between...facility's heat removal systems, including primary coolant, emergency coolant, decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility	2.7/2.9	1	891
K/A Category Totals:	0	1	0	0	1	1	Group Point Total:	3	3	3

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2 Group 1													Form ES-401-3 [redacted]		Bank
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)	Imp.	Points	Question
001 Control Rod Drive									3.08			Ability to monitor automatic operation of the...Anticipation of criticality at any time when adding positive reactivity	3.9/4.0	1	866
003 Reactor Coolant Pump						6.14						Knowledge of the effect that a loss or malfunction will have on ...Staring requirements	2.6/2.9	1	867
004 Chemical Volume Control		2.06										Knowledge of bus power supplies to...control instrumentation	2.6*/2.7	1	885
013 Engineered Safety Features Actuation								2.01				Ability to predict the impacts of the following malfunction or operation...and based on those predictions, use procedures to correct, control or mitigate the consequences of...LOCA	4.6/4.8	1	540
014 Rod Position Indication	1.02											Knowledge of physical connections and/or cause and effect relationships...NIS	3.0/3.3	1	893.1
015 Nuclear Instrumentation				4.01								Knowledge of design feature(s) and/or interlock(s) which provide for...Source-range detector shutoff at high powers		1	878
017 In-core Temperature Monitor			3.01									Knowledge of the effect that a loss or malfunction ...will have on ...Natural circulation indications	3.5*/3.7*	1	911
022 Containment Cooling											4.22	Knowledge of the bases for prioritizing safety functions during abnormal / emer	3.0/4.0	1	858
025 Ice Condenser								2.02				Ability to predict the impacts of the following malfunction or operation...and based on those predictions, use procedures to correct, control or mitigate the consequences of...High/low floor cooling temperature	2.7*/2.5*	1	681
026 Containment Spray			3.02									Knowledge of the effect that a loss or malfunction ...will have on ...Recirculation spray system	4.2*/4.3	1	862
056 Condensate	1.03											Knowledge of physical connections and/or cause and effect relationships...MFW	2.6*/2.6	1	415.1
059 Main Feedwater	1.03											Knowledge of physical connections and/or cause and effect relationships...S/Gs	3.1/3.3	1	914.1
061 Auxiliary/Emergency Feedwater			3.02									Knowledge of the effect that a loss or malfunction ...will have on ...S/G	4.2/4.4	1	191.1
063 DC Electrical										4.03		Ability to manually operate and/or monitor in the control room...Battery discharge rate	3.0*/3.1	1	881
068 Liquid Rad Waste										4.03		Ability to manually operate and/or monitor in the control room...Stoppege of release if limits are exceeded	3.9/3.8	1	407
071 Waste Gas Disposal	1.06											Knowledge of physical connections and/or cause and effect relationships...ARM and PRM systems	3.1*/3.1	1	771.1
072 Area Radiation Monitoring								2.02				Ability to predict the impacts of the following malfunction or operation...and based on those predictions, use procedures to correct, control or mitigate the consequences of...Detector failure	2.8/2.9	1	860
022 Containment Cooling		2.01										Knowledge of bus power supplies to...containment cooling fans	3.0*/3.1	1	898
056 Condensate								2.04				Ability to manually operate and/or monitor in the control room...Loss of condensate pumps	2.6/2.8*	1	649.1
K/A Category Totals:	4	2	3	1	0	1	0	4	1	2	1	Group Point Total:	19	19	19

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)	Imp.	Points	Question
002 Reactor Coolant								2.02				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Loss of coolant pressure	4.2/4.4	1	873
006 Emergency Core Cooling											3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized	2.5/3.1	1	861
010 Pressurizer Pressure Control				4.01								Knowledge of design feature(s) and/or interlock(s) which provide for…Spray valve warm-up	2.7/2.9	1	876
011 Pressurizer Level Control					5.06							Knowledge of the following operational implications…Indicated charging flow: seal flow plus actual charging flow	2.9/3.2	1	877
012 Reactor Protection					5.01							Knowledge of the following operational implications…DNB	3.3/3.8	1	48
014 Rod Position Indication	1.02											Knowledge of physical connections and/or cause and effect relationships…NIS	3.0/3.3	1	893.1
[illegible]															
026 Containment Spray			3.02									Knowledge of the effect that a loss or malfunction …will have on …Recirculation spray system	4.2*/4.3	1	862
029 Containment Purge			3.02									Knowledge of the effect that a loss or malfunction …will have on …Containment entry	[illegible]	1	[illegible]
[illegible]															
035 Steam Generator							1.01					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the…S/G wide and narrow range level during start up, shut down and normal operation	3.6/3.8	1	400
[illegible]															
055 Condenser Air Removal			3.01									Knowledge of the effect that a loss or malfunction …will have on …Main condenser	2.5/2.7	1	547
062 AC Electrical Distribution				4.05								Knowledge of design feature(s) and/or interlock(s) which provide for…paralleling of AC sources (synchroscope)	2.7*/3.2	1	860
063 DC Electrical										4.03		Ability to manually operate and/or monitor in the control room…Battery discharge rate	3.0*/3.1	1	881
064 Emergency Diesel Generator							1.06					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the…Maintaining minimum load on the ED/G (to prevent reverse power)	3.1/3.4	1	748.1
[illegible]															
[illegible]															
079 Station Air								2.01				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Cross connection with IAS	2.9/3.2	1	900
086 Fire Protection											4.12	Knowledge of general crew operating responsibilities during emergency operations	3.4/3.9	1	460
K/A Category Totals:	1	0	3	2	2	0	3	3	1	2	3	Group Point Total:	20	20	20

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)	Imp.	Points	Question
005 Residual Heat Removal								2.02				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Pressure transient protection during cold shutdown	3.5/3.7	1	837.1
008 Component Cooling Water												randomly deselected			deselected
027 Containment Iodine Removal												randomly deselected			deselected
028 Hydrogen Recombiner and Purge Control						6.01						Knowledge of the effect that a loss or malfunction will have on …Hydrogen recombiners	2.8/3.1	1	767.1
034 Fuel Handling Equipment								2.01				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Dropped fuel element	3.6/4.4	1	137.1
041 Steam Dump/Turbine Bypass Control												randomly deselected			deselected
045 Main Turbine Generator										4.02		Ability to manually operate and/or monitor in the control room…T/G controls including breakers	2.7/2.6*	1	177
076 Service Water												Knowledge of design feature(s) and/or interlock(s) which provide for…Manual / automatic transfers of control	2.7/2.9	1	883
078 Instrument Air				4.01								Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Containment evacuation (including recognition of alarm)	3.5*/3.6*	1	859.1
103 Containment								2.04				Group Point Total:	8	8	8
K/A Category Totals:	0	1	0	1	0	1	0	3	1	1	0				

Plant Specific Priorities

System / Topic	Recommended Replacement for…	Reason	Points
035 Steam Generator	035A2.02	035A2.02 was replaced by a plant specific priority – the replaced K/A stated: *"Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of… reactor trip / turbine trip" (4.2/4.4).* The plant recently changed the S/G level range used for control during plant start up and shutdowns. This was deemed to be a plant-specific priority to ensure that the applicants had mastered the impact of this change on plant operations. Replaced with K/A 035A1.01 *"Ability7 to predict and / or monitor changes in parameters (to prevent exceeding design limits) associated with operating the S/G controls including S/G wide and narrow range level during startup, shutdown and normal operations" (3.6/3.8).*	1
078 Station Air	No replacement	K/A: *07SA2.01 Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Cross connection with IAS.* This is considered to be a plant specific priority due to a recent change in the system line up procedure. This was also randomly selected and did not require a replacement.	1
			2

Plant-specific Priority Total: (limit 10)

Category	K/A #	Topic	Imp.	Points	Question
Conduct of Operations					
	2.1.21	Ability to obtain and verify controlled procedure copy	3.1/3.2	1	143.1
	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of operation	3.9/4.0	1	331.1
	2.1.31	Ability to locate switches, controls and indications and to determine if they are correctly reflecting the desired plant lineup	4.2/3.9	1	164.1
			4	4	
Equipment Control	2.2.4	(multi unit) Ability to explain the variation in control board layouts, systems, instrumentation, and procedural actions between units at a facility	2.8/3.0*	1	260.1
	2.2.33	Knowledge of rod control programming	2.5/2.9	1	563.2
			3	3	
Radiation Control					
	2.3.2	Knowledge of facility ALARA program	2.5/2.9	1	124
	2.3.4	Knowledge of radiation exposure limits and contamination control including permissible levels in excess of those authorized	2.5/3.1	1	703.1
			3	3	
Emergency Procedures and Plan	2.4.25	Knowledge of fire protection procedures	2.9/3.4	1	910
	2.4.26	Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage	2.9/3.3	1	889
			3	3	
		Tier 3 Point Total	13	13	13

McGuire Sample Plan

Facility: McGuire		Date of Exam: 2/22/02						Exam Level: SRO					
		K/A Category Points										Point	
Tier	Group	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	Target
1 Emergency & Abnormal Plant Evolutions	1	3	1	6				2	10			2	24	24
	2	3	2	3				2	4			2	16	16
	3	0	1	0				0	1			1	3	3
	Tier Totals	6	4	9				4	15			5	43	43
2 Plant Systems	1	4	2	3	1	0	1	0	4	1	2	1	19	19
	2	0	0	2	2	2	1	3	4	0	1	2	17	17
	3	0	0	0	1	0	0	0	1	1	1	0	4	4
	Tier Totals	4	2	5	4	2	2	3	9	2	4	3	40	40
3	Generic Knowledge and Abilities	Cat 1			Cat 2			Cat 3			Cat 4			
		5			4			4			4		17	17
														Totals

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ES-401

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000001 Continuous Rod Withdrawal / 1	1.21						Knowledge of the operational implications of the following concepts as they apply to the...Integral rod worth	2.9/3.2	1	913
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W/E04 LOCA Outside Containment / 3			3.4				Knowledge for the reasons for the following responses...RO or SRO function within the control room team as appropriate to the assigned position in such as way that procedures are adhered to and the limitations in the facilities license and amendments are not violated	3.6/3.8	1	359.2
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W/E06 RCS Overcooling - PTS / 4			3.3				Knowledge for the reasons for the following responses...manipulation of controls required to obtain desired operating results during abnormal and emergency situations	3.7/3.8	1	888
000051 Loss of Condenser Vacuum / 4					2.02		Ability to determine and interpret...conditions requiring a reactor and/or turbine trip	3.9/4.1	1	453.1
000055 Station Blackout / 6	1.01						Knowledge of the operational implications of the following concepts ...Effect of battery discharge rates on capacity	3.3/3.7	1	906
000057 Loss of Vital Ac Elec. Inst. Bus. / 6				1.04			Ability to operate and/or monitor ...RWST and VCT valves	3.5/3.6	1	874
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000068 Control Room Evac. / 8				1.19			Ability to operate and/or monitor ...boric acid transfer pump	3.7/3.9	1	905
000074 (W/E06&E07) Inad. Core Cooling / 4		2.06					Knowledge of the interrelationships between...turbine bypass and atmospheric dump valves	3.5*/3.6	1	907
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000038 Steam Generator Tube Rupture / 3	1.02						Knowledge of the operational implications of the following concepts as they apply to the...leak rate vs. pressure drop	3.2/3.5	1	321
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000060 Accidental Gaseous Radwaste Rel. / 9							deselected at random			deselected
000061 ARM System Alarms / 7				1.01			Ability to operate and/or monitor ...automatic actuation	3.6/3.6	1	398
W/E16 High Containment Radiation / 9			3.10				Knowledge for the reasons for the following responses...Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and	2.9/3.1	1	684
000065 Loss of Instrument Air / 8							randomly deselected			deselected
K/A Category Totals:	3	2	3	2	4	2	Group Point Total:	16	16	15

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Points	Bank Question
000028 Pressurizer Level Malfunction / 2					2.02		Ability to determine and interpret…Pressurizer level as a function of power level or T-ave. including interpretation of malfunction	3.4/3.8	1	902
000036 Fuel Handling Accident / 8							randomly deselected			deselected
W/E 13 Steam Generator Over-pressure / 4							randomly deselected			deselected
W/E 15 Containment Flooding / 5		2.2					Knowledge of the interrelationships between…facility's heat removal systems, including primary coolant, emergency coolant, decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility	2.7/2.9	1	891
K/A Category Totals:	0	1	0	0	1	1	Group Point Total:	3	3	3

ES-401 — PWR RO Examination Outline — Form ES-401-4

17 / 4 — 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	K/A Topic(s)	Imp.	Points	Bank Question
001 Control Rod Drive									3.08			Ability to monitor automatic operation of the…Anticipation of criticality at any time when adding positive reactivity	3.9/4.0	1	866
001 Control Rod Drive				4.03								Knowledge of design feature(s) and/or interlock(s) which provide for…Rod control logic	3.5/3.8*	1	503.2
003 Reactor Coolant Pump						6.14						Knowledge of the effect that a loss or malfunction will have on …Staring requirements	2.6/2.9	1	867
003 Reactor Coolant Pump			3.02									Knowledge of the effect that a loss or malfunction …will have on…S/G	3.5/3.8*	1	715.1
004 Chemical Volume Control						6.04						Knowledge of the effect that a loss or malfunction will have on …Pumps	2.8/3.1*	1	613
004 Chemical Volume Control		2.06										Knowledge of bus power supplies to…control instrumentation	2.6*/2.7	1	885
013 Engineered Safety Features Actuation								2.01				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…LOCA	4.6/4.8	1	540
013 Engineered Safety Features Actuation				4.11								Knowledge of design feature(s) and/or interlock(s) which provide for…Vital power load control	3.2/3.8*	1	548
015 Nuclear Instrumentation				4.01								Knowledge of design feature(s) and/or interlock(s) which provide for…Source-range detector shutoff at high powers	3.1/3.3	1	878
015 Nuclear Instrumentation			3.03									Knowledge of the effect that a loss or malfunction …will have on …Fuel handling system	2.7/3.4*	1	897
017 In-core Temperature Monitor			3.01									Knowledge of the effect that a loss or malfunction …will have on …Natural circulation indications	3.5*/3.7*	1	911
022 Containment Cooling											4.22	Knowledge of the bases for prioritizing safety functions during abnormal / emergency operations	3.0/4.0	1	858
022 Containment Cooling		2.01										Knowledge of bus power supplies to…containment cooling fans	3.0*/3.1	1	898
025 Ice Condenser								2.02				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…High/low floor cooling temperature	2.7*/2.5*	1	681
056 Condensate	1.03											Knowledge of physical connections and/or cause and effect relationships…MFW	2.6*/2.6	1	415.1
056 Condensate								2.04				Ability to manually operate and/or monitor in the control room…Loss of condensate pumps	2.6/2.8*	1	649.1
059 Main Feedwater	1.03											Knowledge of physical connections and/or cause and effect relationships…S/Gs	3.1/3.3	1	914.1
059 Main Feedwater	1.05											Knowledge of physical connections and/or cause and effect relationships…RCS	3.1*/3.2	1	890
061 Auxiliary/Emergency Feedwater			3.02									Knowledge of the effect that a loss or malfunction …will have on …S/G	4.2/4.4	1	191.1
061 Auxiliary/Emergency Feedwater					5.03							Knowledge of the following operational implications…Pump head effects when control valve is shut	2.6/2.9*	1	158
068 Liquid Rad Waste										4.03		Ability to manually operate and/or monitor in the control room…Stoppage of release if limits are exceeded	3.9/3.8	1	407
071 Waste Gas Disposal	1.06											Knowledge of physical connections and/or cause and effect relationships…ARM and PRM systems	3.1*/3.1	1	771.1
072 Area Radiation Monitoring								2.02				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Detector failure	2.8/2.9	1	860
K/A Category Totals:	4	2	4	3	1	2	0	4	1	1	1	Group Point Total:	23	23	23

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)	Imp.	Points	Question
002 Reactor Coolant								2.02				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Loss of coolant pressure	4.2/4.4	1	873
008 Emergency Core Cooling											3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized	2.5/3.1	1	861
010 Pressurizer Pressure Control				4.01								Knowledge of design feature(s) and/or interlock(s) which provide for…Spray valve warm-up	2.7/2.9	1	876
011 Pressurizer Level Control					5.06							Knowledge of the following operational implications…Indicated charging flow: seal flow plus actual charging flow	2.9/3.2	1	877
012 Reactor Protection					5.01							Knowledge of the following operational implications…DNB	3.3/3.8	1	48
016 Non-nuclear Instrumentation												randomly deselected			deselected
027 Containment Iodine Removal												randomly deselected			deselected
028 Hydrogen Recombiner and Purge Control						6.01						Knowledge of the effect that a loss or malfunction will have on …Hydrogen recombiners	2.6/3.1	1	767.1
029 Containment Purge			3.02									Knowledge of the effect that a loss or malfunction …will have on …Containment entry	2.9*/3.5*	1	432.1
033 Spent Fuel Pool Cooling												randomly deselected			deselected
034 Fuel Handling Equipment								2.01				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Dropped fuel element	3.6/4.4	1	137.1
035 Steam Generator							1.01					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the…S/G wide and narrow range level during start up, shut down and normal operation		1	400
055 Condenser Air Removal			3.01									Knowledge of the effect that a loss or malfunction …will have on …Main condenser	2.5/2.7	1	547
062 AC Electrical Distribution				4.05								Knowledge of design feature(s) and/or interlock(s) which provide for…paralleling of AC sources (synchroscope)	2.7*/3.2	1	880
064 Emergency Diesel Generator							1.08					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the…Maintaining minimum load on the ED/G (to prevent reverse power)	3.1/3.4	1	748.1
075 Circulating Water												randomly deselected			deselected
079 Station Air								2.01				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Cross connection with IAS	2.9/3.2	1	900
086 Fire Protection											4.1	Knowledge of general crew operating responsibilities during emergency operations	3.4/3.9	1	460
103 Containment								2.04				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Containment evacuation (including recognition of alarm)	3.5*/3.6*	1	859.1
K/A Category Totals:	0	0	2	2	2	1	3	4	0	1	2	Group Point Total:	17	17	17

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)	Imp.	Points	Question
005 Residual Heat Removal								2.02				Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Pressure transient protection during cold shutdown	3.5/3.7	1	837.1
[redacted]															
008 Component Cooling Water												randomly deselected			deselected
041 Steam Dump/Turbine Bypass Control												randomly deselected			deselected
045 Main Turbine Generator										4.02		Ability to manually operate and/or monitor in the control room…T/G controls including breakers	2.7/2.8*	1	177
076 Service Water												randomly deselected			deselected
078 Instrument Air				4.01								Knowledge of design feature(s) and/or interlock(s) which provide for…Manual / automatic transfers of control	2.7/2.9	1	663
K/A Category Totals:	0	0	0	1	0	0	0	1	1	1	0	Group Point Total:	4	4	4

Plant Specific Priorities

System / Topic	Recommended Replacement for…	Reason	Points
035 Steam Generator	035A2.02	035A2.02 was replaced by a plant specific priority – the replaced K/A stated: *"Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of… reactor trip / turbine trip" (4.2/4.4).* The plant recently changed the S/G level range used for control during plant start up and shutdowns. This was deemed to be a plant-specific priority to ensure that the applicants had mastered the impact of this change on plant operations. Replaced with K/A 035A1.01 *"Ability7 to predict and / or monitor changes in parameters (to prevent exceeding design limits) associated with operating the S/G controls including S/G wide and narrow range level during startup, shutdown and normal operations" (3.6/3.8).*	1
079 Station Air	No replacement necessary	K/A: *079A3.01 Ability to predict the impacts of the following malfunction or operation…and based on those predictions, use procedures to correct, control or mitigate the consequences of…Cross connection with IAS.* This is considered to be a plant specific priority due to a recent change in the system line up procedure. This was also randomly selected and did not require a replacement.	1
Plant-specific Priority Total: (limit 10)			2

McGuire Sample Plan

Category	K/A #	Topic	Imp.	Points	Question
Conduct of Operations	2.1.21	Ability to obtain and verify controlled procedure copy	3.1/3.2	1	143.1
	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of operation	3.9/4.0	1	331.1
	2.1.31	Ability to locate switches, controls and indications and to determine if they are correctly reflecting the desired plant lineup	4.2/3.9	1	164.1
	Total		5	5	
Equipment Control	2.2.4	(multi unit) Ability to explain the variation in control board layouts, systems, instrumentation, and procedural actions between units at a facility	2.8/3.0*	1	260.1
	2.2.33	Knowledge of rod control programming	2.5/2.9	1	563.1
	Total		4	4	
Radiation Control	2.3.2	Knowledge of facility ALARA program	2.5/2.9	1	124
	2.3.4	Knowledge of radiation exposure limits and contamination control including permissible levels in excess of those authorized	2.5/3.1	1	703.1
	Total		4	4	
Emergency Procedures and Plan	2.4.25	Knowledge of fire protection procedures	2.9/3.4	1	910
	2.4.26	Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage	2.9/3.3	1	889
	Total		4	4	
		Tier 3 Point Total	17	17	17

NRC Written Exam Sample Plan Development Method

The sample plan was developed in accordance with the methodology recommended by the NRC in Attachment 1 of ES-401. The following statements amplify this process.

Differences of Method: The sample plan was developed using the random number generation function of Excel instead of using tokens. The random number generation function is programmed to produce an evenly distributed random number between 0 and the number entered into the argument of the function. For example, if the number 20 is entered as the argument, the function produces a resultant between 0 and 20 on an evenly distributed random basis. The result is mathematically equivalent to using the method of selection by tokens.

Initially, all K/A E/APE, System and Generic topics listed in ES-401 are screened and those topics that apply only to B&W or CE are eliminated. All NRC K/A topics and all Westinghouse (WE) E/APEs are retained for sampling. Using the selection methodology described in Attachment 1 to ES-401, an Excel spreadsheet is used to generate the RO examination. When the K/A is randomly selected, the author manually enters the corresponding K/A stem statement, the K/A description and importance rating from NUREG 1122.

SRO Exam Sampling: The SRO examination spreadsheet automatically imports all applicable RO K/As into the corresponding Tiers and Groups in the SRO sample plan. The final outcome results in 89 K/As that are common to both the RO and the SRO sample plans. There are 7 E/APEs and 4 Generic SRO-only K/As that must then be randomly selected to increase the number of questions to 100. These K/As are restricted to those K/As that are identified as having ties to 10CFR55.43(b) in NUREG 1122 for those K/As in Tiers 1 and 2. For Tier 3 (generic K/As), one additional SRO-only K/A is randomly added to each of the four K/A generic categories. It should be noted that there are very few generic K/As that were explicitly correlated to 10CFR55.43 in NUREG 1122 (and no generic K/As in category 2.3 (Radiation Control) although 10CFR55.43(b)(4) states: *"Radiation hazards that may arise during normal and abnormal situations, including maintenance activities, and emergency situations.")* This seems inappropriate, as one of the primary differences between the jobs of RO and SRO is the SRO responsibility for plant administrative tasks. Therefore, all generic K/As are randomly sampled when adding the fourth K/A to each generic category. These are then reviewed to ensure that an SRO-only question can be drafted to the K/A.

This produces an exam outline with 100 K/As of which 89 are common to both exams and 11 are unique to the SRO exam. Similarly, there will be 11 system K/As that are used on the RO exam but not used on the SRO exam due to the larger number of RO system K/As in the sample plan.

During the exam development process, 25 questions will be written that are unique to the SRO exam. The sampling process only identifies 11 of these questions. The exam authors will identify 14 additional SRO-only questions as they become more familiar

Tier and Group	Randomly Selected K/A	Reasons for Rejection
1 - 1	APE 026 Loss of Component Cooling Water G 2.2.4	There is no significant difference between Units 1 and 2 in regards to the Component Cooling Water system.
1-1	APE 026 Loss of Component Cooling Water G2.2.31	"Knowledge of procedures and limitations involved in initial core loading" does not apply to the CCW system because there are no procedures and limitations on this system that are unique to initial core loading..
1-2	APE 008 Pressurizer Vapor Space Accident AA1.05	This K/A states: *"Ability to operate and / or monitor the ...LPI system for a pressurizer vapor space accident (Relief Valve Stuck Open)"*. There is no plant requirement to operate the low-pressure injection system under these conditions because plant pressure would stabilize above the low pressure system injection point.
2-1	System 004 CVCS K6.12	Resampled from K6.12 top K6.04 because there is no BIT installed at McGuire. K6.12 only applies to systems with a Boron Injection Tank. Approved per telcon with Lee Miller on 10/10/01.
2-1	System 068 Liquid Radiological Release	System 068 (Liquid Radiological Release) was randomly selected to be tested twice. This system is already being tested once and the number of valid test items that could be developed is relatively small. The CVCS (NV) system was randomly selected to fill out the sample plan for a total of 23 RO systems.
2-1	System 071 Waste Gas Disposal	System 071 (Waste Gas Disposal) was randomly selected to be a tested twice. This system is already being tested once and the number of valid test items that could be developed is relatively small. The ESFAS system was randomly selected to replaced the WGD system and fill out the sample plan for a total of 23 RO systems.
2-1	System 072 Area Radiation Monitoring	System 072 (Area Radiation Monitoring) was randomly selected to be a second system for testing. This system is already being tested once and the number of valid test items that could be developed is relatively small. The Condensate system was randomly selected to replaced the ARM system and fill out the sample plan for 23 RO systems.
2-1	System 022 Containment Cooling G2.4.9	This generic K/A *"Knowledge of low power and shutdown implications in accident (e.g. LOCA, loss of RHR) mitigation strategies"* does not apply to the containment cooling system. The containment cooling system is not used to mitigate low power or shutdown accidents.

Draft Submittal
(Pink Paper)

1. Operating Test Simulator Scenarios

MCGUIRE EXAM

50-369, 370/2002-301
FEBRUARY 11 - 15, 2002

Facility: McGuire Scenario No.: 1 Op-test No.:_____

Examiners: _____ Operators: _____

_____ _____

_____ _____

Objectives: 1) The crew will deal with minor malfunctions that will be compounded by the rods not working in automatic. 2) The crew will have to cut load due to condenser dump valve being open and power going above 100%. 3)The crew will deal with a loss of essential bus as a result the crew will have to swap to the other train of components. 4) The crew must deal with a small NC leak that becomes a LOCA and a loss of ECR.

Initial Conditions: 100% Power/ "B" Train Components in Service/

Turnover: "1A" D/G Tagged/ "1A" AFW pump tagged/ Unit 2 is available for auxiliary steam/ Maintain present plant conditions

Event No.	Malf. No.	Event Type*	Event Description
1		RO	Tref failure - fails to 557 degrees
2		BOP	Pressurizer Level Channel 2 fails low
2		N	Place excess letdown in service
3		RO	Atmospheric dump valve fails open
3		R	Reduce turbine load due to dump valve failure
4		BOP	Loss of ETB with failure of D/G to start
5		M(ALL)	LOCA with a failure of ECR
			Post major event failures
			Main Steam isolation fails in automatic
			2 rods fails to insert on trip
			Automatic Phase "A" on "A" train does not work
			No automatic Safety Injection
			Sump suction valve fails to open automatically
			The loss of ETB is a DAS at MCGuire. It comprises 1% of the important core melt events.

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

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class 20

TOPIC: Nuclear Regulatory Commission Simulator Exam

Scenario 1

REFERENCES:

1. McGuire Technical Specifications
2. AP/1/A/5500/01 Steam Leak
3. AP/1/A/5500/12 Loss of Letdown, Charging or seal Injection
4. AP/1/A/5500/14 Rod Control Malfunction
5. AP/1/A/5500/07 Loss of Electrical Power
6. EP/1/A/5000/E-0 Reactor Trip or Safety Injection
7. EP/1/A/5000/E-1 Loss of Reactor or Secondary Coolant
8. EP/1A/5000/FR-P.1 Response to Imminent Pressurized Shock
9. EP/1/A/5000/FR.Z.1 Response to High Containment Pressure
10. EP/1/A/5000/ES-1.3 Transfer to Cold Leg Recirculation
11. RP/O/A/5700/00 Classification of Emergency

Author: _____
Facility Review: _____
NRC Review: _____

February 1, 2002
Rev.1

	Bench Mark	ACTIVITY	DESCRIPTION
☐	Sim. Setup	**Rod Step On**	
☐		**IC-142**	
☐		**RUN**	
☐		**Update** Status Board, **Setup OAC** **Setup** ICCM, Turbine Displays, & Trend Recorders. **Check** Rod Step Counters agree with rod positions	See Shift Turnover Information
☐		**(M) EPQ001A** **Set = 1**	Loss of D/G "1A" Control Power
☐		**(LOA) CA009** **Set = Rack Out**	Rack out breaker for "1A" Auxiliary Feedwater Pump
☐		**(MAL) IRE010D14** **(MAL) IRE010H2**	2 Rods fail to insert when tripped
☐		**(M) ISE002A** **(M) ISE002B**	No automatic S/I both trains
☐		**(M) ISE006A** **(M) ISE006B**	Failure of automatic Main Steam Isolation
☐		**(M) ISE003A**	Failure of Phase "A" Train "A" to automatically actuate
☐		**(OVR) SV005D** **Off - Insert**	Fails 1SV-47 OPEN
☐		**(M) NI002F** **Set = 0**	"A" train containment sump valve fails to automatically open
☐		**(M) NV020E** **Set = 100**	Fails 1NV-35 open

	Bench Mark	ACTIVITY	DESCRIPTION
☐		**Freeze.**	
☐		**Update Fresh Tech. Spec. Log.**	
☐		**Fill out the NLO's Available section of Shift Turnover Info.**	
☐	Prior to Crew Briefing	**RUN**	
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Direct the crew to Review the Control Boards taking note of present conditions, alarms.		
☐	T-0	Begin Familiarization Period	
☐	At direction of examiner	**(MAL) IRE001** **Set = 557**	Tref fails to 557 degrees
☐	At direction of examiner	**(XMT) ILE002** **Set = 0** **(M) NV020A** **Set = 0** **Set both to trigger 1**	Pressurizer level channel 2 fails to "0" INV-1A will not reopen
☐	At Direction of Examiner	**(MAL) IDE004A** **Set = 100** **Ramp = 2**	Fails atmospheric dump valve open
☐	At direction of examiner	**(MAL) EP008B**	Trips Operating Train ETB
☐	At step 39 of AP/07	**(M) NC007A** **Set = 1** **Ramp 300**	Initiates a small NC system leak
	At direction of examiner	**(M) NC008A**	Initiates LOCA
☐			**Delete malfunction when BOP opens 1NI-185A**
☐	**Terminate the scenario upon direction of Chief Examiner**		

Event 1: Tref failure

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Recognizes Unwarranted Control Rod Insertion and informs Crew. • No turbine or reactor power excursion • **Tref circuit failed to 557 degrees**	
	RO	Places CRD Bank Selector Switch to manual and verifies movement stopped	**RO places Rods in Manual** Checks rod movement stopped
	SRO	Enters AP/14, Rod Control Malfunctions and directs activities.	
	RO	Performs the following as necessary to maintain Tcolds 555 degrees to 557 degrees • Lower turbine load or • Borate NC system	
	RO	Announce occurrence on page	
	RO	Check all rods – ALIGNED WITH ASSOCIATED BANK	
	RO	Checks "Rod Control Urgent Failure" alarm dark	
	RO	Checks the following normal: • Turb Imp Pressure Channel 1 • T-ref • 1A NC loop T-ave • 1B NC loop T-ave • 1C NC loop T-ave • 1D NC loop T-ave	Go to Enclosure 4 (Response to Continuous Rod Movement)
	SRO	Go to Enclosure 4	
	SRO	• Evaluate rod movement • Check the following normal 1. Turb Imp Pressure Channel 1 2. T-ref 3. 1A NC loop T-ave 4. 1B NC loop T-ave 5. 1C NC loop T-ave 6. 1D NC loop T-ave • Checks to see if failed channel has been identified • Exit procedure	Tref circuit is the failure SRO should notify IAE to investigate and maintain Tcolds 555 degrees to 557 degrees by adjusting control rods in manual or adjusting turbine load or boration/dilution of NC system.

Event 2: Pressurizer Level Channel 2 Failure

	Pos.	Expected Actions/ Behavior	Comments
	BOP	On a loss of letdown ensure the following closed: • 1NV-458A • 1NV-457A • 1NV-35A	**1NV-35A will not close – BOP must attempt to close. Immediate action of AOP.**
	SRO	Enters AP/12 Loss of Letdown, Charging or Seal Injection	
	BOP	If at any time "REGEN HX LETDN HI TEMP" alarms, close: • 1NV-1A • 1NV-2A	BOP will take action if appropriate 1NV-1A closed due to failure
	RO	Stop any power or temperature changes in progress	
	RO	Announces occurrence on page	
	SRO	IF this AP entered due to loss of letdown only, then go to step 35.	SRO will go to step 35 in this AOP
	BOP	Ensures "NC Sys M/U Controller" in AUTO	
	BOP	Ensures charging flow going down to maintain Pzr at program level	
	BOP	Checks "Letdn Relief Hi Temp" alarm has remained dark	
	BOP	Checks 1NV-21A - closed	

Event 2: Pressurizer Level Channel 2 Failure

	Pos.	Expected Actions/ Behavior	Comments
	BOP	Checks Pzr heater group supply breakers – closed b. Check normal spray available c. Place the following Pzr heater groups in Manual and ON to maximize spray. • A • B • D	NO, due to level instrument failure BOP will perform the following: 1. Ensures the following are selected to an operable channel • "Pzr level control select" **1-3 position** • "Pzr level rec select" 2. Ensure Pzr level greater than 17% 3. Place the following switches in "MAN" • A • B • D 4 Close the following breakers: • A • B • "D 5 . Close C Pzr heater group supply breaker
	BOP	Checks the following OPEN • 1NV-1A • 1NV-2A	NO, go to step 42
	SRO	Checks to see if immediate restoration of normal letdown is possible • Both NV 1 & 2 open in the past 30 minutes • Orifice isolation valves closed before or at the same time as NV 1 & 2.	Orifice isolation valve NV-35 has not closed. So will go to step 47 to place excess letdown in service. *May have to provide management guidance that excess letdown is desired.*

Event 2: Pressurizer Level Channel 2 Failure LO

	Pos.	Expected Actions/ Behavior	Comments
	BOP	Establish excess letdown Adjust charging to minimum while maintaining the following: • NC pump seal injection flow greater than 6 gpm • Pzr level at program level 1. Opens the following: • 1KC-315B and 1KC-305B • Places 1NV-27B to VCT position 2. Opens and closes 1NV-26 3. Checks the following OPEN: • 1NV-94AC • 1NV-95B 4. Opens 1NV-24B and 1NV-25B 5. Slowly opens 1NV-26 while maintaining excess letdown heat exchanger temp. less than 200 degrees.	
	SRO	Go TO step 47.n	
	BOP	Notified chemistry that excess letdown is in service. Adjust charging flow as desired while maintaining: • NC pump seal injection flow greater than 6 gpm • Pzr level at program level • Operate Pzr heaters as desired	
	SRO	SRO should notify Work Control Center or IAE to investigate and repair failed instrument	**Tech Spec. 3.3.1 function 9**

Event 3: Atmospheric Dump Valve Fails OPEN

Time	Pos.	Expected Actions/ Behavior	Comments
	CREW	Recognizes symptoms of a steam leak • T-ave decreasing • Power increasing	T-ave-Tref annunicator may come in alarm
	SRO	Enters AP/01 Steam Leak	
	Crew	Monitors fold out page	
	RO	Reduces turbine load to maintain: • Excore NI – less than 100% • NC loop D/Ts - less than 60 degrees • T-ave at T-ref	
	BOP	Checks Pzr level –stable or going up	
	SRO	Will return to step 3 if Pzr level can not be maintained.	
	RO	Announces occurrence on page	
	RO	Identifies and isolates leak: • Checks S/G PORVs – CLOSED • Checks condenser dump valves –CLOSED • Checks atmospheric dump valves – 1 OPEN • Checks containment conditions – NORMAL • Checks turbine driven CA pump – OFF • Checks steam line drain valves – CLOSED • Checks Unit 2 – steam header pressure	*An atmospheric dump valve will be OPEN – RO must select "OFF RESET" on Steam dump interlock Bypass channel A and B. Isolation valve will not close. Must dispatch an operator to fail air to atmospheric dump valve.*
	SRO	Exits procedure when leak is isolated.	

Event 4: Loss of Operating Train ETB

Time	Pos.	Expected Actions/ Behavior	Comments
	Crew	Recognizes loss of operating train "ETB"	
	SRO	Checks bus energized and sequencer applying loads. SRO entered AP/07	The diesel will NOT start due to failure
Critical	BOP	If both NV pumps off, Then isolate NORMAL letdown. Start opposite train: • NV pump • KC pump • RN pump Go to step 3	
	SRO	Verifies NO Safety Injection has occurred If both NV pumps off then isolate: • Excess letdown • ND letdown If any pump was manually started per step 1 go to step 5	"A" train NV pump will be on
	SRO	Check D/Gs - OFF	
Critical	BOP	Align KC as follows: • Places 1KC-51A to AUTO • Ensures the following are open 1. 1KC-3A 2. 1KC-230A 3. 1KC-394A 4. 1KC-345A 5. If needed keep thermal barrier valves open raise KC flow to KF hx by opening 1KC-149 • Ensures KC flow is less than 4000 gpm per operating KC pump	
	SRO	Checks any charging pump – Running - YES	
	BOP	Align RN as follows: • Check 1A RN pump – Running – YES • Close 1RN-43A • Throttle 1RN–89A to desired cooling	
	SRO	Notifies Unit 2 RO to start 2A RN pump	***EXAMINER CUE:*** ***2A RN pump is running***
	SRO	Checks B/O on 1ETA	NO, go to step 22
	BOP	Checks 1RN-86A – OPEN	
	SRO	Dispatches operator to close: • 1KC-228B • 1KC-18B	

Event 4: Loss of Operating Train ETB

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Checks 1B ND train – was not in RHR mode	Go to step 30
	SRO	Checks normal letdown – IN SERVICE	No, may have operator place excess letdown back in service.
	SRO	Go to step 36	
	RO	Announces occurrence on page.	
	SRO	Checks D/G on bus that was blacked out - NO	• Place affected D/G Mode Select to "C/R" • Depress then release the "RESET" pushbutton for the affected train's sequencer. • Start D/G.
	BOP	Check bus energized and sequencer applying loads	• Place affected D/G Mode Select to "C/R" • Ensure normal and standby breaker open to allow auto loading of bus. • If bus not energized or sequencer not loading bus then go to Enclosure 1.
	SRO	Go to Enclosure 1 – Manual Loading of Emergency Bus	
	BOP	• Ensure S/I Reset • Check 1ETA – Energized from Offsite Power • Go to Step 15	
	BOP	Check 1ETB – Energized from Offsite Power - NO	Go to step 20
	BOP	Hold "RESET" on "1B D/G LOAD Seq" while completing steps 21 through 23.	

Event 4: Loss of Operating Train ETB

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Unload 1ETB bus as follows: 1. Open 1B CA pump breaker 2. Open the remaining pump breakers on 1ETB • NV • ND • NI • KC • RN • KF • Ensure Train B NS is reset and open NS pump breaker 3. Open 600v essential transformer feeder breakers: • 1ELXB • 1ELXD • 1ELXF	
	BOP	• Place "1B D/G Mode Select switch to "C/R" • Close "1ETB Emerg Breaker"	Breaker will not close. • Release "RESET" on "1B" D/G Load SEQ" • Stop D/G • Return to procedure and step in effect. • Go back to step 38 in body of procedure.
		NC LEAK WILL BEGIN AT THIS POINT	

Event 5: NC System Leakage AP-10 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Report either of the following: • Pzr level decreasing • Pzr press decreasing • Containment Vent Isol (EMF39) • "Ice Cond Doors Open" Annunciator	
	SRO	Go to AP/10 (Case II) NC System Leakage and directs activities	
	BOP	Report Pzr Level decreasing: • Report NV-238 opening • Open NV-241 while maintaining 6 gpm Seal Injection Flow • Starts additional NV Pump • Isolate excess letdown *If Pzr level less than 4% then: • Manually Trip Reactor • Manually SI	
	Crew	Returns to step 1 if Pzr level can not be maintained.	
	Crew	Isolated leak if location is known	
	BOP	Reports Pzr Pressure stable or trending to 2235 psig	
	RO	Reports Main Steam line is INTACT • Reactor power at turbine power • NC loop T-Ave is stable	
	SRO	When leak is determined greater than makeup capability, directs crew to trip reactor and initiate Safety Injection	
	RO	Manually trips Reactor (Train A & B)	Two rods fail to insert
Critical	BOP	Manually initiates Safety Injection both trains	

Event 5: LOCA E-0 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Go to EP/E-0 and directs activities	
	SRO	Reviews Foldout page with crew	NCP trip criteria based on loss of subcooling
	RO	Report Reactor Trip: • rod bottom lights • reactor trip breakers open • I/R amps decreasing	TWO rods will be stuck
	RO	Reports Turbine Generator tripped • TV's or GV's closed	
	BOP	Reports ETA and ETB energized	"B" will be de-energized
	RO	Reports SI status light - LIT	**After Immediate Actions are completed by operator they can close MSIV's if they recognize they are open and should be closed.**
	BOP	Report LOCA sequencers (A & B) actuated	
	RO	Announce "Unit 1 Safety Injection" on page	
	BOP	Checks ESF Monitor Light Panel • Groups 1,2 and 5 DARK • Group 3 LIT • Checks OAC in service	The "B" side of all panels will be dark
	BOP	Reports all Ss and St components in Group 4 NOT -LIT	If not already done BOP should manually initiate Phase "A" Train "A"
	RO	Reports that CA is running and at least 3 S/G's NR level > 17%	Motor driven pumps are not available.
	BOP	Reports KC pumps running	"A" train only
	BOP	Reports RN pumps running	"A" train only

Event 5: LOCA

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Directs Unit 2 Operator to throttle RN to minimum & start 2A RN pump	***EXAMINER CUE:*** • *2A RN pump is running*
	RO	Checks/reports all S/G pressures > 775 psig	
	BOP	Reports Containment pressure has remained less than 3 psig	NO • record approximate time of reactor trip • Check row G on Monitor Light Group 4 • If any row G is dark on energized train • Stop all NC pumps • Stop all RV pumps • Energize H2 igniters by depressing "ON" and Override • When time allows check Phase B HVAC equipment per Enclosure 2
	BOP	Report NV Pump to Cold Leg Flow gauge - indicating flow - YES • checks NC pressure < 1600 psig • checks NI pumps indicating flow • checks NC pressure – less than 286 psig • checks ND pumps – indicating flow to cold legs	
	SRO	When available notifies OSM or other SRO to implement Generic Enclosure 22	***EXAMINER CUE:*** ***OSM will ensure Generic Enclosure 22 is implemented.***
	RO	• Checks CA flow > 450 gpm and takes control of CA to maintain no load levels • checks VI header pressure > 60 psig • Maintains N/R level between 32% and 50%	RO will take control of auxiliary feedwater.
	BOP	• If any NC pump ON, then check Tave stable or trending to 557 degrees • If all NC pumps off, then check NC T-colds stable or trending to 557 degrees.	
	BOP	Reports Pzr PORV & Spray Valves closed	
	BOP	Reports subcooling > 0 degrees based on Core Exit Thermocouples	
	BOP	Reports all main steamlines INTACT	
	RO/ BOP	Report S/G tube rupture parameters indicate that S/G tubes intact	

Event 5: LOCA

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Checks if NC system is NOT intact: • Containment EMFs – normal • Ice Condenser Lower Inlet Doors Open alarm – DARK • Containment pressure < 1 psig • Containment sump level normal	Perform the following: • If H2 igniters are off then perform the following: Energize H2 igniters by depressing On and Overrride Dispatch operator to stop all NF AHU's • Implement F-0 CSFST • Go to E-1
		CSFST will necessitate going to P-1 then Z-1	**The crew will only do the first step on P-1 and based on pressure will exit P-1.**
	BOP	P-1 – Response to Imminent PTS Check NC pressure – Greater than 286 psig NO	ND pump flow is greater than 500 gpm – Then return to procedure and step in effect. Go to Z-1
	SRO	Will go to Z-1, Response to High Containment Pressure	
	CREW	If loss of emergency coolant recirc has occurred, THEN this procedure may be completed as time allows.	
	Crew	Monitors foldout page	
	BOP	Stop all NC pumps.	
	BOP	Ensure all RV pumps are in manual and off.	
	SRO	Dispatch operator to remove tags and close breakers for the following valves: • 1EMXA-R2A • 1EMXAB1-6B	
	BOP	Check containment pressure – LESS THAN 15 PSIG.	
	BOP	Check any NS pump - ON	
	SRO	The remainder of this EP may be performed as time allows.	

Event 5: LOCA

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	ES 1.3 Transfer to cold leg recirc.	
	BOP	Checks containment sump level – greater than 3 feet	
	BOP	Checks KC flow to each ND heat exchanger greater than 5000 gpm	No, on "B" train crew will do RNO
	BOP	Resets Safety Injection and Sequencer	**MAKE SURE SIMULATOR RUNNER READY TO DELETE MALFUNCTION FOR 1NI-185A IN NEXT STEP.**
Critical	BOP	Align ND system for recirc: Check 1NI-185A OPEN – NO Checks 1A ND pump on – YES Check 1NI-184B OPEN – NO Close 1FW-27A Check any ND pump on	Place the control permissive in "BYPASS" and open 1NI-185A Go to step 6b Go to step 6e
	BOP	Align NV and NI systems for recirc: Check NC pressure less than 1600 psig Close the following: • 1NI-115A • 1NI-144B Close 1NI-147A Close • 1ND-30A Align ND train discharge to NI and NV pump suctions: • Open 1NI-332A • Open 1ND-58A Close 1NI-100B – can not close • Close 1NV-221A	
	SRO	Check if NS should be aligned for recirc – NO go to step 9	
	SRO	Check is ND aux spray is required – NO go to step 10	

Event 5: LOCA

Time	Pos.	Expected Actions/ Behavior	Comments
	CREW	If at any time a B/O signal occurs, then restart S/I equipment previously on.	
	SRO	Checks for proper recirc flow and valve alignment Checks the following closed • 1ND-19A • 1NV-151A • 1NV-221A Checks flow indicated from: • NV pump • NI pump • ND pump Checks the following closed: • 1KC-50A • 1KC-1A Check KC flow to ND heat exchanger established	
	SRO	Implement F-0 CSFST	
	SRO	Return to procedure and step in effect.	
TERMINATE SCENARIO AT DIRECTION OF CHIEF EXAMINER			

EXAMINER NOTE: Be sure SRO classifies event at end of scenario.

Classification of event: ALERT

SHIFT TURNOVER INFORMATION

UNIT 1 STATUS:

{PRIVATE }Power Level: 100% NCS [B] 759ppm Pzr [B]: 759 ppm Xe: OAC

{PRIVATE }Power History: At 100% for 100 days Core Burnup: 200 EFPDs

CONTROLLING PROCEDURE: OP/1/A/6100/03 Controlling Procedure for Unit Operation

OTHER INFORMATION NEEDED TO ASSUME TO SHIFT:

"1A" Diesel Generator tagged for maintenance.
"1A" Auxiliary Feedwater pump tagged for oil change - PM
Unit 2 is available for auxiliary steam.
Reduce power to 90% to do turbine valve movement test.

Work Control SRO/Offsite Communicator	**Thad**
Unit 2 SRO	**Jim**

NLO's AVAILABLE

Unit 1	**Unit 2**
Aux Bldg. Robb	Aux Bldg. Joe
Turb Bldg. Fred	Turb/Service Bldg. Mike
Extra(s) Bill, Craig, Russ, Ron	

Facility: McGuire Scenario No.: 2 Op-test No.:_____

Examiners: _____ Operators: _____

Objectives: 1) Determine if the crew can deal with a variety of malfunctions using immediate actions and AOP's. 2) Determine if the crew can perform an orderly shutdown of the plant then handle a large STGR without filling the steam generator.

Initial Conditions: 55% Power/ "B" Train Components in Service/

Turnover: "1A" D/G Tagged/ "1A" AFW pump tagged/ Unit 2 is available for auxiliary steam/ Begin load increase

Event No.	Malf. No.	Event Type*	Event Description
1		RO	Power Range 43 fails high
2		BOP	Pressurizer Pressure channel 2 fails high
3		BOP	NC PORV 36 fails to 25% open - must close block valve to isolate
4		RO	S/G Control Valve failure - normal controller fails
5		M (ALL)	Steam generator Tube Leak - 40 gallons per minute
6		N	Removing Feedwater Pump from service
6		R	Load reduction due to shut down of plant
7		M (ALL)	SGTR - 430 gpm
			Post Major Event Failures
			Failure of automatic feedwater isolation
			MSIV on ruptured S/G will not close
			No automatic Safety Injection
			One reactor trip breaker will not open
			EMF for ruptured S/G failed as is

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

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class 20

TOPIC: Nuclear Regulatory Commission Simulator Exam

Scenario 2

REFERENCES:

1. McGuire Technical Specifications
2. AP/1/A/5500/06 Loss of S/G Feedwater
3. AP/1/A/5500/11 Pressurizer Pressure Anomalies
4. AP/1/A/5500/10 NC System Leakage Within the Capacity of both NV Pumps
5. AP/1/A/5500/16 Malfunction of Nuclear Instrumentation
5. EP/1/A/5000/E-0 Reactor Trip or Safety Injection
6. EP/1/A/5000/E-3 Steam Generator Tube Rupture
7. RP/O/A/5700/00 Classification of Emergency

Author: _____
Facility Review: _____
NRC Review" _____

February 1, 2002
Rev.1

—	Bench Mark	ACTIVITY	DESCRIPTION
☐	Sim. Setup	**Rod Step On**	
☐		**IC-143**	
☐		**RUN**	
☐		**Update** Status Board, **Setup OAC** **Setup** ICCM, Turbine Displays, & Trend Recorders. **Check** Rod Step Counters agree with rod positions	See Shift Turnover Information
☐		**(MAL) EPQ001A** **Set = 1**	Loss of D/G "1A" Control Power
☐		**(LOA) CA009** **Set = F**	Rackout breaker for "1A" Auxiliary Feedwater Pump
☐		**(M) SM006A**	MSIV on ruptured generator fails open
☐		**(M) ISE002A** **(M) ISE002B**	No automatic S/I both trains
☐		**(M) ISE007A** **(M) ISE007B**	Failure of Feedwater Isolation - both trains
☐		**(M) EMF133** **Set = 10**	Set EMF 33 at 10
☐		**(M) EMF173** **Set = 1**	Fails EMF 24 to "0"
☐		**(M) IPE001A** **(M) IPE002A**	Failure of "A" train reactor trip breaker to open
☐			

	Bench Mark	ACTIVITY	DESCRIPTION
☐		**Freeze.**	
☐		**Update Fresh Tech. Spec. Log.**	
☐		**Fill out the NLO's Available section of Shift Turnover Info.**	
☐	Prior to Crew Briefing	**RUN**	
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Direct the crew to Review the Control Boards taking note of present conditions, alarms.		
☐	T-0	Begin Familiarization Period	
☐	At direction of examiner	**(MAL) ENB013E** **Set = 200** **Ramp = 5**	Power Range NI 43 fails high
☐	At direction of examiner	**(MAL) NC003F** **Set = 25** **(XMT) NC039** **Set = 2500**	Pressurizer Pressure Channel 2 fails HIGH and NC PORV NC-36 sticks at 25% open **Set both to trigger 1**
☐	At direction of examiner	**(MAL) IFE009B1** **Set = 0** **Ramp = 5**	S/G "B" Control Valve Failure
	At direction of examiner	**(M) S/G001A** **Sel = 50** **Ramp = 120**	Initiates 50 gpm tube leak on "A" steam generator
☐		**(M) S/G001A** **Sel =435** **Ramp = 120**	Initiate once FWPT has been shutdown **Design basis tube rupture**
☐	**Terminate the scenario upon direction of Chief Examiner**		

Event 1: Power Range 43 Fails High

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Determines NI-43 has failed high and **places rods to manual**	Immediate action
	SRO	Entered AP/16 Malfunction of Nuclear Instrumentation	
	RO	Checks S/G levels at programmed level	Should place reg. Valve for "A" and "D" S/G to manual and return to program level
	RO	Announce occurrence over page	
	RO	Checks P/R channels – only one failed	
	RO	Positions "PR to S/G Program level defeat" switch to 41/43 position	
	RO	Secures any power increase.	
	BOP	Performs the following actions at the "Miscellaneous Control and Indication Panel" • Rod Stop Bypass to N43 • Power Mismatch Bypass to N43	
	BOP	Performs the following actions at the "Detector Current Comparator" drawer • Upper Section to N43 • Check upper section light lit • Lower Section to N43 • Check lower section light lit	
	BOP	Performs the following at the "Comparator and Rate" drawer • Comparator Channel to N43 • Check comparator light for N43 lit	
	BOP	Trips bistables for failed channel • Remove control power fuses from N43	
	RO	Checks the following status lights for the failed channel lit: • NUC Overpower Rod Stop Bypass • P/R Hi Flux Lo Stpt • P/r Hi Flux Hi Stpt • P/R Hi Flux rate	

Event 1: Power Range 43 Fails High

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Checks the following annunciators lit: • P/R Hi Voltage Failure • P/R Hi Flux Hi Stpt Alert • P/R Hi Flux Rate Alert	
	RO	Checks the following status light lit: • P/R Lo Setpoint Train A Trip Blocked • P/R Lo Setpoint Train B Trip Blocked	
	SRO	If desired to control S/G levels in auto then return affected s/G CF control valves to auto	
	RO	Ensures operable P/R channel selected to record on NIS recorder	
	RO	Adjust control rods to maintain T-ave at T-ref	
	RO	When T-ave within 1 degree of T-red and auto rod control desired then return control rods t auto	
	SRO	Instructs IAE to fail OTDT and OPDT bistables within 6 hours of failure	**Tech Spec evaluation** Table 3.3.1-1 • 3.3.1.2 • 3.3.1.3 • 3.3.1.6 • 3.3.1.16 b,c,d • 3.3.1.7
	CREW	Ensures proper bistables failed for P/R 43 • NC loop C OPDT Trip • NC loop C OTDT Trip	

Event 2 and 3: Pressurizer Pressure Channel 2 Fails High with NC 36 failed to 25%

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Recognizes/reports PZR pressure decreasing	
	SRO	Implements AP/11 Pzr Pressure Anomalies, Case 2 and directs activities	
	BOP	Reports Pzr Pressure decreasing	
Critical	BOP	Determines all channels not the same	Places "Pzr Pressure Control Select" to backup channel – 1-4 position
Critical	BOP	Checks/reports Pzr PORV's Closed	Will try to close – will not close – must close block valve
	BOP	Checks/reports Spray Valves Closed	
	BOP	Reports Pzr PORVs - closed	No for NC-36 will close 1NC-269
	BOP	Reports Spray Valves Closed	
	SRO	Go to Step 9	
	RO	Announce occurrence on page	
	BOP	Checks/reports NV-21A , CLOSED	
	BOP	Checks/reports Pzr A,B & D heaters ON	.
	BOP	Checks 1C PZR heater - ON	
	BOP	Checks Pzr pressure going UP	
	SRO	Go to step 21	
	SRO	Ensures "Pzr PRESS REC SELECT" is on an operable channel	
	SRO	Will notify Work control center and/or IAE to investigate and repair	**Failure will not be fixed** **Tech spec issue with two channels of OTdT inoperable.** **Tech Spec 3.0.3 for two channels** **Plus Tech Specs** • **3.3.1.6** • **3.3.1.8** • **3.3.2.1.d** • **3.3.2.8.b**

Event 4: Normal Controller for "B" S/G Fails Low

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Refer to annunciator responses • C-2	Annunciators on 1AD-4
	SRO	Goes to AP/06 Loss of Feedwater	
Critical	RO	Places Feed Regulator to Manual Restores S/G level to program level	**If S/G CF control valve fails to respond in manual then:** • **Select ALT on control circuit** • **Restore to program level**
	RO	Checks the following channel indicating the same: • Feed flow • Steam Flow • S/G Level	Immediate Action step
	RO	Checks S/G CF control valve in manual control	YES
	RO	When the following are met then return affected S/G CF control to automatic 1. Selected control channels indicated correctly • Feed flow • Steam flow • S/G level 2. Affected S/G level restored to program level 3. Automatic control is desired	
	SRO	Checks the reactor tripped	NO
	RO	Maintains S/G level	Go to step 7
	RO	Controls feed flow to maintain S/G NR level - at programmed level	
	SRO	Checks NC temperature with NC pumps on stable or trending to programmed temperature	
	SRO	Checks procedure enter due to failed controller	
	SRO	Contacts I&E to repair failed controller Exit procedure	**Failure will not be repaired**

Event 5: S/G Tube Leakage on "A" S/G

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Report either of the following: • Pzr level decreasing • Pzr press decreasing • **EMF 24 – Blocked - crew will not see**	
	SRO/ BOP/ RO	Refer to Ann. Response and/or AP 10 • Notify RP shift • RDW shift • CT lab • Refer to AP/10 • Have operator secure drains to TB sump	
	SRO	Go to AP/10 (Case I) S/G Tube Leakage and directs activities	
	BOP	Report Pzr Level decreasing: • Report NV-238 opening • Open NV-241 while maintaining 8 gpm Seal Injection Flow • Starts additional NV Pump • Reduce letdown to 45 gpm or isolate letdown *If level less than 11% then: • Manually Trip Reactor • Manually SI	
	SRO	If primary to secondary leak is greater than 100 gpm, then trip reactor and go to E-0	Leak is < 100 gpm
	RO	Announce occurrence on page	
	SRO	If at any time while in this procedure Pzr level can not be maintained stable then perform step 1.	
	BOP	Checks Pzr pressure – stable or trending to 2235 psig.	
	SRO	If NC leakage exceeds Tech Spec limits then ensure outside air pressure filter train in service.	**Tech Spec 3.4.13**
	SRO	Check if unit shutdown is required: 1. Leakage in one S/G – greater than 125 gpd 2. Reduce load in step 8 • Ensure reactor power is less than 50% within 1 hour of exceeding 125 gpd • Be in Mode 3 within 3 hours of exceeding 125 gpd.	
	SRO	Reduce load PER one of the following: • AP/1/A/5500/04 Rapid Downpower OR • OP/1A/6100/03 Controlling procedure for Unit Operation	

Event 5: S/G Tube Leakage on "A" S/G AP/04 Evaluation – Rapid Downpower

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Identify "C" S/G as having excessive leakage	AP/04 evaluation Rapid Downpower • Monitor foldout page • determine power reduction rate • check control rods in AUTO - YES • notify SOC of load reduction • initiate turbine load reduction • borate the NC system • check control rods moving in as required • check turbine impulse pressure > 290# • May refer to RP/00 Classification of Emergency and RP/10 Immediate NRC Notification Requirements • check turbine control in AUTO • check Unit 2 aux steam available to supply header • check P/R instruments indicate power < 40% • Check < P-8 • all CF flows < 40% • Impulse pressure < 290# • **Once FWPT is removed from service the leak size will increase**
	SRO	When leak is greater than makeup capability, directs crew to trip reactor and initiate Safety Injection	Crew will go back to step 1 of AP/10 when Pzr level begins decreasing
	RO	Manually trips Reactor (Train A & B)	
Critical	BOP	Manually initiates Safety Injection	

Event 6: SGTR on "A" S/G E-0 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Go to EP/E-0 and directs activities	
	SRO	Reviews Foldout page with crew	
	RO	Report Reactor Trip: • rod bottom lights • reactor trip breakers open • I/R amps decreasing	
	RO	Reports Turbine Generator tripped • TV's or GV's closed	
	BOP	Reports ETA and ETB energized	
	RO	Reports SI status light - LIT	
	BOP	Report LOCA sequencers (A & B) actuated	
	SRO/ RO	Announce "Unit 1 Safety Injection" on page	
	BOP	Checks ESF Monitor Light Panel • Groups 1,2 and 5 DARK • Group 3 LIT • Checks OAC in service	**If not already recognized the crew should initiate feedwater isolation.**
	BOP	Reports all Ss and St components in Group 4 NOT -LIT	
	RO	Reports that CA is running and at least 3 S/G's NR level > 17%	
	BOP	Reports KC pumps running	
	BOP	Reports RN pumps running	

Event: SGTR "A" S/G

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Directs Unit 2 Operator to throttle RN to minimum & start 2A RN pump	***EXAMINER CUE:*** • ***2A RN pump is running***
	RO	Checks/reports all S/G pressures > 775 psig	
	BOP	Reports Containment pressure has remained less than 3 psig	
	BOP	Report NV Pump to Cold Leg Flow gauge - indicating flow - YES • checks NC pressure < 1600 psig • checks NI pumps indicating flow - NO	Crew will ensure ND pump mini-flow valves are open
	SRO	When available notifies OSM or other SRO to implement Generic Enclosure 22	***EXAMINER CUE:*** ***OSM will ensure Generic Enclosure 22 implemented.***
	RO	• Checks CA flow > 450 gpm and takes control of CA to maintain no load levels • checks VI header pressure > 60 psig • Maintains N/R level between 11% and 50%	
	BOP	Checks NC pumps ON and Tave stable or trending to 557 degrees	If not stable and decreasing crew will go to Enclosure 3
	BOP	Reports Pzr PORV & Spray Valves closed	
	BOP	Reports subcooling > 0 deg.	
	BOP	Reports all main steamlines INTACT	
	RO/ BOP	Report S/G tube rupture parameters indicate that S/G tubes NOT intact	Implements F-0 and E-3

Event: STGR on "A" S/G E-3 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Implement CSF Status Trees and go to EP/E-3	
	SRO	Go to EP/E-3 and directs activities	
	SRO	Monitor foldout page	
	RO/ BOP	Identify "A" as the ruptured S/G	
	RO	Check at least one S/G - AVAILABLE FOR NC SYSTEM COOLDOWN	
	RO	Isolate steam flow from ruptured S/Gs as follows: • checks ruptured S/G PORV closed	
	RO	Check S/G 1B and 1C INTACT	
	RO	Check blowdown isolation valves - CLOSED: • 1BB- 1B • 1BB- 5A	
	BOP	Close steam drain and check "CLSD" light lit for ruptured S/Gs: • 1SM-83A (A SM Line Drain)	
Critical	RO	Close the following on ruptured S/Gs: • MSIV • MSIV bypass valve	MSIV on ruptured S/G will not close. RO will close other S/G • MSIVs • MSIV bypass valves • steam dumps • Close SM-14,SM-15,AS-12,TL-3 • SP1 and SP2 • Dispatch an operator to isolate steam line drains per enclosure 4 • When cooldown is initiated in subsequent steps then use intact S/G PORVs for steam dump.

Event 6: SGTR on "A" Steam Generator

Event:	Pos.	Expected Actions/ Behavior	Comments
	RO	Checks ruptured S/G NR levels greater than 11% Isolates feed flow to "A" S/G • Close 1CA-66AC • Close 1CA-62A	
	BOP	Checks Pzr PORV and isolation valves: • Power to all Pzr PORVs available • All Pzr PORVs CLOSED • At least one Pzr PORV isolation valve OPEN	
	RO	Checks main stream lines intact: • All S/G pressures stable or going up • All S/G pressurized	
	BOP	Reset the following: • S/I • Sequencers • Phase A isolation • Phase B isolation	
	BOP	Established VI to containment • 1VI-129B open • 1VI-160B open • 1VI-150B open • Checks VI header pressure > 85 psig.	
	RO	Controls intact S/G levels: • N/R level in all intact S/Gs > 11% • Throttles feed flow to maintain intact S/Gs N/R levels between 22% and 50%	
	BOP	Checks 1ETA and 1ETB energized by offsite power	
	SRO	Checks ruptured S/G identified	
	SRO	Checks the following closed on ruptured S/G: • MSIV • MSIV bypass valve	NO, MSIV open
	SRO	Checks ruptured S/G pressure greater than 280 psig.	

Event: STGR on "A" S/G

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Checks any NC pump running	
	SRO	When P-11 status light lit then block steamline isolation and maintain NC pressure less than 1955 psig.	
Critical	RO	Initiate a NC system cooldown as follows: Determine required core exit temperature based on lowest ruptured S/G pressure. • COND AVAILABLE FOR STEAM DUMP" status light – LIT • MSIV on intact S/Gs OPEN • Check low pressure steamline isolation – BLOCKED • Check core exit T/Cs – less than required temperature. • Stop NC system coodown • Maintain core exit T/Cs less than required temperature.	NO • If Pzr pressure is greater than 1955 psig, then depressurize to 1900 psig using Pzr PORV. • Depress "BLOCK" on low pressure steamline isolation block switches. • Maintain NC pressure less than 1955 psig. • Ensure Main Steam Isolation reset. • Ensure S/G PORVs reset. • Dump steam using all intact S/Gs PORVs at maximum rate as follows: 1. Close S/G PORV manual loader on ruptured S/G 2. Place intact S/G PORV manual loaders at 50% 3. Select "MANUAL" on "SM PORV MODE SELECT" 4. Adjust manual loader on intact S/G PORVs as required to control intact S/G depressurization rate at approximately 2 psig per second.
	SRO	Checks ruptured S/G pressure – stable or going up	
	SRO	Checks NC subcooling based on core exit T/Cs > than 20 degrees	

Event: STGR on "A" S/G

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Depressurizes the NC system 1. Checks ruptured S/G NR level less than 73% 2. Checks normal Pzr spray available 3. Initiates NC depressurization using maximum spray 4. Do not continue in procedure until one of the following satisfied: • NC subcooling less than 0 degrees • Pzr level greater than 76% Or • Both of the following NC pressure less than ruptured S/G pressure Pzr level greater than 11% • Go to step 23	If crew uses PORV go to step 21.
	Crew	Checks for S/I termination criteria 1. NC subcooling greater than 0 degrees 2. Secondary heat sink 3. NC pressure – stable or going up 4. Pzr level greater than 11%	Must meet all criteria to terminate.
	BOP	Stop S/I pumps as follows: • NI pumps • All but one NV pump	
	BOP	Isolate NV S/I flowpath • Check NV pump – SUCTION ALIGNED TO FWST • Check the following valves OPEN: 1NV-150B 1NV-151A • Close the following valves: 1NI-9A 1NI-10A	
		STOP SCENARIO HERE	
TERMINATE SCENARIO AT DIRECTION OF CHIEF EXAMINER			

EXAMINER NOTE: Be sure SRO classifies event at end of scenario.

Classification of event: Site Area Emergency

SHIFT TURNOVER INFORMATION

UNIT 1 STATUS:

{PRIVATE }Power Level: 55% NCS [B] 866 ppm Pzr [B]: 865 ppm Xe: Per OAC

{PRIVATE }Power History: Reduced power to 20% to add Oil to "D" reactor coolant pump. Core Burnup: 200 EFPDs

CONTROLLING PROCEDURE: OP/1/A/6100/03 Controlling Procedure for Unit Operation enclosure 4.1 step 3.21.

OTHER INFORMATION NEEDED TO ASSUME TO SHIFT:

"1A" Diesel Generator tagged for maintenance.
"1A" Auxiliary Feedwater pump tagged - PM
Unit 2 is available for auxiliary steam.
Continue load increase at 2 MW/Min.
Conditioned power level 100%.

Work Control SRO/Offsite Communicator **Thad**

Unit 2 SRO **Jim**

NLO's AVAILABLE

Unit 1	**Unit 2**
Aux Bldg. Robb	Aux Bldg. Joe
Turb Bldg. Fred	Turb/Service Bldg. Mike
Extra(s) Bill, Craig, Russ, Ron	

Facility: McGuire Scenario No.: Spare Op-test No.:_____

Examiners: _____ Operators: _____

_____ _____

_____ _____

Objectives: 1) Diagnose failures that are not readily understood such as letdown back pressure instrument and charging line leak. 2)Deal with a small steam generator tube leak after a large steam line break. This exercise will give the candidates opportunity to exercise a variety of AOPs and EOPs.

Initial Conditions: 70% Power/ Increasing Load/ "B" Train Component in service

Turnover: "A" D/G inoperable/ "A" CA pump tagged/Unit 2 is available for auxiliary steam/ Begin load increase to 100%.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Load Increase
1		R	Rod Withdrawal/Dilution
2		BOP	Letdown Back pressure Instrument Failure
3		RO	Steam Generator Narrow Level Instrument fails low
4		BOP	Charging Line Leak
5		RO	Power Mismatch Circuit Failure
6		M(ALL)	Steam Leak becomes Steamline Break Inside Containment with a SGTR
			Post Major Event Malfunctions
			No automatic spray actuation
			No Auto Main Steam Isolation - done manually
			Tube Leak on Faulted Steam Generator
			No automatic safety injection

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

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class 20

TOPIC: Nuclear Regulatory Commission Simulator Exam

Spare Scenario

REFERENCES:

1. McGuire Technical Specifications
2. AP/1/A/5500/06 Loss of S/G Feedwater
3. AP/1/A/5500/12 Loss of Letdown, Charging or Seal Injection
4. AP/1/A/5500/14 Rod Control Malfunction
5. AP/1/A/5500/10 NC System Leakage Within Capacity of Both Charging Pumps
5. EP/1/A/5000/E-0 Reactor Trip or Safety Injection
6. EP/1/A/5000/E-2 Faulted Steam Generator Isolation
7. EP/1/A/5000/E-3 Steam Generator Tube Rupture
8. EP/1/A/5000/FR-Z.1 Response to High Containment Pressure
9. RP/O/A/5700/000 Classification of Emergency

Author: Charles Lawyer
Facility Review: Tony Lamb
NRC Review"

December 6, 2001
Rev.1

SIMULATOR OPERATOR INSTRUCTIONS

–	Bench Mark	ACTIVITY	DESCRIPTION
☐	Sim. Setup	**Rod Step On**	
☐		**IC-144**	
☐		**RUN**	
☐		**Update** Status Board, **Setup OAC** **Setup** ICCM, Turbine Displays, & Trend Recorders. **Check** Rod Step Counters agree with rod positions	See Shift Turnover Information
☐		**(M) EPQ001A** **Set = Rack Out**	Loss of D/G "1A" Control Power
☐		**(LOA) CA009** **Set = Racked Out**	Rackout breaker for "1A" Auxiliary Feedwater Pump
☐		**(MAL) ISE006A** **(MAL) ISE006B** **Block auto**	Blocks auto main steam isolation
☐		**(MAL) ISE004B** **Block auto**	Failure of Phase "B" train "B" to actuate
☐		**(M) ISE002A** **(M) ISE002B**	Failure of automatic Safety Injection – both trains

	Bench Mark	ACTIVITY	DESCRIPTION
☐			
☐		**Freeze.**	
☐		**Update Fresh Tech. Spec. Log.**	
☐		**Fill out the NLO's Available section of Shift Turnover Info.**	
☐	Prior to Crew Briefing	**RUN**	
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Direct the crew to Review the Control Boards taking note of present conditions, alarms.		
☐	T-0	Begin Familiarization Period	
☐	At direction of examiner	**(XMT) NV030** **Set = 0**	Fails NV letdown back pressure regulator – causes a loss of letdown
☐	At direction of examiner	**(XMT) CF020** **Set = 0** **Ramp = 5**	Steam Generator "B" Narrow Range Instrument Fails
☐	At direction of examiner	**(MAL) NV008C** **Ramp = 10** **Set = 25**	Initiates leak on charging line

	Bench Mark	ACTIVITY	DESCRIPTION
☐	At direction of examiner	**(MAL) IRE001** **Set = 557**	Power Mismatch Circuit Failure
☐	At direction of examiner	**(MAL) SM007A** **Set = 3e4** **Ramp 200**	Initiates a Steam Leak
☐	At direction of examiner	**(MAL) SM007A** **Set = 4e6** **Set to trigger 1** **(MAL) SM001A** **Set = 200** **Set to trigger 1**	Initiates Steam Break Initiates a SGTR
☐	**Terminate the scenario upon direction of Chief Examiner**		

EVENT: Normal Operations – Turbine Load Decrease

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO RO	Notifies SOC of load increase	
	SRO RO	Increases load per OP/1/A/6300/001A and OP/1/A/6100/03 Determines load changing rate	
	RO	Depress the "LOAD RATE" pushbutton	
	RO	Set the selected rate of load change in the "Variable Display" window	
	RO	Depress the "ENTER" pushbutton	
	RO	Depress the "REFERENCE" pushbutton	
	RO	Set in the desired load	
	RO	Depress the "ENTER" pushbutton	
	RO	Depress the "GO" pushbutton	
	RO	Verify that the load starts to change at the selected rate	

Event: Normal Operations Rod Insertion

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Provide guidance to RO on expectations for rod withdrawal on load increase. • maintains control rods within insertion limits • AFD within target band	SRO should provide some general guidance as to using rods to maintain Tave within a pre-determined range of Tref.
	RO	Will withdraw rods as necessary based on instructions from SRO	
	BOP	Will dilute NC system per guidance provided	

Event: Letdown Back Pressure Instrument Failure

	Pos.	Expected Actions/ Behavior	Comments
	SRO	Enters AP/12 Loss of Letdown, Charging or Seal Injection	
	BOP	On a loss of letdown ensure the following closed: • 1NV-458A • 1NV-457A • 1NV-35A	Immediate action step
	BOP	If at any time "REGEN HX LETDN HI TEMP" alarms, close: • 1NV-1A • 1NV-2A	BOP will take action if appropriate
	RO	Stop and power or temperature changes in progress	
	RO	Announces occurrence on page	
	BOP	Checks "1B" NV pump - ON	
	BOP	Checks to following NV pump parameters stable: • Motor AMPs • Charging header pressure • Charging flow	
	BOP	Checks seal injection flow parameters: • Seal flow to each NC pump > 6 gpm • Seal Water Inj Filter Hi D/P alarm - DARK	
	SRO	IF this AP entered due to loss of letdown only, then go to step 35.	SRO will go to step 35 in this AOP
	BOP	Ensures "NC Sys M/U Controller" in AUTO	
	BOP	Ensures charging flow going down to maintain Pzr at program level	
	SRO	NOTE: A failure of the letdown pressure instrument may cause loss of letdown.	
	BOP	Checks "Letdn Relief Hi Temp" alarm has remained dark	**No, crew should evaluate note prior to step 37.**
	BOP	Checks 1NV-21A - closed	

Event: Letdown Backpressure Instrument Failure

	Pos.	Expected Actions/ Behavior	Comments
	BOP	Checks Pzr heater group supply breakers – closed YES	
	BOP	Checks the following OPEN • 1NV-2A • 1NV-2A	NO, go to step 42
	SRO	Checks to see if immediate restoration of normal letdown is possible • Both NV 1 & 2 open in the past 30 minutes • Orifice isolation valves closed before or at the same time as NV 1 & 2.	Yes, go to step 46.
	BOP	Establish normal letdown 1. Ensures 1NV-459 is closed 2. Place 1NV-124 in manual between 10-20% open 3. Establish cooling to Regenerative Hx by performing the following concurrently: • Throttle open 1NV-238 • Throttle 1NV-241 to establish approximately 8 gpm seal injection 4. Check the following OPEN • 1NV-1A • 1NV-2A 5. Open letdown line isolation valves: • 1NV-7B • 1NV-1A • 1NV-2A • 1NV-35A 1. Establish desired letdown rate by completing the following concurrently: • Slowly throttle open 1NV-459 • Adjust 1NV-124 to maintain letdown pressure between 250 and 350 psig. 2. Do not continue until desired flow rate is established. 3. Adjust charging flow as desired 4. Crew may stay on variable orifice or swap to 75 gpm orifice.	Crew should determine normal letdown control is not available and establish excess letdown. 1. Opens the following • 1KC-315 • 1KC-305 2. Places 1NV-27B to VCT position 3. Opens and closes 1NV-26 4. Checks to following OPEN • 1NV-94 • 1NV-95 5. Opens 1NV-24 and 1NV-25 6. Slowly opens 1NV-26 7. Notifies chemistry that excess letdown is in service.
	SRO	End of Procedure	

Event 2: Steam Generator "B" Narrow Range Level Failure

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Refer to annunciator responses • A-3 • B-3	Per annunciator response and AP/06 the operator will swap failed channel to operable channel
	RO	Places Feed Regulator to Manual Restores S/G level to program level	Immediate Action step
	RO	Checks the following channel indicating the same: • Feed flow • Steam Flow • S/G Level	Immediate Action step
	RO	Checks S/G CF control valve in manual control	YES
	RO	When the following are met then return affected S/G CF control to automatic 1. Selected control channels indicated correctly • Feed flow • Steam flow • S/G level 2. Affected S/G level restored to program level 3. Automatic control is desired	
	SRO	Checks the reactor tripped	NO
	RO	Maintains S/G level	Go to step 7
	RO	Controls feed flow to maintain S/G NR level - at programmed level	
	SRO	Checks NC temperature with NC pumps on stable or trending to programmed temperature	
	SRO	Checks procedure enter due to failed controller	
	SRO	Contacts I&E to repair failed controller Exit procedure	**Failure will not be repaired**

Event 3: NC System Leakage – Charging Line Leak AP-10 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Report either of the following: • Pzr level decreasing • Pzr press decreasing • Containment Vent Isol (EMF39) • "Ice Cond Doors Open" Annunciator	
	SRO	Go to AP/10 (Case II) NC System Leakage and directs activities	
	BOP	Report Pzr Level decreasing: • Report NV-238 opening • Open NV-241 while maintaining 6 gpm Seal Injection Flow • Starts alternate NV Pump • Reduce letdown to 45 gpm or isolate letdown *If Pzr level less than 11% then: • Manually Trip Reactor • Manually SI	
	RO	Announce Occurrence on page	
	SRO	If Pzr level can not be maintained go to step 1	
	SRO	If location of leak is known, than initiate actions to isolate leak.	Crew may go to step 18
	BOP	Reports Pzr Pressure at or increasing to 2235 psig	
	RO	Reports Main Steam line is INTACT • Reactor power at turbine power • NC loop T-Ave is stable	
	SRO	Refer to RP/000	
	SRO	Ensures OP/O/A/6450/11 done if NC leakage exceeds Tech Spec leakage	
	SRO	Ensures VCT aligned to FWST if VCT level goes below 16%	

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Checks the following EMFs normal: • 1EMF-38L • 1EMF-39L • 1EMF-40 • 1EMF-41 • 1EMF-46A • 1EMF-46B	
	BOP	Checks NC pump thermal barrier KC outlet flow computer alarms NORMAL	GO to step 17
	SRO	If leak is suspected on letdown line near demineralizers	It should not be suspected there.
	SRO	If leak on letdown line, then isolate leak as follows:	Leak is not on letdown line.
		If leak is on normal charging line then isolate as follows: 1. close letdown isolation valves • 1NV-458A • 1NV-457A • 1NV-35A • 1NV-1A • 1NV-2A 2. Isolate charging: • Close 1NV-244A • Close 1NV-245B • Manually throttle 1NV-238 to maintain 6-10 gpm seal injection flow per NC pump.	Crew should have already established excess letdown
	SRO	Checks the following NORMAL: • Pzr Safeties • Pzr PORvs • PRT Conditions	
	SRO	Checks CLAs level NORMAL	
	SRO	Checks the NCDT NORMAL	
	SRO	Checks the containment floor and equipment sumps NORMAL	

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Checks VCT intact	
	SRO	Checks NV pump suction – aligned to VCT	
	SRO	Verifies leak has been identified	
	SRO	Verifies leak has been isolated.	
	SRO	Exits procedure	

Event 4: Power Mismatch Circuit Failure

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Recognizes Unwarranted Control Rod Insertion and informs Crew. • No turbine or reactor power excursion • Tref normal	
	RO	If more than one rod dropped – trip Rx	
	RO	Places CRD Bank Selector Switch to manual and verifies movement stopped	**RO places Rods in Manual**
	SRO	Enters AP/14, Rod Control Malfunctions and directs activities.	
	RO	Perform the following to maintain T-colds 555 to 557 degrees. • Lower turbine load or raise T-cold Or • Borate the NC system to lower T-cold	
	RO	Announce occurrence on paging system	
	RO	Check all control banks aligned with associated bank	
	RO	Checks Rod Control Urgent Failure alarm DARK	
	RO	Checks to following reactor control instruments NORMAL • Turb Imp Press Ch 1 • T-ref indication • "1A" NC loop T-ave • "1B" NC loop T-ave • "1C" NC loop T-ave • "1D" NC loop T-ave	
	RO	Check Nuclear power P/R Channels - NORMAL	
	SRO	Will go to enclosure 4 based on unwarranted rod movement.	
	CREW	Evaluates the following prior to any control rod withdrawal: • Ensures no inadvertent mode change will occur. • Ensures rods are withdrawn in a deliberate manner.	

Event 4: Power Mismatch Failure

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Checks the following normal: • Turb Imp Press Ch 1 • T-ref indication	
	BOP	Checks the following channels - NORMAL	
	SRO	Checks if failed channel – HAS BEEN IDENTIFIED.	
	RO	When the problem is repaired then Ensure T-ave at T-ref +/- 1 degree and auto rod control is desired, then return rod control to auto.	
	SRO	Exits procedure	

Event: **Steam Line Break Inside Containment with SGTR** E-0 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Go to EP/E-0 and directs activities	
	SRO	Reviews Foldout page with crew	
	RO	Report Reactor Trip: • rod bottom lights • reactor trip breakers open • I/R amps decreasing	
	RO	Reports Turbine Generator tripped • TV's or GV's closed	
	BOP	Reports ETA and ETB energized	
	RO	Reports SI status light - LIT	
	BOP	Report LOCA sequencers (A & B) actuated	
	SRO/ RO	Announce "Unit 1 Safety Injection" on page	
	BOP	Checks ESF Monitor Light Panel • Groups 1,2 and 5 DARK • Group 3 LIT • Checks OAC in service	**Crew should take actions to correct Phase "B" alignment.**
	BOP	Reports all Ss and St components in Group 4 NOT -LIT	
	RO	Reports that CA is running and at least 3 S/G's NR level > 17%	
	BOP	Reports KC pumps running	
	BOP	Reports RN pumps running	

Event: **Steam Line Break Inside Containment**

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Directs Unit 2 Operator to throttle RN to minimum & start 2A RN pump	***EXAMINER CUE:*** • ***2A RN pump is running***
	RO	Checks/reports all S/G pressures > 775 psig	
	BOP	Reports Containment pressure has remained less than 3 psig	NO
	BOP	Report NV Pump to Cold Leg Flow gauge - indicating flow - YES • checks NC pressure < 1600 psig • checks NI pumps indicating flow - NO	
	SRO	When available notifies OSM or other SRO to implement Generic Enclosure 22	
	RO	• Checks CA flow > 450 gpm and takes control of CA to maintain no load levels • checks VI header pressure > 60 psig • Maintains N/R level between 11% and 50%	
	BOP	Checks NC pumps ON and Tave stable or trending to 557 degrees	If not stable and decreasing crew will go to Enclosure 3
	BOP	Reports Pzr PORV & Spray Valves closed	
	BOP	Reports subcooling > 0 deg.	
	BOP	Reports all main steamlines INTACT	NO, crew will go to E-2 and implement F-0 – Crew should go to Z-1

Event: **Steamline Break Inside Containment with SGTR** Z -1 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	CREW	If loss of emergency coolant recirc has occurred, THEN this procedure may be completed as time allows.	
	CREW	Monitors foldout page	
	BOP	Stop all NC pumps	
	BOP	Ensure all RV pumps are in manual and off.	
	SRO	Dispatch an operator to remove tags and close breakers for the following valves: • 1NI-173A • 1NI-178B	
	BOP	Checks containment pressure - LESS THAN 15 PSIG.	
	BOP	Check any NS pump - ON	
	SRO	The remainder of this EP may be performed as time allows.	

Event: Steam Line Break Inside Containment E-2

Time	Pos.	Expected Actions/ Behavior	Comments
	Crew	Monitors foldout page	
	Crew	Maintains one S/G available for NC system cooldown	
	SRO	Checks the following closed: • All MSIVs • All MSIV Bypasses	
	SRO	Check at least one S/G pressure – stable or going up	
	RO	Identifies faulted S/G; • Any S/G pressure – going down in an uncontrolled manner • Any S/G depressurized	
	RO	Checks faulted S/G PORV closed	
	RO	Isolates faulted S/G as follows for "A" S/G: • Check S/G A FDW Isolated status light LIT • Close 1CA-66A • Close 1CA-62A • Check closed 1BB-1A & 1BB-5A • Close 1SM-83	
	SRO	Checks if S/G tubes INTACT Checks EMFs normal • 1EMF-24 • 1EMF-25 • 1EMF-26 • 1EMF-27	NO, 1EMF-24 will indicated a tube leak
	SRO	Go to EP-E-3 Steam Generator Tube Rutpure	

Event: STGR on "A" S/G E-3 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Implement CSF Status Trees and go to EP/E-3	
	SRO	Go to EP/E-3 and directs activities	
	SRO	Monitor foldout page	
	RO/ BOP	Identify "A" as the ruptured S/G	
	RO	Check at least one S/G - AVAILABLE FOR NC SYSTEM COOLDOWN	
	RO	Isolate steam flow from ruptured S/Gs as follows: • checks ruptured S/G PORV closed	
	RO	Check S/G 1B and 1C INTACT	
	RO	Check blowdown isolation valves - CLOSED: • 1BB- 1 • 1BB- 5	
	BOP	Close steam drain and check "CLSD" light lit for ruptured S/Gs: • 1SM-83 (A SM Line Drain)	
	RO	Close the following on ruptured S/Gs: • MSIV • MSIV bypass valve	
	RO	Checks ruptured S/G NR levels greater than 11% (32% ACC) Isolates feed flow to "D" S/G • Closed 1CA-66A • Closed 1CA-62A	

Event: SGTR on "D" Steam Generator

Event	Pos.	Expected Actions/ Behavior	Comments
	BOP	Checks Pzr PORV and isolation valves: • Power to all Pzr PORVs available • All Pzr PORVs CLOSED • At least one Pzr PORV isolation calve OPEN	
	RO	Checks main stream lines intact: • All S/G pressures stable or going up • All S/G pressurized	NO, "A" depressurizing or depressurized
	BOP	Reset the following: • S/I • Sequencers • Phase A isolation • Phase B isolation	
	BOP	Established VI to containment • 1VI-129B open • 1VI-160B open • 1VI-150B open • Checks VI header pressure > 85 psig.	
	RO	Controls intact S/G levels: • N/R level in all intact S/Gs > 11% (32% ACC) • Throttles feed flow to maintain intact S/Gs N/R levels between 22% and 50%	
	BOP	Checks 1ETA and 1ETB energized by offsite power	
	SRO	Checks ruptured S/G identified	
	SRO	Checks the following closed on ruptured S/G: • MSIV • MSIV bypass valve	
	SRO	Checks ruptured S/G pressure greater than 280 psig.	NO, crew should go to ECA 3.1

Note to Examiner: Be sure SRO classifies event at end of scenario.

Classification of Event: Site Area Emergency

SHIFT TURNOVER INFORMATION

UNIT 1 STATUS:

Power Level: 100% NCS [B] 66 ppm Pzr [B]: 66 ppm Xe: 2895pcm

Power History: At this power for 400 days Core Burnup: 440 EFPDs

CONTROLLING PROCEDURE: OP/1/A/6100/03 Controlling Procedure for Unit Operation

OTHER INFORMATION NEEDED TO ASSUME TO SHIFT:

"1A" Diesel Generator tagged for maintenance.
"1A" Auxiliary Feedwater Pump Tagged for PM
Unit 2 is available for auxiliary steam

Begin load reduction to take the plant to mode 6 to begin refueling outage.
Reactor group has determined it will take 300 gallons of boric acid for the shutdown.
Insert 50 gallons of acid to begin shutdown and use rods for AFD control.
Begin load reduction at 2 MW/min.

Work Control SRO/Offsite Communicator **Thad**

Unit 2 SRO **Jim**

NLO's AVAILABLE

Unit 1	**Unit 2**
Aux Bldg. Eric	**Aux Bldg Bill**
Turb Bldg. Fred	**Turb/Service Bldg Buster**
Extra(s) Mark, Bruce	