Facility: Grand Gulf Nuclear Station Date of Exam: December 2, 2011

Tier	Group	RO K/A Category Points												SRO-Only Points		
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total
1. Emergency & Abnormal Plant Evolutions	1	1	5	2				4	2			6	20			7
	2	1	1	1				2	1			1	7			3
	Tier Totals	2	6	3				6	3			7	27			10
2. Plant Systems	1	4	3	4	3	1	3	2	2	2	1	1	26			5
	2	1	0	2	2	1	1	1	1	1	1	1	12			3
	Tier Totals	5	3	6	5	2	4	3	3	3	2	2	38			8

3. Generic Knowledge and Abilities Categories	1	2	3	4	Total	SRO 1	SRO 2	SRO 3	SRO 4	SRO Total
	3	3	2	2	10					7

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the “Tier Totals” in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.

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

8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics’ importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401 BWR Examination Outline - **RO** Form ES-401-1

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4						X	**2.4.11 Knowledge of abnormal condition procedures. 55.41(b)(10)**	4.0	4 F
295003 Partial or Complete Loss of AC / 6				X			**Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: AA1.04 D.C. electrical distribution system 55.41(b)(7)**	3.6	35 H
295004 Partial or Total Loss of DC Pwr / 6		X					**Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF D.C. POWER and the following: AK2.02 Batteries 55.41(b)(8)**	3.0	14 F
295005 Main Turbine Generator Trip / 3				X			**Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP: AA1.05 Reactor/turbine pressure regulating system 55.41(b)(4) & (10)**	3.6	20 F
295006 SCRAM / 1						X	**2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. 55.41(b)(7) & (10)**	4.5	25 F
295016 Control Room Abandonment / 7						X	**2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. 55.41(b)(10)**	3.9	36 H
295018 Partial or Total Loss of CCW / 8						X	**2.4.11 Knowledge of abnormal condition procedures. 55.41(b)(10)**	4.0	50 F
295019 Partial or Total Loss of Inst. Air / 8				X			**Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: AA1.01 Backup air supply 55.41(b)(4)**	3.5	8 H
295021 Loss of Shutdown Cooling / 4		X					**Knowledge of the interrelations between LOSS OF SHUTDOWN COOLING and the following: AK2.01 Reactor water temperature 55.41(b)(10) & (14)**	3.6	53 H
295023 Refueling Acc / 8			X				**Knowledge of the reasons for the following responses as they apply to REFUELING ACCIDENTS: AK3.02 Interlocks associated with fuel handling equipment 55.41(b)(6)**	3.4	59 F
295024 High Drywell Pressure / 5		X					**Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: EK2.02 HPCS 55.41(b)(7)**	3.7	24 H
295025 High Reactor Pressure / 3					X		**Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE: EA2.03 Suppression pool temperature 55.41(b)(10)**	3.9	15 H
295026 Suppression Pool High Water Temp. / 5						X	**2.2.39 Knowledge of less than or equal to one hour Technical Specification action statements for systems. 55.41(b)(10)**	3.9	60 F
295027 High Containment Temperature / 5									
295028 High Drywell Temperature / 5	X						**Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE: EK1.01 Reactor water level measurement 55.41(b)(10)**	3.5	58 H

295030 Low Suppression Pool Wtr Lvl / 5		X					**Knowledge of the interrelations between LOW SUPPRESSION POOL WATER LEVEL and the following: EK2.02 RCIC 55.41(b)(8) & (10)**	3.7	21 F
295031 Reactor Low Water Level / 2				X			**Ability to operate and/or monitor the following as they apply to REACTOR LOW WATER LEVEL: EA1.10 Control rod drive 55.41(b)(7) & (10)**	3.6	54 F
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1			X				**Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: EK3.03 Lowering reactor water level 55.41(b)(10)**	4.1	16 H
295038 High Off-site Release Rate / 9		X					**Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following: EK2.05 †Site emergency plan 55.41(b)(10)**	3.7	55 F
600000 Plant Fire On Site / 8						X	**2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. 55.41(b)(10)**	4.6	56 F
700000 Generator Voltage and Electric Grid Disturbances / 6					X		**Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: AA2.01 Operating point on the generator capability curve 55.41(b)(10)**	3.5	57 H
K/A Category Totals:	1	5	2	4	2	6	Group Point Total:		20

ES-401	BWR Examination Outline - **RO** Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)							Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295002 Loss of Main Condenser Vac / 3		X					**Knowledge of the interrelations between LOSS OF MAIN CONDENSER VACUUM and the following: AK2.07 Offgas system 55.41(b)(4)**	3.1	9 H
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2			X				**Knowledge of the reasons for the following responses as they apply to HIGH REACTOR WATER LEVEL: AK3.07 HPCS isolation 55.41(b)(7)**	3.2	39 F
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5									
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1				X			**Ability to operate and/or monitor the following as they apply to INADVERTENT REACTIVITY ADDITION: AA1.06 Reactor/turbine pressure regulating system 55.41(b)(7) & (10)**	3.3	52 H
295015 Incomplete SCRAM / 1									
295017 High Off-site Release Rate / 9									
295020 Inadvertent Cont. Isolation / 5 & 7	X						**Knowledge of the operational implications of the following concepts as they apply to INADVERTENT CONTAINMENT ISOLATION: AK1.02 Power/reactivity control 55.41(b)(7) & (10)**	3.5	40 H
295022 Loss of CRD Pumps / 1				X			**Ability to operate and/or monitor the following as they apply to LOSS OF CRD PUMPS: AA1.01 CRD hydraulic system 55.41(b)(7)**	3.1	61 H
295029 High Suppression Pool Wtr Lvl / 5									
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9					X		**Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS: EA2.01 Area radiation levels 55.41(b)(10)**	3.8	10 H
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5						X	**2.1.28 Knowledge of the purpose and function of major system components and controls. 55.41(b)(7)**	4.1	37 H
295036 Secondary Containment High Sump/Area Water Level / 5									
500000 High CTMT Hydrogen Conc. / 5									
K/A Category Point Totals:	1	1	1	2	1	1	Group Point Total:		7

ES-401 BWR Examination Outline - **RO** Form ES-401-1
Plant Systems - Tier 2/Group 1 (RO)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
203000 RHR/LPCI: Injection Mode			X									**Knowledge of the effect that a loss or malfunction of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) will have on following: K3.03 Automatic depressurization logic 55.41(b)(7)**	4.2	17 H
							X					**Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) controls including: A1.03 System flow 55.41(b)(8)**	3.8	38 F
205000 Shutdown Cooling		X										**Knowledge of electrical power supplies to the following: K2.02 Motor operated valves 55.41(b)(8)**	2.5	1 F
206000 HPCI														
207000 Isolation (Emergency) Condenser														
209001 LPCS		X										**Knowledge of electrical power supplies to the following: K2.03 Initiation logic 55.41(b)(8)**	2.9	41 F
209002 HPCS								X				**Ability to (a) predict the impacts of the following on the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A2.05 D.C. electrical failure: BWR-5,6 55.41(b)(7) & (10)**	2.8	62 H
211000 SLC											X	**2.1.31 Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. 55.41(b)(6) & (7)**	4.6	11 H
212000 RPS						X						**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR PROTECTION SYSTEM: K6.01 A.C. electrical distribution 55.41(b)(4) & (6) & (7)**	3.6	19 H
215003 IRM				X								**Knowledge of INTERMEDIATE RANGE MONITOR (IRM) SYSTEM design feature(s) and/or interlocks which provide for the following: K4.04 Varying system sensitivity levels using range switches 55.41(b)(7)**	2.9	2 H
215004 Source Range Monitor						X						**Knowledge of the effect that a loss or malfunction of the following will have on the SOURCE RANGE MONITOR (SRM) SYSTEM: K6.05 Trip units 55.41(b)(7)**	2.6	22 H

215005 APRM / LPRM										X		**Ability to manually operate and/or monitor in the control room: A4.06 Verification of proper functioning/ operability 55.41(b)(7)**	3.6	42 H
	X											**Knowledge of the physical connections and/or cause effect relationships between AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM and the following: K1.16 Flow converter/comparator network 55.41(b)(7)**	3.3	63 H
217000 RCIC									X			**Ability to monitor automatic operations of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) including: A3.01 Valve operation 55.41(b)(7)**	3.5	18 H
								X				**Ability to (a) predict the impacts of the following on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A2.09 Loss of vacuum pump 55.41(b)(7) & (10)**	2.9	64 H
218000 ADS				X								**Knowledge of AUTOMATIC DEPRESSURIZATION SYSTEM design feature(s) and/or interlocks which provide for the following: K4.02 Allows manual initiation of ADS logic 55.41(b)(7)**	3.8	43 F
	X											**Knowledge of the physical connections and/or cause-effect relationships between AUTOMATIC DEPRESSURIZATION SYSTEM and the following: K1.05 Remote shutdown system 55.41(b)(7)**	3.9	65 H
223002 PCIS/Nuclear Steam Supply Shutoff							X					**Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF controls including: A1.02 Valve closures 55.41(b)(7)**	3.7	66 H
239002 SRVs			X									**Knowledge of the effect that a loss or malfunction of the RELIEF/SAFETY VALVES will have on following: K3.01 Reactor pressure control 55.41(b)(7)**	3.9	67 H
259002 Reactor Water Level Control									X			**Ability to monitor automatic operations of the REACTOR WATER LEVEL CONTROL SYSTEM including: A3.06 Reactor water level setpoint setdown following a reactor scram 55.41(b)(7)**	3.0	3 F
261000 SGTS			X									**Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on the following: K3.05 Secondary containment radiation/ contamination levels 55.41(b)(8)**	3.2	26 H
262001 AC Electrical Distribution				X								**Knowledge of A.C. ELECTRICAL DISTRIBUTION design feature(s) and/or interlocks which provide for the following: K4.01 Bus lockouts 55.41(b)(8)**	3.0	72 H
262002 UPS (AC/DC)	X											**Knowledge of the physical connections and/or cause effect relationships between UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) and the following: K1.01 Feedwater level control 55.41(b)(4) & (7)**	2.8	7 H

263000 DC Electrical Distribution			X									**Knowledge of the effect that a loss or malfunction of the D.C. ELECTRICAL DISTRIBUTION will have on following: K3.03 Systems with D.C. components (i.e. valves, motors, solenoids, etc.) 55.41(b)(6) & (7)**	3.4	68 H
264000 EDGs					X							**Knowledge of the operational implications of the following concepts as they apply to EMERGENCY GENERATORS (DIESEL/JET): K5.05 Paralleling A.C. power sources 55.41(b)(7) & (10)**	3.4	27 H
300000 Instrument Air	X											**Knowledge of the connections and / or cause effect relationships between INSTRUMENT AIR SYSTEM and the following: K1.04 Cooling water to compressor 55.41(b)(4)**	2.8	23 H
		X										**Knowledge of electrical power supplies to the following: K2.01 Instrument air compressor 55.41(b)(4)**	2.8	69 F
400000 Component Cooling Water						X						**Knowledge of the effect that a loss or malfunction of the following will have on the CCWS: K6.07 Breakers, relays, and disconnects 55.41(b)(7)**	2.7	70 H
K/A Category Point Totals:	4	3	4	3	1	3	2	2	2	1	1	Group Point Total:		26

ES-401	BWR Examination Outline - **RO** Plant Systems - Tier 2/Group 2 (RO)	Form ES-401-1

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)	IR	#
201001 CRD Hydraulic														
201002 RMCS														
201003 Control Rod and Drive Mechanism														
201004 RSCS														
201005 RCIS					X							**Knowledge of the operational implications of the following concepts as they apply to ROD CONTROL AND INFORMATION SYSTEM (RCIS): K5.09 High power setpoints BWR-6 55.41(b)(5) & (7)**	3.5	12 H
201006 RWM														
202001 Recirculation						X						**Knowledge of the effect that a loss or malfunction of the following will have on the RECIRCULATION SYSTEM : K6.01 Jet pumps 55.41(b)(2) & (3)**	3.5	28 H
202002 Recirculation Flow Control														
204000 RWCU							X					**Ability to predict and/or monitor changes in parameters associated with operating the REACTOR WATER CLEANUP SYSTEM controls including: A1.07 RWCU drain flow 55.41(b)(3) & (10)**	2.9	29 H
214000 RPIS														
215001 Traversing In-core Probe														
215002 RBM														
216000 Nuclear Boiler Inst.			X									**Knowledge of the effect that a loss or malfunction of the NUCLEAR BOILER Instrumentation will have on following: K3.24 Vessel level monitoring 55.41(b)(3) & (7)**	3.9	30 H
219000 RHR/LPCI: Torus/Pool Cooling Mode											X	**2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. 55.41(b)(10)**	4.5	5 F
223001 Primary CTMT and Aux.														
226001 RHR/LPCI: CTMT Spray Mode										X		**Ability to manually operate and/or monitor in the control room: A4.12 Containment/drywell pressure 55.41(b)(7) & (10)**	3.8	13 F
230000 RHR/LPCI: Torus/Pool Spray Mode														
233000 Fuel Pool Cooling/Cleanup														
234000 Fuel Handling Equipment														
239001 Main and Reheat Steam				X								**Knowledge of MAIN AND REHEAT STEAM SYSTEM design feature(s) and/or interlocks which provide for the following: K4.08 Removal of non condensable gases from reactor head area 55.41(b)(3)**	2.5	44 F
239003 MSIV Leakage Control														

241000 Reactor/Turbine Pressure Regulator									X			**Ability to monitor automatic operations of the REACTOR/TURBINE PRESSURE REGULATING SYSTEM including: A3.08 Steam bypass valve operation 55.41(b)(4) & (5)**	3.8	71 H
245000 Main Turbine Gen. / Aux.			X									**Knowledge of the effect that a loss or malfunction of the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS will have on following: K3.05 Reactor feedwater pump 55.41(b)(4)**	2.7	45 F
256000 Reactor Condensate														
259001 Reactor Feedwater														
268000 Radwaste														
271000 Offgas														
272000 Radiation Monitoring				X								**Knowledge of RADIATION MONITORING System design feature(s) and/or interlocks which provide for the following: K4.03 Fail safe tripping of process radiation monitoring logic during conditions of instrument failure 55.41(b)(7) & (11)**	3.6	46 F
286000 Fire Protection								X				**Ability to (a) predict the impacts of the following on the FIRE PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A2.08 Failure to actuate when required 55.41(b)(4) & (10)**	3.2	51 F
288000 Plant Ventilation														
290001 Secondary CTMT														
290003 Control Room HVAC														
290002 Reactor Vessel Internals	X											**Knowledge of the physical connections and/or cause effect relationships between REACTOR VESSEL INTERNALS and the following: K1.09 LPCI 55.41(b)(3) & (8)**	3.2	6 H
K/A Category Point Totals:	1	0	2	2	1	1	1	1	1	1	1	Group Point Total:		12

Facility: Grand Gulf Nuclear Station Date of Exam: December 2, 2011

Category	K/A #	Topic	RO IR	RO #	SRO-Only IR	SRO-Only #
1. Conduct of Operations	2.1.1	**Knowledge of conduct of operations requirements. 55.41(b)(10)**	3.8	31 F		
	2.1.2	**Knowledge of operator responsibilities during all modes of plant operation. 55.41(b)(10)**	4.1	74 H		
	2.1.44	**Knowledge of RO duties in the control room during fuel handling such as responding to alarms from the fuel handling area, communication with the fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation. 55.41(b)(10)**	3.9	47 F		
	Subtotal			3		
2. Equipment Control	2.2.12	**Knowledge of surveillance procedures. 55.41(b)(10)**	3.7	75 F		
	2.2.35	**Ability to determine Technical Specification Mode of Operation. 55.41(b)(5)**	3.6	48 H		
	2.2.43	**Knowledge of the process used to track inoperable alarms. 55.41(b)(10)**	3.0	32 F		
	Subtotal			3		
3. Radiation Control	2.3.4	**Knowledge of radiation exposure limits under normal or emergency conditions. 55.41(b)(10)**	3.2	33 F		
	2.3.13	**Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. 55.41(b)(8) & (10)**	3.4	49 F		
	Subtotal			2		
4. Emergency Procedures / Plan	2.4.6	**Knowledge of EOP mitigation strategies. 55.41(b)(10)**	3.7	34 F		
	2.4.29	**Knowledge of the emergency plan. 55.41(b)(10)**	3.1	73 F		
	Subtotal			2		
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
2/1	263000 A4.02	Could not write a question (#68) for this KA that would not be double-jeopardy with the context of an already-written (and preferred) question (#14). Additionally, we could not write an operationally valid question for either of the two remaining A4 KA's; therefore, we randomly and systematically selected 263000 K3.03 as the replacement KA.
3	2.4.46	Could not write an operationally valid question (#73) for this KA without the question being a "system specific" one. Per ES-401, Section D.2.a (1st para.) this is unacceptable for Tier 3 questions. Randomly and systematically selected 2.4.29 as the replacement KA.
SYSTEMS DELETED		
201002	Reactor Manual Control System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
201004	Rod Sequence Control System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
201006	Rod Worth Minimizer System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
214000	Rod Position Information System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
215002	Rod Block Monitor System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
206000	High Pressure Coolant Injection (HPCI) – System is not part of BWR-6 design.	
207000	Isolation (Emergency) Condenser – System is not part of BWR-6 design.	
230000	RHR/LPCI: Torus/Pool Spray Mode – System is not part of the BWR-6 Mark III Containment design.	

Facility: Grand Gulf Nuclear Station Date of Exam: December 2, 2011

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	2												7	0		3		3
	Tier Totals												27	4		6		10
2. Plant Systems	1												26	2		3		5
	2												12		0	3		3
	Tier Totals												38	2		6		8
3. Generic Knowledge and Abilities Categories													10	1	2	3	4	7
														2	2	1	2	

Note:

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ES-401 BWR Examination Outline - **SRO** Form ES-401-1
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (SRO)

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4					X		**Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: AA2.05 Jet pump operability 55.43(b)(2)**	3.4	76 F
295003 Partial or Complete Loss of AC / 6						X	**2.4.41 Knowledge of the emergency action level thresholds and classifications. 55.41(b)(10) 55.43(b)(5)**	4.6	77 H
295004 Partial or Total Loss of DC Pwr / 6									
295005 Main Turbine Generator Trip / 3									
295006 SCRAM / 1									
295016 Control Room Abandonment / 7									
295018 Partial or Total Loss of CCW / 8									
295019 Partial or Total Loss of Inst. Air / 8									
295021 Loss of Shutdown Cooling / 4						X	**2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. 55.43(b)(2)**	4.2	78 H
295023 Refueling Acc / 8									
295024 High Drywell Pressure / 5									
295025 High Reactor Pressure / 3						X	**2.4.6 Knowledge of EOP mitigation strategies. 55.43(b)(5)**	4.7	79 H
295026 Suppression Pool High Water Temp. / 5									
295027 High Containment Temperature / 5									
295028 High Drywell Temperature / 5									
295030 Low Suppression Pool Wtr Lvl / 5									
295031 Reactor Low Water Level / 2									
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1					X		**Ability to determine and/or interpret the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: EA2.01 Reactor power 55.43(b)(5)**	4.3	90 H
295038 High Off-site Release Rate / 9					X		**Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: EA2.03 †Radiation levels 55.43(b)(4)**	4.3	80 H
600000 Plant Fire On Site / 8					X		**Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: AA2.17 Systems that may be affected by the fire 55.43(b)(5)**	3.6	81 H
700000 Generator Voltage and Electric Grid Disturbances / 6									
K/A Category Totals:					4	3	Group Point Total:		7

ES-401	BWR Examination Outline - **SRO** Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (SRO)						Form ES-401-1		
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295002 Loss of Main Condenser Vac / 3									
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2									
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5									
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1									
295015 Incomplete SCRAM / 1									
295017 High Off-site Release Rate / 9									
295020 Inadvertent Cont. Isolation / 5 & 7									
295022 Loss of CRD Pumps / 1									
295029 High Suppression Pool Wtr Lvl / 5						X	**2.2.40 Ability to apply Technical Specifications for a system. 55.43(b)(2)**	4.7	93 F
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5						X	**2.4.6 Knowledge of EOP mitigation strategies. 55.43(b)(5)**	4.7	82 H
500000 High CTMT Hydrogen Conc. / 5						X	**2.4.6 Knowledge of EOP mitigation strategies. 55.43(b)(5)**	4.7	92 H
K/A Category Point Totals:					0	3	Group Point Total:		3

ES-401 BWR Examination Outline - **SRO** Form ES-401-1
Plant Systems - Tier 2/Group 1 (SRO)

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
203000 RHR/LPCI: Injection Mode														
205000 Shutdown Cooling														
206000 HPCI														
207000 Isolation (Emergency) Condenser														
209001 LPCS											X	**2.2.37 Ability to determine operability and/or availability of safety related equipment. 55.43(b)(5)**	4.6	83 H
209002 HPCS														
211000 SLC											X	**2.2.40 Ability to apply Technical Specifications for a system. 55.43(b)(2)**	4.7	84 F
212000 RPS								X				**Ability to (a) predict the impacts of the following on the REACTOR PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A2.21 †Failure of individual relays to reposition: Plant-Specific 55.43(b)(2)**	3.9	91 H
215003 IRM														
215004 Source Range Monitor														
215005 APRM / LPRM														
217000 RCIC														
218000 ADS														
223002 PCIS/Nuclear Steam Supply Shutoff														
239002 SRVs														
259002 Reactor Water Level Control														
261000 SGTS								X				**Ability to (a) predict the impacts of the following on the STANDBY GAS TREATMENT SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A2.11 High containment pressure 55.43(b)(5)**	3.3	85 H
262001 AC Electrical Distribution														
262002 UPS (AC/DC)														

263000 DC Electrical Distribution														
264000 EDGs											X	**2.4.30 Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator. 55.43(b)(5)**	4.1	86 F
300000 Instrument Air														
400000 Component Cooling Water														
K/A Category Point Totals:								2			3	Group Point Total:		5

ES-401												BWR Examination Outline - **SRO** Plant Systems - Tier 2/Group 2 (SRO)		Form ES-401-1
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)	IR	#
201001 CRD Hydraulic														
201002 RMCS														
201003 Control Rod and Drive Mechanism											X	**2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. 55.43(b)(2)**	4.2	87 H
201004 RSCS														
201005 RCIS														
201006 RWM														
202001 Recirculation											X	**2.4.11 Knowledge of abnormal condition procedures. 55.43(b)(5)**	4.2	88 H
202002 Recirculation Flow Control														
204000 RWCU														
214000 RPIS														
215001 Traversing In-core Probe														
215002 RBM														
216000 Nuclear Boiler Inst.														
219000 RHR/LPCI: Torus/Pool Cooling Mode														
223001 Primary CTMT and Aux.														
226001 RHR/LPCI: CTMT Spray Mode														
230000 RHR/LPCI: Torus/Pool Spray Mode														
233000 Fuel Pool Cooling/Cleanup														
234000 Fuel Handling Equipment														
239001 Main and Reheat Steam														
239003 MSIV Leakage Control														
241000 Reactor/Turbine Pressure Regulator														
245000 Main Turbine Gen. / Aux.														
256000 Reactor Condensate														
259001 Reactor Feedwater														
268000 Radwaste														
271000 Offgas														
272000 Radiation Monitoring														
286000 Fire Protection														
288000 Plant Ventilation														
290001 Secondary CTMT														
290003 Control Room HVAC											X	**2.2.40 Ability to apply Technical Specifications for a system. 55.43(b)(2)**	4.7	89 F

290002 Reactor Vessel Internals													
K/A Category Point Totals:							0			3	Group Point Total:		3

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

Facility: Grand Gulf Nuclear Station	Date of Exam: December 2, 2011					
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.1	**Knowledge of conduct of operations requirements. 55.41(b)(10)**			4.2	97 F
	2.1.36	**Knowledge of procedures and limitations involved in core alterations. 55.43(b)(6)**			4.1	94 H
	Subtotal					2
2. Equipment Control	2.2.18	**Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc. 55.43(b)(5)**			3.9	98 H
	2.2.23	**Ability to track Technical Specification limiting conditions for operations. 55.43(b)(5)**			4.6	95 F
	Subtotal					2
3. Radiation Control	2.3.11	**Ability to control radiation releases. 55.43(b)(5)**			4.3	100 F
	Subtotal					1
4. Emergency Procedures / Plan	2.4.16	**Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, and severe accident management guidelines. 55.43(b)(5)**			4.4	99 F
	2.4.38	**Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required. 55.43(b)(5)**			4.4	96 F
	Subtotal					2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
3	2.3.4	Per Chief Examiner's direction, de-selected this KA. Reason: same Tier 3 KA was selected on both of the last two NRC SRO exams. Randomly and systematically replaced this KA with 2.3.11.
SYSTEMS DELETED		
201002	Reactor Manual Control System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
201004	Rod Sequence Control System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
201006	Rod Worth Minimizer System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
214000	Rod Position Information System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
215002	Rod Block Monitor System – System is not part of BWR-6 design. Functions of this system are incorporated into the Rod Control & Information System (201005).	
206000	High Pressure Coolant Injection (HPCI) – System is not part of BWR-6 design.	
207000	Isolation (Emergency) Condenser – System is not part of BWR-6 design.	
230000	RHR/LPCI: Torus/Pool Spray Mode – System is not part of the BWR-6 Mark III Containment design.	

Facility: **Grand Gulf Nuclear Station**	Date of Examination: **12/05/2011**
Examination Level: RO ☒ SRO ☐	Operating Test Number: LOT-2011

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N-R	Fire Door Surveillance GJPM-OPS-2011AR1 2.1.20 (4.6)
Conduct of Operations	M-R	Review Cooldown Record GJPM-OPS-2011AR2 2.1.23 (4.3)
Equipment Control	N-R	Prepare a Tagout GJPM-OPS-2011AR3 2.2.13 (4.1)
Radiation Control		
Emergency Procedures/Plan	P-R	Primary CTMT Water Lvl Determination EOP Att 29 GJPM-OPS-2011AR4 2.4.21 (4.0)

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

* Type Codes & Criteria:

(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Facility: **Grand Gulf Nuclear Station**	Date of Examination: **12/05/2011**
Examination Level: RO ☐ SRO ☒	Operating Test Number: LOT-2011

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N-R	Determine Fire Watch Requirements GJPM-OPS-2011AS1 K/A 2.1.2 (4.0)
Conduct of Operations	M-S	Plant Safety Index GJPM-OPS-2011AS2 K/A 2.1.20 (4.6)
Equipment Control	N-R	Review Adequacy of a Tagout GJPM-OPS-2011AS3 K/A 2.2.13 (4.3)
Radiation Control	N-R	Review Liquid Radwaste Discharge Permit GJPM-OPS-2011AS4 K/A 2.3.6 (3.8)
Emergency Procedures/Plan	N-R	EPP Classification GJPM-OPS-2011AS5 K/A 2.4.41 (4.6)

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Facility: **GRAND GULF NUCLEAR STATION** Date of Examination: **12/05/2011**

Exam Level: RO ☒ SRO-I ☐ SRO-U ☐ Operating Test No.: LOT-2011

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. 202001 A4.01 (3.7/3.7) / Shifting Reactor Recirc Pumps to Fast Speed (GJPM-OPS-B3306)	A-D-S	1
b. 217000 A4.04 (3.6/3.6) / RCIC Manual Startup (GJPM-OPS-E5102)	A-D-S	2
c. 241000 A2.06 (3.1/3.2) / Rotate EHC Pumps (GJPM-OPS-N3201)	A-D-S	3
d. 205000 A4.01 (3.7/3.7) / Startup Shutdown Cooling B (GJPM-OPS-E1201)	D-L-S	4
e. 223001 A2.11 (3.6/3.8) / Manually Initiate Suppression Pool Make Up (GJPM-OPS-E3013)	D-S	5
f. 212000 A2.03 (3.3/3.5) / Reactor Manual Scram Switch Test (Not yet added to JPM bank GJPM-OPS-C7105)	A-N-S	7
g. 400000 A4.01 (3.1/3.0) / Rotate CCW Pumps (GJPM-OPS-P4271)	A-D-S	8
h. 261000 A4.03 (3.0/3.0) / Secure SSTG With One Train In Standby Mode Following Automatic Initiation (GJPM-OPS-T4803)	D-S	9
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. 295015 AA1.01 (3.8/3.9) / Manually Venting the Scram Air Header (GJPM-OPS-EOP23)	D-E-R	1
j. 219000 A4.01 (3.8/3.7) / Startup RHR In Suppression Pool Cooling From the Remote Shutdown Panel (GJPM-OPS-C6101)	D-E	5
k. 262002 A4.01 (2.8/3.1) / Startup an ESF Static Inverter (Not yet added to JPM bank GJPM-OPS-L62-3)	N	6

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: **GRAND GULF NUCLEAR STATION** Date of Examination: **12/05/2011**

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ Operating Test No.: LOT-2011

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. 202001 A4.01 (3.7/3.7) / Shifting Reactor Recirc Pumps to Fast Speed (GJPM-OPS-B3306)	A-D-S	1
b. 217000 A4.04 (3.6/3.6) / RCIC Manual Startup (GJPM-OPS-E5102)	A-D-S	2
c. 241000 A2.06 (3.1/3.2) / Rotate EHC Pumps (GJPM-OPS-N3201)	A-D-S	3
d. 205000 A4.01 (3.7/3.7) / Startup Shutdown Cooling B (GJPM-OPS-E1201)	D-L-S	4
e. 223001 A2.11 (3.6/3.8) / Manually Initiate Suppression Pool Make Up (GJPM-OPS-E3013)	D-S	5
f. 212000 A2.03 (3.3/3.5) / Reactor Manual Scram Switch Test (Not yet added to JPM bank GJPM-OPS-C7105)	A-N-S	7
g. 400000 A4.01 (3.1/3.0) / Rotate CCW Pumps (GJPM-OPS-P4271)	A-D-S	8
h. NA		

In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

System / JPM Title	Type Code*	Safety Function
i. 295015 AA1.01 (3.8/3.9) / Manually Venting the Scram Air Header (GJPM-OPS-EOP23)	D-E-R	1
j. 219000 A4.01 (3.8/3.7) / Startup RHR In Suppression Pool Cooling From the Remote Shutdown Panel (GJPM-OPS-C6101)	D-E	5
k. 262002 A4.01 (2.8/3.1) / Startup an ESF Static Inverter (Not yet added to JPM bank GJPM-OPS-L62-3)	N	6

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: Grand Gulf Nuclear Station Scenario No.: 1 Op-Test No.: 12/11

Examiners: ______________________ Operators: ______________________

Objectives: To evaluate the candidates' ability to operate the facility in response to the following evolutions:

1. Inoperable Primary Containment Air Lock
2. Rotate CRD Pumps.
3. Respond to a CRD Pump Trip.
4. Lower reactor power using Recirc Flow Control.
5. Respond to a Recirc Pump Trip.
6. Respond to ST-11 and 15AA lockout.
7. Take actions for RPS fails to scram.
8. Take actions for an ATWS.
9. Respond to a FW Line A Break in the Drywell.

Initial Conditions: Operating at 100% power.

Inoperable Equipment: None

Turnover:

The plant is at rated power. Rotate CRD pumps in accordance with the C11-1 SOI in preparation for CRD pump "A" maintenance. There is no out of service equipment and EOOS is GREEN. It is a division 1 work week.

Scenario Notes:

This scenario was written from lesson plan GSMS-RO-EP033 revision 6. Attributes have been altered in order to meet the requirements of NUREG 1021 ES-301 section D.5.b, and is considered significantly modified.

Validation Time: 60 minutes

Event No.	Malf. No.	Event Type †	Event Description
1		TS (CRS)	Primary Containment Air Lock seal fails to inflate (TS 3.6.1.2)
2		N (BOP)	Rotate CRD pumps (SOI 04-1-01-C11-1 section 5.5)
3	C11028b	C (BOP) A (CREW)	CRD pump Trip (CRD Malfunctions (05-1-02-IV-1) ONEP section 2.1.2)
4		N (BOP) R (ACRO)	Lower generator load by 200 MWe using FCV's (IOI 03-1-01-2 Attachment VIII)
5	rr012a	C (ACRO) R (BOP) A (CREW) TS (CRS)	Recirc Pump Trip (Reduction in Recirc Flow (05-1-02-III-3) ONEP, TS 3.4.1, TR 3.4.1)
6	r21133a r21139e	M (CRS, BOP)	Service Transformer 11 and ESF 15AA bus lockout (Loss of AC Power (05-1-02-I-4) ONEP)
7	c71076	I (ACRO)	RPS fails to scram the reactor when the second Recirc pump trips and the Exclusion Region of the power to flow map is entered (Reduction in Recirc Flow (05-1-02-III-3) ONEP) ∗ **Second Recirculation pump trips. Crew inserts manual reactor scram as observed by control rods inserted and scram annunciators received. Criterion is to give the highest priority to insert a manual scram.**

8	c11164 e51044	M (All)	ATWS <4% power with reduced feed capability (EP-2A) * **When EP-2A requires Emergency Depressurization, Crew terminates and prevents all injection except boron, CRD, and RCIC per 02-S-01-27 Operations Philosophy. Feedwater and ECCS system alignments prevent injection into the RPV as evidenced by available instrumentation. Criterion is to give the highest priority to prevent all injection except boron, CRD, and RCIC until reaching MSCP.** * **Reactor pressure decreases to MSCP. Crew commences and slowly raises injection utilizing available EP-2A Table 4 and/or Table 5 systems with RPV level restored and maintained to greater than -191". Criterion is to give the highest priority to restore RPV level greater than -191".**
9	fw171a rr063a	M (ACRO)	Feedwater Line A rupture inside the Drywell.

† (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (A)bnormal (TS) Tech Spec

* **Critical Task** (As defined in NUREG 1021 Appendix D)

Quantitative Attributes Table

Normal Events	2	Abnormal Events	2
Reactivity Manipulations	2	Total Malfunctions	6
Instrument/Component Failures	3	EP Entries (Requiring substantive action)	1
Major Transients	3	EP Contingencies	1
Tech Spec Calls	2	Critical Tasks	3

Facility: Grand Gulf Nuclear Station Scenario No.: 2 Op-Test No.: 12/11

Examiners: ______________________ Operators: ______________________

______________________ ______________________

______________________ ______________________

Objectives: To evaluate the candidates' ability to operate the facility in response to the following evolutions:

1. Place SSW "A" in STANDBY.
2. Raise reactor power using Recirc Flow Control.
3. RPS "A" MG failure.
4. Electric Power Monitoring Assembly INOPERABLE.
5. Two APRM channel failures.
6. Fuel cladding leak.
7. RCIC fails to start on initiation.
8. RCIC room unisolable steam leak.

Initial Conditions: Operating at 85% power.

Inoperable Equipment: APRM "F" is failed downscale and bypassed.

Turnover:

A plant startup is in progress with all steps complete up to step 6.8 of Attachment II in 03-1-01-2 (Power Ascension From 60% to Full Power). The crew will place SSW "A" in STANDBY upon assuming the shift. When SSW "A" is in STANDBY, raise reactor power to 100% of rated.

Scenario Notes:

This scenario was written from lesson plan GSMS-RO-EP015 rev. 8. Attributes have been altered in order to meet the requirements of NUREG 1021 ES-301 section D.5.b, but is not considered significantly modified.

Validation Time: 50 minutes

Event No.	Malf. No.	Event Type †	Event Description
1	p41f005a_i	C (BOP)	Place SSW “A” in Standby (SOI 04-1-01-P41-1 section 4.6)
2		N (BOP) R (ACRO)	Raise Reactor power using FCV’s (IOI 03-1-01-2 Att. 2 step 6.8)
3	c71077a	C (BOP) A (CREW)	RPS “A” MG failure (Loss of One or Both RPS Buses (05-1-02-III-2) ONEP)
4		TS (CRS)	Electric Power Monitoring Assembly INOPERABLE (TS 3.3.8.2)
5	c51010f c51010d	I (ACRO) TS (CRS) A (CREW)	Two APRM channel failures (ARI/TS 3.3.1.1)
6	rr071 rm157a rrd21k648a_d rrd21k648b_d rrd21k648c_d rrd21k648d_d	M (CREW) R (ACRO)	Fuel cladding leak (Off-Gas Activity High (05-1-02-II-2) and SCRAM (05-1-02-I-1) ONEP) ∗ **Fuel failure is occurring and main steam line radiation is greater than 3 times normal full power background as indicated by MSL B / MSL C RAD HI-HI or MSL A / MSL D RAD HI-Hi alarms, the crew closes MSIVs and MSL drains per EP-4. The crew closes the MSIVs and MSL drains and observes valve position indications and lowering pressure trend downstream of the MSIVs. Criterion is to give the highest priority to close the four inboard MSIVs or the four outboard MSIVs and MSL drains when MSL radiation is greater than 3 times normal full power background.**
7	e51043 DI_1E51M625D	I (ACRO / BOP)	RCIC fails to start on initiation (SOI 04-1-01-E51-1)

8	e51187a e51187b rrd21k603 rrd21k613	M (CREW) I/C (ACRO / BOP)	RCIC room unisolable steam leak (EP-4) * **A primary system is discharging outside primary containment and area temperatures, radiation levels, or water levels are above their max safe values in two or more areas. The crew opens 8 ADS/SRVs and observes lowering pressure trend and valve position indications (tailpipe pressure indication lamps or solenoid valve energized). Criterion is to give the highest priority to open at least seven SRVs when area temperatures, radiation levels, or water levels are above their maximum safe values in two or more areas.**

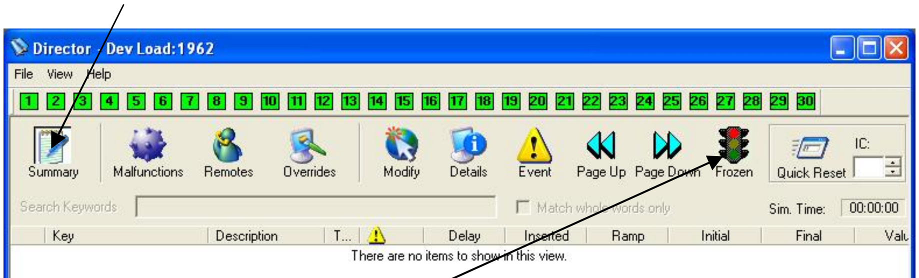
† (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (A)bnormal (TS) Tech Spec

* **Critical Task** (As defined in NUREG 1021 Appendix D)

Quantitative Attributes Table

Normal Events	1	Abnormal Events	3
Reactivity Manipulations	2	Total Malfunctions	5
Instrument/Component Failures	4	EP Entries (Requiring substantive action)	2
Major Transients	2	EP Contingencies	1
Tech Spec Calls	2	Critical Tasks	2

7. Click the Summary tab in the Director window. Verify the schedule files are loaded and opened per Section B below. (Note: Any actions in the schedule file without a specific time will not load into the director until triggered.)



8. Take the simulator out of freeze.

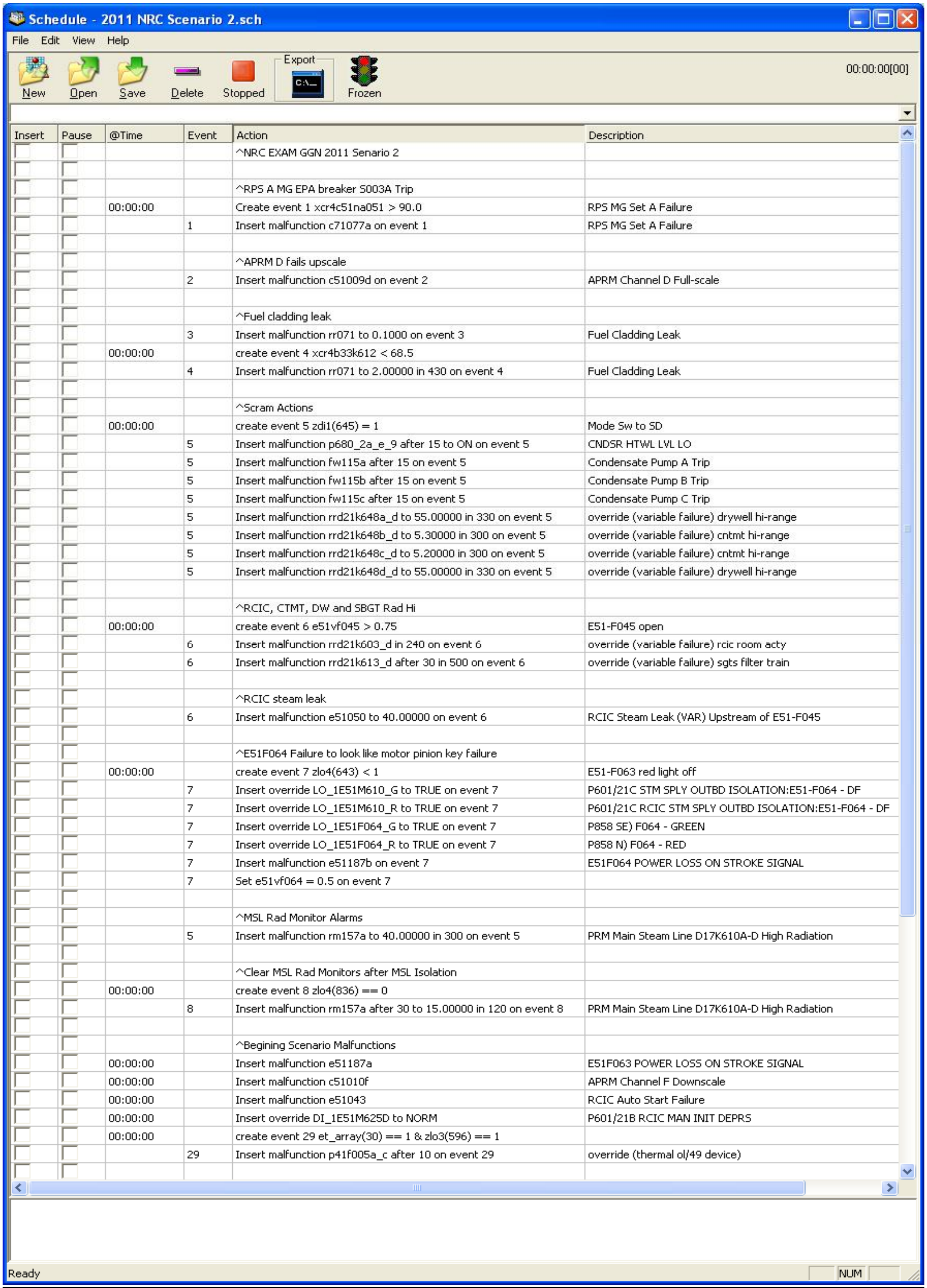
9. Log on to all simulator PDS and SPDS computers.

10. Verify or perform the following:
    - IC-33
    - SSW "A" started normally.
    - After SSW "A" is running, trigger event 30 to setup malfunction p41f005a_c (thermal ol/49 device)
    - APRM "F" is bypassed and caution tagged
    - APRM's are turned on (4,1,2,3)
    - Ensure the correct rod movement sequence available at the P680.
    - Advance all chart recorders and ensure all pens inking properly.
    - Clear any graphs and trends off of SPDS.

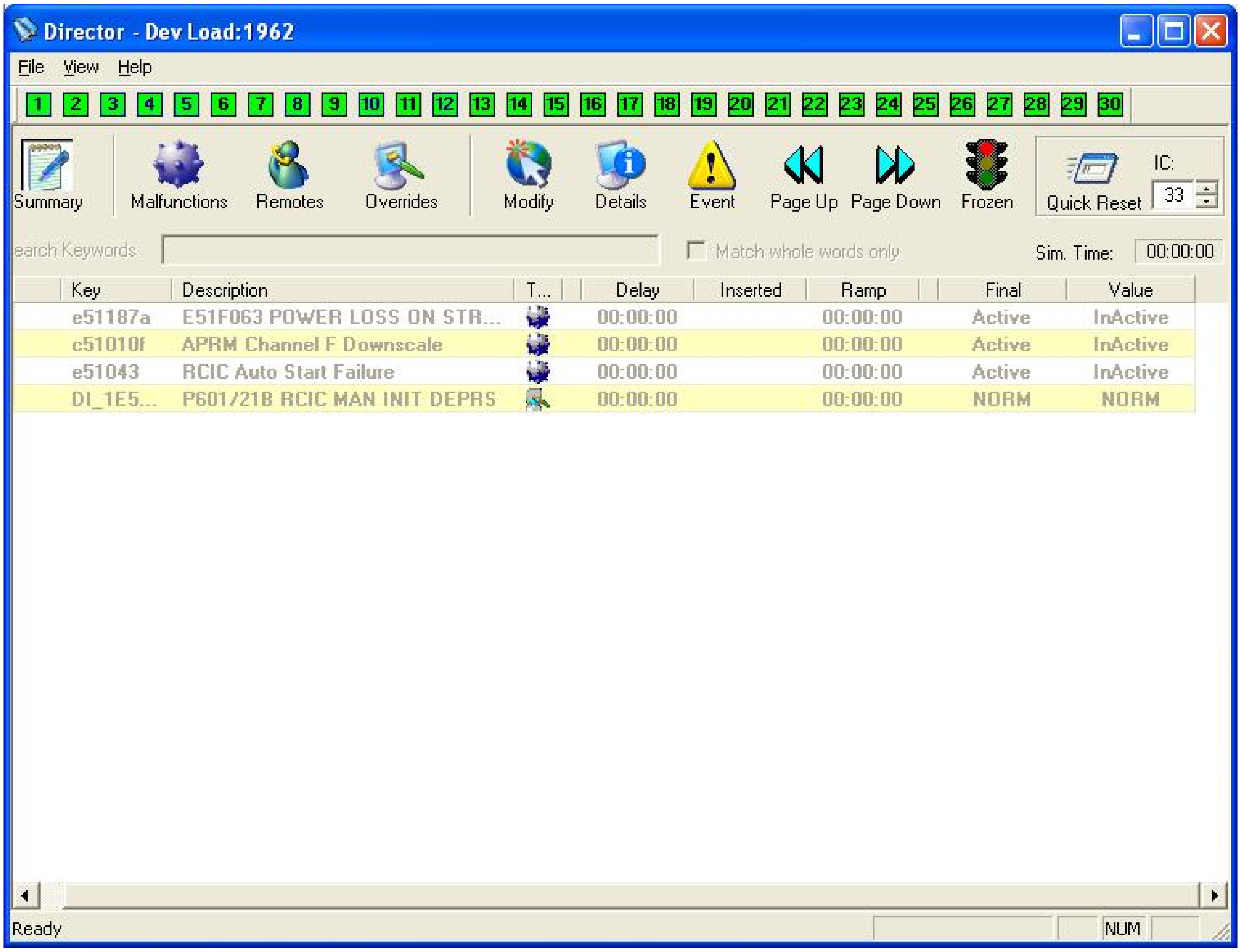
11. Run through any alarms and ensure alarms are on. **(Note: On T-Rex, to verify alarms are ON, the indicator will indicate "Alarms On").**

12. Place the simulator in Freeze.

B. File loaded verification:



Insert	Pause	@Time	Event	Action	Description
				^NRC EXAM GGN 2011 Senario 2	
				^RPS A MG EPA breaker S003A Trip	
		00:00:00		Create event 1 xcr4c51na051 > 90.0	RPS MG Set A Failure
			1	Insert malfunction c71077a on event 1	RPS MG Set A Failure
				^APRM D fails upscale	
			2	Insert malfunction c51009d on event 2	APRM Channel D Full-scale
				^Fuel cladding leak	
			3	Insert malfunction rr071 to 0.1000 on event 3	Fuel Cladding Leak
		00:00:00		create event 4 xcr4b33k612 < 68.5	
			4	Insert malfunction rr071 to 2.00000 in 430 on event 4	Fuel Cladding Leak
				^Scram Actions	
		00:00:00		create event 5 zdi1(645) = 1	Mode Sw to SD
			5	Insert malfunction p680_2a_e_9 after 15 to ON on event 5	CNDSR HTWL LVL LO
			5	Insert malfunction fw115a after 15 on event 5	Condensate Pump A Trip
			5	Insert malfunction fw115b after 15 on event 5	Condensate Pump B Trip
			5	Insert malfunction fw115c after 15 on event 5	Condensate Pump C Trip
			5	Insert malfunction rrd21k648a_d to 55.00000 in 330 on event 5	override (variable failure) drywell hi-range
			5	Insert malfunction rrd21k648b_d to 5.30000 in 300 on event 5	override (variable failure) cntmt hi-range
			5	Insert malfunction rrd21k648c_d to 5.20000 in 300 on event 5	override (variable failure) cntmt hi-range
			5	Insert malfunction rrd21k648d_d to 55.00000 in 330 on event 5	override (variable failure) drywell hi-range
				^RCIC, CTMT, DW and SBGT Rad Hi	
		00:00:00		create event 6 e51vf045 > 0.75	E51-F045 open
			6	Insert malfunction rrd21k603_d in 240 on event 6	override (variable failure) rcic room acty
			6	Insert malfunction rrd21k613_d after 30 in 500 on event 6	override (variable failure) sgts filter train
				^RCIC steam leak	
			6	Insert malfunction e51050 to 40.00000 on event 6	RCIC Steam Leak (VAR) Upstream of E51-F045
				^E51F064 Failure to look like motor pinion key failure	
		00:00:00		create event 7 zlo4(643) < 1	E51-F063 red light off
			7	Insert override LO_1E51M610_G to TRUE on event 7	P601/21C STM SPLY OUTBD ISOLATION:E51-F064 - DF
			7	Insert override LO_1E51M610_R to TRUE on event 7	P601/21C RCIC STM SPLY OUTBD ISOLATION:E51-F064 - DF
			7	Insert override LO_1E51F064_G to TRUE on event 7	P858 SE) F064 - GREEN
			7	Insert override LO_1E51F064_R to TRUE on event 7	P858 N) F064 - RED
			7	Insert malfunction e51187b on event 7	E51F064 POWER LOSS ON STROKE SIGNAL
			7	Set e51vf064 = 0.5 on event 7	
				^MSL Rad Monitor Alarms	
			5	Insert malfunction rm157a to 40.00000 in 300 on event 5	PRM Main Steam Line D17K610A-D High Radiation
				^Clear MSL Rad Monitors after MSL Isolation	
		00:00:00		create event 8 zlo4(836) == 0	
			8	Insert malfunction rm157a after 30 to 15.00000 in 120 on event 8	PRM Main Steam Line D17K610A-D High Radiation
				^Begining Scenario Malfunctions	
		00:00:00		Insert malfunction e51187a	E51F063 POWER LOSS ON STROKE SIGNAL
		00:00:00		Insert malfunction c51010f	APRM Channel F Downscale
		00:00:00		Insert malfunction e51043	RCIC Auto Start Failure
		00:00:00		Insert override DI_1E51M625D to NORM	P601/21B RCIC MAN INIT DEPRS
		00:00:00		create event 29 et_array(30) == 1 & zlo3(596) == 1	
			29	Insert malfunction p41f005a_c after 10 on event 29	override (thermal ol/49 device)



Director - Dev Load:1962
File View Help
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Summary
Malfunctions
Remotes
Overrides
Modify
Details
Event
Page Up
Page Down
Frozen
Quick Reset
IC:
33
earch Keywords
Match whole words only
Sim. Time:
00:00:00
Key
Description
T...
Delay
Inserted
Ramp
Final
Value
e51187a
E51F063 POWER LOSS ON STR...
00:00:00
00:00:00
Active
InActive
c51010f
APRM Channel F Downscale
00:00:00
00:00:00
Active
InActive
e51043
RCIC Auto Start Failure
00:00:00
00:00:00
Active
InActive
DI_1E5...
P601/21B RCIC MAN INIT DEPRS
00:00:00
00:00:00
NORM
NORM
Ready
NUM

Crew Turnover:

A. Assign the candidates crew positions.

B. Turnover the following conditions:

Power	85%
Pressure	1010 psig
BOC	
EOOS	GREEN

- A reactor startup is in progress with all steps complete up to step 6.8, Attachment II of 03-1-01-2 (Power Ascension from 60% to full power)
- SSW "A" is in service.
- APRM "F" has failed downscale and is in BYPASS (a tracking LCO was written).
- <u>Note that an independent Reactivity Management SRO per Operations Philosophy 6.8.1.b will not be provided for this scenario.</u>

Planned Evolutions this shift:

- Place SSW "A" in STANDBY using 04-1-01-P41-1 SSW SOI.
- Once SSW "A" is in STANDBY, continue with plant startup and raise reactor power to 100%. Ramp rates are not required until reactor power reaches 95%.

C. Allow the crew to perform pre-shift brief and review procedures for planned evolutions.

D. Bring the crew into the Simulator, place the simulator is in RUN.

E. Allow the crew to walk down panels.

F. When the crew assumes the shift begin Scenario Activities.

SCENARIO ACTIVITIES:

A. Start SBT report and any other required recording devices (Video recording not allowed for NRC exams).

Place SSW "A" in STANDBY

B. The crew will place SSW "A" in STANDBY.

1. When the operator attempts to close P41-F005A, it will not shut due to tripped thermal device.
2. If directed by the control room to manually shut P41-F005A, wait 3 minutes and report that the valve is stuck and the motor is hot to the touch.
3. If asked to check the breaker, report that the breaker is tripped and you will submit a work request to further determine the cause.
4. When the lead evaluator is satisfied with the crew response, call the CRS (2374) and prompt the crew to go ahead and raise power.

NRC

Raise reactor power to 100%:

C. The crew will raise reactor power to 100% using FCVs.

1. No operations outside the control room are required.
2. When APRM "A" reaches 90% power, RPS "A" MG will Trip (Auto Event 1).

RPS "A" MG set failure

D. The crew will enter the Loss of One or Both RPS Buses ONEP and:

1. Re-energize RPS "A" by placing the MG Set "A" transfer switch to Alternate "A".
2. Reset the Half-Scram
3. Ensure MSIVs are open.
    a. When the BOP comes to the booth and asks the status of the pilot solenoids amperage on the back panels, reply that all MSIVs indicate normally.

E. When asked to investigate the cause of the bus trip, when the half-scram is reset, inform the control room that:

1. the RPS "A" MG EPA breaker C71S003A and C71S003C (located on the Control Building, 189' el.) are tripped and the undervoltage flags are tripped. The motor-generator is operating normally.

2. you have also noted that the alternate feeder EPA breaker C71S003G underfrequency flag is tripped, but the breaker is still closed **(ensure that the CRS understands that this is the breaker currently powering the RPS "A" Bus).**

APRM "D" fails upscale

F. When the CRS enters LCO 3.3.8.2 Condition "A," insert malfunction c51009d by triggering **Event 2** to cause APRM "D" to fail full scale.

   1. Since APRM "F" is already in bypass, no operator action is required for this situation; however, the CRS may opt to place APRM "F" in service and bypass APRM "D" in order to clear the Half-Scram.

   2. When the CRS enters LCO 3.3.1.1 Condition "A," insert malfunction rr071 by triggering **Event 3** to insert a Fuel Cladding Leak.

Fuel Cladding Leak

G. When the OG PRE-TREAT RAD HI annunciator alarms, the crew will enter the Off-Gas Activity High ONEP.

   1. If asked as RP to report local Pre-treat rad levels, report them as above normal and trending up.

   2. Prior to Pre-treat radiation levels reaching 1,400 mR/hr, the CRS will direct the ACRO to lower core flow to 67 mlbm/hr.

   3. When core flow is below 68.5 mlbm/hr, Auto Event 4 will trigger causing the Fuel Cladding Leak to worsen.

      a. The crew will enter the Reduction in Recirc Flow ONEP and the ACRO will become the THI watch with concurrent duties.

   4. When the crew determines that Pre-treat radiation levels cannot be maintained below 14,000 mR/hr, the crew will manually scram the reactor and enter the Reactor Scram and Turbine Trip ONEPs and EP-2. **Insert EP Attachments as directed** by the Control Room.

   5. 15 seconds after the scram Auto Event 5 will trigger causing Condensate Pumps to trip on low condenser level (due to failed trip unit, this is unrecoverable)

   6. 2 minutes after the scram, MSL RAD HI annunciator will alarm and the CRS will enter EP-4.

   7. 4 ½ minutes after the scram, MSL A-D HI-HI annunciators will alarm. The CRS will direct the BOP operator to close all MSIVs per EP-4 step 1.

Unisolable steam leak RCIC room/RCIC fail to start on initiation

H. After all MSIVs are closed the CRS will direct the ACRO/BOP operator to control reactor level using RCIC and HPCS.

   1. The CRS should establish a reactor pressure band of 800-1060 psig using ADS/SRV valves and a reactor level band of +30” to -30”.
   2. Once the operating feed pump trips, RCIC will fail to initiate (when started by the operator or on low level). The operator must manually line up RCIC.

I. When E51-F045 opens, an unisolable steam leak will occur in the RCIC room.

   1. The crew will receive RCIC room high temperature and radiation alarms. The E51-F063 and E51-F064 will fail to close (loss of power, motor pinion key failed respectively).
   2. The crew should enter the reduced pressure band 450-600 psig to reduce driving head of the steam leak.
   3. Five minutes after RCIC is started, report to the control room as Security that there is a plume of steam coming from the Auxiliary Building Roof.
   4. When 2 max safe values (Rad levels) from EP-4 Table 10 are reached, the crew will enter the emergency depressurization procedure of EP-2.

Termination:

J. Once emergency depressurization has been conducted and reactor water level is stabilized above TAF, or as directed by Lead Evaluator:

   - Take the simulator to Freeze and turn horns off.
   - Stop and save the SBT report and any other recording devices.
   - Instruct the crew to not erase any markings or talk about the scenario until after follow-up questions are asked.

Critical Tasks:

- Fuel failure is occurring and main steam line radiation is greater than 3 times normal full power background as indicated by MSL B / MSL C RAD HI-HI or MSL A / MSL D RAD HI-Hi alarms, the crew closes MSIVs and MSL drains per EP-4. The crew closes the MSIVs and MSL drains and observes valve position indications and lowering pressure trend downstream of the MSIVs. Criterion is to give the highest priority to close the four inboard MSIVs or the four outboard MSIVs and MSL drains when MSL radiation is greater than 3 times normal full power background.
- A primary system is discharging outside primary containment and area temperatures, radiation levels, or water levels are above their max safe values in two or more areas. The crew opens 8 ADS/SRVs and observes lowering pressure trend and valve position indications (tailpipe pressure indication lamps or solenoid valve energized). Criterion is to give the highest priority to open at least seven SRVs when area temperatures, radiation levels, or water levels are above their maximum safe values in two or more areas.

Emergency Classification:

Site Area Emergency FS1

Op-Test No: 12/11 Scenario No: 2 Event No: 1

Event Description: **Place SSW “A” in Standby**

TIME	Position	Applicant’s Actions or Behavior
	CRS	Directs the BOP operator to place SSW “A” in standby.
	BOP	Places SSW “A” in Standby using SOI 04-1-01-P41-1 section 4.6: • Verifies all prerequisites are met • N/A’s steps 4.6.2a – 4.6.2h. • Places the SSW “A” MOV test switch to TEST • Open/check open P41-F006A. • Close P41-F005A – **P41-F005A will fail to close** ❖ As indicated by annunciator P870-1A-C2, SSW DIV 1 OOSVC ❖ SSW D1 MOV OVERLD PWR LOSS status light turns on The operator refers to ARI for P870-1A-C2 and: Does not proceed with securing SSW and report that P41-F005 lost power and is still open. At this point, if the crew chooses to stop the SSW pump they will cause the SSW head tank to drain. Look in Attachment IIIA of 04-1-01-P41-1 and determine breaker number for P41-F005A (52-155112). Direct the local operator to the breaker for P41-F005A on 15B51to determine the cause of loss of power. Using ARI and control room indications, determine that the valve’s breaker has tripped on overload. ❖ As indicated by the SSW D1 MOV OVERLD PWR LOSS status light lit and the valve positions indicating lights for P41-F005A on the P870 are still lit. Reports diagnosis to the CRS.
	CRS	Ensure an operator and/or electrical maintenance is dispatched to investigate the problem. The CRS should opt to leave SSW A running. In order to secure SSW A, P41-F005A would have to be manually closed. Without power to the valve, SSW A would have to be declared INOPERABLE. If the CRS declares SSW A INOPERABLE, enters TS 3.5.1 Condition A.

Op-Test No: 12/11 Scenario No: 2 Event No: 2

Event Description: **Raise reactor power using Recirc Flow Control**

TIME	Position	Applicant's Actions or Behavior
	CRS	Conducts reactivity brief for the planned power change. (May be performed prior to taking the shift) Directs the ACRO to raise reactor power to 100% using Recirc FCV's.
	ACRO	Raises power by opening the Recirc FCVs A & B using loop flow controllers B33K603A & B in slow detent on P680-3B (IOI-2 attachment VIII step 12.3).
	BOP	Raises Load Demand as power is raised by depressing EHC LOAD REF DEMAND RAISE pushbutton (P680-9C) to maintain generator actual load within +/- 25 MW of the load demand limited value during power ascension (IOI-2 attachment VIII step 12.2).

Op-Test No: 12/11	Scenario No: 2	Event No: 3
Event Description: **RPS "A" MG failure**		

TIME	Position	Applicant's Actions or Behavior
	ACRO	Recognizes and reports a half-scram with no additional annunciators and a trip of the RPS bus has occurred. • As indicated by annunciator P680-7A-A-2, RX SCRAM TRIP coupled with a ½ scram and no other indications for why the ½ scram occurred. • The GENERATOR A NORMAL FEED AVAILABLE light is out on the back panel.
	CRS	Enters the Loss of One or Both RPS Buses ONEP. Direct the BOP to re-energize the A RPS bus using the alternate power source. Direct the ACRO to reset the half-scram. Send a local operator to investigate the cause of the RPS A MG failure.
	BOP	When directed, Re-energize the A RPS Bus using the Alternate power source. • Place the MG SET A TRANSFER switch on the CONTROL ROD TEST INSTRUMENT PANEL (P610) to ALT "A"
	ACRO	When directed, reset the half-scram. • Place the division 1 scram RESET switches to RESET on the P680.
	CRS	Direct the BOP to ensure all MSIVs are energized.
	BOP	When directed, ensure all MSIV solenoid lights are on and all MSIV pilot solenoids indicate amperage on the P622 and P623 panels. (This is not modeled in the simulator. The operator should go to the instructor booth behind the P807 and simulate performance by stating to the instructor his intentions to perform the step. The instructor will provide the operator with a verbal cue concerning indications the operator observes).

Op-Test No: 12/11 Scenario No: 2 Event No: 4

Event Description: **<u>Electric Power Monitoring Assembly INOPERABLE</u>**

TIME	Position	Applicant's Actions or Behavior
	CRS	Recognizes entry conditions and enters TS 3.3.8.2 Condition A. ❖ There are no indications in the control room for the EPMA breaker failure; however, the following report will be made to the control room: *When asked to investigate the cause of the bus trip, when the half-scram is reset, inform the control room that:* *1. the RPS "A" MG EPA breaker C71S003A (located on the Control Building, 189' el.) is tripped and the undervoltage flag is tripped.* *2. you have also noted that the <u>alternate feeder</u> EPA breaker C71S003G underfrequency flag is tripped, but the breaker is still closed (ensure that the CRS understands that this is the breaker currently powering the RPS "A" Bus).*

Op-Test No: 12/11	Scenario No: 2	Event No: 5
Event Description: **Two APRM channel failures**		

TIME	Position	Applicant's Actions or Behavior
	ACRO	Recognizes and reports APRM D has failed upscale. ❖ As indicated by annunciators P680-7A-A-2, RX SCRAM TRIP, and P680-7A-B-3, NEUTRON MON SYS TRIP ❖ APRM Ch-D will be "pegged" high and will have the UPSC ALM light on. ❖ This will also cause a ½ scram.
	CRS	Recognizes entry conditions and enters TS 3.3.1.1 Condition A and TRM 3.1.5 Conditions A & B. The CRS may opt to un-bypass APRM F (failed downscale) in order to bypass APRM D (failed upscale) so that the ½ scram can be cleared. If so, the CRS will: -Direct the ACRO to un-bypass APRM F and bypass APRM D. -Direct the ACRO to reset the ½ scram.
	ACRO	If directed, Move Division 2 APRM bypass switch from CH-F to CH-D. Reset the ½ scram by momentarily placing the RPS DIV 2 and RPS DIV 4 SCRAM RESET switches to reset and observing that all 8 SCRAM SOL VLV lights are lit. Report completed actions to the CRS.

Op-Test No: 12/11 Scenario No: 2 Event No: 6

Event Description: **Fuel Cladding Leak**

TIME	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports to the CRS when the OG PRE-TREAT RAD HI annunciator alarms. Directs the CRS to the Off-Gas Activity High ONEP per the OG PRE-TREAT RAD HI ARI.
	CRS	Enters the Off-Gas Activity High ONEP. Establish Off-Gas Pre-Treat Radiation Level as a critical parameter.
	ACRO / BOP	Monitor Off-Gas Pre-Treat Radiation Level. Report Off-Gas Pre-Treat Radiation Levels as directed by the CRS.
	CRS	When the CRS anticipates exceeding the limits of step 3.1 Pre-Treatment Monitor Limit (700mR/hr), directs the ACRO to lower core flow to 67 mlbm/hr in fast detent.
	ACRO	Lower core flow to 67 mlbm/hr using Recirc "A" and "B" FCV flow controllers in fast detent when directed by the CRS.
	CRS	Enters the Reduction in Recirculation Flow Rate ONEP. Ensures THI watch with concurrent duties is established.
	ACRO	Plot the power to flow map. Recognize and report to the CRS entry into the Monitored Region as determined by the power to flow map plot. Establish THI watch with concurrent duties.
	CRS	Perform subsequent actions of the Off-Gas Activity High ONEP. • Consult with the Reactor Engineer or Duty Manager for further power reductions. • Activate the Emergency Plan when limits of step 3.3 are exceeded. • Notify Chemistry to monitor ventilation release points.
	CRS	When the CRS determines that Off-Gas Pre-Treat Radiation Levels cannot be maintained below 14,000 mR/hr, direct the ACRO to scram the reactor. Enter the Scram ONEP, Turbine/Generator Trip ONEP, EP-2

Op-Test No: 12/11	Scenario No: 2	Event No: 6 cont.
Event Description: **Fuel Cladding Leak**		

TIME	Position	Applicant's Actions or Behavior
	ACRO	Places the Reactor Mode Switch to SHUTDOWN when directed by the CRS. Provides a scram report: • Reactor Mode SW in SHUTDOWN. • Reactor power is 0%. • Reactor water level and trend. • Reactor pressure and trend. • Feedwater is NOT available. • Bypass valves are available.
	ACRO / BOP	Start RCIC by arming and depressing the RCIC initiation push button (RCIC will fail to start; see event 7 on page 17).
	BOP	Recognizes and reports EP-4 entry condition when MSL RAD HI annunciator alarms on P601-19A-D4.
	CRS	Enters EP-4 when any entry condition is met.

Op-Test No: 12/11 Scenario No: 2 Event No: 6 cont.

Event Description: **Fuel Cladding Leak**

	ACRO / BOP	Recognize and report when MSL A-D HI-HI radiation annunciators alarm. Close all MSIVs (per EP-4 step 1).
	CRS	When MSL A-D HI-HI radiation annunciators alarm, direct the ACRO/BOP to close all MSIVs. ***Fuel failure is occurring and main steam line radiation is greater than 3 times normal full power background as indicated by MSL B / MSL C RAD HI-HI or MSL A / MSL D RAD HI-Hi alarms, the crew closes MSIVs and MSL drains per EP-4. The crew closes the MSIVs and MSL drains and observes valve position indications and lowering pressure trend downstream of the MSIVs. Criterion is to give the highest priority to close the four inboard MSIVs or the four outboard MSIVs and MSL drains when MSL radiation is greater than 3 times normal full power background.** Establish reactor pressure band of 800 – 1060 psig using ADS/SRV valves. Establish reactor level band of +30" to -30" using Feed and Condensate system (this band is established per Ops Philosophy Level Band Strategies since reactor pressure is now being controlled with ADS/SRV's).
	BOP	Maintain pressure band of 800 – 1060 psig using ADS/SRV valves (cycle open and closed as required to stay within band).
	ACRO	Maintain level band of +30" to -30" using HPCS (May use the Startup Level Controller in Auto or Manual).

Op-Test No: 12/11 Scenario No: 2 Event No: 7

Event Description: **RCIC fails to start on initiation**

TIME	Position	Applicant's Actions or Behavior
	ACRO / BOP	Recognizes that RCIC does not start when manually initiated using Initiate push button. ❖ As indicated when nothing happens after the Initiate PB is depressed. Manually starts RCIC using SOI 04-1-01-E51-1 Attachment VI. • Shift RCIC Flo controller to manual and reduce output to minimum. • Open E51-F046. • Start Gland Seal Compressor. • Open E51-F095. • After 6 seconds, Open E51-F045. • Raise turbine speed using flow controller in manual to develop pressure greater than reactor pressure. • Open E51-F013. • Adjust flow as necessary with Flo controller. • Verify SSW A is running with adequate flow path. Establish and maintain reactor water level in the established band (11.4" to 53.5")

Op-Test No: 12/11 Scenario No: 2 Event No: 8

Event Description: **RCIC room unisolable steam leak**

TIME	Position	Applicant's Actions or Behavior
	ACRO / BOP	Recognize and report unisolable steam leak in the RCIC room after RCIC is initiated. ❖ As indicated by annunciators P601-21A-G-3, RCIC EQUIP AREA TEMP HI, P601-21A-H-2, RCIC PIPE/EQUIP AMBIENT TEMP HI, and P601-21A-H-3, RCIC EQUIP AREA dT HI. ❖ E51-F063 loss of power and E51-F064 will not close. ❖ RCIC room temperature remains high.
	CRS	Enter EP-4 at 22 (will be on step 10 until 2 max safe values are reached). Direct the BOP to monitor EP-4 parameters.
	BOP	Monitor EP-4 parameters using EP-4 table 3. • Monitor for 2 Max Safe values
	CRS	Establish a reduced pressure band of 450 – 600 psig to reduce the driving head of the steam leak in accordance with the Ops Philosophy Pressure Control Strategy. Establish a level band of +30" to -30" in accordance with Ops Philosophy Level Control Strategy.
	BOP	Control reactor pressure in the 450 – 600 psig band using ADS/SRV valves when directed.
	ACRO	Manually initiate HPCS to maintain reactor water level within the established band by arming and depressing the HPCS initiation pushbutton.

Op-Test No: 12/11	Scenario No: 2	Event No: 8 cont
Event Description: **RCIC room unisolable steam leak**		

	BOP / ACRO	Recognize and report to the CRS when 2 max save values of EP-4 Table 10 are exceeded.
	CRS	When 2 max save values of EP-4 Table 10 are exceeded, enters the Emergency Depressurization procedure of EP-2. ***A primary system is discharging outside primary containment and area temperatures, radiation levels, or water levels are above their max safe values in two or more areas. The crew opens 8 ADS/SRVs and observes lowering pressure trend and valve position indications (tailpipe pressure indication lamps or solenoid valve energized). Criterion is to give the highest priority to open at least seven SRVs when area temperatures, radiation levels, or water levels are above their maximum safe values in two or more areas.** ❖ The Two Max Safe values for this scenario are: - SGTS Rad levels of 800 mr/hr (≥8 x10^2 mr/hr) - RCIC Room Rad levels of 80,000 mr/hr (≥8 x10^4 mr/hr) • Verify SP level is above 10.5 ft. • Direct the BOP operator to open 8 ADS valves.
	BOP	Opens at least 7 ADS valves when directed by the CRS.
	ACRO	Maintain reactor level band of +30” to -30” following Emergency Depressurization. (The CRS may establish a level band of 11.4” to 53.5”)

Give this page to the CRS

Turnover the following conditions:

Power	85%
Pressure	1010 psig
BOC	
EOOS	GREEN

- A reactor startup is in progress with all steps complete up to step 6.8, Attachment II of 03-1-01-2 (Power Ascension from 60% to full power)
- SSW "A" is in service.
- APRM "F" has failed downscale and is in BYPASS (a tracking LCO was written).
- <u>Note that an independent Reactivity Management SRO per Operations Philosophy 6.8.1.b will not be provided for this scenario.</u>

Planned Evolutions this shift:

- Place SSW "A" in STANDBY using 04-1-01-P41-1 SSW SOI.
- Once SSW "A" is in STANDBY, continue with plant startup and raise reactor power to 100%. Ramp rates are not required until reactor power reaches 95%.

Facility: Grand Gulf Nuclear Station Scenario No.: 4 Op-Test No.: 12/11

Examiners: ______________________ Operators: ______________________

______________________ ______________________

______________________ ______________________

Objectives: To evaluate the candidates' ability to operate the facility in response to the following evolutions:

1. Place Suppression Pool Cooling in service.
2. Condensate Booster Pump Trip.
3. Trip of the 16BB3 electric bus.
4. Control Rod drift.
5. Second Control Rod drift.
6. Unisolable LOCA with limited injection capabilities.
7. Division 3 Diesel Generator failure to start.
8. Division 2 Diesel Generator running without cooling water.
9. Loss of power to E22-F004 HPCS injection valve.

Initial Conditions: Operating at 100% power.

Inoperable Equipment: None

Turnover:

A plant is operating at rated power. Suppression Pool temperature is elevated due to a weeping SRV. The Crew will start Suppression Pool Cooling on RHR B using the 04-1-01-E12-1 RHR system SOI.

Scenario Notes:

This is a new scenario.

Validation Time: 55 min

Event No.	Malf. No.	Event Type †	Event Description
1		N (BOP) TS (CRS)	Place Suppression Pool Cooling in Service (SOI 04-1-01-E12-1 section 5.2, TS 3.5.1 Condition A)
2	fw118a	C (ACRO) A (Crew)	Condensate Booster Pump Trip (ARI P680-1A-A4, Feedwater System Malfunctions ONEP (05-1-02-V-7))
3	r21142z	TS (CRS) A (CREW)	Trip of the 16BB3 electric bus (480V LCC 16BB3 UNDERVOLT ARI (04-1-02-1H13-P864-2A-E3), TS 3.6.1.3 Condition A, TS 3.5.1 Condition C, TS 3.6.4.3 Condition A, TS 3.6.3.2 Condition A)
4	z161161_24_33 z022022_24_33	R (ACRO)	Control Rod Drift (Control Rod/Drive Malfunctions (05-1-02-IV-1) ONEP)
5	z021021_28_33	M (CREW)	Second Control Rod Drift (Control Rod/Drive Malfunctions (05-1-02-IV-1) ONEP)
6	rr063a r21139e xml1r21191 xml1r21192 e12050c	M (Crew)	Unisolable LOCA with limited injection capabilities (Scram (05-1-02-I-1) and Turbine Trip (05-1-02-I-2) ONEPs, EP-2, EP-3) ∗ **The crew injects HPCS to the reactor before reactor water level lowers to -191".**
7	n41140c	C (BOP)	Division 3 Diesel Generator failure to start (Loss of AC Power (05-1-02-I-4) ONEP) ∗ **When Division 3 Diesel Generator fails to start, the crew re-energizes the 17AC bus with an alternate feeder (ESF 12). HPCS is the only recoverable system and power to this bus is required to run the HPCS pump.**

8	p41f018b_i	C (BOP)	Division 2 Diesel Generator running without cooling water (02-S-01-27 Ops Philosophy section 6.1.1.c)
9	e22159a	C (ACRO)	Loss of power to E22-F004 HPCS injection valve (02-S-01-27 Ops Philosophy section 6.1.1.d) * **When E22-F004 loses power, the crew sends an operator to manually open the valve. HPCS is the only recoverable system and this valve must be manually opened in order to allow injection to the reactor. Criteria is that this valve is opened prior to reactor water level reaching -191".**

† (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (A)bnormal (TS) Tech Spec

* **Critical Task** (As defined in NUREG 1021 Appendix D)

Quantitative Attributes Table

Normal Events	1	Abnormal Events	2
Reactivity Manipulations	1	Total Malfunctions	8
Instrument/Component Failures	4	EP Entries (Requiring substantive action)	1
Major Transients	2	EP Contingencies	1
Tech Spec Calls	2	Critical Tasks	3