Draft Submittal

BRUNSWICK EXAM
50-2003-301
50-325 & 50-324

FEBRUARY 10 - 14 & 19, 2003

1. Written Exam Sample outlines (Ro $5R0)

Facility: Brunswick Date of Exam: 2/19/03 Exam Level: **RO**

Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1	2	2	2				3	2			2	13
	2	4	3	3				3	3			3	19
	3	1	1	1					1				4
	Tier Totals	7	6	6				6	6			5	36
2. Plant Systems	1	3	2	2	5	2	3	2	1	3	3	3	29
	2	2	2	3	1	1	1	1	3	2	2	1	19
	3		1					1	1				3
	Tier Totals	5	5	5	6	3	4	4	5	5	5	4	51

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	13
	3	3	2	5	

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 given 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 Catalog, 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 topics' importance ratings for the SRO 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	BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						Form ES-401-2 (R8, S1)		
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Points
295005 Main Turbine Generator Trip / 3				05			**AA1.05** Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP: Reactor/turbine pressure regulating system.	3.6/3.6	1
295006 SCRAM / 1					06		**AA2.06** Ability to determine and/or interpret the following as they apply to SCRAM: Cause of reactor SCRAM. (RO ONLY)	3.5/3.8	1
295007 High Reactor Pressure / 3			06				**AK3.06** Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE : Reactor/turbine pressure regulating system operation.	3.7/3.8	1
295009 Low Reactor Water Level / 2	05						**AK1.05** Knowledge of the operational implications of the following concepts as they apply to LOW REACTOR WATER LEVEL: Natural circulation.	3.3/3.4	1
295010 High Drywell Pressure / 5				01			**AA1.01** Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE : Safety/relief valve operation.	3.4/3.5	1
295014 Inadvertent Reactivity Addition / 1		03					**AK2.03** Knowledge of the interrelations between INADVERTENT REACTIVITY ADDITION and the following: Fuel temperature.	3.3/3.4	1
295015 Incomplete SCRAM / 1	02						**AK1.02** Knowledge of the operational implications of the following concepts as they apply to INCOMPLETE SCRAM: Cooldown effects on reactor power.	3.9/4.1	1
295024 High Drywell Pressure / 5			01				**EK3.01** Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE : Drywell spray operation.	3.6/4.0	1
295025 High Reactor Pressure / 3				02		2.1.20	**EA1.02** Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE: Reactor/turbine pressure regulating system. **G2.1.20** Ability to execute procedure steps. (RO ONLY)	3.8/3.8 4.3/4.2	1 1
295031 Reactor Low Water Level / 2						2.1.1	**G2.1.1** Knowledge of conduct of operations requirements.	3.7/3.8	1
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1		05					**EK2.05** Knowledge of the interrelations between SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN and the following: CRD hydraulic system.	4.0/4.1	1
500000 High Containment Hydrogen Conc. / 5					01		**EA2.01** Ability to determine and / or interpret the following as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS: Hydrogen monitoring system availability.	3.1/3.5	1
K/A Category Totals:	2	2	2	3	2	2	Group Point Total:		13

ES-401	BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2						Form ES-401-2 (R8, S1)	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4		02					**AK2.02** Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION and the following: Nuclear boiler instrumentation	3.2/3.3	1
295002 Loss of Main Condenser Vacuum / 3		08	02				**K2.08** Knowledge of the interrelations between LOSS OF MAINCONDENSER VACUUM and the following: Condenser circulating water system **AK3.02** Knowledge of the reasons for the following responses as they apply to LOSS OF MAIN CONDENSER VACUUM : Turbine trip.	3.1/3.2 3.4/3.4	2
295003 Partial or Complete Loss of AC Pwr / 6	02						**AK1.02**Knowledge of the operational implications fo the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: Load shedding.	3.1/3.4	1
295004 Partial or Complete Loss of DC Pwr / 6					02		**AA2.02** Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Extent of partial or complete loss of D. C. power.	3.5/3.9	1
295008 High Reactor Water Level / 2			04				**AK3.04** Knowledge of the reasons for the following responses as they apply to HIGH REACTOR WATER LEVEL: Reactor feed pump trip: Plant-Specific	3.3/3.5	1
295011 High CTMT Temperature / 5							(Mark III Containment Only) - N/A		
295012 High Drywell Temperature / 5				02			**AA1.02** Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell cooling system.	3.8/3.8	1
295013 High Suppression Pool Temp. / 5	03						**AK1.03** Knowledge of the operational implications of the following concepts as they apply to HIGH SUPPRESSION POOL TEMPERATURE : Localized heating.	3.0/3.3	1
295016 Control Room Abandonment / 7			01				**AK3.01** Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT: Reactor SCRAM.	4.1/4.2	1
295017 High Off-site Release Rate / 9						2.1.2	**G2.1.2** Knowledge of operator responsibilities during all modes of plant operation.	3.0/4.0	1
295018 Partial or Complete Loss of CCW / 8									
295019 Part. or Comp. Loss of Inst. Air / 8				01			**AA1.01** Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Backup air supply.	3.5/3.3	1
295020 Inadvertent Cont. Isolation / 5 & 7					06		**AA2.06** Ability to determine and/or interpret the following as they apply to INADVERTENT CONTAINMENT ISOLATION: Cause of isolation.	3.4/3.8	1
295022 Loss of CRD Pumps / 1						2.1.30	**2.1.30** Ability to locate and operate components / including local controls.	3.9/3.4	1

295026 High Suppression Pool Water Temp. / 5		04					**EK2.04** Knowledge of the interrelations between SUPPRESSION POOL HIGH WATER TEMPERATURE and the following: SPDS/ERIS/CRIDS/GDS.	2.5/2.8	1
295027 High Containment Temperature / 5							(Mark III Containment Only) - N/A		
295028 High Drywell Temperature / 5	01						**EK1.01** Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE: Reactor water level measurement.	3.5/3.7	1
295029 High Suppression Pool Water Level / 5							Not selected.		
295030 Low Suppression Pool Water Level / 5				05			**EA1.05** Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: HPCI.	3.5/3.5	1
295033 High Sec. Cont. Area Rad. Levels / 9						2.3.2	**G2.3.2** Knowledge of facility ALARA program. (RO ONLY)	2.5/2.9	1
295034 Sec. Cont. Ventilation High Rad. / 9	02						**EK1.02** Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION: Radiation releases	4.1/4.4	1
295038 High Off-site Release Rate / 9							Not selected.		
600000 Plant Fire On Site / 8					02		**AA2.02** Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Damper position. (RO ONLY)	2.8/2.9	1
K/A Category Point Totals:	4	3	3	3	3	3	Group Point Total:		19

ES-401	BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3						Form ES-401-2 (R8, S1)		
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295021 Loss of Shutdown Cooling / 4		01					**AK2.01** Knowledge of the interrelations between LOSS OF SHUTDOWN COOLING and the following: Reactor water temperature.	3.6/3.7	1
295023 Refueling Accidents / 8					02		**AA2.02** Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS : Fuel pool level.	3.4/3.7	1
295032 High Secondary Containment Area Temperature / 5			01				**EK3.01** Knowledge of the reasons for the following responses as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Emergency/normal depressurization	3.5/3.8	1
295035 Secondary Containment High Differential Pressure / 5	01						**EK1.01** Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE: Secondary containment integrity. (RO ONLY)	3.9/4.2	1
295036 Secondary Containment High Sump/Area Water Level / 5							Not selected.		
K/A Category Point Totals:	1	1	1		1		Group Point Total:		4

ES-401	BWR RO Examination Outline Plant Systems - Tier 2/Group 1											Form ES-401-2 (R8, S1)		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201001 CRD Hydraulic	01											**K1.01** Knowledge of the physical connections and/or cause- effect relationships between CONTROL ROD DRIVE HYDRAULIC SYSTEM and the following: Condensate system. (RO ONLY)	3.1/3.1	1
201002 RMCS			01	02					03			**K3.01** Knowledge of the effect that a loss or malfunction of the REACTOR MANUAL CONTROL SYSTEM will have on following: Ability to move control rods (RO ONLY) **K4.02** Knowledge of REACTOR MANUAL CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: Control rod blocks **A3.03** Ability to monitor automatic operations of the REACTOR MANUAL CONTROL SYSTEM including: Rod drift alarm.	3.4/3.4 3.5/3.5 3.2/3.2	1 1 1
201005 RCIS												Applies to BWR 6 - N/A		
202002 Recirculation Flow Control				06								**K4.06** Knowledge of RECIRCULATION FLOW CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: Recirculation pump NPSH.	3.1/3.1	1
203000 RHR/LPCI: Injection Mode							04					**A1.04** Ability to predict and/or monitor change in parameters associated with operating the RHR/LPCI: INJECTION MODE controls including: System pressure.	3.6/3.6	1
206000 HPCI					08							**K5.08** Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE COOLANT INJECTION SYSTEM: Vacuum breaker operation.	3.0/3.2	1
207000 Isolation (Emerg.) Condenser												Not applicable to Brunswick.		
209001 LPCS		03										**K2.03** Knowledge of the electrical power supplies to the following: Initiation logic.	2.9/3.1	1
209002 HPCS												Not applicable to Brunswick.		
211000 SLC									08			**A3.08** Ability to monitor automatic operations of the STANDBY LIQUID CONTROL SYSTEM including: System initiation: Plant-Specific	4.2./4.2	1

212000 RPS						04					2.1.27	**K6.04** Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR PROTECTION SYSTEM: D.C. electrical distribution **G2.1.27** Knowledge of system purpose and or function. (RO ONLY)	2.8/3.1 2.8/2.9	1 1
215003 IRM										07		**A4.07** Ability to manually operate and/or monitor in the control room: Verification of proper functioning / operability. (RO ONLY)	3.6/3.6	1
215004 SRM											2.2.1	**G2.2.1** Ability to perform pre-startup procedures for the facility / including operating those controls associated with plant equipment that could affect reactivity.	3.7/3.6	1
215005 APRM / LPRM										06		**A4.06** Ability to manually operate and/or monitor in the control room: Verification of proper functioning / operability.	3.6/3.8	1
216000 Nuclear Boiler Instrumentation		01										**K2.01** Knowledge of electrical power supplies to the following: Analog trip system.	2.8/2.8	1
217000 RCIC	01										2.1.28	**K1.01** Knowledge of the physical connections and/or cause-effect relationships between REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) and the following: Condensate storage and transfer system. **G2.1.28** Knowledge of the purpose and function of major system components and controls.	3.5/3.5 3.2/3.3	1 1
218000 ADS										02		**A4.02** Ability to manually operate and/or monitor in the control room: ADS logic initiation.	4.2/4.2	1
223001 Primary CTMT and Auxiliaries				03								**K4.03** Knowledge of PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES design feature(s) and/or interlocks which provide for the following: Containment/drywell isolation. (RO Only)	3.7/3.8	1
223002 PCIS/Nuclear Steam Supply Shutoff	07								02			**K1.07** Knowledge of the physical connections and/or cause-effect relationships between PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF and the following: Reactor core isolation cooling. **A3.02** Ability to monitor automatic operation of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF including: valve closure.	3.4/3.6 3.5/3.5	1 1

239002 SRVs						05	01					**K6.05** Knowledge of the effect that a loss or malfunction of the following will have on the RELIEF/SAFETY VALVES: Discharge line vacuum breaker **A1.01** Ability to mointor automatic actions of the RELIEF/SAFETY VALVES including: Tail pipe temperature	3.0/3.2 3.3/3.4	2
241000 Reactor/Turbine Pressure Regulator						05						**K6.05** Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR/TURBINE PRESSURE REGULATING SYSTEM: Condenser vacuum.	3.4/3.4	1
259001 Reactor Feedwater								07				**A2.07** Ability to(a) predict the impacts of the following on the REACTOR FEEDWATER SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor water level control malfunctions.	3.7/3.8	1
261000 SGTS			04	01								**K3.04** Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on the following: High pressure coolannt injection system. **K4.01** Knowledge of STANDBY GAS TREATMENT SYSTEM design feature(s) and/or interlocks which provide for the following: Automatic system initiation. (RO Only)	3.1/3.1 3.7/3.8	1 1
264000 EDGs				05	06							**K4.05** Knowledge of EMERGENCY GENERATORS (DIESEL/JET) design feature(s) and/or interlocks which provide for the following: Laod shedding and sequencing **K5.06** Knowledge of the op Load shedding and sequencing erational implications of the following concepts as they apply to EMERGENCY GENERATORS (DIESEL/JET): Load sequencing.	3.2/3.5 3.4/3.5	2
K/A Category Point Totals:	3	2	2	5	2	2	2	2	3	3	3	Group Point Total:		28

ES-401	BWR RO Examination Outline Plant Systems - Tier 2/Group 2	Form ES-401-2 (R8, S1)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201003 Control Rod and Drive Mechanism			01					09				**K3.01** Knowledge of the effect that a loss or malfunction of the CONTROL ROD AND DRIVE MECHANISM will have on following: Reactor power. (RO ONLY) **A2.09** Ability to (a) predict the impacts of the following on the CONTROL ROD AND DRIVE MECHANISM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low reactor pressure	3.2/3.4 3.2/3.4	2
201004 RSCS												Does not apply to Browns Ferry.		
201006 RWM											2.2.12	**G2.2.12** Knowledge of surveillance procedures. (RO ONLY)	3.0/3.4	1
202001 Recirculation							07					**A1.07** Ability to predict and/or monitor changes in parameters associated with operating the RECIRCULATION SYSTEM controls including: Recirculation pump speed.	2.7/2.8	1
204000 RWCU	06				04							**K1.06** Knowledge of the physical connections and/or cause- effect relationships between REACTOR WATER CLEANUP SYSTEM and the following: Main condenser **K5.04** Knowledge of the operational implications of the following concepts as they apply to REACTOR WATER CLEANUP SYSTEM: Heat exchanger operation.	2.8/2.8 2.7/2.7	2
205000 Shutdown Cooling									01			**A3.01** Ability to monitor automatic operations of the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) including: Valve operation. (RO ONLY)	3.2/3.1	1
214000 RPIS				01								**K4.01** Knowledge of ROD POSITION INFORMATION SYSTEM design feature(s) and/or interlocks which provide for the following: Reed switch locations.	3.0/3.1	1
215002 RBM						04						**K6.04** Knowledge of the effect that a loss or malfunction of the following will have on the ROD BLOCK MONITOR SYSTEM: APRM reference channel. (RO ONLY)	2.8/3.0	1

219000 RHR/LPCI: Torus/Pool Cooling Mode								03				**A2.03** Ability to (a) predict the impacts of the following on the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Valve closures	3.1/3.2	1
226001 RHR/LPCI: CTMT Spray Mode														
230000 RHR/LPCI: Torus/Pool Spray Mode								15				**A2.15** Ability to (a) predict the impacts of the following on the RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of coolant accident. (RO ONLY)	4.0/4.1	1
239001 Main and Reheat Steam			16									**K3.16** Knowledge of the effect that a loss or malfunction of the MAIN AND REHEAT STEAM SYSTEM will have on the following: Relief/safety valves.	3.6/3.6	1
245000 Main Turbine Gen. and Auxiliaries										10		**A4.10** Ability to manually operate and/or monitor in the control room: Hydrogen gas pressure.	2.6/2.6	1
256000 Reactor Condensate		01										**K2.01** Knowledge of electrical power supplies to the following: System pumps.	2.7/2.8	1
262001 AC Electrical Distribution										05		**A4.05** Ability to manually operate and/or monitor in the control room: Voltage, current, power, frequency and A.C. buses.	3.3/3.3	1
262002 UPS (AC/DC)												Not selected.		
263000 DC Electrical Distribution		01										**K2.01** Knowledge of electrical poser supplies to the following: Major D.C. loads.	3.1/3.4	1
271000 Offgas									02			**A3.02** Ability to monitor automatic operations of the OFFGAS SYSTEM including: System flows. (RO ONLY)	2.9/2.8	1
272000 Radiation Monitoring	02											**K1.02** Knowledge of the physical connections and/or cause-effect relationships between the RADIATION MONITORING SYSTEM and the following: Offgas system (augmented offgas).	3.2/3.5	1
286000 Fire Protection												Not selected.		
290001 Secondary CTMT														
290003 Control Room HVAC												Not selected.		

300000 Instrument Air			02									**K3.02** Knowledge of the effect that a loss or malfuntion of the INSTRUMENT AIR SYSTEM will have on the following: Systems having pneumatic valves and controls.	3.3/3.4	1
400000 Component Cooling Water												Not selected.		
K/A Category Point Totals:	2	2	3	1	1	1	1	3	2	2	1	Group Point Total:		19

ES-401	BWR RO Examination Outline Plant Systems - Tier 2/Group 3	Form ES-401-2 (R8, S1)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	PTS
215001 Traversing In-core Probe								01				**A2.01** Ability to (a) predict the impacts of the following on the TRAVERSING IN-CORE PROBE; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low reactor water level. (RO ONLY)	2.7/2.9	1
233000 Fuel Pool Cooling and Cleanup		02										**K2.02** Knowledge of electrical power supplies to the following: RHR pumps. (RO ONLY)	2.8/2.9	1
239003 MSIV Leakage Control												Does not apply to Brunswick.		
268000 Radwaste							01					**A1.01** Ability to predict and/or monitor changes in parameters associated with operating the RADWASTE controls including: Radiation level.	2.7/3.1	1
288000 Plant Ventilation														
290002 Reactor Vessel Internals														
K/A Category Point Totals:		1				1	1	1				Group Point Total:		4

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility: Brunswick Date of Exam: Exam Level: **RO**

Category	K/A #	Topic	Imp.	Pts.
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements.	3.7/3.8	1
	2.1.10	Knowledge of conditions and limitations in the facility license	2.7/3.9	1
	2.1.28	Knowledge of the purpose and function of major system components and controls.	3.2/3.3	1
	Total			
Equipment Control	2.2.3	Knowledge of the design / procedural / and operational differences between units.	3.1/3.3	
	2.2.12	Knowledge of surveillance procedures. RO ONLY	3.0/3.4	
	2.2.13	Knowledge of tagging and clearance procedures. RO ONLY	3.6/3.8	
	Total			
Radiation Control	2.3.1	Knowledge fo 10 CFR: 20 and related facility radiation control requirements.	2.6/3.0	1
	2.3.11	Ability to control radiation releases (RO ONLY)	2.7/3.2	
	Total			
Emergency Procedures/ Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps.	4.3/4.6	1
	2.4.2	Knowledge of system set points / interlocks and automatic actions associated with EOP entry conditions.	3.9/4.1	1
	2.4.3	Ability to identify post-accident instrumentation.	3.5/3.8	1
	2.4.11	Knowledge of abnormal condition procedures.	3.0/3.1	1
	2.4.18	Knowledge of the specific basis for EOPs.	2.7/3.6	1
	Total			13
Tier 3 Point Total (RO)				13

Facility: Brunswick Date of Exam: 2/19/03 Exam Level: **SRO**

Tier	Group	K/A Category Points											Point Total
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	2	2	3	3				3	4			2	17
	Tier Totals	6	6	6				6	10			9	43
2. Plant Systems	1	2	2	1	2	2	2	2	2	2	3	3	23
	2	2	1	1	2	1	0	1	2	1	1	1	13
	3		1		1			1	1				4
	Tier Totals	4	4	2	5	3	2	4	5	3	4	4	40

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	17
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ES-401	BWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						Form ES-401-1 (R8, S1)		
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295003 Partial or Complete Loss of AC Pwr / 6	02					2.1.10	**AK1.02** Knowledge of the operational implications fo the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: Load shedding. **2.1.10** Knowledge of conditions and limitations in the facility license.	3.1/3.4 2.7/3.9	1 1
295006 SCRAM / 1					05	2.2.20	**AA2.05** Ability to determine and/or interpret the following as they apply to SCRAM : Whether a reactor SCRAM has occurred **2.2.20** Knowledge of the process for managing troubleshooting activities.	4.6/4.6 2.2/3.3	1 1
295007 High Reactor Pressure / 3			06				**AK3.06** Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE : Reactor/turbine pressure regulating system operation.	3.7/3.8	1
295009 Low Reactor Water Level / 2	05					2.4.1	**AK1.05** Knowledge of the operational implications of the following concepts as they apply to LOW REACTOR WATER LEVEL: Natural circulation. **2.4.1** Knowledge of EOP entry conditions and immediate action steps. (SRO ONLY)	3.3/3.4 4.3/4.6	1 1
295010 High Drywell Pressure / 5				01	06		**AA1.01** Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE : Safety/relief valve operation. **AA2.06** Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE: Drywell temperature. (SRO ONLY)	3.4/3.5 3.6/3.6	1 1
295013 High Suppression Pool Temp. / 5	03				02		**AK1.03** Knowledge of the operational implications of the following concepts as they apply to HIGH SUPPRESSION POOL TEMPERATURE: Localized heating. **AA2.02** Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL TEMPERATURE: Localized heating/stratification. (SRO ONLY)	3.0/3.3 3.2/3.5	1 1
295014 Inadvertent Reactivity Addition / 1		03			03		**AA2.03** Ability to determine and/or interpret the following as they apply to INADVERTENT REACTIVITY ADDITION: Cause of reactivity addition. **AK2.03** Knowledge of the interrelations between INADVERTENT REACTIVITY ADDITION and the following: Fuel temperature.	4.0/4.3 3.3/3.4	1 1
295015 Incomplete SCRAM / 1	02						**AK1.02** Knowledge of the operational implications of the following concepts as they apply to INCOMPLETE SCRAM: Cooldown effects on reactor power.	3.9/4.1	1
295016 Control Room Abandonment / 7			01				**AK3.01** Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT: Reactor SCRAM.	4.1/4.2	1
295017 High Off-site Release Rate / 9						2.1.2	**G2.1.2** Knowledge of operator responsibilities during all modes of plant operation.	3.0/4.0	1
295023 Refueling Accidents Cooling Mode / 8					02		**AA2.02** Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS : Fuel pool level.	3.4/3.7	1

295024 High Drywell Pressure / 5			01				**EK3.01** Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE : Drywell spray operation.	3.6/4.0	1
295025 High Reactor Pressure / 3				02		2.4.4	**EA1.02** Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE: Reactor/turbine pressure regulating system. **G2.4.4** Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (SRO ONLY)	3.8/3.8 4.0/4.3	1 1
295026 Suppression Pool High Water Temp. / 5		04					**EK2.04** Knowledge of the interrelations between SUPPRESSION POOL HIGH WATER TEMPERATURE and the following: SPDS/ERIS/CRIDS/GDS.	2.5/2.8	1
295027 High Containment Temperature / 5							Does not apply to Brunswick. Mark III containment only.		
295030 Low Suppression Pool Water Level / 5				05			**EA1.05** Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: HPCI.	3.5/3.5	1
295031 Reactor Low Water Level / 2						2.1.1	**G2.1.1** Knowledge of conduct of operations requirements.	3.7/3.8	1
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1		05					**EK2.05** Knowledge of the interrelations between SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN and the following: CRD hydraulic system.	4.0/4.1	1
295038 High Off-site Release Rate / 9					03		**EA2.03** Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Radiation levels. (SRO ONLY)	3.5/4.3	1
500000 High Containment Hydrogen Conc. / 5					01		**EA2.01** Ability to determine and / or interpret the following as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS: Hydrogen monitoring system availability.	3.1/3.5	1
K/A Category Totals:	4	3	3	3	7	6	Group Point Total:		26

ES-401	BWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2						Form ES-401-1 (R8, S1)	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4		02					**AK2.02** Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION and the following: Nuclear boiler instrumentation.	3.2/3.2	1
295002 Loss of Main Condenser Vacuum / 3		08	02				**AK2.08** Knowledge of the interrelations between LOSS OF MAIN CONDENSER VACUUM and the following: Condenser circulating water system. **AK3.02** Knowledge of the reasons for the following responses as they apply to LOSS OF MAIN CONDENSER VACUUM : Turbine trip.	3.1/3.2 3.4/3.4	2
295004 Partial or Total Loss of DC Pwr / 6					02		**AA2.02** Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Extent of partial or complete loss of D. C. power.	3.5/3.9	1
295005 Main Turbine Generator Trip / 3				05			**AA1.05** Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP: Reactor/turbine pressure regulating system.	3.6/3.6	1
295008 High Reactor Water Level / 2			04				**AK3.04** Knowledge of the reasons for the following responses as they apply to HIGH REACTOR WATER LEVEL: Reactor feed pump trip: Plant-Specific.	3.3/3.5	1
295011 High Containment Temperature / 5							Does not apply to Hatch. For Mark III containment only.		
295012 High Drywell Temperature / 5				02			**AA1.02** Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell cooling system.	3.8/3.8	1
295018 Partial or Total Loss of CCW / 8									
295019 Partial or Total Loss of Inst. Air / 8				01			**AA1.01** Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Backup air supply.	3.5/3.3	1
295020 Inadvertent Cont. Isolation / 5 & 7					06		**AA2.06** Ability to determine and/or interpret the following as they apply to INADVERTENT CONTAINMENT ISOLATION: Cause of isolation.	3.4/3.8	1
295021 Loss of Shutdown Cooling / 4		01			01		**AK2.01** Knowledge of the interrelations between LOSS OF SHUTDOWN COOLING and the following: Reactor water temperature. **AA2.01** Ability to determine and/or interpret the following as they apply to LOSS OF SHUTDOWN COOLING : Reactor water heatup/cooldown rate.	3.6/3.7 3.5/3.6	2
295022 Loss of CRD Pumps / 1						2.1.30	**2.1.30** Ability to locate and operate components / including local controls.	3.9/3.4	1
295028 High Drywell Temperature / 5	01						**EK1.01** Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE: Reactor water level measurement.	3.5/3.7	1
295029 High Suppression Pool Water Level / 5							**Not selected.**		

295032 High Secondary Containment Area Temperature / 5			01				**EK3.01** Knowledge of the reasons for the following responses as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Emergency/normal depressurization.	3.5/3.8	1
295033 High Secondary Containment Area Radiation Levels / 9						2.3.10	**2.3.10** Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure. (SRO ONLY)	2.9/3.3	1
295034 Secondary Containment Ventilation High Radiation / 9	02						**EK1.02** Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION: Radiation release.	4.1/4.4	1
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5							**Not selected.**		
600000 Plant Fire On Site / 8					06		**AA2.06** Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Need for pressurizing control room (recirculation mode). (SRO ONLY)	2.5/2.8	1
K/A Category Point Totals:	2	3	3	3	3		Group Point Total:		17

ES-401	BWR SRO Examination Outline Plant Systems - Tier 2/Group 1											Form ES-401-1 (R8, S1)		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201005 RCIS												Applies to BWR 6 - N/A		
202002 Recirculation Flow Control				06								**K4.06** Knowledge of RECIRCULATION FLOW CONTROL SYSTEM design feature(s) and/or interlocks which provide for thefollowing: Recirculation pump NPSH.	3.1/3.1	1
203000 RHR/LPCI: Injection Mode							04					**A1.04** Ability to predict and/or monitor change in parameters associated with operating the RHR/LPCI: INJECTION MODE controls including: System pressure.	3.6/3.6	1
206000 HPCI					08							**K5.08** Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE COOLANT INJECTION SYSTEM: Vacuum breaker operation.	3.0/3.2	1
207000 Isolation (Emergency) Condenser												Not applicable to Brunswick.		
209001 LPCS		03										**K2.03** Knowledge of the electrical power supplies to the following: Initiation logic.	2.9/3.1	1
209002 HPCS												Not applicable to Brunswick.		
211000 SLC									08			**A3.08** Ability to monitor automatic operations of the STANDBY LIQUID CONTROL SYSTEM including: System initiation: Plant-Specific.	4.2/4.2	1
212000 RPS						04						**K6.04** Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR PROTECTION SYSTEM: D.C. electrical distribution.	2.8/3.1	1
215004 Source Range Monitor											2.2.1	**G2.2.1** Ability to perform pre-startup procedures for the facility / including operating those controls associated with plant equipment that could affect reactivity.	3.7/3.6	1
215005 APRM / LPRM										06		**A4.06** Ability to manually operate and/or monitor in the control room: Verification of proper functioning / operability.	3.6/3.8	1
216000 Nuclear Boiler Instrumentation		01										**K2.01** Knowledge of electrical power supplies to the following: Analog trip system.	2.8/2.8	1

217000 RCIC	01										2.1.28	**K1.01** Knowledge of the physical connections and/or cause-effect relationships between REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) and the following: Condensate storage and transfer system. **G2.1.28** Knowledge of the purpose and function of major system components and controls.	3.5/3.5 3.2/3.3	1 1
218000 ADS										02		**A4.02** Ability to manually operate and/or monitor in the control room: ADS logic initiation.	4.2/4.2	1
223001 Primary CTMT and Auxiliaries								01			2.1.7	**A2.01** Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: LOCA. (SRO ONLY) **2.1.7** Ability to evaluate plant performance and make operational judgments based on operating characteristics / reactor behavior / and instrument interpretation.	4.3/4.4 3.7/4.4	2
223002 PCIS/Nuclear Steam Supply Shutoff	07								02			**K1.07** Knowledge of the physical connections and/or cause-effect relationships between PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF and the following: Reactor core isolation cooling. **A3.02** Ability to monitor automatic operation of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF including: valve closure.	3.4/3.6 3.5/3.5	1 1
226001 RHR/LPCI: CTMT Spray Mode														
239002 SRVs							01					**A1.01** Ability to predict and/or monitor changes in parameters associated with operating the RELIEF/SAFETY VALVES controls including: Tail pipe temperature.	3.3/3.4	1
241000 Reactor/Turbine Pressure Regulator						05						**K6.05** Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR/TURBINE PRESSURE REGULATING SYSTEM: Condenser vacuum.	3.4/3.4	1
204000 Reactor Water Cleanup System	06											**K1.06** Knowledge of the physical connections and/or cause-effect relationships between REACTOR WATER CLEANUP SYSTEM and the following: Main condenser	2.8/2.8	1

261000 SGTS			04									**K3.04** Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on following: High pressure coolant injection system: Plant-Specific	3.1/3.1	1
262001 AC Electrical Distribution								03		05		**A2.03** Ability to (a) predict the impacts of the following on the A.C. ELECTRICAL DISTRIBUTION; and (b) bases on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of off-site power. **A4.05** Ability to manually operate and/or monitor in the control room: Voltage, current, power, frequency and A.C. buses.	3.9/4.3 3.4/3.4	1 1
264000 EDGs				05	06							**K4.05** Knowledge of EMERGENCY GENERATORS (DIESEL/JET) design feature(s) and/or interlocks which provide for the following: Load shedding and sequencing **K5.06** Knowledge of the operational implications of the following concepts as they apply to EMERGENCY GENERATORS (DIESEL/JET): Load sequencing.	3.2/3.5 3.4/3.5	2
290001 Secondary CTMT												Not selected.		
K/A Category Point Totals:	2	2	1	3	2	2	2	2	2	3	2	Group Point Total:		23

ES-401	BWR SRO Examination Outline Plant Systems - Tier 2/Group 2	Form ES-401-1 (R8, S1)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201001 CRD Hydraulic												Not selected.		
201002 RMCS				02					03			**K4.02** Knowledge of REACTOR MANUAL CONTROL SYSTEM designfeature(s) and/or interlocks which provide for the following: Control rod blocks **A3.03** Ability to monitor automatic operations of the REACTOR MANUAL CONTROL SYSTEM including: rod drift alarm.	3.5/3.5 3.2/3.2	2
201004 RSCS												Does not apply to Browns Ferry.		
201006 RWM												Not selected.		
202001 Recirculation							07					**A1.07** Ability to predict and/or monitor changes in parameters associated with operating the RECIRCULATION SYSTEM controls including: Recirculation pump speed.	2.7/2.8	1
204000 RWCU	06				04							**K1.06** Knowledge of the physical connections and/or cause- effect relationships between REACTOR WATER CLEANUP SYSTEM and the following: Main condenser. **K5.04** Knowledge of the operational implications of the following concepts as they apply to REACTOR WATER CLEANUP SYSTEM: Heat exchanger operation.	2.8/2.8 2.7/2.7	2
214000 RPIS				01								**K4.01** Knowledge of ROD POSITION INFORMATION SYSTEM design feature(s) and/or interlocks which provide for the following: Reed switch locations.	3.0/3.1	1
215002 RBM												Not selected.		
215003 IRM												Not selected.		
219000 RHR/LPCI: Torus/Pool Cooling Mode								03				**A2.03** Ability to (a) predict the impacts of the following on the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Valve closures.	3.1/3.2	1
230000 RHR/LPCI: Torus/Pool Spray Mode												Changed to 272000K2.05 due to KA selected was the same as 226001K2.02.		

234000 Fuel Handling Equipment														1
239003 MSIV Leakage Control												Does not apply to Hatch.		
245000 Main Turbine Gen. and Auxiliaries										10		**A4.10** Ability to manually operate and/or monitor in the control room: Hydrogen gas pressure.	2.6/2.6	1
259001 Reactor Feedwater								07				**A2.07** Ability to(a) predict the impacts of the following on the REACTOR FEEDWATER SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor water level control malfunctions.	3.7/3.8	1
262002 UPS (AC/DC)												Not selected.		
263000 DC Electrical Distribution		01										**K2.01** Knowledge of electrical poser supplies to the following: Major D.C. loads.	3.1/3.4	1
271000 Offgas												Not selected.		
272000 Radiation Monitoring	02											**K1.02** Knowledge of the physical connections and/or cause-effect relationships between RADIATION MONITORING SYSTEM and the following: Offgas system.	3.2/3.5	1
286000 Fire Protection												Not selected.		
290003 Control Room HVAC												Not selected.		
300000 Instrument Air			02									**K3.02** Knowledge of the effect that a loss or malfuntion of the INSTRUMENT AIR SYSTEM will have on the following: Systems having pneumatic valves and controls.	3.3/3.4	1
400000 Component Cooling Water											2.2.18	**G2.2.18** Knowledge of the process of managing maintenance activities during shutdown operations. (SRO ONLY)	2.3/3.6	1
K/A Category Point Totals:	1	1	1	2	1	0	1	2	1	1	2	Group Point Total:		13

ES-401	BWR SRO Examination Outline Plant Systems - Tier 2/Group 3	Form ES-401-1 (R8, S1)

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201003 Control Rod and Drive Mechanism												Not selected.		
215001 Traversing In-core Probe												Not selected.		
233000 Fuel Pool Cooling and Cleanup												Not selected.		
239001 Main and Reheat Steam				16								**K3.16** Knowledge of the effect that a loss or malfunction of the MAIN AND REHEAT STEAM SYSTEM will have on the following: Relief/safety valves.	3.6/3.6	1
256000 Reactor Condensate		01										**K2.01** Knowledge of the power supplies to the system pumps	2.7/2.8	1
268000 Radwaste							01					**A1.01** Ability to predict and/or monitor changes in parameters associated with operating the RADWASTE controls including: Radiation level.	2.7/3.1	1
288000 Plant Ventilation								02				**A2.02** Ability to (a) predict the impacts of the following on the PLANT VENTILATION SYSTEMS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: LOW REACTOR WATER LEVEL. (SRO ONLY)	3.4/3.6	1
290002 Reactor Vessel Internals												Not selected.		
K/A Category Point Totals:		1		1			1	1				Group Point Total:		4

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total (limit 10):			

Facility: Brunswick Date of Exam: Exam Level: **SRO**

Category	K/A #	Topic	Imp.	Pts.
Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements.	3.7/3.8	1
	2.1.10	Knowledge of conditions and limitations in the facility license	2.7/3.9	1
	2.1.28	Knowledge of the purpose and function of major system components and controls.	3.2/3.3	1
	2.1.12	Ability to apply technical specifications for a system.	2.9/4.0	1
	Total			
Equipment Control	2.2.3	Knowledge of the design / procedural / and operational differences between units.	3.1/3.3	
	2.2.14	Knowledge of the process for making configuration changes. (SRO ONLY)	2.1/3.0	1
	2.2.17	Knowledge of the process for managing maintenance activities during power operations. (SRO ONLY)	2.3/3.5	1
	2.2.27	Knowledge of the refueling process. (SRO ONLY)	2.6/3.5	1
	Total			
Radiation Control	2.3.1	Knowledge of the process for performing a containment purge.	2.8/3.0	1
	2.3.4	Knowledge of radiation exposure limits and contamination control / including permissible levels in excess of those authorized.	2.5/3.1	1
	Total			
Emergency Procedures/ Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps.	4.3/4.6	1
	2.4.2	Knowledge of system set points / interlocks and automatic actions associated with EOP entry conditions.	3.9/4.1	1
	2.4.3	Ability to identify post-accident instrumentation.	3.5/3.8	1
	2.4.11	Knowledge of abnormal condition procedures.	3.4/3.6	1
	2.4.18	Knowledge of the specific basis for EOPs.	2.7/3.6	1
	2.4.27	Knowledge of fire in the plant procedure. (SRO ONLY)	3.0/3.5	1
	2.4.48	Ability to interpret control room indication. (SRO ONLY)	3.5/3.8	1
	Total			
Tier 3 Point Total (SRO)				17