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

Facility: River Bend Station Date of Exam: 12/1/2008

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

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 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			1				**(AK3.04) Knowledge of the reason for a reactor scram as it applies to a partial or complete loss of forced core flow circulation.**	3.4	1
295003 Partial or Complete Loss of AC / 6					1		**(AA2.03) Ability to determine and/or interpret battery status as it applies to a partial or complete loss of AC power.**	3.2	2
295004 Partial or Total Loss of DC Pwr / 6				1			**(AA1.01) Ability to operate and/or monitor the DC electrical distribution system during a partial or complete loss of DC power.**	3.3	3
295005 Main Turbine Generator Trip / 3				1			**(AA1.02) Ability to operate and/or monitor RPS following a Main Turbine or Generator trip.**	3.6	4
295006 SCRAM / 1		1					**(AK2.02) Knowledge of the interrelations between SCRAM and reactor water level control.**	3.8	5
295016 Control Room Abandonment / 7						1	**(G.2.4.4) Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures as they relate to control room abandonment.**	4.5	6
295018 Partial or Total Loss of CCW / 8			1				**(AK3.07) Knowledge of the reasons for the cross connecting of backup systems as it applies to the partial or complete loss of component cooling water.**	3.1	7
295019 Partial or Total Loss of Inst. Air / 8						1	**(G.2.4.47) Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material during a partial or total loss of instrument air.**	4.2	8
295021 Loss of Shutdown Cooling / 4			1				**(AK3.05) Knowledge of the reason for establishing alternate heat removal paths during a loss of shutdown cooling.**	3.6	9
295023 Refueling Acc / 8				1			**(AA1.06) Ability to operate or monitor neutron monitoring during a refueling accident.**	3.3	10
295024 High Drywell Pressure / 5			1				**(EK3.06)Knowledge of the reasons for Reactor Scram as it applies to High Drywell Pressure.**	4.0	11
295025 High Reactor Pressure / 3									
295026 Suppression Pool High Water Temp. / 5				1			**(EA1.01) Ability to operate and/or monitor suppression pool cooling as it applies to a suppression pool high water temperature.**	4.1	12
295027 High Containment Temperature / 5				1			**(EA1.03) Ability to operate and/or monitor emergency depressurization as it applies to High Containment Temperature.**	3.5	13
295028 High Drywell Temperature / 5	1						**(EK1.02) Knowledge of the operational implications of equipment environmental qualifications as they apply to high drywell temperature.**	2.9	14

295030 Low Suppression Pool Wtr Lvl / 5					1		**(EA2.01) Ability to determine and/or interpret suppression pool level as it applies to a low suppression pool water level.**	4.1	15
295031 Reactor Low Water Level / 2				1			**(EA1.06) Ability to operate and/or monitor the automatic depressurization system as it applies to a reactor low water level.**	4.4	16
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1	1						**(EK1.01) Knowledge of the operational implications of reactor pressure effects on reactor power as they apply to an ATWS.**	4.1	17
295038 High Off-site Release Rate / 9					1		**(EA2.03) Ability to determine and/or interpret the Radiation Levels during a High Offsite Release Rate.**	3.5	18
600000 Plant Fire On Site / 8				1			**(AA1.09) Ability to operate and/or monitor the plant fire zone panel (including detector location) during a Plant Fire On Site.**	2.5	19
700000 Generator Voltage and Electric Grid Disturbances / 6					1		**(AA2.06) Ability to determine and/or interpret generator frequency limitations as they apply to Generator Voltage and Electrical Grid Disturbances.**	3.4	20
K/A Category Totals:	2	1	4	7	4	2	Group Point Total:		20/7

ES-401 BWR Examination Outline Form ES-401-1
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)

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		1					**(AK2.04) Knowledge of the interrelations between loss of main condenser vacuum and the reactor/turbine pressure regulating system.**	3.2	21
295007 High Reactor Pressure / 3		1					**(AK2.06) Knowledge of the interrelations between High Reactor Pressure and NSSSS.**	3.5	22
295008 High Reactor Water Level / 2									
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5	1						**(AK1.01) Knowledge of the operational implications of containment pressure as it applies to a High Containment Temperature.**	4.0	23
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5						1	**(G.2.2.12) Knowledge of surveillance procedures associated with High Suppression Pool Temperature.**	3.7	24
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					1		**(AA2.03) Ability to determine and/or interpret CRD mechanism temperature as it applies to a Loss of CRD Pumps.**	3.1	25
295029 High Suppression Pool Wtr Lvl / 5									
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9		1					**(EK2.01) Knowledge of the interrelations between High Secondary Containment Area Radiation Levels and the area radiation monitoring system.**	3.8	26
295034 Secondary Containment Ventilation High Radiation / 9			1				**(EK3.02) Knowledge of the reasons for starting SBGT as it applies to a Secondary Containment Ventilation High Radiation condition.**	4.1	27
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5									
500000 High CTMT Hydrogen Conc. / 5									
K/A Category Point Totals:	1	3	1	0	1	1	Group Point Total:		7/3

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (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	#
203000 RHR/LPCI: Injection Mode							1		1			**(A1.02) Ability to predict and/or monitor changes in reactor pressure associated with the operating ofRHR/LPCI injection mode.** **(A3.01) Ability to monitor automatic valve operation of the RHR/LPCI injection mode**	3.9 3.8	28 29
205000 Shutdown Cooling			1									**(K3.03) Knowledge of the effect that a loss or malfunction of the Shutdown Cooling System will have on reactor temperatures (moderator, vessel, flange)**	3.8	30
206000 HPCI														
207000 Isolation (Emergency) Condenser														
209001 LPCS		1							1			**(K2.01) Knowledge of the electrical power supply to the pump.** **(A3.01) Ability to monitor automatic valve operations of LPCS.**	3.0 3.6	31 32
209002 HPCS									1			**(A3.06) Ability to monitor lights and alarms associated automatic operation of HPCS.**	2.8	33
211000 SLC							1					**(A1.03) Ability to predict and/or monitor changes in pump discharge pressure associated with operating the Standby Liquid Control System.**	3.6	34
212000 RPS			1									**(K3.09) Knowledge of the effect that a loss or malfunction of RPS will have on the magnitude of heat energy that must be absorbed by the containment during accident/transient conditions.**	3.2	35
215003 IRM				1								**(K4.04) Knowledge of the IRM design feature and/or interlocks that provide for varying system sensitivity levels using range switches.**	2.9	36
215004 Source Range Monitor								1				**(A2.02) Ability to predict the impact of an SRM inop and based on those predictions, use procedures to correct, control, or mitigate the consequences of that condition.**	3.4	37
215005 APRM / LPRM		1										**(K2.02) Knowledge of electrical power supplies to APRM channels.**	2.6	38
217000 RCIC									1			**(A3.04) Ability to monitor system flow during automatic operation of RCIC.**	3.6	39
218000 ADS										1		**(A4.09) Ability to manually operate and/or monitor suppression pool temperature in the control room.**	3.9	40

223002 PCIS/Nuclear Steam Supply Shutoff				1								**(K4.07) Knowledge of NSSSS design features which provide for physical separation of system components (to prevent localized environmental factors, electrical faults, and physical events from impairing system response).**	2.8	41
239002 SRVs			1									**(K3.02) Knowledge of the effect that a loss or malfunction of the Relief/Safety Valves will have on reactor over pressurization.**	4.2	42
259002 Reactor Water Level Control	1											**(K1.03) Knowledge of the physical connections and/or cause-effect relationships between Reactor Water Level Control System and reactor water level.**	3.8	43
261000 SGTS			1						1			**(K3.01) Knowledge of the effect that a loss or malfunction of the Standby Gas Treatment System will have on secondary containment and environment differential pressure.** **(A4.09) Ability to manually operate and/or monitor ventilation valves and dampers in the control room.**	3.3 2.7	44 45
262001 AC Electrical Distribution					1				1			**(K5.02) Knowledge of the operational implications of breaker control as it applies to the AC electrical distribution system.** **(A4.03) Ability to manually operate and/or monitor local operation of breakers in the control room.**	2.6 3.2	46 47
262002 UPS (AC/DC)				1								**(K4.01) Knowledge of the UPS design feature and/or interlocks which provide for the transfer from preferred power to alternate power supplies.**	3.1	48
263000 DC Electrical Distribution	1							1				**(K1.02) Knowledge of the physical connections and/or cause-effect relationships between DC electrical distribution system and the battery charger and batteries.** **(A2.02) Ability to predict the impact of a loss of ventilation during charging and based on those predictions, use procedures to correct, control, or mitigate the consequence of this condition.**	3.2 2.6	49 50
264000 EDGs							1					**(A1.03) Ability to predict and/or monitor changes in operating voltages, currents, and temperatures associated with the Emergency Diesel Generators.**	2.8	51
300000 Instrument Air								1				**(A2.01) Ability to predict the impact of air dryer and filter malfunctions on the Instrument Air System and based on those predictions, use procedures to correct, control, or mitigate the consequences of this condition.**	2.9	52
400000 Component Cooling Water				1								**(K4.01) Knowledge of the CCW design feature and/or interlocks which provide for the automatic start of the standby pump.**	3.4	53
K/A Category Point Totals:	2	2	4	4	1	0	3	3	4	3	0	Group Point Total:		26/5

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (RO)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
201001 CRD Hydraulic											1	**(G.2.2.39) Knowledge of less than or equal to one hour Technical Specification action statements for CRD Hydraulics.**	3.9	54
201002 RMCS														
201003 Control Rod and Drive Mechanism														
201004 RSCS														
201005 RCIS							1					**(A1.01) Ability to predict and/or monitor changes in first stage shell pressure associated with RCIS.**	3.2	55
201006 RWM														
202001 Recirculation						1						**(K6.09) Knowledge of the effect that a loss of reactor water level will have on the Recirculation System.**	3.4	56
202002 Recirculation Flow Control	1											**(K1.09) Knowledge of the physical connections and/or cause effect relationships between Recirculation Flow Control and reactor water level.**	3.1	57
204000 RWCU														
214000 RPIS														
215001 Traversing In-core Probe														
215002 RBM														
216000 Nuclear Boiler Inst.							1					**(A1.03) Ability to predict and/or monitor changes in parameters associated with operating the Nuclear Boiler Instrumentation including surveillance testing.**	2.9	58
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								1				**(K4.02) Knowledge of Fuel Handling Equipment design features and/or interlocks which provide for prevention of control rod movement during core alterations.**	3.3	59
239001 Main and Reheat Steam											1	**(G.2.4.20) Knowledge of the operational implications of EOP warnings, cautions, and notes as related to main and reheat steam..**	3.8	60
239003 MSIV Leakage Control														
241000 Reactor/Turbine Pressure Regulator														
245000 Main Turbine Gen. / Aux.									1			**(A3.05) Ability to monitor operation of main turbine generator and control valve automatic operation.**	3.0	61

256000 Reactor Condensate														
259001 Reactor Feedwater	1											**(K1.05) Knowledge of the physical connections and/or cause-effect relationships between Reactor Feedwater System and Condensate.**	3.2	62
268000 Radwaste														
271000 Offgas					1							**(K5.11) Knowledge of the operational implications of the necessity of reducing the relative humidity of carbon bed filters in the Offgas System.**	2.6	63
272000 Radiation Monitoring														
286000 Fire Protection										1		**(A4.05) Ability to manually operate and or monitor the fire pump in the main control room.**	3.3	64
288000 Plant Ventilation														
290001 Secondary CTMT														
290003 Control Room HVAC														
290002 Reactor Vessel Internals						1						**(K6.01) Knowledge ot the effect that a loss or malfunction of the CRD Hydraulic system will have on Reactor Vessel Internals.**	2.8	65
K/A Category Point Totals:	2	0	0	0	1	2	2	1	1	1	2	Group Point Total:		12/3

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

Facility:		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	**2.1.19**	**Ability to use plant computers to evaluate system or component status.**	3.9	66		
	2.1.29	**Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.**	4.1	67		
	2.1.34	**Knowledge of primary and secondary plant chemistry limits.**	2.7	68		
	2.1.					
	2.1.					
	2.1.					
	Subtotal					
2. Equipment Control						
	2.2.17	**Knowledge of the process for managing maintenance activities during plant operations, such as risk assessments, work prioritization, and coordination with the transmission system operator.**	2.6	70		
	2.2.18	**Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.**	2.6	71		
	2.2.23	**Ability to track Technical Specification limiting conditions for operations**	3.1	69		
	2.2.					
	2.2.					
	Subtotal					
3. Radiation Control						
	2.3.15	**Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.**	2.9	73		
	2.3.7	**Ability to comply with radiation work permit requirements during normal or abnormal conditions.**	3.5	72		
	2.3.					
	Subtotal					
4. Emergency Procedures / Plan	**2.4.1**	**Knowledge of EOP entry conditions and immediate action steps.**	4.6	74		
	2.4.5	**Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.**	3.7	75		
	2.4.					
	2.4.					
	2.4.					
	Subtotal					
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1	295024 EK3.08	Containment spray is not applicable to RBS design. Re-selected 295024 EK3.05.
1/1	600000 AA1.07	Importance rating <2.5. Based on review of Plant Safety Analysis performance of this action is not of high significance. Re-selected 600000 AA1.09
1/1	295021 AK3.04	This function is not performed in the associated abnormal operating procedure. Re-selected. 295021 AK3.05
2/1	203000 A1.07	Importance rating <2.5. Based on review of Plant Safety Analysis performance of this action is not of high significance. Re-selected 203000 A1.02
2/1	259002 K1.07	Rod worth minimizer is not applicable to RBS design. Re-selected 259002 K1.03.
2/1	261000 A4.05	RBS is equipment with a Mark III containment, this KA therefore is not applicable. Re-selected 261000 A4.09
2/1	400000 K5.01	Importance rating <2.5. Based on review of Plant Safety Analysis knowledge of this item and associated actions is not of high significance. Re-selected 400000 A4.01
2/2	201001 K3	K3s were oversampled in T2G1 while K5 and Generics had <2 topics selected. In order to balance the Tier, two K3 topics were randomly selected to be rejected in favor of a K5 and a Generic. In this case, re-selected 201001 G2.2.39.
2/2	271000 K3	K3s were oversampled T2G1 while K5 and Generics had <2 topics selected. In order to balance the Tier, two K3 topics were randomly selected to be rejected in favor of a K5 and a Generic. In this case, 271000 K5.11
3	G.2.2.5	Importance rating <2.5 and is of no particular importance to the site at the RO level. Re-selected G.2.2.12
1/1	295024 EK3.05	Rejected due high drywell pressure not being a condition that requires RPV flooding. Reselected 295024 EK3.06
1/1	295038 EA2.02	Rejected due to this not being a function performed by the Reactor Operator. Reselected 295038 EA2.03
1/2	295002 AK2.06	Rejected due to low operational validity for discriminatory RO level question. Reselected 295002 AK2.04

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/2	295034 EK3.03	Rejected due to inability to write a discriminatory RO level question. Reselected 295034 EK3.02
3	G 2.2.12	This KA was on both the 2004 and 2007 NRC Exams. Randomly selected KA G.2.2.23
3	G 2.3.11	This KA was on both the 2004 and 2007 NRC Exams. Randomly selected KA G.2.3.7 to replace.
2/2	234000 A2.03	Rejected due to inability to write a discriminatory RO level question. Reselected 234000 K4.02.

Facility: River Bend Station Date of Exam: 11/21/2008

Tier	Group	RO K/A Category Points											SRO-Only Points		
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1. Emergency & Abnormal Plant Evolutions	1				N/A					N/A			20	2	5	7
	2												7	0	3	3
	Tier Totals												27	2	8	10
2. Plant Systems	1												26	3	2	5
	2												12	0 / 1	2	3
	Tier Totals												38	4	4	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1 / 2	2 / 1	3 / 2	4 / 2	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).
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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 Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (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	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4									
295003 Partial or Complete Loss of AC / 6									
295004 Partial or Total Loss of DC Pwr / 6									
295005 Main Turbine Generator Trip / 3						1	**(G.2.4.6)Knowledge of EOP mitigation strategies as they relate to main turbine and generator trips.**	4.7	76
295006 SCRAM / 1					1		**(AA2.04) Ability to determine and/or interpret reactor pressure as it applies to a SCRAM condition.**	4.1	77
295016 Control Room Abandonment / 7									
295018 Partial or Total Loss of CCW / 8									
295019 Partial or Total Loss of Inst. Air / 8					1		**(AA2.01) Ability to determine and/or interpret the instrument air system pressure as it applies to a partial or total loss of instrument air.**	3.6	78
295021 Loss of Shutdown Cooling / 4									
295023 Refueling Acc / 8									
295024 High Drywell Pressure / 5									
295025 High Reactor Pressure / 3						1	**(G.2.2.44) Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions while experiencing a high reactor pressure condition..**	4.4	79
295026 Suppression Pool High Water Temp. / 5						1	**(G.2.1.27) Knowledge of system purpose and function regarding systems used to control suppression pool water temperature**	4.0	80
295027 High Containment Temperature / 5									
295028 High Drywell Temperature / 5						1	**(G.2.4.50) Ability to verify alarm setpoints and operate controls identified in the alarm response manual regarding High Drywell Temperature.**	4.0	81
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						1	**(G.2.4.35) Knowledge of local auxiliary operator tasks during an emergency and the resultant operator effects during an ATWS condition.**	4.0	82
295038 High Off-site Release Rate / 9									
600000 Plant Fire On Site / 8									
700000 Generator Voltage and Electric Grid Disturbances / 6									
K/A Category Totals:					2	5	Group Point Total:		20/7

ES-401	BWR Examination Outline 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						1	**(G.2.2.38) Knowledge of conditions and limitations in the facility license regarding High Containment Temperature.**	4.5	83
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									
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9						1	**(G2.4.6) Knowledge of EOP mitigation strategies regarding Secondary Containment Ventilation High Radiation.**	4.7	84
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5						1	**(G.2.4.9) Knowledge of low power/shutdown implications in accident mitigation strategies with respect to secondary containment high sump/area water level.**	4.2	85
500000 High CTMT Hydrogen Conc. / 5									

K/A Category Point Totals:					0	3	Group Point Total:	7/3

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (SRO)												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	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								1				**(A2.10) Ability to predict the impact of high suppression pool temperature on LPCS and based on those predictions, use procedures to correct, control, or mitigate the consequences of this condition.**	3.4	86
209002 HPCS											1	**(G.2.4.49) Ability to perform without reference to procedures those actions that require immediate operation of system components and controls related to HPCS.**	4.4	87
211000 SLC														
212000 RPS														
215003 IRM														
215004 Source Range Monitor														
215005 APRM / LPRM														
217000 RCIC														
218000 ADS														
223002 PCIS/Nuclear Steam Supply Shutoff								1				**(A2.10) Ability to predict the impact of loss of coolant accidents on NSSSS and based on those predictions use procedures to correct, control, or mitigate the consequence of this condition.**	4.2	88
239002 SRVs														
259002 Reactor Water Level Control											1	**(G.2.4.1) Knowledge of EOP entry conditions and immediate action steps regarding reactor water level control**	4.8	89
261000 SGTS														
262001 AC Electrical Distribution														
262002 UPS (AC/DC)														
263000 DC Electrical Distribution														

264000 EDGs													
300000 Instrument Air													
400000 Component Cooling Water							1				**(A2.01) Ability to predict the impact of a loss of CCW pump and based on those predictions, use procedures to correct, control, or mitigate the consequences of this condition.**	3.4	90
K/A Category Point Totals:							3			2	Group Point Total:		26/5

ES-401	BWR Examination Outline 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	A2	A 3	A 4	G	K/A Topic(s)	IR	#
201001 CRD Hydraulic											1	**(G.2.4.11) Knowledge of abnormal condition procedures associated with CRD hydraulics.**	4.2	91
201002 RMCS														
201003 Control Rod and Drive Mechanism														
201004 RSCS														
201005 RCIS														
201006 RWM														
202001 Recirculation														
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								1				**(A2.10) Ability to predict the impact of nuclear boiler instrument failures on RHR pool cooling mode and based on those predictions, use procedures to correct, control or mitigate the consequences of this condition.**	3.2	92
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											1	**(G2.4.31) Knowledge of the alarms, indications, or response procedures associated with reactor condensate.**	4.1	93
259001 Reactor Feedwater														
268000 Radwaste														
271000 Offgas														
272000 Radiation Monitoring														
286000 Fire Protection														
288000 Plant Ventilation														
290001 Secondary CTMT														
290003 Control Room HVAC														

290002 Reactor Vessel Internals														
K/A Category Point Totals:								1			2	Group Point Total:		12/3

Facility:		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	**2.1.23**	**Ability to perform specific system and integrated plant procedures during all modes of plant operation.**			**4.4**	94
	2.1.42	**Knowledge of new and spent fuel movement procedures.**			**3.4**	95
	2.1.					
	2.1.					
	2.1.					
	2.1.					
	Subtotal					**2**
2. Equipment Control	**2.2.43**	**Knowledge of the process used to track inoperable alarms.**			**3.3**	96
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	2.2.					
	Subtotal					**1**
3. Radiation Control	**2.3.6**	**Ability to approve release permits.**			**3.8**	97
	2.3.15	**Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.**			**3.1**	98
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal					**2**
4. Emergency Procedures / Plan	**2.4.28**	**Knowledge of procedures relating to a security event (non-safeguards information).**			**4.1**	99
	2.4.49	**Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.**			**4.4**	100
	2.4.					
	2.4.					
	2.4.					
	Subtotal					**2**
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
2/2	256000 G.2.2.12	No credible tie exists for this K/A for this system. Re-selected G.2.4.31.
1/2	295022 G.2.4.6	KA is rejected due to an event related to this abnormal event being included in Scenario 2 of the Operating Exam. Randomly re-selected 295034 from T1G2.Maintained the originally selected Generic topic. New KA is 295034 G2.4.6

Facility: River Bend Station Date of Examination: 12/1/2008

Examination Level: RO ☒ SRO ☐ Operating Test Number: 2008-NRC

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, N	**(A1) - DETERMINE THE AMOUNT OF DECAY HEAT IN THE CORE (KA 2.1.20)**
Conduct of Operations	R, N	**(A2) - DETERMINE WHEN HOT SHUTDOWN BORON WEIGHT HAS BEEN INJECTED INTO THE CORE (KA 2.1.25)**
Equipment Control	R, M	**(A3) - DETERMINE EFFECTS OF REMOVING CONTROL POWER FUSE (KA 2.2.15)**
Radiation Control	R, N	**(A4) – DETERMINE STAY TIME TO COMPLETE TAGOUT (KA 2.3.7)**
Emergency Procedures/Plan		NA

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: River Bend Station — Date of Examination: 12/1/2008

Examination Level: RO ☐ SRO ☒ — Operating Test Number: 2008-NRC

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, D	**(A5) – REVIEW CALCULATION PER GOP-0004 FOR ENTERING SINGLE LOOP OPERATION (KA 2.1.20)**
Conduct of Operations	R, N	**(A6) - DETERMINE PLANT SAFETY LEVEL DURING SHUTDOWN CONDITIONS (KA 2.1.23)**
Equipment Control	R, N	**(A7) - ESTABLISH ADMINISTRATIVE CONTROLS FOR MANIPULATED COMPONENTS (KA 2.2.14)**
Radiation Control	R, N	**(A4) - DETERMINE STAY TIME TO COMPLETE TAGOUT (KA 2.3.7)**
Emergency Procedures/Plan	R, D	**(A8) - DETERMINE PROTECTIVE ACTION RECOMMENDATIONS (KA 2.4.44)**

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)

Control Room/In-Plant Systems Outline Form ES-301-2

Facility: River Bend Station	Date of Examination: 12/1/2008
Exam Level: RO ☒ SRO-I ☐ SRO-U ☐	Operating Test No.: 1

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
(S1) - RESTART RECIRCULATION PUMP B IN FAST SPEED	**A, S, D**	**1**
(S2) - SHUTDOWN HPCS AFTER AUTOMATIC INITIATION	**A, S, D, EN**	**2**
(S3) – SHIFT CONTROL BUILDING CHILLERS	**A, S, N, EN**	**9**
(S4) - PERFORM MAIN TURBINE BYPASS SYSTEM VALVE CYCLE TEST	**S,D**	**3**
(S5) - RESET THE REACTOR SCRAM	**S, D, E**	**7**
(S6) - PLACE FUEL BUILDING VENTILATION IN REFUEL MODE	**S, N, L, E**	**8**
(C1) - PREVENT INJECTION OF LOW PRESSURE ECCS SYSTEMS	**C, D, L, E, EN**	**4**
(C2) - DEFEAT PRIMARY CONTAINMENT VENT AND PURGE ISOLATION INTERLOCKS	**C, D, E, EN**	**5**
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
(P1) - ALIGNING IAS TO SVV	**A, E, N, R**	**3**
(P2) - PERFORM A MANUAL START OF THE HPCS DIESEL GENERATOR LOCALLY	**D, EN**	**6**
(P3) - MANUAL LOCAL START OF DIESEL FIRE PUMP FPW-P1A	**A, D, E,**	**8**

@ 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	

Control Room/In-Plant Systems Outline Form ES-301-2

Facility: River Bend Station — Date of Examination: 12/1/2008

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ — Operating Test No.: 1

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
(S1) - RESTART RECIRCULATION PUMP B IN FAST SPEED	**A, S, D**	**1**
(S2) - SHUTDOWN HPCS AFTER AUTOMATIC INITIATION	**A, S, D, EN**	**2**
(S3) – SHIFT CONTROL BUILDING CHILLERS	**A, S, N, EN**	**9**
(S4) - PERFORM MAIN TURBINE BYPASS SYSTEM VALVE CYCLE TEST	**S,D**	**3**
(S5) - RESET THE REACTOR SCRAM	**S, D, E**	**7**
(C1) - PREVENT INJECTION OF LOW PRESSURE ECCS SYSTEMS	**C, D, L, E, EN**	**4**
(C2) - DEFEAT PRIMARY CONTAINMENT VENT AND PURGE ISOLATION INTERLOCKS	**C, D, E, EN**	**5**

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

(P1) - ALIGNING IAS TO SVV	**A, E, N, R**	**3**
(P2) - PERFORM A MANUAL START OF THE HPCS DIESEL GENERATOR LOCALLY	**D, EN**	**6**
(P3) - MANUAL LOCAL START OF DIESEL FIRE PUMP FPW-P1A	**A, D, E,**	**8**

@ 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	

Control Room/In-Plant Systems OutlineForm ES-301-2

Facility: River Bend Station — Date of Examination: 12/1/2008

Exam Level: RO ☐ SRO-I ☐ SRO-U ☒ — Operating Test No.: 1

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
(S1) - RESTART RECIRCULATION PUMP B IN FAST SPEED	**A, S, D**	**1**
(S3) – SHIFT CONTROL BUILDING CHILLERS	**A, S, N, EN**	**9**
(C1) - PREVENT INJECTION OF LOW PRESSURE ECCS SYSTEMS.	**C, D, L, E, EN**	**4**

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

(P1) - ALIGNING IAS TO SVV	**A, E, N, R**	**3**
(P2) - PERFORM A MANUAL START OF THE HPCS DIESEL GENERATOR LOCALLY	**D, EN**	**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: River Bend Station Scenario No.: 1 Op-Test No.: 1

Examiners: _____ Operators: SRO-_____
_____ ATC-_____
_____ BOP-_____

Initial Conditions: Reactor power 100%

Turnover: TS LCO 3.0.3 has been in effect for twenty minutes, from Tech Spec 3.5.1 Condition H. Required to restore one ECCS system to service or be in Mode 3 in 6 hours. Div 2 RHR line fill tripped 20 minutes ago while LPCS pump breaker was out of service for breaker inspection. LPCS pump breaker has been returned to cubicle and requires a breaker functional check to declare operable. Perform breaker functional to exit LCO 3.0.3

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP,SRO)	Perform breaker functional on LPCS in accordance with SOP-0032 Section 4.4 (Tech Spec)
2	B21002B	I (ALL)	Level transmitter B21-ESN080B fails high (Tech Spec).
3	MSS005A	C (BOP,SRO) R (ATC)	B21-RVF051D fails open (Tech Spec).
4	MSS001	M (ALL)	Steam leak in the drywell following SRV closure following removal of fuses per AOP-0035 OPEN SAFETY RELIEF VALVE. Steam leak progresses into steam line rupture.
5	HPCS002	C (BOP,SRO)	E22-MOVF004 HPCS Injection valve fails to open on HPCS initiation signal (after EOP entry).
6	ED003H	C (SRO,BOP)	Loss of ENS-SWG1A Div. I emergency bus due to bus fault (after EOP entry).

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

Total Malfunctions	=5 (Level Xmitter, Relief Valve, Steam Line Rupture, E22-F004, ENS-SWG1A
Malfunctions after EOP	=2 (E22-F004, ENS-SWG1A)
Abnormal Events	=3 (AOP-35 SRV; AOP-1 Scram. AOP-2 Turbine trip)
Major Transients	=1 (Steam line rupture)
EOP entered	=2 (EOP-1, EOP-2)
EOP contingencies	=1 (Alternate Level Control)
Critical Tasks	=2 (Close SRV, Restart Feedwater/Condensate injection)

Narrative:

Event 1) The crew will perform a breaker functional test of LPCS

Event 2) Due to a failure high on the Level 8 transmitter the crew will determine the equipment failure, and evaluate the Division 2 half scram, entering the appropriate Technical Specifications.

Event 3) A Safety Relief Valve will fail open, resulting in elevated suppression pool temperatures. Crew will lower power to 90% per AOP-0035 Open Safety Relief valve and to close the valve using front and back panel switches and then pulling fuses.

Event 4) The removal of the fuses in Event 4 will result in a Steam Leak in the drywell due to the closure of the SRV and resultant stress this places on the steam piping. This steam leak will progress into a steam line rupture. The crew will take actions to reduce the steam leak by a Reactor Scram and entry into EOP's upon receipt of a 1.68 psid signal.

Crew will take action to makeup to the RPV using feedwater and condensate, restarting the feedwater pumps which will trip on Level 8 resulting from the steam line rupture if Reactor pressure is still high. If pressure is lowered sufficiently injection with condensate will be required.

Event 5) Following the EOP entry, High pressure injection from the HPCS system will fail due to a failure of the HPCS injection valve to open. Crew will attempt to dispatch personnel to open the valve locally. Valve will not be open prior to termination.

Event 6) Following the EOP entry the crew will recognize that the Division 1 Diesel Generator started but failed to tie into the safety bus due to a bus fault. Bus fault will not be cleared prior to termination.

The scenario will terminate once the crew has restored level to 10 to 51 inch level band using Feedwater/Condensate injection

Facility: River Bend Station Scenario No.: 2 Op-Test No.: 2

Examiners: _____ Operators: SRO-_____
_____ ATC-_____
_____ BOP-_____

Initial Conditions: Reactor power 75%.

Turnover: Outboard seal replacement is complete on FWS-P1A. Start FWS-P1A then commence power ascension to 85% at 2% per hour using reactor recirculation flow. CNM-P1B is tagged out. Expected back this shift. NNS-SWG1C aligned to NNS-SWG1A due to maintenance on NNS-ACB24.CNM-P1B is tagged out for motor inspection.

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP,SRO)	Start FWS-P1A Feedwater pump per SOP-0009.
2		R (ATC) N (SRO)	Raise power with reactor recirculation flow.
3	RMS016A	I (SRO)	RMS-RE16A Containment PAM radiation monitor upscale failure. (Tech Spec)
4	CRD001B	C (ALL)	Control Rod Drive Pump B trips (Tech Spec)
5	FWS017D	I (ATC,SRO)	Steam line flow input to Feedwater Level Control Systems fails low
6	ED001	M (ALL)	Loss of offsite power.
7	RCIC003A RCIC001	I (BOP, SRO)	RCIC controller failure (After EOP entry) RCIC Turbine Trip
8	HPCS003	C	HPCS DG fails to start on initiation signal (After EOP entry)

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

Total Malfunctions	= 6 (RMS-RE16A, CRD Pump, FWLC fails low, Loss offsite power, RCIC controller/trip, HPCS DG failure
Malfunctions after EOP	= 2 (RCIC, HPCS DG)
Abnormal Events	= 4 (AOP-0001 Reactor Scram, AOP-0002 Turbine Trip, AOP-0004 Loss of Offsite Power, AOP-0006 Condensate & Feedwater Failures)
Major Transients	= 1 (Loss of offsite power)
EOP entered	= 2(EOP-0001, EOP-0002)
EOP contingencies	= 2 (Alternate Level control, Emergency Depressurization)
Critical Tasks	=2 (Restore reactor water level to normal band, Restore offsite power)

Narrative:

Event 1) The crew will perform a startup of the 'A' Feedwater Pump, BOP will startup Lube Oil system and ATC will start the feedwater pump.

Event 2) The crew will raise power with Reactor Recirculation flow at ~2% CTP per hour.

Event 3) The crew will respond to a upscale failure RMS-RE16A Containment PAM radiation monitor. (Tech Spec)

Event 4) Trip of the running CRD pump B, the BOP will start the alternate CRD pump and restore flow and pressure. The ATC operator will be monitoring for accumulator faults and CRD high temperatures. (Tech Spec)

Event 5) Equipment failure of one of the steam flow transmitters causes a steam flow–feed flow mismatch in the 3 element circuitry in the level control system.

This result in a lower flow demand, and a resultant lowering of level. Since there are 4 steam flow inputs, the loss of 1, bias the level setpoint to about 20" vessel level.

The ATC operator can take manual control of the master controller or go the single level control and allow the system to automatically control level

Event 6) The plant suffers a loss of offsite power. This results in a loss of all Condensate and Feedwater flow, and power to the Reactor Protection System. Vessel level will lower, but a Reactor Scram has already occurred from the loss of power to RPS.

The Div. I & II diesel generators start and supply their associated buses. Div. III diesel generator fails to start on the loss of power signal resulting in the loss of HPCS injection.

Event 7) Following the EOP entry the crew will recognize that the RCIC Controller is failed down scale, resulting in no injection. The BOP can place the RCIC Flow Controller into manual and slowly open the governor valve to start injection. RCIC will trip at 90% speed, meaning that no high pressure injection sources of necessary size are available. Before level drops below -186" the CRS will direct the opening of 7 ADS/SRV to lower pressure and allow injection by low pressure ECCS systems, per Alternate Level Control

Event 8) Following the EOP entry the crew will recognize that the Division 3 Diesel Generator failed to start, and the safety related bus is de-energized. The diesel generator will not be started prior to termination.

The scenario will terminate once the crew has restored level to 10 to 51 inch level band using Low Pressure ECCS systems

Facility: River Bend Station Scenario No.: 3 Op-Test No.: 3

Examiners:_____ Operators: CRS – _____
_____ ATC – _____
_____ BOP– _____

Initial Conditions: Reactor power 100%.

Turnover: Div 1 DG monthly run is in progress. Diesel has been running at full load for > 1 hour. After turnover, unload and secure diesel in accordance with STP-309-0201 (currently at Step 7.3.2.) CCS-P1A tagged out for breaker inspection. Div I DG is inoperable.

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP,SRO)	Unload and secure Div 1 DG.
2	NMS011F	I (ATC, SRO)	APRM 'F' upscale failure (Tech Spec)
3	CRDM 4029	C (ATC,SRO)	Single rod scram on APRM failure. (Tech Spec)
4	MGEN005A	C (SRO,BOP)	Isophase Bus Duct Cooling Fan A Trip (GML-FN1)
5	MGEN005B	C (SRO) R (ATC)	Isophase Bus Duct Cooling Fan B Trip (GML-FN2)
6	TMS003	C (SRO,ATC)	Turbine High Vibration
7	CRD014	M (ALL)	Anticipated Transient Without Scram (hydraulic lock)
8	SLC001A SLC002B	C (BOP,SRO)	SLC pumps both fail

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

Total Malfunctions =6 (APRM F, Single Rod Scram, GML-FN1, GML-FN2, ATWS, SLC)
Malfunctions after EOP = 1 (SLC Pumps)
Abnormal Events = 2 (Single Rod scram, Turbine Vibration)
Major Transients = 1 (ATWS)
EOP entered = 2 (EOP-0001, EOP-0002)
EOP contingencies = 1 (EOP-0001A)
Critical Tasks = 2 (Trip the turbine, Insert all Control Rods)

NARRATIVE:

EVENT 1) BOP Operator unloads and secures Division 1 Diesel Generator

EVENT 2&3) APRM 'F' fails upscale. This will cause a reactor half scram. The CRS will reference TS 3.3.1.1 and recognize only three APRMs per channel are required also TS 3.3.2.1 and TR 3.3.2.1 and recognize only 6 APRMs are needed for rod blocks. The crew should recognize that one APRM may be bypassed then bypass the APRM and reset the half scram. APRM 'F' fails upscale resulting in a Single Rod Scram of rod 40-29.

EVENT 4&5) Trip of GML-FN1. GML-FN2 Iso Bus Duct Cooling fan will be started and then subsequently trip also. This requires that Generator loading be reduced to ~52% of full power.

EVENT 6) As a result of starting to lower generator load, the turbine starts to experience high vibration. This vibration requires a Turbine Trip when it reaches 10 mils for 15 minutes or 12 mils immediate. As a result of the lowering power or high turbine vibration, the reactor is scrammed

EVENT 7&8) When the scram is inserted, a hydraulic lock will prevent rods from inserting. The crew will take actions in accordance with EOP-1A. Suppression Pool Temperature will require boration. Neither Standby Liquid Control system is available to inject Boron into the Core to shutdown the reactor.

Termination Criteria:

- All rods in as the result of resetting and initiating additional scram signals
- Reactor Level and pressure controlled in assigned bands or efforts underway to restore to assigned bands.
- All previously elevated primary containment parameters restored or are being addressed.

Facility: River Bend Station Scenario No.: 4 Op-Test No.4

Examiners: _____ Operators: SRO-_____
_____ ATC-_____
_____ BOP-_____

Initial Conditions: Startup is in progress. Reactor pressure is 90 psig. Reactor power 2%.

Turnover: Shift priorities: 1) Shift to CNM-P1B, secure CNM-P1C to support oil addition to CNM-P1C. CNM-P1C has a low oil level. 2) Warm up RCIC and place in standby per SOP-0035 prior to exceeding 150 psig. 3) Continue power ascension per GOP-0001 by withdrawing control rods per Step 50 of Reactivity Control Plan. Additional operators are being called in to assist with other startup acitivities.

Event No.	Malf. No.	Event Type*	Event Description
1		N (ALL)	Start CNM-P1B/Secure CNM-P1C.
2		N (SRO, BOP)	Place RCIC in standby.
3		R (ATC) N (SRO)	Raise power with control rods
4	B21005	I (ALL)	B21-PTN078A RPV Pressure fails upscale (Tech Spec.)
5	ED005F	C (SRO)	Div 3 HPCS 125VDC Bus Fault (Tech Spec)
6	RCIC004	M (ALL)	RCIC Steam Leak in the RCIC Room
7	RPS001B	C (ATC)	RPS fails to insert control rods. Rods will be inserted with Alternate Rod Insertion.
8	RCIC007 RCIC008	C (BOP,CRS)	RCIC Inboard and Outboard Containment Isolation Valve (E51-F063 & E51-F064 Fail to Close

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

Total Malfunctions	=5 B21-PTN078A failure, Div 3 125 VDC bus failure, RCIC Steam Leak, Failure to Scram, RCIC Isolation Failure
Malfunctions after EOP	=2 RCIC Isolation failure, RPS Failure
Abnormal Events	=2 AOP-0001, AOP-0003
Major Transients	=1 RCIC Steam Leak
EOP entered	=2 EOP-0001, EOP-0003
EOP contingencies	=1 Emergency Depressurization
Critical Tasks	=3 Initiate ARI, Emergency Depressurize, Isolate RCIC

Narrative:

Event 1) Rotate CNM pumps per turnover sheet. Crew will start CNM-P1B and secure CNM-P1C to allow oil addition to CNM-P1C.

Event 2) Place RCIC in standby per SOP-0035. Crew will warm up the RCIC system via the steam bypass line. Once pressure is equalized across the steam supply valves, the crew will place RCIC in service by opening the containment isolation valves.

Event 3) The ATC operator will withdraw control rods in accordance with the Reactivity Control Plan in order to raise reactor power.

Event 4) B21-PTN078A fails upscale (Tech Spec.) This failure will cause a reactor half scram. The SRO will enter TS 3.3.1.1 Condition A and TS 3.3.6.1. Condition A. In both cases the channel is in the tripped condition as a result of the half scram.

Event 5) Div 3 HPCS 125VDC Bus Fault (Tech Spec). This bus loss will require entry into TS 3.8.9 Condition E which will require declaring HPCS and SWP-P2C inoperable. This will cascade into TS 3.5.1. Condition B and TS 3.7.1 Condition E.

Event 6) RCIC Steam Leak in the RCIC Room. Initial indication of the steam leak will be in the RHR A room due to the high temperature alarm set point (110°F) being lower than the RCIC Room. The SRO will enter EOP-0003, Secondary Containment and Radioactive Release Control and will direct a reactor scram.

Event 7) The ATC operator will place the Reactor Mode Switch to the Shutdown position to scram the reactor. RPS fails to insert control rods. The ATC will attempt alternate methods of rod insertion by depressing the RPS pushbuttons which will be unsuccessful. The ATC will then attempt insertion via the Alternate Rod Insertion System. Rods will be inserted with Alternate Rod Insertion.

Event 8) RCIC Inboard and Outboard Containment Isolation Valve (E51-F063 & E51-F064) Fail to Close. The crew will attempt to isolate the leak once the source is identified. The isolation valves will fail to shut. The valves will also fail to isolate when the automatic isolation signal is received due to high temperature.

The scenario will terminate when all rods are inserted, the reactor is depressurized and RCIC is isolated.