

Facility: River Bend Station														Date of Exam: 2016				
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	3	3	4	N/A			4	3	N/A			3	20	4	3	7	
	2	1	1	2	N/A			1	1	N/A			1	7	1	2	3	
	Tier Totals	4	4	6	N/A			5	4	N/A			4	27	5	5	10	
2. Plant Systems	1	2	3	3	3	3	2	2	2	2	2	2	26	2	3	5		
	2	1	1	1	1	1	1	1	1	1	1	2	12	0	1	3		
	Tier Totals	3	4	4	4	4	3	3	3	3	3	4	38	4	4	8		
3. Generic Knowledge and Abilities Categories				1		2		3		4		10		1	2	3	4	7
				3		3		2		2				2	1	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). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category.)
 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 with justification; 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 a category 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.

G* Generic K/As

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A2	G*	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4			X				Knowledge of the reasons for the following responses as they apply to partial or complete loss of forced core flow circulation: (CFR: 41.5 / 45.6) AK3.02 Reactor power response	3.7	39
295003 Partial or Complete Loss of AC / 6				X			Ability to operate and/or monitor the following as they apply to partial or complete loss of A.C. power: (CFR: 41.7 / 45.6) AA1.04 D.C. electrical distribution system	3.6	40
295004 Partial or Total Loss of DC Pwr / 6					X		Ability to determine and/or interpret the following as they apply to partial or complete loss of D.C. power: (CFR: 41.10 / 43.5 / 45.13) AA2.01 Cause of partial or complete loss of D.C. power	3.2	41
295005 Main Turbine Generator Trip / 3						X	2.1.19 Ability to use plant computers to evaluate system or component status. (CFR: 41.10 / 45.12)	3.9	42
295006 SCRAM / 1	X						Knowledge of the operational implications of the following concepts as they apply to SCRAM: (CFR: 41.8 to 41.10) AK1.01 Decay heat generation and removal	3.7	43
295016 Control Room Abandonment / 7		X					Knowledge of the interrelations between control room abandonment and the following: (CFR: 41.7 / 45.8) AK2.02 Local control stations: Plant-Specific	4.0	44
295018 Partial or Total Loss of CCW / 8			X				Knowledge of the reasons for the following responses as they apply to partial or complete loss of component cooling water: (CFR: 41.5 / 45.6) AK3.04 Starting standby pump	3.3	45
295019 Partial or Total Loss of Inst. Air / 8				X			Ability to operate and/or monitor the following as they apply to partial or complete loss of instrument air: (CFR: 41.7 / 45.6) AA1.01 Backup air supply	3.5	46
295021 Loss of Shutdown Cooling / 4									
295023 Refueling Acc / 8					X		Ability to determine and/or interpret the following as they apply to refueling accidents: (CFR: 41.10 / 43.5 / 45.13) AA2.02 Fuel Pool Level	3.4	47
295024 High Drywell Pressure / 5						X	2.2.44 Ability to interpret control room indications to verify status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)	4.2	48
295025 High Reactor Pressure / 3	X						Knowledge of the operational implications of the following concepts as they apply to high reactor pressure: (CFR: 41.8 to 41.10) EK1.01 Pressure effects on reactor power	3.9	49
295026 Suppression Pool High Water Temp. / 5		X					Knowledge of the interrelations between suppression pool high water temperature and the following: (CFR: 41.7 / 45.8) EK2.05 Containment pressure: Mark-III	3.0	50
295027 High Containment Temperature / 5			X				Knowledge of the reasons for the following responses as they apply to high containment temperature (Mark III containment only): (CFR: 41.5 / 45.6) EK3.01 Emergency depressurization: Mark-III	3.7	51
295028 High Drywell Temperature / 5				X			Ability to operate and/or monitor the following as they apply to high drywell temperature: (CFR: 41.7 / 45.6) EA1.02 Drywell ventilation system	3.9	52

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E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A2	G*	K/A Topic(s)	IR	#
295030 Low Suppression Pool Wtr Lvl / 5					X		Ability to determine and/or interpret the following as they apply to low suppression pool water level: (CFR: 41.10 / 43.5 / 45.13) EA2.03 Reactor pressure	3.7	53
295031 Reactor Low Water Level / 2						X	2.2.37 Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)	3.6	54
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1	X						Knowledge of the operational implications of the following concepts as they apply to SCRAM condition present and reactor power above APRM downscale or unknown: (CFR: 41.8 to 41.10) EK1.07 Shutdown margin	3.4	55
295038 High Off-site Release Rate / 9		X					Knowledge of the interrelations between high off-site release rate and the following: (CFR: 41.7 / 45.8) EK2.05 Site emergency plan	3.7	56
600000 Plant Fire On Site / 8			X				Knowledge of the reasons for the following responses as they apply to plant fire on site: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.04 Actions contained in the abnormal procedure for plant fire on site	2.8	57
700000 Generator Voltage and Electric Grid Disturbances / 6				X			Ability to operate and/or monitor the following as they apply to generator voltage and electric grid disturbances: (CFR: 41.5 and 41.10 / 45.5, 45.7, and 45.8) AA1.02 Turbine/generator controls	3.8	58
295026 Suppression Pool High Water Temp / 5					X		Ability to determine and/or interpret the following as they apply to Suppression pool high water temp: (CFR:43.2) EA2.01 SP water temp	4.2	84
295004 Partial or Total Loss of DC Pwr / 6						X	2.2.40 Ability to apply Technical Specifications for a system. (CFR:43.5)	4.7	85
295005 Main Turbine Generator Trip / 3					X		Ability to determine and/or interpret the following as they apply to main turbine generator trip: (CFR:43.5) AA2.05 Reactor Power	3.9	86
295016 Control Room Abandonment / 7						X	2.4.11 Knowledge of abnormal condition procedures (43.5)	4.2	87
295021 Loss of Shutdown Cooling / 4					X		Ability to determine and/or interpret the following as they apply to loss of shutdown cooling: (CFR: 43.5) AA2.02 RHR/shutdown cooling system flow	3.4	88
295024 High Drywell Pressure / 5						X	2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. (CFR:43.2)	4.2	89
295028 High Drywell Temperature / 5					X		Ability to determine and/or interpret the following as they apply to high drywell temperature: (CFR:43.5) A2.01 Drywell temp	4.1	90
K/A Category Totals:	3	3	4	4	3/4	3/3	Group Point Total:		20/7

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / 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			X				Knowledge of the reasons for the following responses as they apply to loss of main condenser vacuum: (CFR: 41.5 / 45.6) AK3.05 Main steam isolation valve: Plant-Specific	3.4	59
295007 High Reactor Pressure / 3				X			Ability to operate and/or monitor the following as they apply to high reactor pressure: (CFR: 41.7 / 45.6) AA1.04 Safety/relief valve operation: Plant-Specific	3.9	60
295008 High Reactor Water Level / 2									
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5									
295012 High Drywell Temperature / 5					X		Ability to determine and/or interpret the following as they apply to high drywell temperature: (CFR: 41.10 / 43.5 / 45.13) AA2.02 Drywell pressure	3.9	61
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1									
295015 Incomplete SCRAM / 1						X	2.4.3 Ability to identify post-accident instrumentation.	3.7	62
295017 High Off-site Release Rate / 9	X						Knowledge of the operational implications of the following concepts as they apply to high off-site release rate: (CFR: 41.8) AK1.02 Protection of general public	3.8	63
295020 Inadvertent Cont. Isolation / 5 & 7									
295022 Loss of CRD Pumps / 1									
295029 High Suppression Pool Wtr Lvl / 5		X					Knowledge of the interrelations between high suppression pool water level and the following: (CFR: 41.7 / 45.8) EK2.08 Drywell/suppression chamber ventilation	2.6	64
295032 High Secondary Containment Area Temperature / 5			X				Knowledge of the reasons for the following responses as they apply to high secondary containment area temperature: (CFR: 41.5 / 45.6) EK3.03 Isolating affected systems	3.8	65
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5									
500000 High CTMT Hydrogen Conc. / 5									
295020 Inadvertent Cont. Isolation / 5 & 7						X	2.1.20 Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	91
295033 High Secondary Containment Area Radiation Levels / 9					X		Ability to determine and/or interpret the following as they apply to high secondary containment area radiation levels: (CFR: 41.10 / 43.5 / 45.13) EA2.03 Cause of high area radiation	4.2	92
500000 High CTMT Hydrogen Conc. / 5						X	2.4.6 Knowledge of EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)	4.7	93
K/A Category Point Totals:	1	1	2	1	1/1	1/2	Group Point Total:		7/3

ES-401		BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)											Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
203000 RHR/LPCI: Injection Mode		X										Knowledge of electrical power supplies to the following: (CFR: 41.7) K2.01 Pumps	3.5	1
203000 RHR/LPCI: Injection Mode			X									Knowledge of the effect that a loss or malfunction of the RHR/LPCI: injection mode (plant specific) will have on following: (CFR: 41.7 / 45.4) K3.04 Adequate core cooling	4.6	24
205000 Shutdown Cooling				X								Knowledge of shutdown cooling system (RHR shutdown cooling mode) design feature(s) and/or interlocks which provide for the following: (CFR: 41.7) K4.04 Adequate pump NPSH	2.6	3
209001 LPCS					X							K5. Knowledge of the operational implications of the following concepts as they apply to LOW PRESSURE CORE SPRAY SYSTEM: (CFR: 41.5 / 45.3) K5.04 Heat removal (transfer) mechanisms	2.8	4
209002 HPCS						X						Knowledge of the effect that a loss or malfunction of the following will have on the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS): (CFR: 41.7 / 45.7) K6.02 Condensate Storage Tank Level	3.4	5
211000 SLC							X					Ability to predict and/or monitor changes in parameters associated with operating the STANDBY LIQUID CONTROL SYSTEM controls including: (CFR: 41.5 / 45.5) A1.09 SBLC system lineup	4.0	6
212000 RPS								X				Ability to (a) predict the impacts of the following on the REACTOR PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.16 Changing mode switch position	4.0	7
215003 IRM									X			Ability to monitor automatic operations of the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM including: (CFR: 41.7 / 45.7) A3.02 Annunciator and alarm signals	3.3	8
215004 Source Range Monitor										X		Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.07 Verification of proper functioning/ operability	3.4	9
215005 APRM / LPRM											X	2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)	4.2	10
217000 RCIC	X											Knowledge of the physical connections and/or cause/effect relationships between REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) and the following: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.04 Main condenser	2.6	11
218000 ADS				X								Knowledge of ADS design features and/or interlocks which provide for the following: (CFR: 41.7) K4.03:ADS logic control	3.8	12

ES-401		BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / 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	#
223002 PCIS/Nuclear Steam Supply Shutoff			X									Knowledge of the effect that a loss or malfunction of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF will have on following: (CFR: 41.7 / 45.4) K3.06 Turbine building radiation	2.8	13
239002 SRVs				X								Knowledge of RELIEF/SAFETY VALVES design feature(s) and/or interlocks which provide for the following: (CFR: 41.7) K4.01 Insures that only one or two safety/relief valves reopen following the initial portion of a reactor isolation event (LLS logic): Plant-Specific	3.9	14
239002 SRVs					X							Knowledge of the operational implications of the following concepts as they apply to RELIEF/SAFETY VALVES: (CFR: 41.5 / 45.3) K5.05 Discharge line quencher operation	2.6	15
259002 Reactor Water Level Control						X						Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR WATER LEVEL CONTROL SYSTEM: (CFR: 41.7 / 45.7) K6.02 A.C. power	3.3	16
259002 Reactor Water Level Control							X					Ability to predict and/or monitor changes in parameters associated with operating the REACTOR WATER LEVEL CONTROL SYSTEM controls including: (CFR: 41.5 / 45.5) A1.03 Reactor power	3.8	17
261000 SGTS								X				Ability to (a) predict the impacts of the following on the STANDBY GAS TREATMENT SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.01 Low system flow	2.9	18
261000 SGTS									X			Ability to monitor automatic operations of the STANDBY GAS TREATMENT SYSTEM including: (CFR: 41.7 / 45.7) A3.04 System Temperature	3.0	19
262001 AC Electrical Distribution										X		Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.03 Local operation of breakers	3.2	20
262002 UPS (AC/DC)											X	2.4.31 Knowledge of annunciator alarms, indications, or response procedures. (CFR: 41.10)	4.2	21
263000 DC Electrical Distribution	X											Knowledge of the physical connections and/or cause/effect relationships between D.C. ELECTRICAL DISTRIBUTION and the following: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.01 A.C. electrical distribution	3.3	22
264000 EDGs			X									Knowledge of the effect that a loss or malfunction of the EMERGENCY GENERATORS (DIESEL/JET) will have on following: (CFR: 41.7 / 45.4) K3.01 Emergency core cooling systems	4.2	23
300000 Instrument Air		X										Knowledge of electrical power supplies to the following: (CFR: 41.7) K2.01 Instrument air compressor	2.8	24

ES-401		BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / 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	#
300000 Instrument Air					X							Knowledge of the operational implications of the following concepts as they apply to the INSTRUMENT AIR SYSTEM: (CFR: 41.5 / 45.3) K5.01 Air compressors	2.5	25
400000 Component Cooling Water		X										Knowledge of electrical power supplies for the following: (CFR: 41.7) K2.01 CCW Pumps	2.9	26
215005 APRM / LPRM								X				Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.07 Recirculation flow channels flow mismatch	3.4	76
239002 SRVs											X	2.2.25 Knowledge of bases for Tech Specs for LCOs and safety limits (CFR: 43.2)	4.2	77
262002 UPS (AC/DC)								X				Ability to (a) predict the impacts of the following on the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.02 Over voltage	2.5	78
264000 EDGs											X	2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)	4.3	79
212000 RPS											X	2.2.25 Knowledge of the bases in Tech Specs for LCOs and Safety limits	4.2	80
K/A Category Point Totals:	2	3	3	3	3	2	2	2/2	2	2	2/3	Group Point Total:		26/5

ES-401 401-1		BWR Examination Outline											Form ES-	
Plant Systems - Tier 2/Group 2 (RO / SRO)														
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	#
233000 Fuel Pool Cooling/Cleanup														
234000 Fuel Handling Equipment														
239001 Main and Reheat Steam														
239003 MSIV Leakage Control														
241000 Reactor/Turbine Pressure Regulator								X				Ability to (a) predict the impacts of the following on the REACTOR/TURBINE PRESSURE REGULATING SYSTEMSYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5) A2.02 High Reactor Pressure	3.7	34
245000 Main Turbine Gen. / Aux.														
256000 Reactor Condensate														
259001 Reactor Feedwater														
268000 Radwaste							X					Ability to predict and/or monitor changes in parameters associated with operating the RADWASTE controls including: (CFR: 41.5 / 45.5) A1.01 Radiation level	2.7	35
271000 Offgas									X			Ability to monitor automatic operations of the OFFGAS SYSTEM including: (CFR: 41.7 / 45.7) A3.07 Process radiation monitoring system indications	3.4	36
272000 Radiation Monitoring														
286000 Fire Protection														
288000 Plant Ventilation														
290001 Secondary CTMT										X		Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.09 System status lights and alarms: Plant-Specific	3.2	37
290003 Control Room HVAC														
290002 Reactor Vessel Internals											X	2.1.32 Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	3.8	38
204000 RWCU														
234000 Fuel Handling Equipment								X				Ability to (a) predict the impacts of the following on the FUEL HANDLING EQUIPMENT; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR: 41.5 / 45.6) A2.01 Interlock Failure	3.7	82
290003 Control Room HVAC											X	2.2.22 Knowledge of limiting conditions for operations and safety limits	4.7	83
K/A Category Point Totals:	1	1	1	1	1	1	1	1/1	1	1	2/2	Group Point Total:		12/3

Facility: River Bend Station		Date of Exam: 2016				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.3	Knowledge of shift or short-term relief turnover practices. (CFR: 41.10 / 45.13)	3.7	66		
	2.1.39	Knowledge of conservative decision making practices. (CFR: 41.10 / 43.5 / 45.12)	3.6	67		
	2.1.45	Ability to identify and interpret diverse indications to validate the response of another indication. (CFR: 41.7 / 43.5 / 45.4)	4.1	68		
	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. (CFR: 41.10 / 43.5 / 45.12)			3.9	94
	2.1.42	Knowledge of new and spent fuel movement procedures. (CFR: 41.10 / 43.7 / 45.13)			3.4	95
	Subtotal				3	
2. Equipment Control	2.2.2	Ability to manipulate the controls as required to operate the facility between shutdown and power levels	4.6	69		
	2.2.43	Knowledge of the process used to track inoperable alarms. (CFR: 41.10 / 43.5)	3.0	70		
	2.2.14	Knowledge of the process for controlling equipment configuration or status. (CFR: 41.10 / 43.3 / 45.13)	3.9	71		
	2.2.38	Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)			4.5	96
	Subtotal				3	
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)	3.2	72		
	2.3.12	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.2	73		
	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.11 / 41.12 / 43.4 / 45.9)			2.9	97
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 43.4 / 45.9)			3.1	98
	Subtotal				2	
4. Emergency Procedures / Plan	2.4.12	Knowledge of general operating crew responsibilities during emergency operations	4.0	74		
	2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc. (CFR: 41.7 / 43.5 / 45.12)	4.0	75		
	2.4.32	Knowledge of operator response to loss of all annunciators. (CFR: 41.10 / 43.5 / 45.13)			4.0	99

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Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
	2.4.38	Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required. (CFR: 41.10 / 43.5 / 45.11)			4.4	100
	Subtotal			2		2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
		Rejected KAs were not tracked since this was NRC written and the majority of the exam required new questions to be written for the randomly selected KAs because they did not have previously written questions in the facility licensee's bank.

Facility: River Bend Nuclear Station		Date of Examination: <u>9/12/2016</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: <u>LOT-2016</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R – N	CRD pump clearance
Conduct of Operations	R – N	Calculation for leakage
Equipment Control	R – N	Electrical Print Reading (Determine effect of removing fuses in RPS system)
Radiation Control	R – N	Determine emergency entry requirements for high dose
Emergency Plan		
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 Ben Nuclear Station		Date of Examination: <u>9/12/2016</u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: <u>LOT-2016</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R - N	Print Reading (RPS fuse removal)
Conduct of Operations	R - N	Leakage calculation and TS call associated with leakage.
Equipment Control	R - N	Evaluate a CRD pump clearance
Radiation Control	R - N	Emergency entry for high dose and who authorizes the entry.
Emergency Plan	R - N	Emergency Classification
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 NUCLEAR STATION		Date of Examination: <u>9/12/2016</u>	
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>LOT 2016</u>	
Control Room Systems* 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U			
System / JPM Title	Type Code*		Safety Function
S1. Perform Rod Withdrawal Limiter Test with a MSIV inadvertent closure.	A - N - S		1
S2. Align SU FRV and controller drifts open.	A - N - S - L		2
S3. Open MSIVs per SOP-011.	M - S - L		3
S4. Align Division 3 DG to power ENS-SWGR1A	E - N - S - L		4
** S5. SBGT fails to start with dampers fail to open.	A - EN - N - S		9
** S6. Swap electrical bus power supplies	N - S		6
S7. Drive In IRM/SRM Detectors Following a SCRAM	D - S - L		7
** S8. Start RHR in Suppression Pool Cooling Mode with high pump amps.	A - D - S - L		5
In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
** P1. CRD filter swap with new filter clogged (CR-2016-1724)	A - N - R		1
** P2. ATC actions to Man the RSP. AOP 31 Att 12 Section 1.1.4-1.1.6	N - E - L		2
P3. Place Inverter ENB-IV01B in Service	M		6
<p>* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p> <p>** and bolded indicates SRO-U selected JPMs.</p> <p>Shaded JPM indicates RO only JPM.</p>			
* 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	$\leq 9 / \leq 8 / \leq 4$
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$
(EN)gineered safety feature	$\geq 1 / \geq 1 / \geq 1$ (control room system)
(L)ow-Power / Shutdown	$\geq 1 / \geq 1 / \geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)
(R)CA	$\geq 1 / \geq 1 / \geq 1$
(S)imulator	

Facility: River Bend Nuclear Station Scenario No.: 1

Op-Test No.: NRC LOT 2016

Examiners: _____ Operators: _____

Initial Conditions: Operating at 100% power.

Inoperable Equipment: None

Turnover:

Severe Thunderstorm warning in effect for West Feliciana in effect. All required actions per AOP-29 (Severe Weather Operation) are complete.

Scenario Notes:

This scenario is a NEW Scenario.

Validation Time: 60 minutes

Event No.	Malf. No.	Event Type †	Event Description
1	HPCS004	C (BOP) TS (CRS) AOP	HPCS Inadvertent Initiation. AOP 6, Condensate/Feedwater Failures. TS 3.5.1
2	MGEN005A	C (BOP)	Isophase Bus Duct Cooling Fan Trips. SOP 67, Isolated Phase Bus Duct Cooling System. ARP P870-54-B-1
3	p808_86a:h_1 DI_EXS-VRAA	C (ATC) AOP	Degraded Grid. Adjust MVARs per AOP 64, Degraded Grid. ARP 680-P808-86-H-1.
4	AO_FWS-A03-M P680_3a:c_1	C (ATC) AOP	FWS Pump A motor failure (amps increasing/secure pump). AOP 6, Condensate/Feedwater Failures. AOP 24, Thermal Hydraulics Stability Controls. ARP P680-3-C-1.
5	p680_6a:a_8 p680_5a:b_10 RPS005D	TS (CRS)	SDV level instrument fails high 1 of 4 instruments. TS 3.3.1.1. ARP P680-5-B-10, P680-5-A-10, P680-6-A-8
6	ED002B	M (CREW)	NPS-B Fault/Trip. Complete loss of feedwater. EOP 1
7	RCIC001 E51MOV045P	C (BOP)	RCIC trips due to malfunction. Restore HPCS. EOP-2, EOP-3
8	WCS006	M (CREW)	RWCU line break in the steam tunnel 100 gpm ramp for 3 minutes after mode switch taken to shutdown. EOP-2, EOP 3
9	WCS004 WCS005	C (ATC)	G33-MOV-1 and G33-MOV-4 fail to auto close. AOP 3
† (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (A)bnormal (TS) Tech Spec			

Quantitative Attributes Table

Normal Events	0	EOP Contingency Procedures Used	1
Total Malfunctions	9	Simulator Run Time	60
Malfunctions After EOP Entry	2	EOP Run Time	30
AOP Events	3	Critical Tasks	2
Major Transients	2	Reactivity Manipulations	0
EOPs Used (Requiring measurable action)	3		

SCENARIO ACTIVITIES:**HPCS Inadvertent Initiation:**

- A. After turnover and at the direction of the lead evaluator trigger *Event 1*.
- B. The BOP will override HPCS off. This will prevent further automatic initiation.

**Isophase Bus Duct Cooling Fan Trips:**

- A. The BOP will restart Isophase Bus Duct Cooling Fan per SOP 67, Isolated Phase Bus Duct Cooling System and ARP P870-54-B-1.

**Degraded Grid:**

- A. CRS will enter AOP 64 and dispatcher will notify control room to adjust MVARs.
- B. MVARs will initially be 250 MVARs. ATC adjusts MVARs to 200 MVARs per AOP 64, Degraded Grid and ARP 680-P808-86-H-1.

**FWS Pump A Motor Failure:**

- A. The ATC will recognize the increasing FW motor amps and secure the FWS Pump A per AOP 6 (Condensate/Feedwater Failures), AOP 24 (Thermal Hydraulics Stability Controls), ARP P808-86-H-1, and ARP P680-3-C-1.

**SDV level instrument fails high:**

- A. 1 of 4 SDV level instruments fails high. CRS enters TS 3.3.1.1.

**NPS-B Fault/Trip, Complete loss of feedwater,:**

- A. Crew will manually scram the reactor due to the complete loss of feedwater. The automatic RPS scram will occur at 9.7" reactor water level if manual action is not taken first.

**RCIC malfunction**

- A. Crew will recognize RCIC malfunction and restore HPCS injection to maintain reactor water level in expanded level band.

RWCU line break in the steam tunnel:

- A. 5 minutes after automatic or manual scram, *Event 7* will automatically trigger.
- B. Indications of high temperatures in the steam tunnel will cause isolation signals. G33-MOV-1 and G33-MOV-4 will fail to auto close.
- C. Crew will shut the failed isolation valves.

Critical Task		
Number	Description	Basis
1	Per EOP-3, close one RWCU isolation valve (G33-MOV-1 OR G33-MOV-4) after failure to close on group 15 isolation before completion of step 5.9 of AOP-3 (EOP-3, SC-4)	Per EOP basis, An area temperature above its maximum normal operating level is an indication that steam from a primary system may be discharging into the secondary containment. As temperatures continue to increase, the continued operability of equipment needed to carry out EOP actions may be compromised. High area temperatures also present a danger to personnel, a consideration of significance since access to the secondary containment may be required by actions specified in the EOPs. (EPSTG*0002, B-9-3)
2	Restore HPCS injection prior to Emergency Depressurization (EOP-1, ALC-8).	Per EOP basis, Submergence is the preferred method for cooling the core. The core is adequately cooled by submergence when it can be determined that RPV water level is at or above the top of the active fuel. All fuel nodes are then assumed to be covered with water and heat is removed by boiling heat transfer. (EPSTG*0002, B-3-1)
<p>* Critical Task (As defined in NUREG 1021 Appendix D)</p> <p>** Per NUREG-1021, Appendix D, If an operator or the crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a CT identified in the post-scenario review.</p>		

Simulator Notes:

Prior to scenario, ensure GML Fan 1 is running

Note: for event 4, get to 360 amps quicker and then ramp to 440 amps slower.

Event 30 deletes amps when FWS pump is tripped.

Event 8, RCIC trips when >90% speed.

Event 29/30 deletes the leak and valve failure when valve switches are closed.

For the isophase fan trouble ARP states, "Check computer alarm typer Points GMLFC01 and GMLFC02 to determine which device is causing alarm." May need to provide screen shot to provide proper indications.

Graphics for the SPI-REC102 to indicate values consistent with grid.

Screen Shot for C11NC036 needs to indicate one trip unit in TRIP.

When restoring HPCS during leak, if asked to fill and vent system, expedite the process.

SIMULATOR SET UP:

SCHEDULE FILE PICTURE

DIRECTOR FILE PICTURE

Provide the following:

- Turnover briefing sheets and reactivity management briefing materials.
- Marked up copy of AOP-29, Severe Weather

Facility: River Bend Nuclear Station Scenario No.: 2 Op-Test No.: NRC LOT 2016

Examiners: _____ Operators: _____

Initial Conditions: Operating at 100% power.

Inoperable Equipment: None

Turnover:

Restore 3-element control for feedwater. I&C has completed maintenance and retest.

Severe Thunderstorm warning in effect for West Feliciana in effect. All required actions per AOP-29 are complete.

Main Turbine experienced increased (approximately 1 mil higher than normal) turbine vibrations on previous shift.

Scenario Notes:

This scenario is a NEW Scenario.

Validation Time: 60 minutes

Event No.	Malf. No.	Event Type †	Event Description
1		N (ATC)	Restore 3-element control per SOP-9, Section 4.10
2	ED004J RCS015B	C (ATC) TS (CRS) AOP R (ATC)	NJS-J malfunction. MFP A trip. FCV runback. B FCV fails to runback. Recirculation flow mismatch. AOP 2 (MAIN TURBINE AND GENERATOR TRIPS) AOP 6 (Condensate / Feedwater failures). TS 3.4.1 Reset FCV Runback IAW ARP. Increase flow to increase margin away from restricted region.
3	FWS012 DTM-AOV41A	C (BOP)	Loss of extraction steam. ARP 870-53-H09, AOP-7
4	MSS005J	C (BOP) TS (CRS) AOP	SRV (47C) stuck open. AOP-35. TS 3.5.1 and 3.6.5.3
5	TMS003	M (CREW)	Main Turbine Vibrations increase to manual scram level. EOP 1 (RPV Control). OSP-53, AOP-2, EOP-1.
6	CRD014	M (CREW)	Hydraulic ATWS 65%. EOP 1A (RPV Control, ATWS). EOP 2
7	SLC002A/B	C (BOP)	SLC Pump Failure.
8	E12MOV064AP E12MOV064BP	C (BOP)	Failure of RHR A/B min flow valve to auto close.
† (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (A)bnormal (TS) Tech Spec			

Quantitative Attributes Table

Normal Events	1	EOP Contingency Procedures Used	1
Total Malfunctions	8	Simulator Run Time	60
Malfunctions After EOP Entry	2	EOP Run Time	30
AOP Events	2	Critical Tasks	3
Major Transients	2	Reactivity Manipulations	1
EOPs Used (Requiring measurable action)	2		

SCENARIO ACTIVITIES:**Restore 3-element control**

- A. After turnover the ATC will restore 3-element control for feedwater control using SOP-9, Section 4.10.

NJS-J malfunction:

- A. FWP A will trip. An automatic FCV runback will occur. The B FCV fails to runback. A large Recirculation flow mismatch will result.
- B. The ATC will manually runback the B FCV to eliminate the flow mismatch per AOP 6 (Condensate / Feedwater failures).
- C. The CRS will enter TS 3.4.1.
- D. ATC will reset FCV Runback IAW ARP. Increase flow to increase margin away from restricted region.

Loss of Extraction Team:

- A. BOP will report the 1st point heater failure and reference ARP-870-53-H09. The ARP operator actions include referencing AOP-7, Loss of FW Heating. The drain will fail to automatically open and the BOP will manually open DTM-AOV41A, 1ST PT EXTRACTION LINE DRAIN CONTROL VLV.

SRV (47C) stuck open:

- A. SRV (47C) will open. Per AOP-35, SRV Stuck Open, the valve will shut when the hand switch is manually taken to close.

Main Turbine Vibrations:

- A. Vibrations continue to increase to 12 mils which require a manual scram and turbine trip per OSP-53.

ATWS:

- A. After the ATC manually scrams the reactor, a 65% Hydraulic ATWS will occur automatically.
- B. The crew will install EOP attachments and drive the control rods in.

SLC Pump Failure:

- A. The first SLC pump started will have an automatic malfunction resulting in a failure to inject.
- B. The second SLC pump will operate normally and inject boron as required.

Failure of RHR A or B min flow valve to Auto Close:

- A. The crew will establish Suppression Pool Cooling per OSP 53, Attachment 12.
- B. The min flow valve will fail to auto close when the test return valves are opened and require crew to manually close the minimum flow valve.

Critical Task		
Number	Description	Basis
1	Per EOP-1A, RLA-13, terminate and prevent all injection sources except boron injection, CRD and RCIC prior to exceeding HCTL.	With RPV injection terminated, RPV level and reactor power decrease at the maximum possible rate allowed by boiloff. Failure to completely stop RPV injection flow (with the exception of CRD, RCIC, and boron injection) would delay the reduction in core inlet subcooling, thus increasing the potential for flux oscillations. (EPSTG*0002, B-7-37)
2	***Per EOP-1A, RQA-4, inject SLC prior to suppression pool temperature reaching 110F.	A scram failure event with reactor power above 5% coupled with an MSIV isolation, however, may result in rapid heatup of the suppression pool due to the steam discharged from the RPV via SRVs. The challenge to containment thus becomes the limiting factor which defines the second of the two possible conditions requiring initiation of boron injection. If suppression pool temperature and RPV pressure cannot be maintained below the Heat Capacity Temperature Limit, emergency depressurization will be required. To avoid depressurizing the RPV with the reactor at power, it is desirable to shut down the reactor prior to reaching the Heat Capacity Temperature Limit. Suppression pool temperature of 110°F represents the minimum Boron Injection Initiation Temperature (BIIT). The suppression pool temperature at which a reactor scram is required by plant Technical Specifications (110°F). River Bend Station uses the suppression pool temperature at which a reactor scram is required by plant Technical Specifications in place of a curve that is a function of reactor power for simplicity. (EPSTG*0002, B-7-59)
3	Per EOP-1A, RQA-2, commence driving control rods in prior to exiting EP-1A.	Positive confirmation that the reactor will remain shutdown under all conditions is best obtained by determining that no control rod is withdrawn beyond the Maximum Subcritical Banked Withdrawal Position (MSBWP). The MSBWP is the greatest banked rod position at which the reactor will remain shutdown under all conditions. For the current fuel design and core load, the MSBWP is all control rods fully inserted. (EPSTG*0002, B-7-2)
<p>* Critical Task (As defined in NUREG 1021 Appendix D)</p> <p>** Per NUREG-1021, Appendix D, If an operator or the crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a CT identified in the post-scenario review.</p> <p>*** Due to SLC malfunction, action may be taken to inject SLC prior to 110F; however, SLC will not inject until failure is recognized and other SLC pump is attempted.</p>		

Facility: River Bend Nuclear Station Scenario No.: 4 Op-Test No.: NRC LOT 2016

Examiners: _____ Operators: _____

Initial Conditions: Operating at 4% power.

Inoperable Equipment: None

Turnover:
Per SOP-7, start CNM-P1B,Section 5.1, and secure CNM-P 1C, Section 6.1

Continue withdrawing rods to achieve mode 1 using RMP-RBS-19-TRG-01 starting on Step 066.

Severe Thunderstorm warning in effect for West Feliciana in effect. All required actions per AOP-29 are complete.

Scenario Notes:

This scenario is a NEW Scenario.

Validation Time: 60 minutes

Event No.	Malf. No.	Event Type †	Event Description
1		N (ATC/BOP)	Swap Condensate Pumps per SOP-7, start CNM-P1B, Section 5.1, and secure CNM-P 1C, Section 6.1
2		R (ATC)	Withdraw rods for mode change. Crew will withdraw 3 rods per Reactivity Management Plan.
3	p877_32a:e_1	TS (CRS)	Division 2 Diesel Generator Air Leak per P877-32A-E01, TS 3.8.3 and 3.8.1.
4	NMS006E	C (ATC)	IRM E fails upscale. Bypass IRM. Reset the ½ scram ARP P680-6-C-10.
5	CCS001B CCS003C	C (BOP) AOP	CCS pump trip. Standby fails to auto start. AOP-12 (Loss of Turbine Plant Component Cooling Water)
6	RMS005C HVFAOD102 104 AND 122	C (BOP) AOP	Rad monitor fails. HVF-AOD-104, HVF-AOD-122 and HVF-AOD-102 fail to auto close. EOP-3, AOP-3
7	NMS007A	TS (CRS)	IRM A fails downscale. ARP P680-6-C-9.
8	ED001 DG002B DG002C RCS007	M	Station Blackout. Loss of offsite power. Loss of feed. Reactor scram. Division 2 and 3 DGs fail. EOP 1. Drywell leak 200 gpm, EOP-2
9	DG006A	C (BOP)	Division 1 DG voltage is low and needs to be raised in order to energize the bus.
10	RCIC002 DI_E51-MIDA	C (ATC)	RCIC manual initiation fails. RCIC must be manually aligned per hardcard.

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

Quantitative Attributes Table

Normal Events	1	EOP Contingency Procedures Used	1
Total Malfunctions	7	Simulator Run Time	60
Malfunctions After EOP Entry	2	EOP Run Time	30
AOP Events	2	Critical Tasks	2
Major Transients	1	Reactivity Manipulations	1
EOPs Used (Requiring measurable action)	3		

SCENARIO ACTIVITIES:**Swap Condensate Pumps**

- A. Per SOP-7, start CNM-P1B, Section 5.1, and secure CNM-P 1C, Section 6.1

Withdraw rods for mode change

- A. ATC will continue with the rod withdraw to transition to mode 1.

Division 2 DG Air Leak

- A. BOP recognizes Division 2 Diesel Generator Air Leak per P877-32A-E01.
Dispatches SNEO to investigate alarm and reports low air pressure and air leak.
- B. CRS enters TS 3.8.3 and 3.8.1.

IRM E fails upscale:

- A. The ATC will bypass IRM E per ARP P680-6-C-10.
- B. The ATC will reset the half scram per ARP P680-5-A-9.

CCS pump trip:

- A. The running CCS pump will trip and the standby pump fails to start.
- B. The Unit Operator will manually start the standby CCS pump per AOP-12 (Loss of Turbine Plant Component Cooling Water).

Rad monitor fails:

- A. The Fuel Building Exhaust Rad monitor fails and HVF-AOD-104, HVF-AOD-122 and HVF-AOD-102 fail to auto close. ARP-RMS-DSP230/4GE005
- B. The Unit Operator manually closes the three dampers.

IRM A fails downscale:

- A. The CRS will enter TS 3.3.1.1.

Station Blackout:

- A. A loss of offsite power will result in a complete loss of feed and an automatic reactor scram on low reactor water level. Division 2 and 3 Diesel Generators will malfunction. A slow drywell leak will occur.

Division 1 Diesel Generator fails to energize ENS-SWGR1A:

- A. Upon the loss of offsite power, ***Event 8 will automatically trigger.***
- B. The Division 1 Diesel Generator will fail to reach voltage required to automatically energize ENS-SWGR1A.
- C. The crew will manually raise diesel voltage and energize ENS-SWGR1A.

RCIC manual initiation fails:

- A. Manual initiation of RCIC using the manual pushbutton will not work, ***Event 9 will automatically trigger.***
- B. The crew will manually align RCIC per the hard card (OSP-53).

Critical Task		
Number	Description	Basis
1	Per EOP-1, RL-1, adjust division 1 voltage to energize ENS SWGR A within 10 minutes. If shutdown, then once fill and vent of LP ECCS systems are complete, restart and power ENS SWGR A prior to auto trip on high temperature. Diesel Generator is needed to restore vital switchgear electrical power for AC control power during a station blackout.	<p>The third bullet "Emergency diesel generators" applies because electrical power supplied by a diesel generator may be required to operate RPV injection systems under emergency conditions.</p> <p>The statement "which should have...but did not" encompasses conditions for which automatic action should have occurred but failed to. In such a case, manual operator action to initiate the appropriate action is required. (EPSTG*0002, B-6-9)</p>
2	Per EOP-1, ALC-8, manually start RCIC prior to emergency depressurization.	<p>Emergency depressurization is not performed while RPV water level is above the top of the active fuel because the core will remain adequately cooled as long as RPV water level remains above the Minimum Steam Cooling RPV Water Level. (EPSTG*0002, B-6-29)</p> <p>Submergence is the preferred method for cooling the core. The core is adequately cooled by submergence when it can be determined that RPV water level is at or above the top of the active fuel. All fuel nodes are then assumed to be covered with water and heat is removed by boiling heat transfer.</p>
<p>* Critical Task (As defined in NUREG 1021 Appendix D)</p> <p>** Per NUREG-1021, Appendix D, If an operator or the crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a CT identified in the post-scenario review.</p>		

Simulator Notes:

Provide and mark up GOP 1 and reactivity plan.

Possible Remote Actions:

CRD006	Reset CRDM high Temperature
ECCS003	LPCS pump breaker (control power fuses)
ECCS004	RHR A pump breaker (control power fuses)
ECCS005	RHR B pump breaker (control power fuses)
ECCS006	RHR C pump breaker (control power fuses)
IAS009	Diesel Air Compressor

Facility: River Bend Nuclear Station Scenario No.: 3 (Spare) Op-Test No.: NRC LOT 2016

Examiners: _____ Operators: _____

Initial Conditions: Operating at 100% power.

Inoperable Equipment: None

Turnover:

Severe Thunderstorm warning in effect for West Feliciana in effect. All required actions per AOP-29 are complete.

RPS B power supply is on alternate due to repairs to B RPS MG set. RPS B normal power supply is available and tags are being cleared.

Swap CRD pumps

STP-203-6305 is in progress commence on step 7.6.3.

Scenario Notes:

This scenario is a NEW Scenario.

Validation Time: 60 minutes

Event No.	Malf. No.	Event Type †	Event Description
1		N (BOP)	Swap CRD pumps per SOP-2
2	HPCS001 Event 1	N (BOP) TS (CRS)	HPCS STP. HPCS pump trip. STP-203-6305. TS 3.5.1. ARP P601-16-B-3, P601-16-F-5, and P601-16-G-4.
3	ED0040	C (BOP/ATC) TS (CRS) AOP	Loss of alternate RPS power supply. Power supply switched back to normal and half scram reset. AOP 10 (Loss of RPS Bus). ARP P877-32-C-3, P877-32-E-1, P877-32-E-2, P877-32-F-2, P877-32-G-1, P877-32-H-3, and P877-32-H-4. TS 3.3.8.2, EOP-3
4/5	RCS005A RCS002A	C (ATC) AOP R (ATC)	Recirc pump seal leak, pump trip, (isolate recirc loop). ARP P680-4-E-5. GOP-4. AOP-24. Exit restricted region (<u>insert rods</u> or increase recirc flow)
6	MSC006	M (CREW)	THI increases and requires manual scram. ARP P680-6-C-1, P680-7-A-5, P680-7-A-6, P680-7-B-5, and P680-7-B-6. AOP-1. EOP-1.
7	ED001 Delay 2:30 RCIC001 T8, Ev 8 ED003I, Delay 2:30	M (CREW)	Loss of offsite power. Loss of feedwater. RCIC trips on overspeed. Failure of Division 2 DG to energize ENS SWGR-1B. Recirc loop rupture.
8	RHR009A	C (ATC)	RHR 'A' pump fails to auto start
9	LPCS002 delete on event 9	C (ATC)	LPCS injection valve fails to auto open
† (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (A)bnormal (TS) Tech Spec			
Quantitative Attributes Table			
Normal Events	2	EOP Contingency Procedures Used	1
Total Malfunctions	5	Simulator Run Time	60
Malfunctions After EOP Entry	2	EOP Run Time	30
AOP Events	2	Critical Tasks	3
Major Transients	2	Reactivity Manipulations	1
EOPs Used (Requiring measurable action)	2		


SCENARIO ACTIVITIES:**Swap CRD Pumps**

- A. Crew will swap CRD pumps per SOP-0002. This is a normal evolution that is not faulted.



HPCS pump trip:

- A. After turnover the Unit Operator will perform STP-203-6305. During the performance of the STP the HPCS pump will *automatically trip (Event 1)*. The Unit operator should secure HPCS STP lineup per ARP P601-16-B-3, P601-16-F-5, and P601-16-G-4.
- B. CRS should enter TS 3.5.1.

EJS SWGR B lockout:

- A. After the Unit Operator secures HPCS, CRS enters TS 3.5.1, and/or at the direction of the lead evaluator trigger *Event 2*. 
- B. The EJS SWGR B lockout will result in loss of alternate RPS power supply and a division 2 half scram.
- C. The Unit Operator will switch the power supply back to normal and the ATC will reset the half scram. AOP 10 (Loss of RPS Bus). ARP P877-32-C-3, P877-32-E-1, P877-32-E-2, P877-32-F-2, P877-32-G-1, P877-32-H-3, and P877-32-H-4.
- D. The CRS will enter TS 3.8.4 and 3.8.9.

Recirculation pump seal leak:

- A. After the Unit Operator swaps the RPS power supply and has completed AOP-10 through step 13 of Attachment 2, the ATC resets the Division 2 half scram, the CRS enters TS 3.8.4 and 3.8.9, and/or at the direction of the lead evaluator trigger *Event 3*. 
- B. The A Recirculation pump #1 seal will degrade.
- C. After the crew diagnosis of the seal failure and/or at the direction of the lead evaluator, trigger *Event 4* to trip the Recirculation Pump. 
- D. The ATC may be required to reduce flow to < 33 kgpm and monitor for THI. ARP P680-4-E-5. GOP-4. AOP-24. The ATC will also isolate tripped recirc pump and take actions to exit restricted region (insert rods or increase recirc flow).
- E. The CRS will enter TS 3.5.1.

Thermal Hydraulic Instability:

- A. After the ATC reduces flow to < 33 kgpm, the CRS enters TS 3.5.1, and/or at the direction of the lead evaluator trigger **Event 5**.
- B. THI power swings get bigger and require a manual scram. ARP P680-6-C-1, P680-7-A-5, P680-7-A-6, P680-7-B-5, and P680-7-B-6. AOP-1. AOP-24. EOP-1.

**Loss of offsite power & Recirc leak:**

- A. After the manual scram, **Event 6 will automatically occur**.
- B. The loss of offsite power will result in a loss of all feedwater. RCIC will trip on overspeed. The Division 2 DG will fail to energize ENS SWGR-1B.
- C. When RCIC trips, recirc leak will develop leading to lowering reactor water level.
- D. Due to a loss of all high pressure injection sources, the crew will be forced to emergency depressurize and inject with Division 1 low pressure ECCS systems.

RHR 'A' pump fails to auto start:

- A. The RHR A pump will fail to auto start after automatic initiation. **Automatic trigger Event 7**.
- B. The crew will manually start the RHR 'A' pump to assist restoring reactor water level. RHR alone will not be enough to restore reactor water level. LPCS will be required as well.

LPCS injection valve fails to auto open:

- A. The LPCS injection valve will fail to open after automatic initiation and emergency depressurization. **Automatic trigger Event 8**.
- B. The crew will manually open the LPCS injection valve to assist restoring reactor water level. LPCS alone will not be enough to restore reactor water level. RHR will be required as well.

Critical Task		
Number	Description	Basis
1	Per AOP-24, 4.2, Mode switch to shutdown immediately after Division 1 and 2 PERIOD BASED DETECTION SYSTEM HI-HI DECAY RATIO alarms are in (P680-07A-A6 and B6).	It is possible for the Critical Power Ratio Safety Limit to be violated during a Thermal Hydraulic Instability Event, even if the peak-to-peak power oscillations are less than 10%. (AOP-24, 1.9)
2	Per EOP-1, ALC-11 & 14, Emergency Depressurize prior to -211 inches compensated fuel zone.	Emergency RPV depressurization (signaled by Step ALC-11) permits injection from low head systems, maximizes the total injection flow, and minimizes the flow through any primary system break. If it is believed that available injection sources are capable of restoring and maintaining RPV water level above the Minimum Steam Cooling RPV Water Level following RPV depressurization, the blowdown may be performed as soon as RPV level reaches the top of the active fuel. (EPSTG*0002, B-6-29)
3	Per EOP-1, RL-2 & 3, Manually start RHR A pump and open LPCS injection valve prior to entering SAPs (restore and maintain reactor water level >-211 inches).	The primary action of Step RL-3 defines the range in which RPV level should be established and maintained, and specifies the preferred systems to use in doing so. Maintaining RPV water level below the high end of the identified control band preserves the availability of RCIC. RPV level above the low end of the identified control band permits the scram to be reset (barring the existence of other scram signals), and allows the use of the normal shutdown cooling system to establish and maintain cold shutdown conditions. Submergence is the preferred method for cooling the core. The core is adequately cooled by submergence when it can be determined that RPV water level is at or above the top of the active fuel. All fuel nodes are then assumed to be covered with water and heat is removed by boiling heat transfer. (EPSTG*0002, B-2-4)
<p>* Critical Task (As defined in NUREG 1021 Appendix D)</p> <p>** Per NUREG-1021, Appendix D, If an operator or the crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a CT identified in the post-scenario review.</p>		

Simulator Notes:

RPS B in alternate using the key switch in the back.

Set up the IC rod line to ensure when the recirc pump trips the crew is deep in the restricted region.

Make the recirc loop rupture big enough not to be turned by RHR alone.

Event 1 E22-MOVF011 red light on zdi5(856)

Event 10 remove MSC006 5 seconds after mode switch

Event 9 LPCS injection valve (5) to open zdi5(538)

T9, RCS001 to 20 on event 9

Event 7, Mode switch not in run

Event 8, RCIC turb >90% speed.

Event 30, Narrow range <0, T30 reactor recirc loop rupture RCS001A to 10. Ramp 2 minutes.