

Facility: BROWNS FERRY		Date of Exam: AUGUST 2011																
Tier	Group	RO K/A Category Points											SRO-Only Points					
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1	4	3	3	N/A			3	3	N/A			4	20	3	4	7	
	2	2	1	1	N/A			1	1	N/A			1	7	2	1	3	
	Tier Totals	6	4	4	N/A			4	4	N/A			5	27	5	5	10	
2. Plant Systems	1	2	2	2	3	3	3	3	2	2	2	2	26	3	2	5		
	2	1	1	2	1	1	1	1	1	1	1	1	12	0	2	3		
	Tier Totals	3	3	4	4	4	4	4	3	3	3	3	38	5	3	8		
3. Generic Knowledge and Abilities Categories				1		2		3		4		10		1	2	3	4	7
				3		2		2		3				2	2	1	2	
<p>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).</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</p> <p>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.</p> <p>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.</p> <p>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.</p>																		

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	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4						R	295001 AA2.02 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : Neutron monitoring. (CFR: 41.10 / 43.5 / 45.13)	3.1	1
295003 Partial or Complete Loss of AC / 6						R	295003 G2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2 / 45.6)	4.3	2
295004 Partial or Total Loss of DC Pwr / 6	R					S	295004 AK1.02 Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Redundant D.C. power supplies: Plant-Specific.... (CFR: 41.8 to 41.10)	3.2	3
							295004 AA2.02 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Extent of partial or complete loss of D.C. power..... (CFR: 41.10 / 43.5 / 45.13)	3.9	76
295005 Main Turbine Generator Trip / 3		R					295005 AK2.01 Knowledge of the interrelations between MAIN TURBINE GENERATOR TRIP and the following: RPS..... (CFR: 41.7 / 45.8)	3.8	4
295006 SCRAM / 1			R			S	295006 AK3.06 Knowledge of the reasons for the following responses as they apply to SCRAM : Recirculation pump speed reduction: Plant-Specific.... (CFR: 41.5 / 45.6)	3.2	5
							295006 G2.4.41 Knowledge of the emergency action level thresholds and classifications. (CFR: 41.10 / 43.5 / 45.11)	4.6	77
295016 Control Room Abandonment / 7				R	S		295016 AA1.08 Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT: Reactor Pressure. (CFR: 41.7 / 45.6)	4.0	6
							295016 AA2.06 Ability to determine and/or interpret the following as they apply to CONTROL ROOM ABANDONMENT : Cooldown rate.... (CFR: 41.10 / 43.5 / 45.13)	3.5	78

295018 Partial or Total Loss of CCW / 8	R					295018 AK1.01 Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : Effects on component/system operations (CFR: 41.8 to 41.10)	3.5	7
295019 Partial or Total Loss of Inst. Air / 8	R					295019 AK2.17 Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR and the following: High pressure coolant injection: Plant-Specific (CFR: 41.7 / 45.8)	2.7	8
295021 Loss of Shutdown Cooling / 4			R		S	295021 AK3.04 Knowledge of the reasons for the following responses as they apply to LOSS OF SHUTDOWN COOLING : Maximizing reactor water cleanup flow (CFR: 41.5 / 45.6)	3.3	9
						<b>295021 G2.4.30</b> <b>Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator. (CFR: 41.10 / 43.5 / 45.11)</b>	4.1	79
295023 Refueling Acc / 8				R		295023 AA1.05 Ability to operate and/or monitor the following as they apply to REFUELING ACCIDENTS : Fuel transfer system: Plant-Specific (CFR: 41.7 / 45.6)	2.8	10
295024 High Drywell Pressure / 5					R	295024 EA2.05 Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE: Suppression chamber air-space temperature: Plant-Specific.... (CFR: 41.10 / 43.5 / 45.13)	3.6	11
295025 High Reactor Pressure / 3					R	295025 G2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 41.10 / 43.5 / 45.12)	4.2	12
295026 Suppression Pool High Water Temp. / 5		R				295026 EK2.06 Knowledge of the interrelations between SUPPRESSION POOL HIGH WATER TEMPERATURE and the following: Suppression pool level... (CFR: 41.7 / 45.8)	3.5	13
295027 High Containment Temperature / 5								
295028 High Drywell Temperature / 5				R		295028 EA1.03 Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE : Drywell cooling system. (CFR: 41.7 / 45.6)	3.9	14

295030 Low Suppression Pool Wtr Lvl / 5					R	S	295030 EA2.01 Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL : Suppression pool level.. (CFR: 41.10 / 43.5 / 45.13)	4.1	15	
							295030 G2.4.6 <b>Knowledge of EOP mitigation strategies</b> (CFR: 41.10 / 43.5 / 45.13)	4.7	80	
295031 Reactor Low Water Level / 2					R		295031 EK3.01 Knowledge of the reasons for the following responses as they apply to REACTOR LOW WATER LEVEL : Automatic depressurization system actuation (CFR: 41.5 / 45.6)	4.2	16	
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1						R	295037 G2.4.46 Ability to verify that the alarms are consistent with the plant conditions. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.2	17	
295038 High Off-site Release Rate / 9		R					295038 EK1.03 Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE : †Meteorological effects on off-site release (CFR: 41.8 to 41.10)	2.8	18	
600000 Plant Fire On Site / 8					R		600000 G2.4.34 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	19	
						S	600000 G2.4.41 <b>Knowledge of the emergency action level thresholds and classifications.</b> (CFR: 41.10 / 43.5 / 45.11)	4.6	81	
700000 Generator Voltage and Electric Grid Disturbances / 6						S	700000 AK1.02 Knowledge of the operational implications of the following concepts as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Over-excitation. (CFR: 41.4, 41.5, 41.7, 41.10 / 45.8)	3.3	20	
							700000 AA2.05 <b>Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Operational Status of Offsite Circuit.</b> (CFR: 41.5 and 43.5 / 45.5, 45.7, and 45.8)	3.8	82	
K/A Category Totals:							Group Point Total:			207

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				R			295002 AA1.08 Ability to operate and/or monitor the following as they apply to LOSS OF MAIN CONDENSER VACUUM : Recirculating flow control system (CFR: 41.7 / 45.6)	2.6	21	
295007 High Reactor Pressure / 3										
295008 High Reactor Water Level / 2										
295009 Low Reactor Water Level / 2					S		295009 AA2.01 Ability to determine and/or interpret the following as they apply to LOW REACTOR WATER LEVEL : Reactor Water Level (CFR: 41.10 / 43.5 / 45.13)	4.2	83	
295010 High Drywell Pressure / 5					R		295010 AA2.04 Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE : Drywell humidity: Plant-Specific (CFR: 41.10 / 43.5 / 45.13)	2.8	22	
295011 High Containment Temp / 5										
295012 High Drywell Temperature / 5										
295013 High Suppression Pool Temp. / 5						R	295013 G2.4.3 Ability to identify post-accident instrumentation. (CFR: 41.6 / 45.4)	3.7	23	
295014 Inadvertent Reactivity Addition / 1						S	295014 G2.2.38 Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)	4.5	84	
295015 Incomplete SCRAM / 1										
295017 High Off-site Release Rate / 9										
295020 Inadvertent Cont. Isolation / 5 & 7										
295022 Loss of CRD Pumps / 1	R						295022 AK1.02 Knowledge of the operational implications of the following concepts as they apply to LOSS OF CRD PUMPS: Reactivity control (CFR: 41.8 to 41.10)	3.6	24	
295029 High Suppression Pool Wtr Lvl / 5										
295032 High Secondary Containment Area Temperature / 5					S		295032 EA2.02 Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE : Equipment operability (CFR: 41.10 / 43.5 / 45.13)	3.5	85	

295033 High Secondary Containment Area Radiation Levels / 9		R					295033 EK2.02 Knowledge of the interrelations between HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS and the following: Process radiation monitoring system (CFR: 41.7 / 45.8)	3.8	25
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5			R				295035 EK3.01 Knowledge of the reasons for the following responses as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE : Blow-out panel operation: Plant-Specific (CFR: 41.5 / 45.6)	2.8	26
295036 Secondary Containment High Sump/Area Water Level / 5									
500000 High CTMT Hydrogen Conc. / 5	R						500000 EK1.01 Knowledge of the operational implications of the following concepts as they apply to HIGH CONTAINMENT HYDROGEN CONCENTRATIONS: Containment integrity (CFR: 41.8 to 41.10)	3.3	27
K/A Category Point Totals:							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						R						203000 K6.01 Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) : A.C. electrical power (CFR: 41.7 / 45.7)	3.6	28
205000 Shutdown Cooling							R					205000 A1.02 Ability to predict and/or monitor changes in parameters associated with operating the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) controls including: SDC/RHR pump flow (CFR: 41.5 / 45.5)	3.3	29
206000 HPCI								R				206000 A2.15 Ability to (a) predict the impacts of the following on the HIGH PRESSURE COOLANT INJECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of control oil pressure: BWR-2,3,4 (CFR: 41.5 / 45.6)	3.4	30
									R			206000 A3.06 Ability to monitor automatic operations of the HIGH PRESSURE COOLANT INJECTION SYSTEM including: System discharge pressure: BWR-2,3,4 (CFR: 41.7 / 45.7)	3.8	31
207000 Isolation (Emergency) Condenser														
209001 LPCS											R	209001 A4.05 Ability to manually operate and/or monitor in the control room: Manual initiation controls (CFR: 41.7 / 45.5 to 45.8)	3.8	32
209002 HPCS														

211000 SLC	R								S			211000 K1.07 Knowledge of the physical connections and/or cause effect relationships between STANDBY LIQUID CONTROL SYSTEM and the following: Jet pump differential pressure indication: Plant-Specific (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.6	33
												211000 A2.08 Ability to (a) predict the impacts of the following on the STANDBY LIQUID CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Failure to SCRAM (CFR: 41.5 / 45.6)	4.2	86
212000 RPS		R										212000 K2.01 Knowledge of electrical power supplies to the following: RPS motor-generator sets (CFR: 41.7)	3.2	34
215003 IRM			R									215003 K3.01 Knowledge of the effect that a loss or malfunction of the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM will have on following: RPS (CFR: 41.7 / 45.4)	3.9	35
215004 Source Range Monitor				R	R							215004 K4.06 Knowledge of SOURCE RANGE MONITOR (SRM) SYSTEM design feature(s) and/or interlocks which provide for the following: IRM/SRM interlock (CFR: 41.7)	3.2	36
														215004 K5.03 Knowledge of the operational implications of the following concepts as they apply to SOURCE RANGE MONITOR (SRM) SYSTEM : Changing detector position (CFR: 41.5 / 45.3)
215005 APRM / LPRM				R								215005 K5.04 Knowledge of the operational implications of the following concepts as they apply to AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM : LPRM detector location and core symmetry (CFR: 41.5 / 45.3)	2.9	38

217000 RCIC						R					217000 K6.03 Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) : Suppression pool water supply (CFR: 41.7 / 45.7)	3.5	39
						R						217000 A2.05 Ability to (a) predict the impacts of the following on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: D.C. power loss (CFR: 41.5 / 45.6)	3.3
218000 ADS									R		218000 A3.05 Ability to monitor automatic operations of the AUTOMATIC DEPRESSURIZATION SYSTEM including: Suppression pool level (CFR: 41.7 / 45.7)	3.6	41
									R		218000 G2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)	4.4	42
223002 PCIS/Nuclear Steam Supply Shutoff									R		223002 A4.06 Ability to manually operate and/or monitor in the control room: Confirm initiation to completion (CFR: 41.7 / 45.5 to 45.8)	3.6	43
239002 SRVs									R		239002 G2.1.20 Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	44
259002 Reactor Water Level Control	R									S	259002 K1.02 Knowledge of the physical connections and/or cause effect relationships between REACTOR WATER LEVEL CONTROL SYSTEM and the following: Main steam flow (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.2	45
											259002 A2.06 Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of controller signal output (CFR: 41.5 / 45.6)	3.4	87

261000 SGTS			R					R						261000 K3.03 Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on following: Primary containment pressure: Mark-I&II (CFR: 41.7 /45.6)	3.2	46
														261000A1.05 Ability to predict and/or monitor changes in parameters associated with operating the STANDBY GAS TREATMENT SYSTEM controls including: Primary containment oxygen level: Mark-I&II (CFR: 41.5 / 45.5)	2.7	47
262001 AC Electrical Distribution		R												S 262001 K2.01 Knowledge of electrical power supplies to the following: Off-site sources of power (CFR: 41.7)	3.3	48
														262001 G 2.1.19 Ability to use plant computers to evaluate system or component status. (CFR: 41.10 / 45.12)	3.8	88
262002 UPS (AC/DC)				R										262002 K4.01 Knowledge of UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) design feature(s) and/or interlocks which provide for the following: Transfer from preferred power to alternate power Supplies (CFR: 41.7)	3.1	49
263000 DC Electrical Distribution					R									263000 K5.01 Knowledge of the operational implications of the following concepts as they apply to D.C. ELECTRICAL DISTRIBUTION : Hydrogen generation during battery charging (CFR: 41.5 / 45.3)	2.6	50
264000 EDGs						R			S					264000 K6.03 Knowledge of the effect that a loss or malfunction of the following will have on the EMERGENCY GENERATORS (DIESEL/JET) : Lube oil pumps (CFR: 41.7 / 45.7)	3.5	51
														264000 A2.03 Ability to (a) predict the impacts of the following on the EMERGENCY GENERATORS (DIESEL/JET) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Operating unloaded, lightly loaded, and highly loaded (CFR: 41.5 / 45.6)	3.4	89



ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (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	#
201001 CRD Hydraulic									R			201001 A3.04 Ability to monitor automatic operations of the CONTROL ROD DRIVE HYDRAULIC SYSTEM including: System flow (CFR: 41.7 / 45.7)	2.8	54
201002 RMCS														
201003 Control Rod and Drive Mechanism									R			201003 A4.01 Ability to manually operate and/or monitor in the control room: CRD mechanism temperature (CFR: 41.7 / 45.5 to 45.8)	2.6	55
201004 RSCS														
201005 RCIS														
201006 RWM								S				201006 A2.05 Ability to (a) predict the impacts of the following on the ROD WORTH MINIMIZER SYSTEM (RWH) (PLANT SPECIFIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Out of sequence rod movement; P-Spec(Not-BWR6) (CFR: 41.5 / 45.6)	3.5	91
202001 Recirculation										S		202001 G2.2.44 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. (CFR: 41.5 / 43.5 / 45.12)	4.4	92
202002 Recirculation Flow Control														
204000 RWCU										R		204000 G2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	4.1	56
214000 RPIS								S				214000 A2.01 Ability to (a) predict the impacts of the following on the ROD POSITION INFORMATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Failed reed switches (CFR: 41.5 / 45.6)	3.3	93

215001 Traversing In-core Probe	R																			215001 K1.05 Knowledge of the physical connections and/or cause effect relationships between TRAVERSING IN-CORE PROBE and the following: Primary containment isolation system: (Not-BWR1) (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.3	57
215002 RBM		R																		215002 K2.03 Knowledge of electrical power supplies to the following: APRM channels: BWR-3,4,5 (CFR: 41.7)	2.8	58
216000 Nuclear Boiler Inst.			R																	216000 K3.02 Knowledge of the effect that a loss or malfunction of the NUCLEAR BOILER Instrumentation will have on following: PCIS/NSSSS (CFR: 41.7 / 45.4)	4.0	59
219000 RHR/LPCI: Torus/Pool Cooling Mode																						
223001 Primary CTMT and Aux.				R																223001 K4.06 Knowledge of PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES design feature(s) and/or interlocks which provide for the following: Maintains proper containment/secondary containment to drywell differential pressure (CFR: 41.7)	3.1	60
226001 RHR/LPCI: CTMT Spray Mode																						
230000 RHR/LPCI: Torus/Pool Spray Mode					R															230000 K5.07 Knowledge of the operational implications of the following concepts as they apply to RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE : Vacuum breaker operation (CFR: 41.5 / 45.3)	2.9	61
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.						R														245000 K6.03 Knowledge of the effect that a loss or malfunction of the following will have on the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS : Hydrogen seal oil (CFR: 41.7 / 45.7)	2.8	62
256000 Reactor Condensate																						



Facility:		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.	G2.1.18 Ability to make accurate, clear, and concise logs, records, status boards, and reports. (CFR: 41.10 / 45.12 / 45.13)	3.6	66		
	2.1.	G2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12)	3.9	67		
	2.1.	G2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management. (CFR: 41.1 / 43.6 / 45.6)	4.3	68		
	2.1.	<b>G 2.1.5</b> <b>Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.</b> (CFR: 41.10 / 43.5 / 45.12)			3.9	94
	2.1.	<b>G 2.1.13</b> <b>Knowledge of facility requirements for controlling vital/controlled access.</b> (CFR: 41.10 / 43.5 / 45.9 / 45.10)			3.2	95
	2.1.					
	Subtotal					
2. Equipment Control	2.2.	G2.2.7 Knowledge of the process for conducting special or infrequent tests. (CFR: 41.10 / 43.3 / 45.13)	2.9	69		
	2.2.	G2.2.12 Knowledge of surveillance procedures. (CFR: 41.10 / 45.13)	3.7	70		
	2.2.	<b>G2.2.17</b> <b>Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator.</b> (CFR: 41.10 / 43.5 / 45.13)			3.8	96
	2.2.	<b>G2.2.25</b> <b>Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.</b> (CFR: 41.5 / 41.7 / 43.2)			4.2	97
	2.2.					

	2.2.					
	Subtotal					
3. Radiation Control	2.3.	G2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions. (CFR: 41.12 / 45.10)	3.5	71		
	2.3.	G2.3.12 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. (CFR: 41.12 / 45.9 / 45.10)	3.2	72		
	2.3.	<b>G 2.3.15</b> <b>Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.</b> (CFR: 41.12 / 43.4 / 45.9)			3.1	98
	2.3.					
	2.3.					
	2.3.					
	Subtotal					
4. Emergency Procedures / Plan	2.4.	G2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. (CFR: 41.7 / 45.7 / 45.8)	4.5	73		
	2.4.	G2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)	4.5	74		
	2.4.	G2.4.35 Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)	3.8	75		
	2.4.	<b>G 2.4.5</b> <b>Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.</b> (CFR: 41.10 / 43.5 / 45.13)			4.3	99
	2.4.	G2.4.38 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
	2.4.					
	Subtotal					
Tier 3 Point Total				10		7

Facility: Browns Ferry NPP Date of Examination: 8/8/2011  
 Examination Level: RO/SRO Operating Test Number: 1108

Administrative Topic (see Note)	Type Code *	Describe activity to be performed
Conduct of Operations RO A1a	M	2.1.4 Determine Adequate Performance of License Reactivation (RO only)
		2.1.4 Determine Adequate Performance of License Reactivation
Conduct of Operations RO A1b	D	2.1.25 Place an RPS Channel in trip
	N	2.1.18 NRC event notification due to Safety Limit Violation
Equipment Control RO/SRO A2	M	2.2.44 Evaluate Recombiner Performance
Radiation Control RO A3	M	2.3.4 Determine Stay Time under Emergency Conditions and determine authorization required
		2.3.4 Determine Stay Time under Emergency Conditions and authorize
Emergency Plan SRO A4	N	2.4.44 Protective action recommendation evaluation

**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
- (D)irect from bank ( $\leq 3$  for ROs;  $\leq 4$  for SROs and RO retakes)
- (N)ew or (M)odified from bank ( $\geq 1$ )
- (P)revious 2 exams ( $\leq 1$ ; randomly selected)
- (S)imulator

*Rec'd 8/27/11*

## Reactor Operator

### 1. Determine Adequate Performance of License Reactivation

- Modified
- OPDP-10, License Status Maintenance, Reactivation, and Proficiency for Non-Licensed Positions
- Given examples of 3 Reactor Operators returning to shift from rotating assignments, determine which personnel have correctly completed the license reactivation requirements.
- 2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc. RO 3.3

### 2. Place an RPS Channel in trip

- Direct from Bank
- 3-OI-99, Drawings 730E915-9 and 10, 3-730E915-11 and 12
- For failed Turbine Stop Valve #3 limit switches determine how to place the RPS instrument channel in trip.
- 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. RO 3.9

### 3. Evaluate Recombiner Performance

- Modified
- 3-OI-66, Offgas System
- Determines that Recombiner performance meets the acceptance criteria and standby Recombiner is not required to be placed in service.
- 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 RO 4.2

### 4. Determination of Stay Time and Approving Authority to perform an emergency evolution to save equipment.

- Modified
- EPIP 15, Emergency Exposure
- Determine amount of time an operator has to perform an emergency evolution due to radiation levels and the authorization authority.
- 2.3.4 Knowledge of radiation exposure limits under normal and emergency conditions. Importance RO 3.2

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## Senior Reactor Operator

### 1. Determine Adequate Performance of License Reactivation

- Modified
- OPDP-10, License Status Maintenance, Reactivation, and Proficiency for Non-Licensed Positions
- Given examples of 6 licensed personnel returning to shift from rotating assignments, determine which personnel have correctly completed the license reactivation requirements.
- 2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc. SRO 3.8

### 2. NRC event notification due to Safety Limit Violation

- New
- NPG-SPP-03.5, Regulatory Reporting Requirements
- Determine NRC event notification requirements, as the Shift Manager due to a Safety Limit Violation.
- 2.1.18 Ability to make accurate, clear, and concise logs, records, status boards, and reports. SRO 3.8

### 3. Evaluate Recombiner Performance

- Modified
- 3-OI-66, Offgas System
- Determines that Recombiner performance meets the acceptance criteria and standby Recombiner is not required to be placed in service.
- 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 SRO 4.4

### 4. Determination of Stay Time and Approving Authority to perform an emergency evolution to save equipment.

- Modified
- EPIP 15, Emergency Exposure
- Determine amount of time an operator has to perform an emergency evolution due to radiation levels and authorize on the correct form.
- 2.3.4 Knowledge of radiation exposure limits under normal and emergency conditions. Importance SRO 3.7

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### 5. Protective Action Recommendation Evaluation

- New
- EPIP-1 and 5 Emergency Classification Procedure and General Emergency
- The event is classified as a General Emergency 3.1-G and the Initial Notification appendix is completed with the correct information and correct PAR. Event is classified within 15 minutes and Initial Notification is completed within 15 minutes of classification.
- 2.4.44 Knowledge of emergency plan protective action recommendations. Importance SRO 4.4

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Facility: Browns Ferry NPP

Date of Examination: 8/8/2011

Exam Level: RO/SROI/SROU

Operating Test No.: 1108

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

System / JPM Title	Type Code*	Safety Function
a. Recirc Pump Recovery with Manual Scram	A, N, S	1
b. Prevention of Injection	A, D, L, S	2
c. HPCI in Pressure Control Mode	A, L, M, S	4
d. Secure Drywell Sprays	A, EN, D, S	5
e. RWM Functional Test for Startup	D, L, S	7
f. Energize 4 KV SD BDs A and B from DGs	M, S	8
g. Restoration of Refuel Zone Ventilation	A, D, S	9
h. Close MSIVs during Power Operations	P, S	3(RO only)

**In-Plant Systems<sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)**

i. Individually Scram Control Rods	D, E, L	1
j. Transfer DG A control to A 4KV SD BD & Secure DG A	N, R	6
k. Control Room Abandonment Attachment 4 Part A	E, L, N	7

**@** 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	4-6/2-3 (5)(5)(3)
(C)ontrol room	
(D)irect from bank	≤ 9/≤ 4 (5)(5)(2)
(E)mergency or abnormal in-plant	≥ 1 (2)(2)(1)
(EN)gineered safety feature	- / ≥ 1 (control room system) (1)(1)(1)
(L)ow-Power / Shutdown	≥ 1 (5)(5)(1)
(N)ew or (M)odified from bank including 1(A)	≥ 2 (5)(5)(3)
(P)revious 2 exams	≤ 3 / ≤ 2 (1)(0)(0) (randomly selected)
(R)CA	≥ 1 (1)(1)(1)
(S)imulator	(8)(7)(3)

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**Control Room Systems:****a. Recirc Pump Recovery with Manual Scram (Unit 2 or 3)**

- Alternate path / New / Simulator
- 2/3-OI-68 Reactor Recirculation System  
2/3-AOI-68-1A Recirc Pump Trip/Core Flow Decrease OPRMs Operable  
2/3-AOI-100-1 Reactor Scram
- 202001 Recirculation System A2.04 Ability to (a) predict the impacts of the following on the RECIRCULATION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Multiple recirculation pump trip IMPORTANCE: RO 3.7 SRO 3.8
- Operator directed to recover tripped Recirculation Pump at power in accordance with 2/3-OI-68 at step 5.3[10], in process, the other pump will trip and operator will insert a manual reactor scram in accordance with 2/3-AOI-68-1A, section 4.2 step [1] and perform immediate actions of 2/3-AOI-100-1 Reactor Scram

**b. Prevention of Injection (Unit 2 or 3)**

- Alternate Path / Direct from bank / Low Power / Simulator
- 2/3-EOI-Appendix-4 Prevention of Injection
- 295031 Reactor Low Water Level EA1.12 Ability to operate and/or monitor the following as they apply to REACTOR LOW WATER LEVEL: Feedwater IMPORTANCE: RO 3.9 SRO 4.1
- Operator will prevent injection in accordance with EOI-Appendix-4 and maintain level minus 50 to minus 100 inches. RFPT C cannot be lowered due to a controller failure, operator will trip C RFPT; and control and maintain level with RFPT A or B.

**c. HPCI in Pressure Control Mode (Unit 2 or 3)**

- Alternate Path / Low Power / Modified from bank / Simulator
- 2/3-EOI-Appendix-11C Alternate RPV Pressure Control Systems HPCI Test Mode
- 206000 A4.06 Ability to manually operate and/or monitor in the control room: Reactor pressure IMPORTANCE: RO 4.3 SRO 4.3
- Operator will place HPCI in Test Mode from standby for alternate RPV Pressure Control in accordance with 2/3-EOI-Appendix-11C. HPCI flow controller will fail in Automatic and operator will shift to manual to control pressure

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**d. Secure Drywell Sprays (Unit 2 or 3)**

- Alternate path / ENgineered Safety Feature / Direct from bank / Simulator
- 2/3-EOI Appendix-17B RHR System Operation Drywell Sprays
- 295024 High Drywell Pressure EA1.11 Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE: Drywell Spray: Mark-I&II  
IMPORTANCE: RO 4.2 SRO 4.2
- Operator will secure drywell sprays, in accordance with 2/3-EOI Appendix-17B, before pressure drops below 0 psig. RHR system II valves will fail to close and operator will secure RHR pumps B & D to secure sprays

**e. RWM Functional Test for Startup (Unit 2 or 3)**

- Direct from Bank / Low Power-Shutdown / Simulator
- 2/3-SR-3.3.2.1.2 RWM functional test for startup
- 201006 Rod Worth Minimizer System (RWM) A2.05 Ability to (a) predict the impacts of the following on the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Out of sequence rod movement; P-Spec(Not-BWR6) IMPORTANCE: RO 3.1 SRO 3.5
- Operator will perform 2/3-SR-3.3.2.1.2, RWM Functional Test for Startup, which requires operator to select and withdraw a control rod out of sequence to test the functionality of the Select Error, Withdraw Error and Withdraw Block

**f. Energize 4 KV SD BDs A and B from DGs (Unit 2 only)**

- Modified from bank / Simulator
- 0-SSI-21 Unit 3, Diesel Generator Building
- 600000 Plant Fire On Site AA2.17 Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Systems that may be affected by the fire  
IMPORTANCE: RO 3.1 SRO 3.6
- Time Critical JPM. Operator is directed to complete steps 20 through 26 in section 2.0 of 0-SSI-21 Unit 3, Diesel Generator Building. Operator will energize 4KV SD BDs A and B from the Unit 1/2 DGs and energize 4KV SD BD 3EA from 4KV SD BD A.

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**g. Restoration of Refuel Zone Ventilation (Unit 2 or 3)**

- Alternate path / Direct from bank / Simulator
- 2/3-OI-30A Refuel Zone Ventilation System  
2/3-AOI-64-2D Group 6 Ventilation System Isolation
- 288000 Plant Ventilation Systems A2.04 Ability to (a) predict the impacts of the following on the PLANT VENTILATION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High radiation: Plant-Specific IMPORTANCE: RO 3.7 SRO 3.8
- Operator directed to alternate Refueling Zone Supply and Exhaust Fans in accordance with 2/3-OI-30A, section 6.1. When B Refuel Zone Fans are started, they will receive a Group 6 Isolation due to a spurious High Radiation Trip Signal. The Operator will determine cause of trip and restore Refuel Zone Ventilation in accordance with 2/3-AOI-64-2D.

**h. Close MSIVs during Power Operation (Unit 2 or 3)(RO only)**

- Previous 2 exams / Simulator
- 2/3-OI-1, Main Steam System
- 239001 Main and Reheat Steam System A4.01 Ability to manually operate and/or monitor in the control room: MSIVs IMPORTANCE: RO 4.2 SRO 4.0
- Operator will close Inboard and Outboard MSIVs on Main Steam Line C, at power, in accordance with 2/3-OI-1 section 8.2.3

**In-Plant Systems:****i. Individually Scram Control Rods**

- Direct from Bank / Emergency or Abnormal In-Plant / Low Power-Shutdown
- 1-EOI Appendix-1C, Individually Scram Control Rods
- 295015 Incomplete SCRAM AA1.02 Ability to operate and/or monitor the following as they apply to INCOMPLETE SCRAM: RPS IMPORTANCE: RO 4.0 SRO 4.2
- Operator simulates Individually Scramming Control Rods in accordance with 1-EOI Appendix-1C.

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**j. Transfer DG A control to A 4KV SD BD & Secure DG A**

- New / RCA Entry
- 0-OI-82, Standby Diesel Generator System
- 264000 Emergency Generators (Diesel/Jet) A2.01 Ability to (a) predict the impacts of the following on the EMERGENCY GENERATORS (DIESEL/JET); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Parallel operation of emergency generator  
IMPORTANCE: RO 3.5 SRO 3.6
- Operator will simulate transferring DG A control to the A 4KV SD BD, in accordance with 0-OI-82 section 8.4, then simulate shutting down the diesel from the A 4KV Shutdown board, in accordance with 0-OI-82 section 7.2 thru step [9].

**k. Control Room Abandonment Attachment 4 Part A**

- Emergency or Abnormal In-Plant / Low Power / New
- 1-AOI-100-2, Control Room Abandonment, Attachment 4 Part A
- 295016 Control Room Abandonment AA1.07 Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT: Control room/local transfer mechanisms IMPORTANCE: RO 4.2 SRO 4.3
- Operator will simulate performing Attachment 4 Part A of 1-AOI-100-2, Control Room Abandonment

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