

Facility: STP		Date of Exam:															
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	3	N/A			3	3	N/A			3	18			6
	2	2	2	2	N/A			1	1	N/A			1	9			4
	Tier Totals	5	5	5	N/A			4	4	N/A			4	27			10
2. Plant Systems	1	2	2	3	3	2	2	3	3	3	2	3	28			5	
	2	1	1	1	1	0	1	1	2	1	1	0	10			3	
	Tier Totals	3	3	4	4	2	3	4	5	4	3	3	38			8	
3. Generic Knowledge and Abilities Categories				1	2	3	4	10	1	2	3	4	7				
				3	2	2	3										

- Note:
- 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).
 - 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.
 - 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.
 - 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.
 - 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.
 - Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
 - * 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.
 - 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.
 - For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-2		
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3	X						Knowledge of the operational implications of the following concepts as they apply to the small break LOCA: (CFR 41.8 / 41.10 / 45.3) EK1.02 Use of steam tables RO 3.5/SRO 4.2	3.5	1
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4				X			Ability to operate and / or monitor the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow) (CFR 41.7 / 45.5 / 45.6) AA1.22 RCP seal failure/malfunction RO 4.0/SRO4.2	4.0	2
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4					X		Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: (CFR: 43.5 / 45.13) AA2.07 Pump cavitation RO 3.4/SRO 3.7	3.4	3
000026 Loss of Component Cooling Water / 8						X	G 2.4.4 Ability to recognize abnormal indications for systems operating parameters that are entry level conditions for emergency and abnormal operating procedures. (CFR: 45.2 / 45.6) RO 3.9/SRO 4.0	3.9	4
000027 Pressurizer Pressure Control System Malfunction / 3	X						Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: (CFR 41.8 / 41.10 / 45.3) AK1.02 Expansion of liquids as temperature increases RO2.8/SRO 3.1	2.8	5

ES-401 PWR Examination Outline Form ES-401-2									
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000029 ATWS / 1		X					Knowledge of the interrelations between the and the following an ATWS: (CFR 41.7 / 45.7) EK2.06 Breakers, relays, and disconnects RO 2.9*/SRO 3.1*	2.9	6
000038 Steam Gen. Tube Rupture / 3			X				Knowledge of the reasons for the following responses as the apply to the SGTR: (CFR 41.5 / 41.10 / 45.6 / 45.13) EK3.02 Prevention of secondary PORV cycling RO 4.4/SRO 4.5	4.4	7
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4				X			Ability to operate and / or monitor the following as they apply to the Steam Line Rupture: (CFR 41.7 / 45.5 / 45.6) AA1.15 T-ave. protection indicators RO 3.9*/SRO 3.8*	3.9	8
000054 (CE/E06) Loss of Main Feedwater / 4					X		Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): (CFR: 43.5 / 45.13) AA2.03 Conditions and reasons for AFW pump startup RO 4.1/SRO 4.2	4.1	9
000055 Station Blackout / 6						X	2.4.1 Knowledge of EOP entry conditions and immediate action steps (CFR: 41.10 / 43.5 / 45.13) RO 4.6 / SRO 4.8	4.6	10
000056 Loss of Off-site Power / 6				X			Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: (CFR 41.7 / 45.5 / 45.6) AA1.06 Safety injection pump RO 3.6*/SRO 3.6*	3.6	11
000057 Loss of Vital AC Inst. Bus / 6			X				Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.01 Actions contained in EOP for loss of vital ac electrical instrument bus RO 4.1/SRO 4.4	4.1	12

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000058 Loss of DC Power / 6			X				Knowledge of the reasons for the following responses as they apply to the Loss of DC Power: (CFR 41.5,41.10 / 45.6 / 45.1) AK3.02 Actions contained in EOP for loss of dc power RO 4.0/SRO 4.2	4.0	13
000062 Loss of Nuclear Svc Water / 4					X		Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water (SWS): CFR 43.5 / 45.13) AA2.01 Location of leak in the SWS RO 2.9/SRO3.6	2.9	14
000065 Loss of Instrument Air / 8									
W/E04 LOCA Outside Containment / 3						X	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7) RO 3.2/SRO 3.3	3.2	15
W/E11 Loss of Emergency Coolant Recirc. / 4	X						Knowledge of the operational implications of the following concepts as they apply to the (Loss of Emergency Coolant Recirculation) (CFR: 41.8 / 41.10 / 45.3) EK1.1 Components, capacity, and function of emergency systems. RO 3.7/SRO 4.0	3.7	16
W/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4		X					Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following: (CFR: 41.7 / 45.7) EK2.2 Facility*s heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility. RO 3.9/SRO 4.2	3.9	17
000077 Generator Voltage and Electric Grid Disturbances / 6		X					Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following: (CFR: 41.4, 41.5, 41.7, 41.10/ 45.8) AK 2.0 1 Motors RO 3.1/SRO 3.2	3.1	18
K/A Category Totals:	3	3	3	3	3	3	Group Point Total:		18/6

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1									
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2									
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7			X				<p>Knowledge of the reasons for the following responses as they apply to the Loss of Intermediate Range Nuclear Instrumentation:</p> <p>(CFR 41.5,41.10 / 45.6 / 45.13)</p> <p>AK3.02 Guidance contained in EOP for loss of intermediate range instrumentation. RO 3.6/SRO 3.9</p>	3.6	19
000036 (BW/A08) Fuel Handling Accident / 8			X				<p>Ability to operate and / or monitor the following as they apply to the Fuel Handling Incidents:</p> <p>(CFR 41.7 / 45.5 / 45.6)</p> <p>AA1.03 Reactor building containment evacuation alarm enable switch. RO 3.5/SRO 3.9</p>	3.5	20
000037 Steam Generator Tube Leak / 3				X			<p>Ability to operate and / or monitor the following as they apply to the Steam Generator Tube Leak:</p> <p>(CFR 41.7 / 45.5 / 45.6)</p> <p>AA1.06 Main steam line rad monitor meters RO 3.8*/SRO 3.9*</p>	3.8	21
000051 Loss of Condenser Vacuum / 4					X		<p>Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum:</p> <p>(CFR: 43.5 / 45.13)</p> <p>AA2.02 Conditions requiring reactor and/or turbine trip. RO 3.9/SRO 4.1</p>	3.9	22
000059 Accidental Liquid RadWaste Rel. / 9						X	<p>2.1.32 Ability to explain and apply all system limits and precautions.</p> <p>(CFR: 41.10 / 43.2 / 45.12)</p> <p>RO 3.4/ SRO 3.8</p>	3.4	23

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
W/E16 High Containment Radiation / 9									
BW/A01 Plant Runback / 1									
BW/A02&A03 Loss of NNI X/Y / 7									
BW/A04 Turbine Trip / 4									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
BW/E03 Inadequate Subcooling Margin / 4									
BW/E08; W/E03 LOCA Cooldown - Depress. / 4									
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4									
BW/E13&E14 EOP Rules and Enclosures									
CE/A11; W/E08 RCS Overcooling - PTS / 4									
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:	2	2	2	1	1	1	Group Point Total:		9/4

ES-401 PWR Examination Outline Form ES-401-2														
Plant Systems - Tier 2/Group 1 (RO / SRO)														
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
003 Reactor Coolant Pump							X					<p>Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCPS controls including:</p> <p>(CFR: 41.5 / 45.7)</p> <p>A1.03 RCP motor stator winding temperatures</p> <p>RO 2.6 /SRO 2.6</p>	2.6	28
004 Chemical and Volume Control						X						<p>Knowledge of the effect of a loss or malfunction on the following CVCS components:</p> <p>(CFR: 41.7 / 45.7)</p> <p>K6.17 Flow paths for emergency boration</p> <p>RO 4.4/SRO 4.6</p>	4.4	29
005 Residual Heat Removal								X				<p>Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:</p> <p>(CFR: 41.5 / 43.5 / 45.3 / 45.13)</p> <p>A2.01 Failure modes for pressure, flow, pump motor amps, motor temperature, and tank level instrumentation</p> <p>RO 2.7/SRO 2.9*</p>	2.7	30
006 Emergency Core Cooling					X							<p>Knowledge of the operational implications of the following concepts as they apply to ECCS:</p> <p>(CFR: 41.5 / 45.7)</p> <p>K5.11 Basic heat transfer equation</p> <p>RO 2.5/SRO 2.4*</p>	2.5	31
007 Pressurizer Relief/Quench Tank									X			<p>Ability to monitor automatic operation of the PRTS, including:</p> <p>(CFR: 41.7 / 45.5)</p> <p>A3.01 Components which discharge to the PRT.</p> <p>RO 2.7*/SRO 2.9</p>	2.7	32

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)											Form ES-401-2		
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	#
026 Containment Spray				X								<p>Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)</p> <p>K4.08 Automatic swapover to containment sump suction for recirculation phase after LOCA (RWST low-low level alarm)</p> <p>RO 4.1*/SRO 4.3*</p>	4.1	38
039 Main and Reheat Steam					X							<p>Knowledge of the operational implications of the following concepts as the apply to the MRSS: (CFR: 41.5 / 45.7)</p> <p>K5.05 Bases for RCS cooldown limits</p> <p>RO 2.7/SRO 3.1*</p>	2.7	39
059 Main Feedwater							X					<p>Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW controls including: (CFR: 41.5 / 45.5)</p> <p>A1.03 Power level restrictions for operation of MFW pumps and valves</p> <p>RO 2.7*/SRO 2.9*</p>	2.7	40
061 Auxiliary/Emergency Feedwater								X				<p>Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)</p> <p>A2.07 Air or MOV failure.</p> <p>RO 3.4/SRO 3.5</p>	3.4	41
062 AC Electrical Distribution											X	<p>2.4.3 Ability to identify post-accident instrumentation. (CFR: 41.6 / 45.4)</p> <p>RO 3.7/SRO 3.9</p>	3.7	42
063 DC Electrical Distribution											X	<p>2.2.39 Knowledge of less than or equal to one hour Technical Specification action statements for systems. RO 3.9/SRO 4.5</p>	3.9	43

ES-401														PWR Examination Outline														Form ES-401-2	
														Plant Systems - Tier 2/Group 1 (RO / SRO)															
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)				IR	#												
064 Emergency Diesel Generator						X						Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: (CFR: 41.7 / 45.7) K6.08 Fuel oil storage tanks RO 3.2/ SRO 3.3				3.2	44												
073 Process Radiation Monitoring	X											Knowledge of the physical connections and/or cause effect relationships between the PRM system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.01 Those systems served by PRMs RO 3.6/SRO 3.9				3.6	45												
076 Service Water							X					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: (CFR: 41.5 / 45.5) A1.02 Reactor and turbine building closed cooling water temperatures RO 2.6*/SRO 2.6*				2.6	46												
078 Instrument Air			X									K3 Knowledge of the effect that a loss or malfunction of the IAS will have on the following: (CFR: 41.7 / 45.6) K3.02 Systems having pneumatic valves and controls. RO 3.4/SRO 3.6				3.4	47												
103 Containment				X								Knowledge of containment system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.06 Containment isolation system. RO 3.1/SRO 3.7				3.1	48												

ES-401														PWR Examination Outline														Form ES-401-2	
														Plant Systems - Tier 2/Group 1 (RO / SRO)															
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)				IR	#												
008 Component Cooling Water											X	2.2.42 Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications. (CFR: 43.2 / 43.3 / 45.3) RO 3.4/ SRO 4.0				3.4	49												
026 Containment Spray			X									Knowledge of the effect that a loss or malfunction of the CSS will have on the following: (CFR: 41.7 / 45.6) K3.02 Recirculation spray system RO 4.2/SRO 4.3				4.2	50												
063 DC Electrical Distribution	X											Knowledge of the physical connections and/or cause/effect relationships between the DC electrical system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.03 Battery charger and battery RO 2.9/SRO 3.5				2.9	51												
064 Emergency Diesel Generator								X				Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.08 Consequences of opening/closing breaker between buses (VARS, out-of-phase, voltage). RO 2.7/SRO 3.1				2.7	52												
076 Service Water										X		Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.01 SWS pumps RO 2.9/ SRO 2.9				2.9	53												

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)											Form ES-401-2		
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	#
078 Instrument Air									X			Ability to monitor automatic operation of the IAS, including: (CFR: 41.7 / 45.5) A3.01 Air Pressure. RO 3.1/SRO 3.2	3.1	54
005 Residual Heat Removal		X										Knowledge of bus power supplies to the following: (CFR: 41.7) K2.01 RHR pumps RO 3.0/ SRO 3.2	3.2	55
K/A Category Point Totals:	2	2	3	3	2	2	3	3	3	3	2	Group Point Total:		28/ 5

ES-401														PWR Examination Outline		Form ES-401-2	
Plant Systems - Tier 2/Group 2 (RO / SRO)																	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#			
075 Circulating Water								X				Ability to (a) predict the impacts of the following malfunctions or operations on the circulating water system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.02 Loss of circulating water pumps RO 2.5 / SRO 2.7	2.5	64			
079 Station Air																	
086 Fire Protection										X		Ability to monitor automatic operation of the Fire Protection System including: (CFR: 41.7 / 45.5) A3.01 Starting mechanisms of fire water pumps RO 2.9/SRO 3.3	2.9	65			
K/A Category Point Totals:	1	1	1	1	0	1	1	2	1	1	0	Group Point Total:		10/3			

Facility: STP		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.	2.1.18 Ability to make accurate, clear, and concise logs, records, status boards, and reports. (CFR: 41.10 / 45.12 / 45.13) RO 3.6 SRO 3.8	3.6	66		
	2.1.	2.1.21 Ability to obtain and verify controlled procedure copy. (CFR: 45.10 / 45.13) RO 3.1 SRO 3.2	3.1	67		
	2.1.	2.1.3 Knowledge of shift turnover practices. (CFR: 41.10 / 45.13) RO 3.0 SRO 3.4	3.0	68		
	Subtotal					
2. Equipment Control	2.2.	2.2.13 Knowledge of tagging and clearance procedures. (CFR: 41.10 / 45.13) RO 3.6 SRO 3.8	3.6	69		
	2.2.	2.2.22 Knowledge of limiting conditions for operations and safety limits. (CFR: 43.2 / 45.2) RO 3.4 SRO 4.1	3.4	70		
	Subtotal					
3. Radiation Control	2.3.	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. (CFR: 41.12 / 45.9 / 45.10) IMPORTANCE RO 3.2 SRO 3.7	3.2	71		
	2.3.	2.3.4 Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. (CFR: 43.4 / 45.10) RO 2.5 SRO 3.1	2.5	72		
	Subtotal					
4. Emergency Procedures / Plan	2.4.	2.1.18 Ability to make accurate, clear, and concise logs, records, status boards, and reports. (CFR: 41.10 / 45.12 / 45.13) RO 3.6 SRO 3.8	3.6	73		
	2.4.	2.4.16 Knowledge of EOP implementation hierarchy and coordination with other support procedures. (CFR: 41.10 / 43.5 / 45.13) RO 3.5 SRO 4.4	3.5	74		

Facility: STP		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
	2.4.	2.4.17 Knowledge of EOP terms and definitions. (CFR: 41.10 / 45.13) IMPORTANCE RO 3.9 SRO 4.3	3.9	75		
	Subtotal					
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1 / 1	EK1.02	This was supposed to be a generic K/A, EK 1.02 mistakenly selected. Replace with Generic K/A 2.4.1
2 / 1	2.1.33	This K/A is not one of the topics for Tiers 1 and 2 Generic K/As. Replace with K/A 2.1.25
3 / 1	2.1.11	This K/A was moved with the release of Revision 2, Supplement 1 of NUREG 1021. Replace with K/A 2.1.18
3 / 3	2.3.1	This K/A was moved with the release of Revision 2, Supplement 1 of NUREG 1021. Replace with K/A 2.3.12
3 / 4	2.4.15	This K/A was moved with the release of Revision 2, Supplement 1 of NUREG 1021. Replace with K/A 2.4.17
1/1	<p>000022 Loss of Rx Coolant Makeup / 2</p> <p>Ability to operate and / or monitor the following as they apply to the Loss of Reactor Coolant Pump Makeup:</p> <p>AA1.07 Excess letdown containment isolation valve switches and indicators</p>	<p>Rejected K/A as could not come up with a quality question. Replaced with 000015/17 RCP Malfunctions / 4, AA1.22 RCP Seal failure/malfunction</p>

1 / 1	<p>000057 Loss of Vital AC Inst. Bus / 6 AK2 Knowledge of the interrelations between the Loss of Vital AC Instrument Bus and the following: (CFR 41.7 / 45.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5. Replaced with AK3 of same system.</p>
1 / 1	<p>000077 Generator Voltage and Electric Grid Disturbances / 6 AK3 Knowledge of the operational implications of the following concepts as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.4, 41.5, 41.7, 41.10 / 45.8)</p>	<p>Replaced with AK2 of same Emergency/Abnormal system to even out the distribution of knowledge attributes</p>
1 / 1	<p>000033 Loss of Intermediate Range NI / 7 K2 Knowledge of the interrelations between the Loss of Intermediate Range Nuclear Instrumentation and the following: (CFR 41.7 / 45.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5. Replaced with AK3 of same system.</p>

1/1	<p>000065 Loss of Instrument Air / 8 Ability to determine and interpret the following as they apply to the Loss of Instrument Air:</p> <p>(CFR: 43.5 / 45.13)</p> <p>AA2.08 Failure modes of air-operated equipment RO2.9*/SRO 3.3</p>	<p>Resampled to due to excessive number of Instrument air questions on the exam.</p> <p>Replaced with 062 Loss of Nuclear Service Water A2.02</p>
2 / 1	<p>026 Containment Spray</p> <p>K5 Knowledge of operational implications of the following concepts as they apply to the CSS:</p> <p>(CFR: 41.5 / 45.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5.</p> <p>Replaced with a K4 of the same system</p>
2 / 1	<p>039 Main and Reheat Steam</p> <p>Knowledge of the effect of a loss or malfunction on the following will have on the MRSS:</p> <p>(CFR: 41.7 / 45.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5.</p> <p>Replaced with a K5 of the same system</p>

2 / 1	<p>008 Component Cooling Water Knowledge of the operational implications of the following concepts as they apply to the CCWS:</p> <p>(CFR: 41.5 / 45.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5.</p> <p>Replaced with a K1 of the same system</p>
2 / 1	<p>026 Containment Spray Knowledge of the effect of a loss or malfunction of the following will have on the CSS:</p> <p>(CFR: 41.7 / 45.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5.</p> <p>Replaced with a K3 of the same system</p>
2 / 2	<p>045 Main Turbine Generator Knowledge of bus power supplies to the following:</p> <p>(CFR: 41.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5.</p> <p>Replaced with a K3 of the same system</p>
2 / 2	<p>056 Condensate Knowledge of Condensate System design feature(s) and/or interlock(s) which provide for the following:</p> <p>(CFR: 41.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5.</p> <p>Replaced with a K1 of the same system</p>
2 / 2	<p>079 Station Air Knowledge of bus power supplies to the following:</p> <p>(CFR: 41.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5.</p> <p>Replaced with system 015 Nuclear Instrumentation K2</p>

<p>2/2</p>	<p>029 Containment Purge</p> <p>Knowledge of the operational implication of the following concepts as they apply to the Containment Purge System:</p> <p>(CFR: 41.5 / 45.7)</p>	<p>There are no Knowledge factors listed in NUREG 1122 Rev 2 with an importance factor of greater than 2.5.</p> <p>Replaced with a A2 of the same system</p>
<p>3</p>	<p>2.4.22 Knowledge of the basis for prioritizing safety functions during abnormal/emergency operations.</p> <p>(CFR 41.7/43.5/41.10/45.12)</p>	<p>Difficulty writing a valid RO level question</p>

Facility: STP		Date of Exam: 9/24/2015																
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	6
	2				N/A					N/A					2	2	4	
	Tier Totals														5	5	10	
2. Plant Systems	1														2	3	5	
	2														1	1	3	
	Tier Totals														5	3	8	
3. Generic Knowledge and Abilities Categories					1		2		3		4			1	2	3	4	7
														2	2	1	2	

- Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
- 7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401										PWR Examination Outline		Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)													
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#				
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1													
000009 Small Break LOCA / 3					X		EA2 Ability to determine or interpret the following as they apply to a small break LOCA: (CFR 43.5 / 45.13) EA2.34 Conditions for throttling or stopping HPI	4.2	76				
000011 Large Break LOCA / 3					X		EA2 Ability to determine or interpret the following as they apply to a Large Break LOCA: (CFR 43.5 / 45.13) EA2.01 Actions to be taken, based on RCS temperature and pressure - saturated and superheated	4.7	77				
000015/17 RCP Malfunctions / 4													
000022 Loss of Rx Coolant Makeup / 2													
000025 Loss of RHR System / 4													
000026 Loss of Component Cooling Water / 8													
000027 Pressurizer Pressure Control System Malfunction / 3													
000029 ATWS / 1							EPE: 029 Anticipated Transient Without Scram (ATWS) (CFR: 41.10 / 43.5 / 45.12) 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	78				
000038 Steam Gen. Tube Rupture / 3						X	APE: 038 Steam Generator Tube Rupture (CFR 55.43.2, 55.41.5, 55.41.7) G2.2.25 Knowledge of the basis in the Technical Specifications for limiting conditions and safety limits	4.2	79				
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4													
000054 (CE/E06) Loss of Main Feedwater / 4													
000055 Station Blackout / 6													
000056 Loss of Off-site Power / 6													
000057 Loss of Vital AC Inst. Bus / 6													
000058 Loss of DC Power / 6													
000062 Loss of Nuclear Svc Water / 4							APE: 062 Loss of Nuclear Service Water (CFR: 41.10 / 43.1 / 45.13) 2.4.18 Knowledge of the specific bases for EOPs.	4.0	80				

ES-401										PWR Examination Outline		Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)													
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#				
000065 Loss of Instrument Air / 8					X		AA2. Ability to determine and interpret the following as they apply to the Loss of Instrument Air: (CFR: 43.5 / 45.13) AA2.05 When to commence plant shutdown if instrument air pressure is decreasing	4.1	81				
W/E04 LOCA Outside Containment / 3													
W/E11 Loss of Emergency Coolant Recirc. / 4													
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4													
000077 Generator Voltage and Electric Grid Disturbances / 6													
K/A Category Totals:					3	3	Group Point Total:					18/6	

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
BW/A02&A03 Loss of NNI-X/Y / 7									
BW/A04 Turbine Trip / 4									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
BW/E03 Inadequate Subcooling Margin / 4									
BW/E08; W/E03 LOCA Cooldown - Depress. / 4									
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4									
BW/E13&E14 EOP Rules and Enclosures									
CE/A11; W/E08 RCS Overcooling - PTS / 4									
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:					2	2	Group Point Total:		9/4

ES-401													PWR Examination Outline		Form ES-401-2	
Plant Systems - Tier 2/Group 1 (RO / SRO)																
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#		
063 DC Electrical Distribution																
064 Emergency Diesel Generator																
073 Process Radiation Monitoring																
076 Service Water								X				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45/3 / 45/13) A2.01 Loss of SWS	3.7	90		
078 Instrument Air																
103 Containment																
K/A Category Point Totals:								3			2	Group Point Total:		28/5		

ES-401													PWR Examination Outline			Form ES-401-2	
Plant Systems - Tier 2/Group 2 (RO / SRO)																	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#			
079 Station Air																	
086 Fire Protection																	
K/A Category Point Totals:							1	1				1	Group Point Total:	10/3			

Facility:		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.	2.1.36 Knowledge of procedures and limitations involved in core alterations. (CFR: 41.10 / 43.6 / 45.7)			4.1	94
	2.1.	2.1.1 Knowledge of conduct of operations requirements. (CFR: 41.10 / 45.13)			4.2	95
	2.1.					
	2.1.					
	Subtotal					
2. Equipment Control	2.2.	2.2.18 Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc. (CFR: 41.10 / 43.5 / 45.13))			3.9	96
	2.2.	2.2.6 Knowledge of the process for making changes to procedures. (CFR: 41.10 / 43.3 / 45.13)			3.6	97
	2.2.					
	2.2.					
	Subtotal					
3. Radiation Control	2.3.	2.3.13 Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 43.4 / 45.9 / 45.10)			3.8	98
	2.3.					
	2.3.					
	Subtotal					
4. Emergency Procedures / Plan	2.4.	2.4.30 Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator. (CFR: 41.10 / 43.5 / 45.11)			4.1	99
	2.4.	2.4.40 Knowledge of SRO responsibilities in emergency plan implementation. (CFR: 41.10 / 43.5 / 45.11)			4.5	100
	2.4.					
	2.4.					
	Subtotal					
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
3 / 4	2.4.41	A question using this K/A could not be written without duplicating an Admin JPM. Replaced with 2.4.44

ES-301

Administrative Topics Outline

Form ES-301-1

Facility: <u>South Texas Project</u>		Date of Examination: <u>09-28-2015</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: <u>LOT 20 NRC Exam</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N,R	A1 Perform an RWST Blended Makeup Calculation G2.1.25 Ability to interpret reference materials such as graphs, curves, tables, etc. (4.3/4.4)
Conduct of Operations	D,P,R	A2 Verify an Excore QPTR Calculation G2.1.20 Ability to interpret and execute procedural steps. (4.6/4.6)
Equipment Control NOTE: A3 and A7 are the same JPM.	N,R	A3 Using Mechanical Drawings Determine the Isolation Boundaries for a Leak on the RHR System G2.2.41 Ability to obtain and interpret station electrical and mechanical drawings. (3.5/3.9)
Radiation Control	M,R	A4 Calculate Stay Times based on Dose Rates G2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. (3.2/3.7)
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics (which would require all five items).		
*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)		

ES-301

Administrative Topics Outline

Form ES-301-1

Facility: <u>South Texas Project</u>		Date of Examination: <u>09-28-2015</u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: <u>LOT 20 NRC Exam</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M,R	A5 Calculate SDM with a Misaligned Control Rod and Determine Applicable Technical Specifications. G2.1.37 Knowledge of procedures, guidelines or limitations associated with Reactivity Management. (4.3/4.69)
Conduct of Operations	N,R	A6 Perform a Calorimetric Heat Balance and Evaluate Technical Specifications G2.1.23 Ability to perform specific system and integrated plant procedures during all modes of operation. (4.3/4.4)
Equipment Control NOTE: A3 and A7 are the same JPM.	N,R	A7 Using Mechanical Drawings Determine the Isolation Boundaries for a Leak on the RHR System G2.2.41 Ability to obtain and interpret station electrical and mechanical drawings. (3.5/3.9)
Radiation Control	N,R	A8 Approve completed Liquid Waste Release Permit. (alternate path actual release did not match the approved release limits) G2.3.6 Ability to approve release permits. (2.0/3.8)
Emergency Procedures/Plan	M,R	A9 Determine EAL G2.4.41 Knowledge of the emergency action level thresholds and classifications. (2.9/4.6)
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics (which would require all five items).		
*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)		

STP LOT-20
NRC Admin JPM Description

RO

- (A1) Perform an RWST Blended Makeup Calculation
Demonstrate the ability to set the boric acid flow integrator for a blended makeup to the RWST using 0POP02-CV-0001, Makeup to the Reactor Coolant System.
- (A2) Verify an Excore QPTR Calculation
Demonstrate the ability to perform and/or verify a QPTR. 0PSP10-NI-0002, Excore QPTR Determination.
- (A3) Using Mechanical Drawings Determine the Isolation Boundaries for a Leak on the RHR System
Demonstrate the ability to isolate portions of a system using a P&ID.
- (A4) Calculate Stay Times based on Dose Rates
Demonstrate the ability to determine stay times based on dose rates given in an RWP.

SRO

- (A5) Calculate SDM with a Misaligned Control Rod and Determine Applicable Technical Specifications
Demonstrate the ability perform a SDM and apply appropriate TSs if required. 0PSP10-ZG-0005, Shutdown Margin Verification – Modes 1 and 2.
- (A6) Perform a Calorimetric Heat Balance and Evaluate Technical Specifications
Demonstrate the ability to perform a Calorimetric Verification and evaluate TSs. 0PEP02-CU-0001, Calorimetric Verification, and 0PSP03-NI-0001, Power Range NI Channel Calibration.
- (A7) Using Mechanical Drawings Determine the Isolation Boundaries for a Leak on the RHR System
Demonstrate the ability to isolate portions of a system using a P&ID.
- (A8) Approve completed Liquid Waste Release Permit. (alternate path actual release did not match the approved release limits)
Demonstrate the ability to review a completed Liquid Waste Release Permit and determine if it was completed correctly. 0PSP07-WL-LDP1, Liquid Effluent Permit.
- (A9) Determine Emergency Action Level
Demonstrate the ability to correctly determine an Emergency Action Level for a given condition requiring entry into the STPNOC Emergency Action Plan.

ES-301

Control Room/In-Plant Systems Outline

Form ES-301-2

Facility: <u>South Texas Project</u>		Date of Examination: <u>09-28-2015</u>
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>LOT 20 NRC Exam</u>
Control Room Systems (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U)		
System/JPM Title	Type Code*	Safety Function
a. (S1) Manually Load an ESF Bus KA: 062 A4.01 (3.3/3.1)	A,D,E,EN,S	6
b. (S2) Cross Connect AFW & Feed 2 SGs from the same AFW Pump KA: 061 A1.05 (3.6/3.7)	E,L,N,S	4S
c. (S3) Commence Emergency Boration KA: 004 A4.18 (4.3/4.1)	E,N,S	2
d. (S4) Re-Establish Letdown KA: 004 A4.06 (3.6/3.1)	A,D,E,S	1
e. (S5) Perform a CCW Valve Operability Test KA: 008 A4.01 (3.3/3.1)	N,S	8
f. (S6) Transfer to Hot Leg Recirculation KA: 006 A4.05 (3.9/3.8)	D,E,L,P,S	3
g. (S7) Manual Containment Isolation Phase A KA: 103 A3.01 (3.9/4.2)	A,E,EN,L,N,S	5
h. (S8) Respond to Radiation Monitor Alarm KA: 073 A4.02 (3.7/3.7)	A,D,E,S	7
In-Plant Systems [®] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. (P1) Locally Operate a SG PORV KA: 035 A1.02 (3.5/3.8)	D,E,L	4S
j. (P2) Commence a Liquid Waste Release; then a CW Pump trips requiring the release to be secured. KA: 068 A4.02 (3.2/3.1)	A,N,R	9
k. (P3) Place RWST on Recirculation KA: 006 A4.02 (4.0/3.8)	D,E,EN	2
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 Code	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 Features	$\geq 1 / \geq 1 / \geq 1$ (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		

ES-301

Control Room/In-Plant Systems Outline

Form ES-301-2

Facility: <u>South Texas Project</u>		Date of Examination: <u>09-28-2015</u>
Exam Level: RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>LOT 20 NRC Exam</u>
Control Room Systems (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U)		
System/JPM Title	Type Code*	Safety Function
a. (S1) Manually Load an ESF Bus KA: 062 A4.01 (3.3/3.1)	A,D,E,EN,S	6
b. (S2) Cross Connect AFW & Feed 2 SGs from the same AFW Pump KA: 061 A1.05 (3.6/3.7)	E,L,N,S	4S
c. (S3) Commence Emergency Boration KA: 004 A4.18 (4.3/4.1)	E,N,S	2
d. (S4) Re-Establish Letdown KA: 004 A4.06 (3.6/3.1)	A,D,E,S	1
f. (S6) Transfer to Hot Leg Recirculation KA: 006 A4.05 (3.9/3.8)	D,E,L,P,S	3
g. (S7) Manual Containment Isolation Phase A KA: 103 A3.01 (3.9/4.2)	A,E,EN,L,N,S	5
h. (S8) Respond to Radiation Monitor Alarm KA: 073 A4.02 (3.7/3.7)	A,D,E,S	7
In-Plant Systems [®] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. (P1) Locally Operate a SG PORV KA: 035 A1.02 (3.5/3.8)	D,E,L	4S
j. (P2) Commence a Liquid Waste Release; then a CW Pump trips requiring the release to be secured. KA: 068 A4.02 (3.2/3.1)	A,N,R	9
k. (P3) Place RWST on Recirculation KA: 006 A4.02 (4.0/3.8)	D,E,EN	2
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 Code	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 Features	$\geq 1 / \geq 1 / \geq 1$ (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: <u>South Texas Project</u>		Date of Examination: <u>09-28-2015</u>
Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>		Operating Test No.: <u>LOT 20 NRC Exam</u>
Control Room Systems (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U)		
System/JPM Title	Type Code*	Safety Function
a. (S1) Manually Load an ESF Bus KA: 062 A4.01 (3.3/3.1)	A,D,E,EN,S	6
f. (S6) Transfer to Hot Leg Recirculation KA: 006 A4.05 (3.9/3.8)	D,E,L,P,S	3
g. (S7) Manual Containment Isolation Phase A KA: 103 A3.01 (3.9/4.2)	A,E,EN,L,N,S	5
In-Plant Systems® (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
j. (P2) Commence a Liquid Waste Release; then a CW Pump trips requiring the release to be secured. KA: 068 A4.02 (3.2/3.1)	A,N,R	9
k. (P3) Place RWST on Recirculation KA: 006 A4.02 (4.0/3.8)	D,E,EN	2
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 Code	Criteria for RO/SRO-I/SRO-U	
(A)lternate Path	4-6 / 4-6 / 2-3	
(C)ontrol Room		
(D)irect from Bank	≤ 9 / ≤ 8 / ≤ 4	
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	
(EN)gineered Safety Features	≥ 1 / ≥ 1 / ≥ 1 (control room system)	
(L)ow-Power/Shutdown	≥ 1 / ≥ 1 / ≥ 1	
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	
(P)revious 2 Exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	
(R)CA	≥ 1 / ≥ 1 / ≥ 1	
(S)imulator		

STP LOT-20
NRC Systems JPM Description

Control Room Systems JPMs

- (S1) Manually Load an ESF Bus – Alternate Path
Demonstrate the ability to ensure equipment has properly loaded on to an ESF 4.16KV Bus in accordance with 0POP04-AE-0001, First Response To Loss Of Any Or All 13.8 KV Or 4.16 KV Bus.
- (S2) Cross Connect AFW & Feed 2 SGs from the same AFW Pump
Demonstrate the ability to control AFW flow to multiple SGS from one AFW Pump in accordance with 0POP01-ZA-0018A, Emergency Operating Procedure Generic Guidance.
- (S3) Commence Emergency Boration
Demonstrate the ability to align boration flow through the alternate boration isolation valve in accordance with 0POP04-CV-0003, Emergency Boration.
- (S4) Re-Establish Letdown – Alternate Path
Demonstrate the ability to establish normal letdown flow after an SI in accordance with 0POP05-EO-ES11, SI Termination.
- (S5) Perform a CCW Valve Operability Test
Demonstrate the ability to perform a CCW System Valve Operability Surveillance in accordance with 0PSP03-CC-0008, Component Cooling Water System Train 1B(2B) Valve Operability Test.
- (S6) Transfer to Hot Leg Recirculation
Demonstrate the ability to align ECCS Hot Leg Recirculation in accordance with 0POP05-EO-ES14, Transfer to Hot Leg Recirculation.
- (S7) Manual Containment Isolation Phase A – Alternate Path
Demonstrate the ability to manually isolate containment penetrations that were not isolated properly following an SI in accordance with 0POP05-EO-EO00, Reactor Trip or Safety Injection, Addendum 1 and 5.
- (S8) Respond to Radiation Monitor Alarm – Alternate Path
Demonstrate the ability to respond to Radiation Transmitter alarms on the RM-11 Radiation Monitor Panel in accordance with 0POP04-RA-0001, Radiation Monitoring System Alarm Response.

NOTE: The following JPMs will be performed in pairs; S2 & S7 together, S3 & S5 together and S6 & S8 together. JPMs S1 and S4 will be performed by themselves.

STP LOT-20
NRC Systems JPM Description

In Plant Systems JPMs

- (P1) Locally Operate a SG PORV
Demonstrate the ability to locally operate a SG PORV in accordance with OPOP05-EO-EC00, Loss of All AC Power, Addendum 6.
- (P2) Commence a Liquid Waste Release; then a CW Pump trips requiring the release to be secured. – Alternate Path
Demonstrate the ability to perform a rad waste release and terminate the release when needed in accordance with OPOP02-WL-0100, Liquid Waste Release.
- (P3) Place RWST on Recirculation
Demonstrate the ability to place the Refueling Water Storage Tank on purification recirculation in accordance with OPOP02-FC-0001, Spent Fuel Pool Cooling and Cleanup System.

Appendix D

Scenario Outline

Form ES-D-1

Facility: South Texas Project

Scenario No.: 3

Op-Test No.: LOT 20 NRC

Examiners: _____

Operators: _____

Initial Conditions:

- Reactor Power is in Mode 2 at 10⁻⁸ AMPs and Stable. BOL (IC #217)

Turnover:

- Unit 1 is returning to service after a forced 7 day outage.
- After the Reactor was taken critical, HHSI & LHSI Pumps 1B and ECW Pump 1B were taken out of service to repair an issue with the breakers. Expected return to service is 2 hours. The crew is to continue raising power per 0POP03-ZG-0004, Reactor Startup, Step 6.32 and be prepared to enter Mode 1 as soon as the breakers are returned to service.
- Circulating Water Pump #14 is removed from service for maintenance.
- SU SGFP #14 is in service. Lineups are being performed on SGFPT #11 so that warmup of the pump can begin. Lineups have not been started yet for SGFPTs #12 and #13.

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	NA	RO (R) SRO (R)	Withdraw control rods to raise reactor power to 1% - 3%
2 (20 min)	05-12-04 1	BOP (I) SRO (I, TS)	SG 1D Controlling NR level channel fails low. LT-0549
3 (30 min)	04-09-03 1	RO (C) SRO (C, TS)	Over current trip on ECW Pump 1C
4 (40 min)	08-12-04 1	BOP (C) SRO (C, TS)	Over current trip on SU SGFP #14. When aligning AFW, AFW Pump #12 fails to start.
5 (50 min)	50-HV-01 1	ALL (M)	PZR PORV RC-PSV-655A fails open. Manual closure attempt is unsuccessful. Manual block valve will not close. (Requires a Rx trip if not already) SBLOCA due to PORV (Critical Task)
6 (60 min)	01-12-04B 1	ALL (C)	Train B of Phase A fails to auto actuate with CV-MOV-0023 failed open
7 (N/A)	10-09-01 1	ALL (C)	During SBLOCA, a lockout on 13.8KV STBY Bus 1F causes Sequencer Mode 3 on Train A. ECW Pump 1A fails to auto start. (Critical Task)

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	2
2. Abnormal events (2-4)	3
3. Major transients (1-2)	1
4. EOPs entered/requiring substantive actions (1-2)	1
5. EOP contingencies requiring substantive actions (0-2)	0
6. Critical tasks (2-3)	2

STP LOT-20
NRC Scenario #3 Description

Initial Conditions: Unit 1 being returned to service after a forced 7 day outage. Reactor power is currently at 10^{-8} AMPs and stable. After the Reactor was taken critical, HHSI & LHSI Pumps 1B and ECW Pump 1B were taken out of service to repair an issue with the breakers. Expected return to service is 2 hours. The crew is to continue raising power per OPOP03-ZG-0004, Reactor Startup, Step 6.32 and be prepared to enter Mode 1 as soon as the breakers are returned to service. CW Pump #14 is removed from service for maintenance. SU MFWP #14 is in service. Lineups are being performed on SGFPT #11 so that warmup of the pump can begin. Lineups have not been started yet for SGFPTs #12 and #13.

Event 1: The crew will take the Reactor from 10^{-8} AMPs to 3% to 4% power using OPOP04-ZG-0004, Reactor Startup, and OPOP03-ZG-0005, Plant Startup to 100% Power.

Event 2: SG 1D controlling NR channel, LT-0549, will fail low causing the LPFRV for SG 1D to open. The crew will respond using OPOP04-FW-0001, Loss of Steam Generator Level Control. The SRO will address Tech Spec implications.

Event 3: ECW Pump 1C will trip on over current. The crew will respond using OPOP09-AN-02M4, annunciator C-7, ECW PUMP 1C TRIP. The SRO will address Tech Spec implications.

Event 4: SU SGFP #14 will trip on over current. A SGFPT will not be available yet. The crew will respond using OPOP04-FW-0002, Steam Generator Feed Pump Turbine Trip, to put AFW in service. AFW Pump #12 will not start. The crew will have to cross connect to feed SG 1B. The SRO will address Tech Spec implications.

Event 5: PZR PORV RC-PSV-0655A fails open. The valve will not manually. When operators try to close the block valve, RC-MOV-0001, the block valve will not close. This creates a SBLOCA on PZR and a Reactor Trip and Safety Injection are required. The crew will respond using OPOP05-EO-EO00, Reactor Trip or Safety Injection. RCS pressure will lower below the RCP trip criteria. **(Critical Task)**

Event 6: Train B of Phase A will fail to actuate. CV-MOV-0023, normal letdown ICIV, fails to close. This creates a penetration that is not isolated. The crew will use OPOP05-EO-EO00, Reactor Trip or Safety Injection, Addendum 5 to ensure the penetration is isolated by performing a manual CVI to actuate the Train B valves.

Event 7: During the SBLOCA, there will be a lockout on 13.8 KV Standby Bus 1F. The sequencer will strip Class 1E 4.16 KV Bus E1A and perform a Mode 3 sequence. During the sequencing of Train A loads. ECW Pump 1A will fail to auto start. The crew will have to manually start ECW Pump 1A. **(Critical Task)**

STP LOT-20
NRC Scenario #3 Description

Termination: The scenario will be terminated after the crew has manually started ECW Pump 1A and OPOP05-EO-EO10, Loss of Reactor or Secondary Coolant, has been properly exercised.

Critical Tasks:

- Trip all RCPs so that CET temperatures do not become superheated when forced circulation in the RCS stops. NOTE: Within 5 minutes of reaching the RCP trip criteria.
- Manually start at least one ECW Pump (ECW Pump 1A) prior to the associated EDG tripping.

Source: New

Appendix D

Scenario Outline

Form ES-D-1

Facility: South Texas Project

Scenario No.: 4

Op-Test No.: LOT 20 NRC

Examiners: _____

Operators: _____

Initial Conditions:

- Unit 1 is at 67% power. BOL (IC #218)

Turnover:

- Unit 1 is reducing power to 60% due to an offsite electrical grid disturbance.
- The Unit is at step 5.15 of 0POP03-ZG-0006, Plant Shutdown from 100% to Hot Standby.
- The Crew is to continue the power reduction at 40%/hour.
- At 65% power the crew will remove SGFPT #13 from service and idle the pump at 3300 rpm.
- CW Pump #13 is removed from service for maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	N/A	ALL (R)	Continue to lower reactor power to 60%
2 (10 min)	N/A	BOP (N)	Remove SGFPT #13 form service and idle at 3300 rpm
3 (20 min)	06-16-02 0	BOP (I) SRO (I, TS)	Turbine Impulse Pressure, PT-0505, fails low
4 (25 min)	05-09-01 1.0	BOP (C) SRO (C)	Gland Steam Pressure Regulator fails open
5 (35 min)	02-26-02 1	RO (I) SRO (I, TS)	Loop 1B Cold Leg RTD T-0420B fails high
6 (40 min)	50-SA-11 0.5	ALL (M)	SG 1B Steamline Break upstream of the MSIV
7 (N/A)	05-07-02 1	BOP (C)	SG 1B MSIV fails to auto close (Critical Task)
8 (N/A)	A6_A1_ S77_4 1	BOP (C)	AFW Pump #12 will not stop from the control room switch (Critical Task)

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	2
2. Abnormal events (2-4)	3
3. Major transients (1-2)	1
4. EOPs entered/requiring substantive actions (1-2)	1
5. EOP contingencies requiring substantive actions (0-2)	0
6. Critical tasks (2-3)	2

STP LOT-20
NRC Scenario #4BU Description

Initial Conditions: During the previous shift Unit 1 started reducing power due to an offsite electrical grid disturbance. Currently the Unit is at 67% power and on step 5.15 of 0POP03-ZG-0006, Plant Shutdown from 100% to Hot Standby. The Crew is to continue to lower power at 40%/hour and stabilize at 60%. At 65% the crew will remove SGFPT #13 and idle the pump at 3300 rpm. CW Pump #13 is removed from service for maintenance.

Event 1: The crew is at step 5.15 of 0POP03-ZG-0006, Plant Shutdown from 100% to Hot Standby, and will continue the power reduction to 60%.

Event 2: At 65% power the crew will remove SGFPT #13 from service and idle the pump at 3300rpm using 0POP02-FW-0002, SGFP Turbine, section 17.

Event 3: Turbine impulse pressure, PT-0505, fails low. The crew will respond using 0POP04-TM-0003, Failure of Turbine Impulse Pressure Transmitter (PT-505/506). The SRO will address Tech Spec implications.

Event 4: The Gland Seal Regulator, PV-6150, fails open causing the gland seal header PSV-6152 to open. The crew will use 0POP04-MS-0001, Excessive Steam Demand, and 0POP02-GS-0001, Turbine Gland Seal Steam System, to bypass the failed regulator.

Event 5: LOOP B Cold Leg RTD T-0420B fails high. The crew will respond using 0POP04-RP-0004, Failure of RCS Loop RTD Protection Channel. The SRO will address Tech Spec implications.

Event 6: SG 1B steamline break upstream of the MSIV. The crew will respond using 0POP05-EO-EO00, Reactor Trip or Safety Injection, and then 0POP05-EO-EO20, Faulted Steam Generator Isolation.

Event 7: SG 1B MSIV will fail to close. The crew will have to manually close SG 1B MSIV using the control board handswitch. **(Critical Task)**

Event 8: AFW Pump #12 will not stop using the control board handswitch. To complete isolation of the faulted SG the crew will have to manually close valves in the AFW Pump #12 discharge line. **(Critical Task)**

STP LOT-20
NRC Scenario #4BU Description

Termination: The scenario will be terminated when the crew exits 0POP05-EO-EO20, Faulted Steam Generator Isolation.

Critical tasks:

- Manually actuate main steamline isolation or close MSIVs before a severe (orange-path) challenge develops to either the subcriticality or the integrity CSF or before transition to EC21, whichever happens first.
- Isolate the faulted SG before transition out of EO20.

Source: New

Appendix D

Scenario Outline

Form ES-D-1

Facility: South Texas Project

Scenario No.: 5

Op-Test No.: LOT 20 NRC

Examiners: _____Operators: _____Initial Conditions:

- Unit 1 is at 78% power. BOL (IC #219)

Turnover:

- The crew will continue to raise power to 100%
- CD Pump #13 and SUSGFP #14 are removed from service for maintenance.
- A line of thunderstorms just passed through Markham and are tracking south towards the STP site.

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	N/A	ALL (R)	Power increase.
2 (10 min)	Multiple	BOP (C) SRO (C)	CW Pump #14 Traveling Screen high differential level.
3 (25 min)	02-20-01 0	RO (I) SRO (I, TS)	PZR level channel LT-0465 fails low
4 (35 min)	05-11-02 0	BOP (I) SRO (I)	SG 1B controlling steam flow channel FT-0522 fails low
5 (45 min)	EE_E1B1TF Fault 1	ALL (C) SRO (TS)	Loss of 480 V LC E1B1
6 (60 min)	10-06-01 1	ALL (M)	Main Generator Output Breaker trips open and inadvertent FWI.
7 (NA)	06-02-01 1	BOP (C)	Main Turbine fails to auto trip on reactor trip. (Critical Task)
8 (NA)	Multiple	ALL (C)	Loss of Heat Sink and entry into FRH1 (Critical Task)

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1–2)	2
2. Abnormal events (2–4)	4
3. Major transients (1–2)	1
4. EOPs entered/requiring substantive actions (1–2)	1
5. EOP contingencies requiring substantive actions (0–2)	1
6. Critical tasks (2–3)	2

STP LOT-20
NRC Scenario #5 Description

Initial Conditions: Current reactor power is 78%. The crew is at step 7.51 of 0POP03-ZG-0005, Plant Startup to 100% and hold points have been satisfied. CD Pump #13 and SU SGFP #14 are removed from service for maintenance. A line of thunderstorms are tracking from the north toward the site.

Event 1: The crew is to re-commence raising power per step 7.51 of 0POP03-ZG-0005, Plant Startup to 100%.

Event 2: CW Pump #14 Traveling Screen high differential level. The crew will respond using 0POP04-CW-0001, Loss of Circulating Water Flow. The malfunction simulates trash built up on the traveling screens for CW Pump #14 but the screens will not rotate. CW Pump #14 will have to be secured.

Event 3: PZR level channel LT-0465 fails low. The crew will respond using 0POP04-RP-0002, Loss of Automatic Pressurizer Level Control. The SRO will address Tech Spec implications.

Event 4: SG 1B controlling steam flow channel FT-0522 fails low. The crew will respond using 0POP04-FW-0001, Loss of Steam Generator Level Control. The SRO will address Tech Spec implications.

Event 5: Loss of Class 1E 480 V LC E1B1. The crew will respond using 0POP09-AN-03M3 annunciator E-5, 480V LC E1B1 TRBL. Power can be temporarily restored through the cross-tie breaker using 0POP02-AE-0001, AC Electrical Distribution Breaker Lineup. The SRO will address Tech Spec implications.

Event 6: The Main Generator Output Breaker will open and an inadvertent FWI will cause a reactor trip. The crew will respond using 0POP05-EO-EO00, Reactor Trip or Safety Injection.

Event 7: On the reactor trip the Main Turbine fails to auto trip The Main Turbine must be manually tripped per the immediate action step 2 RNO of 0POP05-EO-EO00, Reactor Trip or Safety Injection. **(Critical Task)**

Event 8: Loss of Heat Sink and entry into FRH1. When AFW Actuation occurs AFW Pump #14 will trip on over speed, AFW Pump #13 recirc valve will have been left open and AFW Pumps #11 and #12 will trip on over current. After going through 0POP05-EO-EO00, Reactor Trip or Safety Injection, the crew will transition to 0POP05-EO-FRH1, Response to Loss of Secondary Heat Sink. **(Critical Task)**

STP LOT-20
NRC Scenario #5 Description

Termination: The scenario will terminate after the crew has aligned Auxiliary Feedwater to feed Steam Generators per CIP of 0POP05-EO-FRH1, Response to Loss of Secondary Heat Sink.

Critical Tasks:

- Manually trip the main turbine before a severe ORANGE path challenge develops to either the subcriticality or the integrity CSF or before transition to 0POP05-EO-EC21, Uncontrolled Depressurization of all Steam Generators, whichever happens first.
- Initiate RCS Feed and Bleed so that ECCS injection from at least one SI pump occurs, and the RCS depressurizes sufficiently for intermediate-head injection from a HHSI pump to occur prior to CETs rising to 1200°F.

Source: New