Facility: South Texas Project Date of Exam: December 4, 2009

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			4	2	N/A		3	18	3	3	6
	2	1	2	1				2	2			1	9	3	1	4
	Tier Totals	4	5	4				6	4			4	27	6	4	10
2. Plant Systems	1	3	1	4	3	2	3	2	2	3	2	3	28	3	2	5
	2	1	2	0	2	1	0	2	1	0	1	0	10	2	1	3
	Tier Totals	4	3	4	5	3	3	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	

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 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				X		S	EA1.08 – AFW System (S) 2.4.45 – Ability to prioritize and interpret the significance of each annunciator or alarm.	4.4 4.3	
000008 Pressurizer Vapor Space Accident / 3						X	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.	4.2	
000009 Small Break LOCA / 3			X				EK3.03 – Reactor trip and safety injection.	4.1	
000011 Large Break LOCA / 3						X	2.4.6 – Knowledge of EOP mitigation strategies.	3.7	
000015/17 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2					S		(S) AA2.03 – Failures of flow control valve or controller.	3.6	
000025 Loss of RHR System / 4				X		S	AA1.11 – Reactor building sump level indicators. (S) 2.1.23 – Ability to perform specific system and integrated plant procedures during all modes of plant operation.	2.9 4.4	
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3				X			AA1.03 – Pressure control when on a steam bubble.	3.6	
000029 ATWS / 1									
000038 Steam Gen. Tube Rupture / 3			X				EK3.05 – Normal operating precautions to preclude or minimize SGTR.	4.0	
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4						X	2.4.20 – Knowledge of the operational implications of EOP warnings, cautions, and notes.	3.8	
000054 (CE/E06) Loss of Main Feedwater / 4	X					S	AK1.01 – MFW line break depressurizes the S/G (similar to a steam line break. (S) 2.4.41 – Knowledge of the emergency action level thresholds and classifications.	4.1 4.6	
000055 Station Blackout / 6	X				S		EK1.02 – Natural circulation cooling. (S) EA2.05 – When battery is approaching fully discharged.	4.1 3.7	
000056 Loss of Off-site Power / 6									
000057 Loss of Vital AC Inst. Bus / 6					X		AA2.06 – AC instrument bus alarms for the inverter and alternate power source.	3.2	
000058 Loss of DC Power / 6	X						AK1.01 – Battery charger equipment and instrumentation.	2.8	
000062 Loss of Nuclear Svc Water / 4				X			AA1.07 – Flow rates to the components and systems that are serviced by the SWS; interactions among the components.	2.9	

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000065 Loss of Instrument Air / 8					X		AA2.05 – when to commence plant shutdown if instrument air pressure is decreasing.	3.4*	
W/E04 LOCA Outside Containment / 3		X					EK2.01 – Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.5	
W/E11 Loss of Emergency Coolant Recirc. / 4		X					EK2.02 – 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.	3.9	
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4			X				EK3.01 – Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	3.4	
000077 Generator Voltage and Electric Grid Disturbances / 6		X			 S		AK2.07 – Turbine/generator control. (S) AA2.10 – Generator overheating and the required actions.	3.6 3.8	
K/A Category Totals: RO	3	3	3	4	2	3	Group Point Total: RO		18
K/A Category Totals: SRO					3	3	Group Point Total: SRO		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	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1			X				AK3.02 – Reactor runback with a dropped control rod.	3.3*	
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1						X	2.2.37 – Ability to determine operability and/or availability of safety related equipment.	3.6	
000028 Pressurizer Level Malfunction / 2									
000032 Loss of Source Range NI / 7					S		(S) AA2.09 – Effect of improper HV setting.	2.9	
000033 Loss of Intermediate Range NI / 7									
000036 (BW/A08) Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3				X			AA1.11 – PZR level indicator	3.4	
000051 Loss of Condenser Vacuum / 4					S		(S) AA2.02 – Conditions requiring reactor and/or turbine trip.	4.1	
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7		X					AK2.01 – Detectors at each ARM system location.	2.5*	
000067 Plant Fire On-site / 8									
000068 (BW/A06) Control Room Evac. / 8				X			AA1.30 – Operation of the letdown system	3.4	
000069 (W/E14) Loss of CTMT Integrity / 5					S		(S) AA2.01 – Loss of containment integrity.	4.3	
000074 (W/E06&E07) Inad. Core Cooling / 4									
000076 High Reactor Coolant Activity / 9					X		AA2.04 – Process effluent radiation chart recorder.	2.6	
W/EO1 & E02 Rediagnosis & SI Termination / 3	X						W/E02 EK1.1 – Components, capacity, and function of emergency systems.	3.2	
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5					X		EA2.1 – Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	2.7	
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		X					EK2.1 – Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.6	

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BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4						S	(S) 2.1.25 - Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	
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: RO	1	2	1	2	2	1	Group Point Total: RO		9
K/A Category Point Totals: SRO					3	1	Group Point Total: SRO		4

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	#
003 Reactor Coolant Pump			X									K3.04 - RPS	3.9	
004 Chemical and Volume Control						X						K6.01 – Spray/heater combination in PZR to assure uniform boron concentration.	3.1	
										X		A4.05 – Letdown pressure and temperature control valves.	3.6	
											S	(S) 2.1.32 – Ability to explain and apply system limits and precautions.	4.0	
005 Residual Heat Removal								X				A2.01 – Failure modes for pressure, flow, pump motor amps, motor temperature, and tank level instrumentation.	2.7	
											S	(S) 2.4.4 – Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures	4.7	
006 Emergency Core Cooling					X							K5.11 – Basic heat transfer equation.	2.5	
								X				A2.10 – Low boron concentration in SIS.	3.4	
007 Pressurizer Relief/Quench Tank			X									K3.01 - Containment	3.3	
008 Component Cooling Water	X											K1.05 – Sources of makeup water.	3.0	
								S				(S) A2.05 – Effect of loss of instrument and control air on the position of the CCW valves that are air operated.	3.5	
010 Pressurizer Pressure Control											X	2.4.18 – Knowledge of the specific bases for EOP's	3.3	
012 Reactor Protection						X						K6.04 – Bypass-block circuits.	3.3	
									X			A3.02 – Bistables	3.6	
								S				(S) A2.07 – Loss of DC control power.	3.7	
013 Engineered Safety Features Actuation				X								K4.03 – Main Steam isolation signal.	3.9	
022 Containment Cooling							X					A1.01 – Containment temperature	3.6	
025 Ice Condenser														
026 Containment Spray									X			A3.01 – Pump starts and correct MOV positioning.	4.3	
039 Main and Reheat Steam				X								K4.08 – Interlocks on MSIV and bypass valves.	3.3	

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059 Main Feedwater										X	2.4.49 – Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	
061 Auxiliary/Emergency Feedwater					X						K5.03 – Pump head effects when control valve is shut. A1.05 – AFW flow/motor amps.	2.6 3.6	
							X						
062 AC Electrical Distribution		X									K2.01 – Major system loads.	3.3	
										X	2.4.2 – Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.5	
063 DC Electrical Distribution										X	A4.02 – Battery voltage indicator.	2.8*	
064 Emergency Diesel Generator	X										K1.03 – Diesel fuel oil supply system.	3.6	
						X					K6.07 – Air receivers.	2.7	
073 Process Radiation Monitoring			X								K3.01 – Radioactive effluent releases	3.6	
076 Service Water	X										K1.20 – AFW.	3.4*	
								X			A3.02 – Emergency heat loads.	3.7	
078 Instrument Air				X							K4.02 – Cross-over to other air systems.	3.2	
							S				(S) A2.01 – Air dryer and filter malfunctions	2.9	
103 Containment			X								K3.01 – Loss of containment integrity under shutdown conditions.	3.3*	
K/A Category Point Totals: RO	3	1	4	3	2	3	2	2	3	2	3	Group Point Total: RO	28
K/A Category Point Totals: SRO								3			2	Group Point Total: SRO	5

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (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	#
001 Control Rod Drive										X		A4.06 – Control rod drive disconnect/connect.	2.9	
002 Reactor Coolant					X							K5.10 – Relationship between reactor power and RCS differential temperature.	3.6	
011 Pressurizer Level Control		X						S				K2.02 – Knowledge of bus power supplies to PZR heaters. (S) A2.12 – Operation of auxiliary spray.	3.1 3.3	
014 Rod Position Indication				X								K4.03 – Rod bottom lights.	3.2	
015 Nuclear Instrumentation		X										K2.01 - Knowledge of bus power supplies to NIS channels, components, and interconnections.	3.3	
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling								S				(S) A2.02 – Loss of SFPCS	3.0	
034 Fuel Handling Equipment														
035 Steam Generator														
041 Steam Dump/Turbine Bypass Control									X			A3.05 – Ability to monitor automatic operation of the SDS, including main steam pressure.	2.9*	
045 Main Turbine Generator	X											K1.18 – Knowledge of the physical connections and/or cause-effect relationships between the MT/G system and RPS.	3.6	
055 Condenser Air Removal														
056 Condensate														
068 Liquid Radwaste				X								K4.01 – Safety and environmental precautions for handling hot, acidic, and radioactive liquids.	3.4	
071 Waste Gas Disposal								X				A2.05 – Power failure to the ARM and PRM systems.	2.5*	
072 Area Radiation Monitoring											S	(S) 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.	4.1	

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075 Circulating Water													
079 Station Air													
086 Fire Protection							X				A1.05 – Fire protection system lineups.	2.9	
K/A Category Point Totals: RO	1	2	0	2	1	0	1	1	1	1	0	Group Point Total: RO	10
K/A Category Point Totals: SRO								2			1	Group Point Total: SRO	3

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

Facility: Date of Exam:

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4			
	2.1.21	Ability to verify the controlled procedure copy.	3.5*			
	2.1.44	Knowledge of RO duties in the control room during fuel handling, such as responding to alarms from the fuel handling area, communication with the fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.9			
	2.1.36	(S) Knowledge of procedures and limitations involved in core alterations.			4.1	
	2.1.4	(S) Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, “no-solo” operation, maintenance of active license status, 10CFR55, etc.			3.8	
	2.1.					
	Subtotal		3		2	
2. Equipment Control	2.2.40	Ability to apply Technical Specifications for a system.	3.4			
	2.2.35	Ability to determine Technical Specification Mode of Operation	3.6			
	2.2.5	(S) Knowledge of the process for making design or operating changes to the facility.			3.2	
	2.2.17	(S) Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator.			3.8	
	2.2.					
	2.2.					
	Subtotal		2		2	
3. Radiation Control	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.	3.4			
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4			
	2.3.11	(S) Ability to control radiation releases.			4.3	
	2.3.					
	2.3.					
	2.3.					
	Subtotal		2		1	
4. Emergency	2.4.9	Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	3.8			
	2.4.13	Knowledge of crew roles and responsibilities during EOP usage.	4.0			

Procedures / Plan	2.4.31	Knowledge of annunciator alarms, indications, or response procedures.	4.2			
	2.4.27	(S) Knowledge of “fire in the plant” procedures.			3.9	
	2.4.38	(S) Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required.			4.4	
	2.4.					
	Subtotal		3		2	
Tier 3 Point Total			10	10	7	7

ES-401 **Record of Rejected K/As** **Form ES-401-4**

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1	0011 2.4.3	Ability to identify Post Accident Monitoring was too generic for Large-Break LOCA. Changed to 2.4.6 Knowledge of EOP mitigation strategies which is better suited K/A for Large-Break LOCA
1/2	APE 037 AA1.02	Not applicable to STP as there are no actions required to monitor/operate the condensate exhaust system during a Steam Generator tube leak. Randomly selected AA1.11
1/2	APE 068 AA1.20	Not applicable to STP. Randomly selected AA1.30
3/2	2.2.43	STP does not a have specific method to track inoperable alarms other than the corrective action program. Randomly selected 2.2.35

ES-301 **Administrative Topics Outline** **Form ES-301-1**

Facility: South Texas Project Examination Level: **RO**	Date of Examination: 12/7/2009 Operating Test Number: LOT-17 (NRC)

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
(A1) Conduct of Operations	R, N	Perform ESF Power Availability Surveillance. 2.1.20 (4.6) Ability to interpret and execute procedure steps
(A2) Conduct of Operations	R, M, P	Determine Dilution/Boration for Power Increase and Decrease 2.1.7 (4.4) Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation
(A3) Equipment Control	R, N	Prepare Revision to Equipment Clearance Order 2.2.13 (4.1) Knowledge of tagging and clearance procedures
(A4) Radiation Control	R, N	Stay Time Determination with Entry Requirements 2.3.4 (3.2) Knowledge of radiation exposure limits under normal or emergency conditions
Emergency Procedures/Plan		

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

ES-301 **Administrative Topics Outline** **Form ES-301-1**

Facility: South Texas Project Examination Level: **SRO**	Date of Examination: 12/7/2009 Operating Test Number: LOT-17 (NRC)

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
(A5) Conduct of Operations	R, N	Perform a Shutdown Risk Assessment 2.1.23 (4.4) Ability to perform specific system and integrated plant procedures during all modes of plant operation
(A6) Conduct of Operations	R, N	Determine Shift Staffing 2.1.5 (3.9) Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.
(A7) Equipment Control	R, N	Review Completed Surveillance. 2.2.40 (4.7) Ability to apply Technical Specifications for a system
(A8) Radiation Control	R, N	Determine Personnel Exposure Limits 2.3.4 (3.7) Knowledge of radiation exposure limits under normal and emergency conditions
(A9) Emergency Procedures/Plans	S, N	Classify an Emergency Event 2.4.41 (4.6) Knowledge of emergency action level thresholds and classifications

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

ES-301-1

(A1) Complete the ESF Power Availability procedure 0PSP03-EA-0002 to comply with TS 3.8.1.1.b for an inoperable EDG. This JPM will be conducted in the Simulator if possible. If unable to conduct the JPM in the simulator, a list of breakers with current position will be provided in the package (pictures of control board would be another method of providing data).

(A2) Determine the amount of reactor makeup/boron to be added for a power increase/decrease at a given time-in-life. The Plant Curve book will be accessible.

(A3) Utilize 0PGP03-ZO-ECO1A Equipment Clearance Order Instructions to revise a clearance order. Revision will be required due to leaky boundary valves on the original clearance and should require additional mechanical and electrical tags.

(A4) Determine stay-time based on administrative limits for a job in a high radiation area. Entry requirements will also be incorporated into the question.

(A5) SRO – Perform a Shutdown Risk Assessment in accordance with 0PGP-ZA-0101, Shutdown Risk Assessment.

(A6) SRO - Determine actions required when multiple on-shift personnel become unfit-for-duty.

(A7) SRO - Review a completed surveillance. Identify errors and apply Technical Specifications as required.

(A8) SRO – Determine personnel exposure margins during an emergency.

(A9) SRO - Classify a security event and take prescribed actions in accordance with 0ERP01-ZV-IN01 Emergency Classification. Make appropriate notifications.

Facility: South Texas Project	Date of Examination: 12/7/2009
Examination Level: **RO**	Operating Test Number: LOT-17 (NRC)

Control Room Systems[@] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
(S1) 004 / Perform Emergency Boration of RCS	S, N, A	1
(S2) 006 / Lower Safety Injection Accumulator Level	S, N, EN	2
(S3) 010 / Depressurize RCS During Steam Generator Tube Rupture	S, N, A, E, L	3
(S4) 003 / Start a Reactor Coolant Pump	S, N, A, L	4P
(S5) 026 / Perform Containment Spray Pump Test	S, N, A	5
(S6) 064 / Restore Offsite Power to ESF Bus	S, N, EN	6
(S7) 015 / Bypass a Failed Power Range Channel	S, N	7
(S8) 008 / Start CCW Train	S, N	8

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

(P1) EPE-038 / Perform Addendum 8 Secondary Contamination Control	N, E, L	9
(P2) APE-068 / Actions at Auxiliary Shutdown Panel for Control Room Evacuation	N, A	3
(P3) EPE-055 / Locally Re-Align Charging Pump Suction from the VCT to the RWST	N, E, L, R	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 Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: South Texas Project	Date of Examination: 12/7/2009
Examination Level: **SRO - Instant**	Operating Test Number: LOT-17 (NRC)

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

System / JPM Title	Type Code*	Safety Function
(S1) 004 / Perform Emergency Boration of RCS	S, N, A	1
(S2) 006 / Lower Safety Injection Accumulator Level	S, N, EN	2
(S4) 003 / Start a Reactor Coolant Pump	S, N, A, L	4P
(S5) 026 / Perform Containment Spray Pump Test	S, N, A	5
(S6) 064 / Restore Offsite Power to ESF Bus	S, N, EN	6
(S7) 015 / Bypass a Failed Power Range Channel	S, N	7
(S8) 008 / Start CCW Train	S, N	8

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

(P1) EPE-038 / Perform Addendum 8 Secondary Contamination Control	N, E, L	9
(P2) APE-068 / Actions at Auxiliary Shutdown Panel for Control Room Evacuation	N, A	3
(P3) EPE-055 / Locally Re-Align Charging Pump Suction from the VCT to the RWST	N, E, L, R	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 Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: South Texas Project	Date of Examination: 12/7/2009
Examination Level: **SRO - Upgrade**	Operating Test Number: LOT-17 (NRC)

Control Room Systems[@] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
(S1) 004 / Perform Emergency Boration of RCS	S, N, A	1
(S5) 026 / Perform Containment Spray Pump Test	S, N, A	5
(S6) 064 / Restore Offsite Power to ESF Bus	S, N, EN	6

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

(P1) EPE-038 / Perform Addendum 8 Secondary Contamination Control	N, E, L	9
(P3) EPE-055 / Locally Re-Align Charging Pump Suction from the VCT to the RWST	N, E, L, R	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 Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Rev 0

JPM Descriptions

S1 –Perform an emergency boration per step 4 of 0POP05-EO-FRS1 and re-establish charging (isolated due to Containment Isolation signal) in accordance with the RNO of step 4c. The JPM will be complete at step 4.g when emergency boration flowrate is greater than 50 gpm as indicated on FI-0120A. This is an alternate path JPM.

S2 –Lower level in a Safety Injection Accumulator per POP02-SI-0001 section 6.0. As a result of lowering the level, the pressure will fall below specification. The procedure in use will direct the candidate to increase pressure in the accumulator per section 7.0.

S3 – Perform step 19 of POP05-EO-EO30 Steam Generator Tube Rupture to depressurize the RCS to minimize break flow and refill the pressurizer. When terminating the depressurization, one of the spray valves will not close prompting the RNO action of stopping RCP's. This is an alternate path JPM.

S4 – Start a RCP (one RCP already running) per POP02-RC-0004 section 7.0. After starting the pump, Number 1 seal d/p will trend down prompting an alarm. The candidate determines the low seal d/p meets RCP trip criteria and subsequently stops the pump. This is an alternate path JPM.

S5 – Perform Containment Spray Pump Test per POP07-CS-0001. During the test an inadvertent Containment Spray actuation occurs. The candidate should follow the guidance of POP09-AN-05M3. No further actions will be required for this JPM. This is an alternate path JPM.

S6 –Restore Offsite Power to ESF Bus per POP02-DG-0001 section 9.0.

S7 –Bypass a failed Power Range Channel per POP04-NI-0001 Addendum 3.

S8 – Start a CCW train per POP-02-CC-0001 section 10.

P1 – Perform Addendum 8 of POP05-EO-EO30 for Secondary Contamination Control.

P2 –Perform Primary RO actions at the ASP due to a control room evacuation. Steps 9 through 20 of 0POP04-ZO-0001 will be completed at the ASP with multiple RNO actions. This is an alternate path JPM.

P3 –Locally Re-Align Charging Pump Suction from the VCT to the RWST. The applicant will perform field actions to re-align charging pump suction after a loss of all AC.

ES-301-5 not completed at Draft Outline submittal due to scenario set not established by Chief Examiner

Appendix D **Scenario Outline** **Form ES-D-1**

Facility: STP Scenario No.: 1 Op-Test No.: LOT-17 (NRC)

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: 100% MOL; 913 ppm boron

Turnover: Emergency Diesel Generator #11 has been out of service 38 hours for planned routine maintenance. Work is scheduled to be complete in approximately 22 hours. SR 4.8.1.1.1.a is due in approximately 7 hours. Decrease Letdown flow by placing the 85-100 gpm orifice in service.

Event No.	Malf. No.	Event Type*	Event Description
1 (10 min)	N/A	SRO (N) RO (N)	Swap from the 120-150 gpm Letdown Orifice to the 85-100 gpm Letdown Orifice.
2 (25 min)	05-12-03 (0)	SRO (I) BOP (I)	SG 'C' Controlling Level Channel LT-539 Fails Low (Tech Spec)
3 (33min)	06-16-02 (0)	SRO (I) RO (I) BOP (I)	Turbine Impulse Channel PT-505 Fails Low (Tech Spec)
4 (45 min)	06-19-05 (0.3)	SRO (C) BOP (C) RO (R)	High Vibration on Main Turbine Bearing #5 Resulting in Down Power (Will require manual cues)
5 (75 min)	MS-18 (1) 05-01-01 (0.5)	SRO (M) BOP (M) RO (M)	Steam Line Rupture in Turbine Building with Failure of "B" Main Steam Isolation Valve to close
6 (NA)	01-35-02 (True)	SRO (C) RO (C)	Intermediate Range Nuclear Instrument NI-0036 is under compensated (Becomes evident after the Reactor Trip) (Integral to Scenario) (Tech Spec)
7 (NA)	50-AF-03 (True)	SRO (C) BOP (C) RO (C)	Failure of AFW Pump #13 (Integral to Scenario)

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

STP LOT-17
NRC Scenario #1 Description

Initial Conditions: The plant is at 100% MOL with 913 ppm Boron. The Emergency Diesel Generator #11 is out of service for planned maintenance with work planned to complete in 22 hours. All TS actions are complete with surveillance 0PSP03-EA-0002, ESF Power Availability being due in 7 hours (meets SR 4.8.1.1.1.a).

Event 1: The crew is requested to swap letdown orifices by placing the 85 to 100 gpm orifice in service per POP02-CV-0004. This is a normal evolution with no malfunctions.

Event 2: Steam Generator "C" controlling Level channel (LT-539) will fail low. Operators will take action within guidance of 0POP04-FW-0001 and select an alternate controlling channel. The Unit Supervisor (SRO) will address Tech Spec implications.

Event 3: Turbine Impulse Pressure Channel PT-505 will fail low resulting in automatic inward rod motion. The crew will take action per 0POP04-TM-0004 to stabilize the plant, and return Tave to Tref. Steam Dumps will be placed in Steam Pressure Mode and the control rods will remain in manual due to the instrument failure. The Unit Supervisor (SRO) will address Tech Spec implications.

Event 4: The Main Turbine develops high vibration of 8-10 mils. The crew will take action within guidance of 0POP04-TM-0002. Step 8 of Addendum 2 will check Main Turbine vibration less than 7 mils. The actual vibration is less than 14 mils (danger) but greater than 7 mils (alert) which will trigger the Unit Supervisor (SRO) to contact the System Engineer for additional guidance. The Operations Manager (on recommendation of the System Engineer) will instruct the Unit Supervisor (SRO) to lower turbine load by 100 MW at 2%/min in accordance with 0POP04-TM-0005 to evaluate the effects of turbine load on vibration. The power reduction (with control rods in manual) will provide the RO with a reactivity manipulation.

Event 5: A Steam Line Rupture will occur in the Turbine Building. MSIV "B" fails to close and results in a safety injection due to steam line depressurization. The crew will enter 0POP05-EO-EO00 and attempt to close the MSIV locally (will not close due to mechanical binding). The expected procedural path would be from 0POP05-EO-EO00 to 0POP05-EO-EO20 to 0POP05-EO-EO10.

Event 6: The Intermediate Range Nuclear Instrument NI-0036 fails during the Reactor Trip. The compensating voltage for this channel fails resulting in a failure of the Source Range Nuclear Instruments to automatically energize. Operators will need to take action to manually energize the Source Range Instruments.

Event 7: AFW Pump #13 (on non-faulted SG) fails to start. The RO performing 0POP05-EO-EO00, Addendum 5 will start the pump.

Termination: The scenario will terminate when the Operators establish charging at Step 14 of 0POP05-EO-EO10, or at the discretion of the Lead Examiner.

Critical Tasks:

- Manually control steam generator level such that a manual or automatic reactor trip does not occur.
- Isolate Auxiliary Feedwater flow to the faulted steam generator prior to transition out of EO20.

Source: New

Appendix D **Scenario Outline** **Form ES-D-1**

Facility: STP Scenario No.: 2 Op-Test No.: LOT-17 (NRC)

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: 3% MOL; 1500 ppm boron

Turnover: Continue with the plant startup. Currently at Step 6.2 of 0POP03-ZG-0005, Plant Startup to 100%. Condensate Pump #12 and Feedwater Booster Pump #11 are OOS for corrective maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1 (13 min)	N/A	SRO (N) RO (R) BOP (N)	Raise power to between 6 and 8%
2 (23 min)	10-12-02 (True)	SRO (C) BOP (C) RO (C)	Loss of MCC E1A2 (Tech Spec)
3 (33 min)	08-23-01 (True)	SRO (C) BOP (C)	Condensate Pump #11 trip
4 (45 min)	02-19-03 (1)	SRO (I) RO (I)	Pressurizer Pressure PT-457 fails high. PORV PCV-0655A does not fully re-seat after opening. (Tech Spec)
5 (NA)	02-13-01 (0.5)	SRO (C) RO (C)	Pressurizer PORV 0655A fails to fully close (integral to the scenario)
6 (75 min)	50-HV-01 (1)	SRO (M) BOP (M) RO (M)	Leaking PZR PORV PCV-0655A fails open
7 (NA)	04-09-08? (1)	SRO (C) BOP (C)	Essential Chiller 12A fails to start. (integral to the scenario)

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

STP LOT-17
NRC Scenario #2 Description

Initial Conditions: The Plant is at 3% power, MOL with 1500 ppm Boron. Condensate Pump #12 and Feedwater Booster Pump #11 are OOS. Continue plant startup per Step 6.2 of 0POP03-ZG-0005, Plant Startup to 100%.

Event 1: The crew is to raise reactor power to between 6 and 8%. This is a normal evolution with no malfunctions.

Event 2: Loss of power to MCC E1A2. The crew will address control board indications and perform actions of the annunciator response procedures for the alarms caused by the loss of E1A2. The Unit Supervisor (SRO) will address Tech Spec implications.

Event 3: Condensate Pump #11 will trip. The crew will take action per 0POP04-CD-0001 to place a standby pump in service and stabilize the plant.

Event 4: The controlling pressurizer pressure channel fails high causing PZR PORV PCV-0655A to open. The crew will perform actions of 0POP04-RP-0001 to stabilize the plant. The Unit Supervisor (SRO) will address Tech Spec implications.

Event 5: PZR PORV PCV-0655A fails to fully close when the failed PZR pressure channel is de-selected. The valve will go fully closed when the control switch is taken to the CLOSE position.

Event 6: Leaking PZR PORV PCV-0655A will fail open causing a PZR steam space break. The crew will manually trip the reactor, initiate a Safety Injection and enter 0POP05-EO-EO00. The expected procedure path would be from 0POP05-EO-EO00 to 0POP05-EO-EO10 to 0POP05-EO-ES12.

Event 7: Essential Chiller 12A fails to start on the SI. Operators will take action in accordance with 0POP05-EO-EO00, Addendum 5, to secure affected EAB HVAC.

Termination: The scenario will terminate when the Operators enter POP05-EO-ES12 or at the discretion of the Lead Examiner.

Critical Tasks:

- Manually control Pressurizer pressure such that a manual or automatic reactor trip does not occur.
- Manually trip reactor coolant pumps to minimize inventory loss (SBLOCA) prior to exiting POP05-EO-EO00.

Source: New

Appendix D **Scenario Outline** **Form ES-D-1**

Facility: STP Scenario No.: 3 Op-Test No.: LOT-17 (NRC)

Examiners: _____ Operators: _____

Initial Conditions: 38% MOL; 1232 ppm boron;

Turnover: Continue with plant startup. Currently at Step 7.25 of 0POP03-ZG-0005 ready to place a second Steam Generator Feedwater Pump (SGFP) in service. SGFP #12 is warmed up and idling at 3300 RPM. Circ Water Pump #14 and Containment Spray Pump 1A are OOS for maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1 (10 min)	N/A	SRO (N) BOP (N)	Place Steam Generator Feedwater Pump #12 in service.
2 (20 min)	02-20-01 (1)	SRO (I) RO (I)	Pressurizer Level transmitter LT-465 fails high (Tech Spec)
3 (33 min)	50-BM-01 (1)	SRO (C) RO (C)	Volume Control Tank level channel LT-0113 fails high.
4 (40 min)	08-28-02 (True)	SRO (C) BOP (C)	Low Pressure Heater Drip (LPHD) Pump #12 trips
5 (45 min)	03-09-01 (True)	SRO (C) RO (C)	Centrifugal Charging Pump 1A trips. (Tech Spec)
6 (75 min)	50-HB-12 (0.2)	SRO (M) RO (M) BOP (M)	Steam Generator Tube Rupture in "D" Steam Generator
7 (NA)	05-16-02 (True)	SRO (I) BOP (I)	Loss of Steam Dump Control in Steam Pressure Mode (integral to the scenario)

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

STP LOT-17
NRC Scenario #3 Description

Initial conditions: The Plant is at 38% power, MOL and 1281 ppm boron. The operators will continue with plant startup. Currently at Step 7.25 of 0POP03-ZG-0005 ready to place a second Steam Generator Feedwater Pump (SGFP) in service. SGFP #12 is warmed up and idling at 3300 RPM. Circ Water Pump #14 and Containment Spray Pump 1A are OOS for maintenance.

Event 1: The Crew is to place SGFP #12 in service IAW 0POP02-FW-0002. This is a normal evolution with no malfunctions.

Event 2: Pressurizer Level Transmitter LT-465 fails high. The Crew will perform the actions of 0POP04-RP-0002. Manual control of FCV-0205 will be taken and pressurizer level stabilized. An alternate channel for control will be selected and FCV-0205 will be returned to automatic control. The Unit Supervisor (SRO) will address Tech Spec implications.

Event 3: Volume Control Tank Level channel LT-0113 fails high. The crew will perform the actions of the annunciator response procedure to stabilize Volume Control Tank level.

Event 4: Low Pressure Heater Drip Pump (LPHD) #12 trips. The Crew will perform the actions of 0POP04-CD-0001 to stabilize the plant.

Event 5: Centrifugal Charging Pump (CCP) 1A trips. The Crew will perform the actions of the annunciator response to place the standby CCP in service and stabilize the plant. The Unit Supervisor (SRO) will address Tech Spec implications.

Event 6: A tube rupture of approximately 300 gpm occurs in Steam Generator 1D. The Crew will trip the reactor and initiate Safety Injection and perform the actions of 0POP05-EO-EO00 and isolate Steam Generator 1D. The expected procedure path would be from 0POP05-EO-EO00 to 0POP05-EO-EO30.

Event 7: When cooldown of the Reactor Coolant System (RCS) is started in accordance with 0POP05-EO-EO30, a failure of the Steam Dumps occurs requiring the Crew to perform the RCS cooldown using the Steam Generator PORVs.

Termination: The scenario will terminate when the operators commence the cooldown required by POP05-EO-EO30 or at the discretion of the Lead Examiner.

Critical Tasks:

- Manually control pressurizer level such that a manual or automatic reactor trip does not occur.
- Isolate the ruptured steam generator prior to transition out of POP05-EO-EO30.

Source: New

Appendix D **Scenario Outline** **Form ES-D-1**

Facility: STP Scenario No.: 4 Op-Test No.: LOT-17 (NRC)

Examiners: _____ Operators: _____

Initial Conditions: 75% MOL; 967 ppm boron

Turnover: Place MSDT Pump 11B in service using POP02-HV-0001. 'B' Train LHSI and HHSI pumps are OOS for maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1 (5 min)	N/A	SRO (N) BOP (N)	Place MSDT Pump 11B in service per POP02-HV-0001. This is a normal evolution with no malfunctions.
2 (18 min)	02-28-02 (1.0)	SRO (I) RO (I)	Loop 'D' T-cold fails high. (Tech Spec)
3 (27 min)	05-22-02 (0.0)	SRO (I) BOP (I)	Controlling Steam Pressure channel on 'B' Steam Generator fails low. (Tech Spec)
4 (40 min)	03-12-01 (0.25)	SRO (C) RO (C)	Letdown leak outside containment.
5 (65 min)	02-01-03 (0.3)	SRO (M) BOP (M) RO (M)	Large Break LOCA on Loop 'C' cold leg occurs after charging and letdown are isolated. (integral to the scenario)
6 (NA)	04-09-02 (True)	SRO (C) BOP (C)	Essential Cooling Water Pump 1B trips after the SI. (triggered during Phase A isolation verification)
7 (NA)	01-12-03B (True)	SRO (C) RO (C)	Train 'B' Safety Injection fails to automatically actuate. (integral to the scenario)

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

STP LOT-17
NRC Scenario 4 Description

Initial Conditions: The plant is at 75% MOL with 971 ppm Boron. The Train 'B' LHSI and HHSI pumps are OOS for maintenance. Operators are directed to place Moisture Separator Drain Pump 11B in service per POP02-HV-0001.

Event 1: The operators will place MSDT Pump 11B in service using normal operating procedure POP02-HV-0001. This is a normal evolution with no malfunctions.

Event 2: Loop 'D' T-cold fails high causing inward control rod motion. Operators will take action within guidance of POP04-RP-0004 to place control rods in manual and select an alternate controlling channel. The SRO will address Tech Spec implications.

Event 3: Controlling Steam Pressure channel on 'B' Steam Generator fails low. The crew will take action per POP04-FW-0001 to stabilize the plant. The SRO will address Tech Spec implications.

Event 4: A leak will occur on the letdown heat exchanger. The crew will perform actions of POP04-RC-0003 to identify and isolate the leak. The leak will be isolated when the crew removes normal letdown from service.

Event 5: Large Break LOCA on Loop 'C' cold leg occurs after charging and letdown are isolated. Due to leak location and equipment out of service, the RCS heats up requiring entry into POP05-EO-FRC2. The expected procedural path would be from POP05-EO-EO00 to POP05-EO-FRC2. LHSI Pump "B" is restored after charging flow is established in
POP-5-EO-FRC2.

Event 6: Essential Cooling Water Pump 1B trips after the SI. Event will be triggered while the operator is verifying Phase A isolation in Addendum 5. The operators will be required to take the actions necessary to remove ESF Diesel Generator 12 from operation to prevent damage.

Event 7: Train 'B' Safety Injection fails to automatically actuate. The operators will need to manually actuate Safety Injection to ensure the proper equipment is running.

Termination: The scenario will terminate when the Operators have restored 'B' LHSI pump to operation and core exit thermocouples are lowering, or at the discretion of the Lead Examiner.

Critical Tasks:

- Manually control steam generator level such that a manual or automatic reactor trip does not occur.
- Establishes maximum charging flow during degraded core cooling condition.

Source: New