

**ES-401****PWR Examination Outline****Form ES-401-2**

Facility: South Texas Project (RO Exam)													Date of Exam: October 9, 2017					
Tier	Group	RO K/A Category Points												SRO-Only Points				
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2		G*	Total	
1. Emergency and Abnormal Plant Evolutions	1	3	2	3	N/A			4	3	N/A			3	18				6
	2	2	2	1				1	2				1	9				4
	Tier Totals	5	4	4				5	5				4	27				10
2. Plant Systems	1	3	2	3	3	2	2	3	2	3	2	3	28				5	
	2	1	1	1	1	1	0	1	1	1	1	1	10				3	
	Tier Totals	4	3	4	4	3	2	4	3	4	3	4	38				8	
3. Generic Knowledge and Abilities Categories				1		2		3		4		10	1	2	3	4	7	
				3		3		2		2								

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

## G\* Generic K/As

\* These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.

\*\* These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

ES-401		PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#	
000007 (EPE 7; BW E02&E10; CE E02) Reactor Trip, Stabilization, Recovery / 1						X	2.4.2: Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. (CFR: 41.10)	4.5	27	
000008 (APE 8) Pressurizer Vapor Space Accident / 3										
000009 (EPE 9) Small Break LOCA / 3			X				EK3.03: Knowledge of the reasons for the following responses as the apply to the small break LOCA: Reactor trip and safety initiation (CFR 41.5 )	4.1	13	
000011 (EPE 11) Large Break LOCA / 3										
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4						X	2.1.23: Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 )	4.3	38	
000022 (APE 22) Loss of Reactor Coolant Makeup / 2	X						AK1.04: Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup: Reason for changing from manual to automatic control of charging flow valve controller (CFR 41.7)	2.9	57	
000025 (APE 25) Loss of Residual Heat Removal System / 4	X						AK1.01: Knowledge of the operational implications of the following concepts as they apply to Loss of Residual Heat Removal System: Loss of RHRS during all modes of operation. (CFR 41.5)	3.9	54	
000026 (APE 26) Loss of Component Cooling Water / 8			X				AK3.02: Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS (CFR 41.7)	3.6	31	
000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3		X					AK2.03: Knowledge of the interrelations between the Pressurizer Pressure Control Malfunctions and the following: Controllers and positioners (CFR 41.7)	2.6	12	
000029 (EPE 29) Anticipated Transient Without Scram / 1					X		EA2.08: Ability to determine or interpret the following as they apply to a ATWS: Rod bank step counters and RPI (CFR 41.10)	3.4	63	
000038 (EPE 38) Steam Generator Tube Rupture / 3				X			EA1.05: Ability to operate and monitor the following as they apply to a SGTR: Maximum controlled depressurization rate for affected S/G (CFR 41.10 )	4.1	66	
000040 (APE 40; BW E05; CE E05; W E12) Steam Line Rupture—Excessive Heat Transfer / 4										
000054 (APE 54; CE E06) Loss of Main Feedwater / 4	X						AK1.01: Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): MFW line break depressurizes the S/G (similar to a steam line break) (CFR 41.5 )	4.1	69	
000055 (EPE 55) Station Blackout / 6										
000056 (APE 56) Loss of Offsite Power / 6				X			AA1.04: Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: Adjustment of speed of ED/G to maintain frequency and voltage levels (CFR 41.7 )	3.2	24	

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000057 (APE 57) Loss of Vital AC Instrument Bus / 6				X			AA1.01: Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus: Manual inverter swapping (CFR 41.7 )	3.7	48
000058 (APE 58) Loss of DC Power / 6									
000062 (APE 62) Loss of Nuclear Service Water / 4						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. (CFR: 41.7 )	4.2	49
000065 (APE 65) Loss of Instrument Air / 8					X		AA2.06: Ability to determine and interpret the following as they apply to the Loss of Instrument Air: When to trip reactor if instrument air pressure is decreasing (CFR: 41.7)	3.6	59
000077 (APE 77) Generator Voltage and Electric Grid Disturbances / 6					X		AA2.03: Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: Generator current outside the capability curve (CFR: 41.5 )	3.5	16
(W E04) LOCA Outside Containment / 3				X			W/E04 EA1.2: Ability to operate and / or monitor the following as they apply to the (LOCA Outside Containment): Operating behavior characteristics of the facility.(CFR: 41.5)	3.6	67
(W E11) Loss of Emergency Coolant Recirculation / 4			X				W/E11 EK3.3: Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation): Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.(CFR: 41.10)	3.8	62
(BW E04; W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4		X					W/E05 EK2.2: Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following: 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.(CFR: 41.10 )	3.9	65
K/A Category Totals:	3	2	3	4	3	3	Group Point Total:		18

ES-401		PWR Examination Outline						Form ES-401-2		
Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#	
000001 (APE 1) Continuous Rod Withdrawal / 1		X					AK2.06: Knowledge of the interrelations between the Continuous Rod Withdrawal and the following: Tave/Tref deviation meter (CFR 41.7 )	3.0	23	
000003 (APE 3) Dropped Control Rod / 1										
000005 (APE 5) Inoperable/Stuck Control Rod / 1			X				AK3.05: Knowledge of the reasons for the following responses as they apply to the Inoperable / Stuck Control Rod: Power limits on rod misalignment (CFR 41.1)	3.4	44	
000024 (APE 24) Emergency Boration / 1	X						AK1.01: Knowledge of the operational implications of the following concepts as they apply to Emergency Boration: Relationship between boron addition and change in T-ave (CFR 41.5)	3.4	8	
000028 (APE 28) Pressurizer (PZR) Level Control Malfunction / 2										
000032 (APE 32) Loss of Source Range Nuclear Instrumentation / 7										
000033 (APE 33) Loss of Intermediate Range Nuclear Instrumentation / 7										
000036 (APE 36; BW/A08) Fuel-Handling Incidents / 8					X		AA2.02: Ability to determine and interpret the following as they apply to the Fuel Handling Incidents: Occurrence of a fuel handling incident (CFR: 41.10)	3.4	53	
000037 (APE 37) Steam Generator Tube Leak / 3				X			AA1.11: Ability to operate and / or monitor the following as they apply to the Steam Generator Tube Leak: PZR level indicator (CFR 41.7)	3.4	58	
000051 (APE 51) Loss of Condenser Vacuum / 4										
000059 (APE 59) Accidental Liquid Radwaste Release / 9						X	2.4.31: Knowledge of annunciator alarms, indications, or response procedures. (CFR: 41.11)	4.2	3	
000060 (APE 60) Accidental Gaseous Radwaste Release / 9										
000061 (APE 61) Area Radiation Monitoring System Alarms / 7										
000067 (APE 67) Plant Fire On Site / 8										
000068 (APE 68; BW A06) Control Room Evacuation / 8					X		AA2.05: Ability to determine and interpret the following as they apply to the Control Room Evacuation: Availability of heat sink (CFR: 41.4)	4.2	52	
000069 (APE 69; W E14) Loss of Containment Integrity / 5										
000074 (EPE 74; W E06 & E07) Inadequate Core Cooling / 4										
000076 (APE 76) High Reactor Coolant Activity / 9										
000078 (APE 78*) RCS Leak / 3										
(W E01 & E02) Rediagnosis & SI Termination / 3										
(W E13) Steam Generator Overpressure / 4										
(W E15) Containment Flooding / 5										

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO)						Form ES-401-2	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
(W E16) High Containment Radiation /9		X					W/E16 EK2.1: Knowledge of the interrelations between the (High Containment Radiation) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. (CFR: 41.7 )	3.0	61
(BW A01) Plant Runback / 1									
(BW A02 & A03) Loss of NNI-X/Y/I									
(BW A04) Turbine Trip / 4									
(BW A05) Emergency Diesel Actuation / 6									
(BW A07) Flooding / 8									
(BW E03) Inadequate Sub-cooling Margin / 4									
(BW E08; W E03) LOCA Cooldown—Depressurization / 4									
(BW E09; CE A13**; W E09 & E10) Natural Circulation/4	X						W10 EK1.2: Knowledge of the operational implications of the following concepts as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS): Normal, abnormal and emergency operating procedures associated with (Natural Circulation with Steam Void in Vessel with/without RVLIS).(CFR: 41.10 )	3.4	68
(BW E13 & E14) EOP Rules and Enclosures									
(CE A11**; W E08) RCS Overcooling—Pressurized Thermal Shock / 4									
(CE A16) Excess RCS Leakage / 2									
(CE E09) Functional Recovery									
(CE E13*) Loss of Forced Circulation/LOOP/Blackout / 4									
K/A Category Point Totals:	2	2	1	1	2	1	Group Point Total:		9

ES-401 PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO)														Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)		IR	#
003 (SF4P RCP) Reactor Coolant Pump										X		A4.08: Ability to manually operate and/or monitor in the control room: RCP cooling water supplies (CFR: 41.7)		3.2	10
004 (SF1; SF2 CVCS) Chemical and Volume Control			X									K4.11: Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following: Temperature/pressure control in letdown line: prevent boiling, lifting reliefs, hydraulic shock, piping damage, and burst (CFR: 41.7)		3.1	25
												A3.09: Ability to monitor automatic operation of the CVCS, including: VCT level (CFR: 41.7)		3.3	26
005 (SF4P RHR) Residual Heat Removal	X					X						K1.04: Knowledge of the physical connections and/or cause-effect relationships between the RHRS and the following systems: CVCS (CFR: 41.7)		2.9	4
												K6.03: Knowledge of the effect of a loss or malfunction on the following will have on the RHRS: RHR heat exchanger (CFR: 41.4)		2.5	20
006 (SF2; SF3 ECCS) Emergency Core Cooling	X											K1.03: Knowledge of the physical connections and/or cause-effect relationships between the ECCS and the following systems: RCS (CFR: 41.7)		4.2	35
007 (SF5 PRTS) Pressurizer Relief/Quench Tank							X					A1.01: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Maintaining quench tank water level within limits (CFR: 41.7)		2.9	47
008 (SF8 CCW) Component Cooling Water							X					A1.02: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCWS controls including: CCW temperature (CFR: 41.5)		2.9	32
010 (SF3 PZR PCS) Pressurizer Pressure Control				X								K5.02: Knowledge of the operational implications of the following concepts as they apply to the PZR PCS: constant enthalpy expansion through a valve (CFR: 41.5)		2.6	51
												2.2.42: Ability to recognize system parameters that are entry-level conditions for Technical Specifications. (CFR: 41.5)		3.9	43
012 (SF7 RPS) Reactor Protection								X				A2.05: Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Faulty or erratic operation of detectors and function generators (CFR: 41.7)		3.1	50
013 (SF2 ESFAS) Engineered Safety Features Actuation			X									K3.01: Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: Fuel (CFR: 41.7)		4.4	64
022 (SF5 CCS) Containment Cooling									X			A3.01: Ability to monitor automatic operation of the CCS, including: Initiation of safeguards mode of operation (CFR: 41.7)		4.1	6

ES-401														PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO)														Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)		IR	#														
025 (SF5 ICE) Ice Condenser												Not part of plant design																	
026 (SF5 CSS) Containment Spray		X							X			K2.01: Knowledge of bus power supplies to the following: Containment spray pumps (CFR: 41.8)		3.4	73														
												A3.01: Ability to monitor automatic operation of the CSS, including: Pump starts and correct MOV positioning (CFR: 41.7)		4.3	18														
039 (SF4S MSS) Main and Reheat Steam			X									K3.06: Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: SDS (CFR: 41.7)		2.8	36														
059 (SF4S MFW) Main Feedwater											X	2.4.20: Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10)		3.8	56														
061 (SF4S AFW) Auxiliary/Emergency Feedwater				X								K5.02: Knowledge of the operational implications of the following concepts as the apply to the AFW: Decay heat sources and magnitude (CFR: 41.5)		3.2	1														
												K6.01: Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: Controllers and positioners (CFR: 41.7)		2.5	22														
062 (SF6 ED AC) AC Electrical Distribution		X										K2.01: Knowledge of bus power supplies to the following: Major system loads (CFR: 41.7)		3.3	37														
063 (SF6 ED DC) DC Electrical Distribution	X											K1.03: Knowledge of the physical connections and/or cause-effect relationships between the DC electrical system and the following systems: Battery charger and battery (CFR: 41.7)		2.9	74														
064 (SF6 EDG) Emergency Diesel Generator			X									K4.11: Knowledge of ED/G system design feature(s) and/or interlock(s) which provide for the following: Automatic load sequencer: safeguards (CFR: 41.8)		3.5	15														
												A1.08: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ED/G system controls including: Maintaining minimum load on ED/G (to prevent reverse power) (CFR: 41.8)		3.1	28														
073 (SF7 PRM) Process Radiation Monitoring										X		A4.01: Ability to manually operate and/or monitor in the control room: Effluent release (CFR: 41.11)		3.9	30														
076 (SF4S SW) Service Water				X								K4.02: Knowledge of SWS design feature(s) and/or interlock(s)which provide for the following: Automatic start features associated with SWS pump controls (CFR: 41.7)		2.9	7														
078 (SF8 IAS) Instrument Air											X	2.1.30 Ability to locate and operate components, including local controls. (CFR: 41.7 )		4.4	46														

ES-401														PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO)														Form ES-401-2	
System # / Name		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)		IR	#													
103 (SF5 CNT) Containment				X					X				K3.03: Knowledge of the effect that a loss or malfunction of the containment system will have on the following: Loss of containment integrity under refueling operations (CFR: 41.9)		3.7	42													
													A2.05: Ability to (a) predict the impacts of the following malfunctions or operations on the containment system and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Emergency containment entry (CFR: 41.9)		2.9	70													
053 (SF1; SF4P ICS*) Integrated Control													Not part of plant design																
K/A Category Point Totals:		3	2	3	3	2	2	3	2	3	2	3	Group Point Total:			28													



PWR Examination Outline													Form ES-401-2	
Plant Systems—Tier 2/Group 2 (RO)														
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
001 (SF1 CRDS) Control Rod Drive														
002 (SF2; SF4P RCS) Reactor Coolant			X									K3.03: Knowledge of the effect that a loss or malfunction of the RCS will have on the following: Containment (CFR: 41.7)	4.2	5
011 (SF2 PZR LCS) Pressurizer Level Control														
014 (SF1 RPI) Rod Position Indication				X								K4.06: Knowledge of RPIS design feature(s) and/or interlock(s) which provide for the following: Individual and group misalignment (CFR: 41.7)	3.4	9
015 (SF7 NI) Nuclear Instrumentation										X		A4.03: Ability to manually operate and/or monitor in the control room: Trip bypasses (CFR: 41.7)	3.8	19
016 (SF7 NNI) Nonnuclear Instrumentation									X			A3.02: Ability to monitor automatic operation of the NNIS including: Relationship between meter readings and actual parameter value (CFR: 41.7)	2.9	34
017 (SF7 ITM) In-Core Temperature Monitor														
027 (SF5 CIRS) Containment Iodine Removal		X										K2.01: Knowledge of bus power supplies to the following: Fans (CFR: 41.7)	3.1	29
028 (SF5 HRPS) Hydrogen Recombiner and Purge Control														
029 (SF8 CPS) Containment Purge														
033 (SF8 SFPCS) Spent Fuel Pool Cooling														
034 (SF8 FHS) Fuel-Handling Equipment														
035 (SF 4P SG) Steam Generator	X											K1.12: Knowledge of the physical connections and/or cause-effect relationships between the S/GS and the following systems: RPS (CFR: 41.7)	3.7	11
041 (SF4S SDS) Steam Dump/Turbine Bypass Control														
045 (SF 4S MTG) Main Turbine Generator					X							K5.01: Knowledge of the operational implications of the following concepts as the apply to the MT/B System: Possible presence of explosive mixture in generator if hydrogen purity deteriorates (CFR: 41.5)	2.8	17
055 (SF4S CARS) Condenser Air Removal														
056 (SF4S CDS) Condensate											X	2.1.7: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.10)	4.4	21
068 (SF9 LRS) Liquid Radwaste														
071 (SF9 WGS) Waste Gas Disposal														
072 (SF7 ARM) Area Radiation Monitoring														
075 (SF8 CW) Circulating Water								X				A2.03: 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: Safety features and relationship between condenser vacuum, turbine trip, and steam dump (CFR: 41.7)	2.5	60

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Plant Systems—Tier 2/Group 2 (RO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#	
079 (SF8 SAS**) Station Air															
086 Fire Protection							X					A1.01: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Fire Protection System operating the controls including: Fire header pressure(CFR: 41.7)	2.9	39	
050 (SF 9 CRV*) Control Room Ventilation															
K/A Category Point Totals:	1	1	1	1	1	0	1	1	1	1	1	Group Point Total:		10	

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

Facility: South Texas Project (RO Exam) Date of Exam: October 9, 2017						
Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.4	Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc. (CFR: 41.10)	3.3	75		
	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management. (CFR: 41.1)	4.3	2		
	2.1.40	Knowledge of refueling administrative requirements. (CFR: 41.10)	2.8	72		
	2.1.					
	Subtotal		3			
2. Equipment Control	2.2.6	Knowledge of the process for making changes to procedures. (CFR: 41.10)	3.0	41		
	2.2.14	Knowledge of the process for controlling equipment configuration or status. (CFR: 41.10)	3.9	40		
	2.2.39	Knowledge of less than or equal to one hour Technical Specification action statements for systems. (CFR:41.10)	3.9	45		
	2.2.					
	Subtotal		3			
3. Radiation Control	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)	3.2	71		
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (CFR: 41.12)	3.4	14		
	2.3.					
	Subtotal		2			
4. Emergency Procedures/Plan	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. (CFR: 41.10)	3.8	33		
	2.4.27	Knowledge of "fire in the plant" procedures. (CFR: 41.10)	3.4	55		
	2.4.					
	Subtotal		2			
Tier 3 Point Total			10			

ES-401 (STP LOT 21 RO Exam)

Record of Rejected K/As

Form ES-401-4

**All replacement K/As were requested from the NRC Chief Examiner per ES-401 D.1.b.**

Tier/Gro up	Randomly Selected K/A	Reason for Rejection
1/1	APE 008 AK1.01 (Outline Question 12)	This K/A tests knowledge of thermodynamics of a leaking or open valve associated with a Pressurizer vapor space accident. A question for this K/A is similar to a question written K/A 010 K5.02 (Outline Question 9) on this exam. Therefore the K/A was replaced with APE 025 AK1.01.
1/1	EPE 009 EK3.12 (Outline Question 13)	This K/A tests the knowledge of the reason for a letdown isolation during a SBLOCA. There were not enough plausible distractors to answer this K/A. Therefore the K/A was replaced with EPE 009 EK3.03.
1/1	APE 065 AA2.07 (Outline Question 24)	This K/A tests the ability to determine if backup nitrogen supply is controlling a valve upon the loss of IA. This is not applicable at STP. There are no valves that have an automatic backup nitrogen supply. Therefore the K/A was replaced with APE 065 AA2.06.
1/2	APE 001 AK2.01 (Outline Question 29)	This K/A tests the knowledge of relations between rod bank step counters and continuous rod withdrawal. There were not enough plausible distractors to answer this K/A. Therefore the K/A was replaced with APE 001 AK2.06.
1/2	APE 061 AA1.01 (Outline Question 34)	This K/A tests the ability to operate or monitor automatic actuations associated with ARMs. There are no auto actions associated with the ARMs at STP. Therefore the K/A was replaced with APE 037 AA1.11.
2/1	076 K4.03 (Outline Question 52)	This K/A tests the knowledge of the automatic opening features associated with SWS isolation valves to CCW heat exchangers. This does not apply at STP. These valves have no automatic opening features. Therefore the K/A was replaced with 076 K4.02.
2/1	078 G2.2.3 (Outline Question 53)	This K/A tests the differences between units associated with IA system. There is nothing of significance that is different with IA between the two units at STP. Therefore the K/A was replaced with 078 G2.1.30.
2/2	033 A3.02 (Outline Question 60)	This K/A tests the ability to monitor automatic operations of the SFPCS. There is no auto functions associated with this K/A at STP. Therefore the K/A was replaced with 016 A3.02.
2/2	045 K5.18 (Outline Question 62)	This K/A tests the knowledge of the purpose of low power reactor trips as applied to MT/B system. There were not enough plausible distractors to answer this K/A. Therefore the K/A was replaced with 045 K5.01.
2/2	072 A2.01 (Outline Question 64)	This K/A predicts the impacts of a malfunction on the ARM system and use procedures to mitigate the consequences of an erratic or failed power supply. There were not enough plausible distractors to answer this K/A. Therefore the K/A was replaced with 075 A2.03.
3	G2.1.39 (Outline Question 68)	This K/A tests the knowledge of conservative decision-making. The question written was determined to have a LOD of 1. Therefore, the K/A was replaced with G2.1.40.

**ES-401****PWR Examination Outline****Form ES-401-2**

Facility: South Texas Project (SRO Exam)													Date of Exam: October 9, 2017					
Tier	Group	RO K/A Category Points												SRO-Only Points				
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2		G*	Total	
1. Emergency and Abnormal Plant Evolutions	1				N/A					N/A			18	3		3	6	
	2												9	2	2	4		
	Tier Totals													27	5		5	10
2. Plant Systems	1												28	3		2	5	
	2												10	0	1	2	3	
	Tier Totals												38	4		4	8	
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	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 outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)
  2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by  $\pm 1$  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 outline. Systems or evolutions that do not apply at the facility should be deleted with justification. Operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
  4. Select topics from as many systems and evolutions as possible. Sample every system or evolution in the group before selecting a second topic for any system or evolution.
  5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
  6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
  7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
  8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' IRs for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. If fuel-handling equipment is sampled in a category other than Category A2 or G\* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2. (Note 1 does not apply). Use duplicate pages for RO and SRO-only exams.
  9. For Tier 3, select topics from Section 2 of the K/A catalog and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

**G\* Generic K/As**

- \* These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.
- \*\* These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (SRO)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000007 (EPE 7; BW E02&E10; CE E02) Reactor Trip, Stabilization, Recovery / 1									
000008 (APE 8) Pressurizer Vapor Space Accident / 3									
000009 (EPE 9) Small Break LOCA / 3									
000011 (EPE 11) Large Break LOCA / 3					X		EA2.11: Ability to determine or interpret the following as they apply to a Large Break LOCA: Conditions for throttling or stopping HPI (CFR 43.5 )	4.3	80
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4									
000022 (APE 22) Loss of Reactor Coolant Makeup / 2									
000025 (APE 25) Loss of Residual Heat Removal System / 4									
000026 (APE 26) Loss of Component Cooling Water / 8									
000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3									
000029 (EPE 29) Anticipated Transient Without Scram / 1									
000038 (EPE 38) Steam Generator Tube Rupture / 3									
000040 (APE 40; BW E05; CE E05; W E12) Steam Line Rupture—Excessive Heat Transfer / 4						X	2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 43.5)	4.2	87
000054 (APE 54; CE E06) Loss of Main Feedwater /4									
000055 (EPE 55) Station Blackout / 6						X	2.4.18: Knowledge of the specific bases for EOPs. (CFR: 43.5)	4.0	88
000056 (APE 56) Loss of Offsite Power / 6									
000057 (APE 57) Loss of Vital AC Instrument Bus / 6						X	2.2.37: Ability to determine operability and/or availability of safety related equipment. (CFR: 43.2)	4.6	96
000058 (APE 58) Loss of DC Power / 6					X		AA2.03: Ability to determine and interpret the following as they apply to the Loss of DC Power: DC loads lost; impact on ability to operate and monitor plant systems (CFR: 43.2)	3.9	91
000062 (APE 62) Loss of Nuclear Service Water / 4									
000065 (APE 65) Loss of Instrument Air / 8									
000077 (APE 77) Generator Voltage and Electric Grid Disturbances / 6									
(W E04) LOCA Outside Containment / 3					X		EA2.1: Ability to determine or interpret the following as they apply to LOCA Outside Containment: Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR 43.5 )	4.3	82

ES-401		PWR Examination Outline						Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (SRO)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
(W E11) Loss of Emergency Coolant Recirculation / 4									
(BW E04; W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4									
K/A Category Totals:					3	3	Group Point Total:		6

ES-401		PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (SRO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#	
000001 (APE 1) Continuous Rod Withdrawal / 1										
000003 (APE 3) Dropped Control Rod / 1						X	2.2.40: Ability to apply Technical Specifications for a system. (CFR: 43.2)	4.7	97	
000005 (APE 5) Inoperable/Stuck Control Rod / 1										
000024 (APE 24) Emergency Boration / 1										
000028 (APE 28) Pressurizer (PZR) Level Control Malfunction / 2										
000032 (APE 32) Loss of Source Range Nuclear Instrumentation / 7										
000033 (APE 33) Loss of Intermediate Range Nuclear Instrumentation / 7										
000036 (APE 36; BW/A08) Fuel-Handling Incidents / 8										
000037 (APE 37) Steam Generator Tube Leak / 3					X		A2.11 Ability to determine and interpret the following as they apply to a Steam Generator Tube Leak: When to isolate one or more SGs (CFR: 43.5)	3.8	83	
000051 (APE 51) Loss of Condenser Vacuum / 4										
000059 (APE 59) Accidental Liquid Radwaste Release / 9						X	2.3.6 Ability to approve release permits. (CFR: 43.4 )	3.8	84	
000060 (APE 60) Accidental Gaseous Radwaste Release / 9										
000061 (APE 61) Area Radiation Monitoring System Alarms / 7										
000067 (APE 67) Plant Fire On Site / 8										
000068 (APE 68; BW A06) Control Room Evacuation / 8										
000069 (APE 69; W E14) Loss of Containment Integrity / 5										
000074 (EPE 74; W E06 & E07) Inadequate Core Cooling / 4										
000076 (APE 76) High Reactor Coolant Activity / 9										
000078 (APE 78*) RCS Leak / 3										
(W E01 & E02) Rediagnosis & SI Termination / 3					X		W/E01 EA2.1: Ability to determine and interpret the following as they apply to SI termination: Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5)	4.2	86	
(W E13) Steam Generator Overpressure / 4										
(W E15) Containment Flooding / 5										
(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 Sub-cooling Margin / 4										
(BW E08; W E03) LOCA Cooldown—Depressurization / 4										
(BW E09; CE A13**; W E09 & E10) Natural Circulation/4										
(BW E13 & E14) EOP Rules and Enclosures										
(CE A11**; W E08) RCS Overcooling—Pressurized Thermal Shock / 4										
(CE A16) Excess RCS Leakage / 2										



(CE E09) Functional Recovery										
(CE E13*) Loss of Forced Circulation/LOOP/Blackout / 4										
ES-401 PWR Examination Outline Form ES-401-2 Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (SRO)										
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#	
K/A Category Point Totals:					2	2	Group Point Total:		4	

ES-401 PWR Examination Outline Plant Systems—Tier 2/Group 1 (SRO)													Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
003 (SF4P RCP) Reactor Coolant Pump														
004 (SF1; SF2 CVCS) Chemical and Volume Control														
005 (SF4P RHR) Residual Heat Removal														
006 (SF2; SF3 ECCS) Emergency Core Cooling								X				A2.04: Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Improper discharge pressure (CFR: 43.2)	3.8	98
007 (SF5 PRTS) Pressurizer Relief/Quench Tank														
008 (SF8 CCW) Component Cooling Water														
010 (SF3 PZR PCS) Pressurizer Pressure Control														
012 (SF7 RPS) Reactor Protection														
013 (SF2 ESFAS) Engineered Safety Features Actuation								X				A2.02: Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operation: Excess steam demand (CFR: 43.5)	4.5	81
022 (SF5 CCS) Containment Cooling														
025 (SF5 ICE) Ice Condenser														
026 (SF5 CSS) Containment Spray														
039 (SF4S MSS) Main and Reheat Steam														
059 (SF4S MFW) Main Feedwater														
061 (SF4S AFW) Auxiliary/Emergency Feedwater											X	2.2.25: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (CFR: 43.2)	4.2	90
062 (SF6 ED AC) AC Electrical Distribution								X				A2.04: Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Effect on plant of de-energizing a bus (CFR: 43.2 )	3.4	93
063 (SF6 ED DC) DC Electrical Distribution														
064 (SF6 EDG) Emergency Diesel Generator														

ES-401														PWR Examination Outline Plant Systems—Tier 2/Group 1 (SRO)														Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)												IR	#				
073 (SF7 PRM) Process Radiation Monitoring																													
076 (SF4S SW) Service Water											X	2.4.8: Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 43.5 )												4.5	89				
078 (SF8 IAS) Instrument Air																													
103 (SF5 CNT) Containment																													
053 (SF1; SF4P ICS*) Integrated Control																													
K/A Category Point Totals:								3			2	Group Point Total:													5				

PWR Examination Outline														Form ES-401-2	
Plant Systems—Tier 2/Group 2 (SRO)															
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)		IR	#
001 (SF1 CRDS) Control Rod Drive															
002 (SF2; SF4P RCS) Reactor Coolant															
011 (SF2 PZR LCS) Pressurizer Level Control											X	2.2.12: Knowledge of surveillance procedures (CFR: 43.2)		4.1	95
014 (SF1 RPI) Rod Position Indication															
015 (SF7 NI) Nuclear Instrumentation															
016 (SF7 NNI) Nonnuclear Instrumentation															
017 (SF7 ITM) In-Core Temperature Monitor											X	2.4.21: Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor Coolant system integrity, containment conditions, radioactivity release control, etc. (CFR: 43.5 )		4.6	79
027 (SF5 CIRS) Containment Iodine Removal															
028 (SF5 HRPS) Hydrogen Recombiner and Purge Control															
029 (SF8 CPS) Containment Purge															
033 (SF8 SFPCS) Spent Fuel Pool Cooling								X				A2.03: Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal spent fuel pool water level or loss of water level (CFR: 43.2)		3.5	92
034 (SF8 FHS) Fuel-Handling Equipment												Not selected for this sample plan			
035 (SF 4P SG) Steam Generator															
041 (SF4S SDS) Steam Dump/Turbine Bypass Control															
045 (SF 4S MTG) Main Turbine Generator															
055 (SF4S CARS) Condenser Air Removal															
056 (SF4S CDS) Condensate															
068 (SF9 LRS) Liquid Radwaste															
071 (SF9 WGS) Waste Gas Disposal															
072 (SF7 ARM) Area Radiation Monitoring															
075 (SF8 CW) Circulating Water															
079 (SF8 SAS**) Station Air															
086 Fire Protection															
050 (SF 9 CRV*) Control Room Ventilation															
K/A Category Point Totals:								1			2	Group Point Total:			3

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

Facility: South Texas Project (SRO Exam)			Date of Exam: October 9, 2017			
Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. (CFR: 43.1)			3.9	100
	2.1.41	Knowledge of the refueling process. (CFR: 43.7)			3.7	77
	2.1.					
	Subtotal				2	
2. Equipment Control	2.2.43	Knowledge of the process used to track inoperable alarms. (CFR: 43.3)			3.3	78
	2.2.22	Knowledge of limiting conditions for operations and safety limits. (CFR: 43.2 )			4.7	99
	2.2.					
	Subtotal				2	
3. Radiation Control	2.3.11	Ability to control radiation releases. (CFR: 43.2)			4.3	94
	2.3.					
	Subtotal				1	
4. Emergency Procedures/Plan	2.4.29	Knowledge of the emergency plan. (CFR: 43.3)			4.4	76
	2.4.27	Knowledge of “fire in the plant” procedures. (CFR: 43.5)			3.9	85
	2.4.					
	Subtotal				2	
Tier 3 Point Total					7	

**ES-401 (STP LOT 21 SRO Exam) Record of Rejected K/As****Form ES-401-4****All replacement K/As were requested from the NRC Chief Examiner per ES-401 D.1.b.**

Tier/Group	Randomly Selected K/A	Reason for Rejection
1/1	EPE 025 AA2.03 (Outline Question 77)	This K/A tests the ability to determine an increasing RCB sump level upon a loss of RHR. This event applies to an off-normal procedure and only 1 hour TS or less action statements at STP. An SRO only question could not be written. Therefore, the K/A was replaced with W E04 EA2.1.
1/1	W E11 G2.2.37 (Outline Question 81)	This K/A is a generic K/A that determines operability of safety related equipment associated with the Loss of Emergency Coolant Recirculation. There was too much overlap with this K/A and associated question with Outline Question 76 on this exam. Therefore, the Generic portion of the K/A was kept but replaced to APE 057.
1/2	APE 069 G2.2.40 (Outline Question 84)	This K/A is a generic K/A to test the ability to apply Tech Specs and is related to Loss of Containment Integrity. This K/A was changed in order to avoid over sampling of TS on the SRO exam and also due to the majority of the TS associated with it being a 1 hour or less action. Therefore, the K/A was replaced with APE 059 G2.3.6.
2/1	008 G2.2.25 (Outline Question 87)	This K/A is a generic K/A to test knowledge of TS bases and was associated with CCW. There was no plausibility for an SRO only question. Therefore, the Generic portion of the K/A was kept but replaced to 061 system.
2/2	041 G2.4.21 (Outline Question 93)	This K/A is a generic K/A to test knowledge of the parameters and logic used to assess the status of safety functions and was associated with Steam Dumps. The generic portion of this K/A did not match the system well and an SRO only question could not be written. Therefore, the Generic portion of the K/A was kept but replaced to 017 system.
3	G2.2.1 (Outline Question 96)	This K/A tests the ability to perform pre-startup procedures including operating the controls associated with equipment that could affect reactivity. A plausible SRO only question could not be written for this K/A. Therefore, the K/A was replaced with G2.2.43.
3	G2.4.45 (Outline Question 100)	This K/A tests the ability to prioritize alarms. A question was written for this K/A. However, it was decided to replace it to avoid over sampling of questions regarding TS on the SRO exam. Therefore, this K/A was replaced with G2.4.27.

ES-301

## Administrative Topics Outline

Form ES-301-1

<b>Facility:</b> <u>South Texas Project</u>		<b>Date of Examination:</b> <u>09-25-17</u>
<b>Examination Level:</b> RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		<b>Operating Test Number:</b> <u>LOT 21 NRC</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations RA(1) K/A Importance: 4.6	M,R	2.1.20 Ability to interpret and execute procedure steps. Determine Reactor Vessel Level
Conduct of Operations RA(2) K/A Importance: 3.9	D,R	2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. Calculate RCS refill volume
Equipment Control RA(3) K/A Importance: 4.3	D,R	2.1.23 Ability to perform specific and integrated plant procedures during all modes of operation. Determine H2 Recombiner Power Settings
Radiation Control		N/A
Emergency Plan RA(4) K/A Importance: 3.9	D,P,R	2.4.39 Knowledge of RO responsibilities in emergency plan implementation Complete an Offsite Agency Notification Message Form
NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).		
*Type Codes and Criteria:      (C)ontrol Room, (S)imulator, Class(R)oom (D)irect from bank ( $\leq 3$ for ROs; $\leq 4$ for SROs and RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ , randomly selected)		

ES-301

## Administrative Topics Outline

Form ES-301-1

<b>Facility:</b> <u>South Texas Project</u>		<b>Date of Examination:</b> <u>09-25-17</u>
<b>Examination Level:</b> RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		<b>Operating Test Number:</b> <u>LOT 21 NRC</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations SA(5) K/A Importance: 3.4	N,R	2.1.42 Knowledge of new and spent fuel movement procedures. Determine Close Contact Fuel Assembly Movement
Conduct of Operations SA(6) K/A Importance: 4.6	D,R	2.1.20 Ability to interpret and execute procedure steps Review ESF Power Availability
Equipment Control SA(7) K/A Importance: 4.3	D,R	2.2.13 Knowledge of Tagging and Clearance Procedures Review faulted ECO for AFW Pump
Radiation Control SA(8) K/A Importance: 3.8	D,P,R	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. Initiate a Dose Extension
Emergency Plan SA(9) K/A Importance: 4.4	M,R	2.4.44 Knowledge of the emergency plan Protective Action Recommendations. Determine Appropriate Emergency Plan Protective Action Recommendation.
NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).		
*Type Codes and Criteria:      (C)ontrol Room, (S)imulator, Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs and RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1, randomly selected)		



STP LOT-21  
NRC Admin JPM Description

**RO**

- (A1) Determine Reactor Vessel Level  
Demonstrate the ability to perform procedure steps to determine Reactor Vessel level in accordance with 0POP02-II-0002, RVWL Monitoring System, when QDPS is not displaying RVWL level.
- (A2) Calculate RCS Refill Volume  
Demonstrate the ability to calculate the volume needed to fill the RCS from the given conditions.
- (A3) Determine H2 Recombiner Power Settings  
Demonstrate the ability to calculate the required power setting for operation of a Hydrogen Recombiner in a post-LOCA environment.
- (A4) Complete An Offsite Agency Notification Message Form  
Demonstrate the ability to prepare an Offsite Agency Notification Message Form for approval by the Emergency Director per 0ERP01-ZV-IN02, Notifications to Offsite Agencies.

**SRO**

- (A5) Determine Close Contact Fuel Assemble Movement  
Demonstrate the ability to review Fuel Transfer Forms and interpret procedure guidance for Close Contact Fuel Assembly moves in accordance with 0POP08-FH-0001, Refueling Machine Operating Instructions, Addendum 4, Guidelines For Close Contact Fuel Assembly Movements.
- (A6) Review ESF Power Availability Surveillance Results  
Demonstrate the ability to review a completed ESF Power Availability surveillance and determine Technical Specification action requirements.
- (A7) Review faulted ECO for AFW Pump  
Demonstrate the ability perform a technical review of an ECO in accordance with 0PGP03-ZO-EC01A, Equipment Clearance Order Instructions.
- (A8) Initiate a Dose Extension  
Demonstrate the ability to determine the requirements for a dose extension in accordance with 0PGP03-ZR-0050, Radiation Protection Program.
- (A9) Determine Appropriate Emergency Plan Protective Action Recommendation  
Demonstrate the ability to correctly determine an Emergency Protective Action Recommendation for a given condition requiring entry into the STPNOC Emergency Action Plan in accordance with 0ERP01-ZV-IN07, Offsite Protective Action Recommendations.

ES-301

Control Room/In-Plant Systems Outline

Form ES-301-2

<b>Facility:</b> <u>South Texas Project</u>	<b>Date of Examination:</b> <u>09-25-17</u>
<b>Exam Level:</b> RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	<b>Operating Test No.:</b> <u>LOT 21 NRC</u>

  

<b>Control Room Systems:</b> * 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U		
System / JPM Title	Type Code*	Safety Function
a. (S1) Place H2 Monitoring in Service KA: 028 A4.03 (3.1/3.3)	D,L,S	5
b. (S2) Start a CCW Pump KA: 008 A4.01 (3.3/3.1)	D,S	8
c. (S3) Isolate SI Accumulators KA: 006 A4.02 (4.0/3.8)	A,D,EN,L,S	3
d. (S4) Roll 13.8 KV buses KA: 062 A4.07 (3.1/3.1)	D,S	6
e. (S5) Transfer MFW from LPFRVs to MFRVs KA: 035 A4.01 (3.7/3.6)	D,P,S	4S
f. (S6) Lower CVCS Charging and Letdown Flow KA: 004 A4.06 (3.6/3.1)	N,S	2
g. (S7) Respond to a FHB Rad Monitor Alarm KA: 072 A3.01 (2.9/3.1)	A,D,EN,S	7
h. (S8) Place Excess Letdown in Service KA: 004 A4.05 (3.6/3.1)	A,N,S	1

  

<b>In-Plant Systems:</b> * 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. (P1) Locally Re-Align Critical Motor Operated Valves during a loss of all AC power. KA: G2.1.20 (4.6/4.6)	D,E,L,R	2
j. (P2) Startup the GWPS following PMT KA: 071 A2.02 (3.3/3.6)	A,D,P,R	9
k. (P3) Place a 1E Battery Charger in Service KA: 063 A3.01 (2.7/3.1)	A,D	6

  

\* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions, all 5 SRO-U systems must serve different safety functions, and 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 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	

ES-301

Control Room/In-Plant Systems Outline

Form ES-301-2

<b>Facility:</b> <u>South Texas Project</u>	<b>Date of Examination:</b> <u>09-25-17</u>
<b>Exam Level:</b> RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	<b>Operating Test No.:</b> <u>LOT 21 NRC</u>

  

<b>Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U</b>		
System / JPM Title	Type Code*	Safety Function
a.		
b. (S2) Start a CCW Pump KA: 008 A4.01 (3.3/3.1)	D,S	8
c. (S3) Isolate SI Accumulators KA: 006 A4.02 (4.0/3.8)	A,D,EN,L,S	3
d. (S4) Roll 13.8 KV buses KA: 062 A4.07 (3.1/3.1)	D,S	6
e. (S5) Transfer MFW from LPFRVs to MFRVs KA: 035 A4.01 (3.7/3.6)	D,P,S	4S
f. (S6) Lower CVCS Charging and Letdown Flow KA: 004 A4.06 (3.6/3.1)	N,S	2
g. (S7) Respond to a FHB Rad Monitor Alarm KA: 072 A3.01 (2.9/3.1)	A,D,EN,S	7
h. (S8) Place Excess Letdown in Service KA: 004 A4.05 (3.6/3.1)	A,N,S	1
<b>In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U</b>		
i. (P1) Locally Re-Align Critical Motor Operated Valves during a loss of all AC power. KA: G2.1.20 (4.6/4.6)	D,E,L,R	2
j. (P2) Startup the GWPS following PMT KA: 071 A2.02 (3.3/3.6)	A,D,P,R	9
k. (P3) Place a 1E Battery Charger in Service KA: 063 A3.01 (2.7/3.1)	A,D	6
<b>* 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, and in-plant systems and functions may overlap those tested in the control room.</b>		
* Type Codes	Criteria for RO/SRO-I/SRO-U	
(A)lternate Path (C)ontrol Room (D)irect from Bank (E)mergency or abnormal in-plant (EN)gineered Safety Features (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ $\geq 1 / \geq 1 / \geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$	

ES-301

Control Room/In-Plant Systems Outline

Form ES-301-2

Facility: South Texas ProjectDate of Examination: 09-25-17Exam Level: RO ☐ SRO-I ☐ SRO-U ☒Operating Test No.: LOT 21 NRC

Control Room Systems:\* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U

System / JPM Title	Type Code*	Safety Function
a.		
b.		
c.		
d. (S4) Roll 13.8 KV buses KA: 062 A4.07 (3.1/3.1)	D,S	6
e.		
f.		
g. (S7) Respond to a FHB Rad Monitor Alarm KA: 072 A3.01 (2.9/3.1)	A,D,EN,S	7
h. (S8) Place Excess Letdown in Service KA: 004 A4.05 (3.6/3.1)	A,N,S	1

In-Plant Systems:\* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U

i. (P1) Locally Re-Align Critical Motor Operated Valves during a loss of all AC power. KA: G2.1.20 (4.6/4.6)	D,E,L,R	2
j. (P2) Startup the GWPS following PMT KA: 071 A2.02 (3.3/3.6)	A,D,P,R	9
k.		

\* 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, and 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 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-21  
NRC Systems JPM Description

**Control Room Systems JPMs**

- (S1) Place Containment H2 Monitoring in Service  
Demonstrate the ability to align the Containment H2 Monitoring System in order to monitor H2 concentration in accordance with Addendum 1 of OPOP05-EO-EO10, Loss of Reactor or Secondary Coolant.
- (S2) Start CCW Pump 1C  
Demonstrate the ability to start a 2<sup>nd</sup> CCW Pump and monitor system flow and pressure in accordance with OPOP02-CC-0001, Component Cooling Water.
- (S3) Isolate SI Accumulators  
Demonstrate the ability to isolate SI Accumulators from the RCS by closing the discharge isolation valve and/or depressurizing the accumulator in accordance with OPOP05-EO-EO10, Loss of Reactor or Secondary Coolant. This is an Alternate Path JPM.
- (S4) Roll 13.8 KV buses  
Demonstrate the ability to shift auxiliary busses between the Unit Aux XFMR and the Standby XFMR.
- (S5) Transfer MFW from LPFRV to MFRV  
Demonstrate the ability to control Steam Generator levels when aligning Main Feedwater flow from the Low Power Feedwater Regulation Valve to the Main Feedwater Regulation Valve in accordance with OPOP03-ZG-0005, Plant Startup to 100%.
- (S6) Lower CVCS Charging and Letdown Flow  
Demonstrate the ability to control CVCS charging and letdown flow while changing letdown flow through the letdown orifices in accordance with OPOP02-CV-0004, Chemical and Volume Control Subsystem.
- (S7) Respond to FHB Radiation Monitor Alarm  
Demonstrate the ability to properly align and control FHB HVAC after a high radiation actuation in accordance with OPOP04-RA-0001, Radiation Monitoring System Alarm Response. This is an Alternate Path JPM.
- (S8) Place Excess Letdown in Service  
Demonstrate the ability to align and control Excess Letdown when it is determined that Normal Letdown is isolated at the Containment Penetration in accordance with OPOP04-CV-0004, Loss of Normal Letdown. This is an Alternate Path JPM.

NOTE: All Control Room JPMs will be performed dynamically in the Simulator. The following JPMs will can be performed in pairs; S1 & S3 together, S2 & S7 together, S4 & S8 together and S5 & S6 together.

STP LOT-21  
NRC Systems JPM Description

**In Plant Systems JPMs**

- (P1) Locally Re-Align Critical Motor Operated Valves during a loss of all AC power  
Demonstrate the ability to locate and then align Charging Pump suction sources and RCP seal return flow path in accordance with 0POP05-EO-EC00, Loss of All AC Power.
- (P2) Startup of GWPS following PMT  
Demonstrate the ability to place a N2 purge on the GWPS prior to system startup in accordance with 0POP02-WG-0001, Gaseous Waste Processing System Operations. This is an Alternate Path JPM.
- (P3) Place a 1E Battery Charger in service  
Demonstrate the ability to operate and monitor Class 1E Battery Chargers in accordance with 0POP02-EE-0001, ESF (Class1E) DC Distribution System. This is an Alternate Path JPM.

## Appendix D

## Scenario Outline

## Form ES-D-1

Facility: South Texas Project

Scenario No.: 1 (Spare) Op-Test No.: LOT 21 NRC

Examiners: \_\_\_\_\_Operators: \_\_\_\_\_Initial Conditions:

- Unit 1 is at 100% Reactor Power. BOL (IC #189)

Turnover:

- The Crew will start FWBP #13 and place FWBP #12 in Auto.
- ESF DG #12, Starting Air Receiver #14 is OOS for Maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	N/A	BOP (N)	Start FWBP #13 and place FWBP #12 in Auto.
2 T (10 min)	POSBBAR1 30352TCC (1)	SRO (TS Only)	Breaker trips open on CV-MOV-0079, CVCS 'SEAL RTN OCIV'.
3 T (17 min)	See NOTE below	RO (C) SRO (C, TS)	EAB Battery Room Exhaust Fan 11C develops sheared shaft. When RO tries to start Battery Room Exhaust Fan 11B the fan trips.
4 T (27min)	05-14-01 0.4	BOP (I) SRO (I)	Main Steam Header Pressure Transmitter PT-557 Fails to a lower intermediate position. (Ramped in over 60 seconds)
5 T (37 min)	50-HV-01 1.0	RO (C) SRO (C)	PZR PORV RC-PCV-0655A fails open. The block valve for this PZR PORV, RC-MOV-001A will have to be closed to prevent a Reactor Trip. <b>(Critical Task)</b>
6 (N/A)	02-07-03 1 01-12-02 1	ALL (M)	RCS Loop C Low Flow due to RCP 1C sheared shaft. (60 seconds after RC-MOV-0001A is closed.)  ATWT- Reactor does not trip until Crew manually opens Load Center Breakers for Rod Drive MG Sets (Auto Rx Trip failure is initial condition of Lesson Plan) <b>(Critical Task)</b>
7 (N/A)	08-06-03 0.5	ALL (M)	SG 1C Loss of Feedwater inside containment. (6 minutes after Reactor Trip breakers are open) <b>(Critical Task)</b>
8 (N/A)	Manually Inserted	RO (C) SRO (C)	RCB Atmosphere Radiation Monitor Isolation Valves fail to automatically close. (Initial condition of Lesson Plan)
* (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)	2
4. EOPs entered/requiring substantive actions (1-2)	1
5. Entry into a contingency EOP with substantive actions ( $\geq 1$ per scenario set)	1
6. Preidentified critical tasks ( $\geq 2$ )	3

**NOTE:** Malfunction numbers for Event #3 - CI\_3V111VFM012TFShear – 1 & POSBBARV32733TCC - 1

STP LOT-21  
NRC Scenario #1 Description

**Initial Conditions:** Unit 1 is at 100% Reactor Power. In preparation for an Engineering evaluation of FWBP #12, the Crew is to start FWBP #13 and place FWBP #12 in Auto after taking the watch.

ESF DG #12, Starting Air Receiver #14, is OOS for Maintenance.

**Event 1:** The BOP will start FWBP #13 and place FWBP #12 in Auto using 0POP02-FW-0001, Main Feedwater.

**Event 2:** The breaker will trip open for CVCS 'SEAL RTN OCIV', CV-MOV-0079. The SRO will address Tech Spec implications.

**Event 3:** EAB Battery Room Exhaust Fan 11C develops sheared shaft. When RO tries to start Battery Room Exhaust Fan 11B the fan trips. The crew will respond using 0POP09-AN-22M3, C3 and D3, 'BATT ROOM EXH FAN TRBL' & 'BATT RM EXH FLOW LO'. The SRO will address Tech Spec implications.

**Event 4:** Main Steam Header Pressure Transmitter PT-557 Fails to an intermediate position. The Crew will respond using 0POP04-FW-0002, Steam Generator Feed Pump Trip.

**Event 5:** PZR PORV, RC-PCV-0655A, fails open. The Crew will close the PZR PORV block valve, RC-MOV-0001A, to stop the RCS inventory loss and prevent a Reactor Trip by using 0POP04-RP-0001, Loss of Automatic Pressurizer Pressure Control, and/or 0POP09-AN-04M8 E-5, PRZR PORV OPEN COMMAND. **(Critical Task)**

**Event 6:** 60 seconds after RC-MOV-001A is closed in Event 5, RCP 1C develops a sheared shaft but the reactor does not trip. The reactor will trip from the control room when the Crew opens the 480 volt LC breakers that feed the Rod Control MG sets. The Crew will respond using 0POP05-EO-EO00, Reactor Trip or Safety Injection and transition to 0POP05-EO-ES01, Reactor Trip Response if an SI does not occur. **(Critical Task)**

**Event 7:** Six (6) minutes after the Reactor trip breakers are opened, a feedwater rupture will develop in containment on SG 1C. The leak will ramp in over 4 minutes. The Crew will transition back to or stay in 0POP05-EO-EO00, Reactor Trip or Safety Injection and then transition to 0POP05-EO-EO20, Faulted Steam Generator Isolation. **(Critical Task)**

**Event 8:** During performance of 0POP05-EO-EO00, Reactor Trip or Safety Injection, the crew will notice that the RCB Atmosphere Radiation Monitor Isolation Valves failed to automatically close and will have to use the RNO step to manually close the valves.



STP LOT-21  
NRC Scenario #1 Description

**Termination:** Exit 0POP05-EO-EO20, Faulted Steam Generator Isolation.

**Critical Tasks:**

- CT-10, With the reactor in an 'At Power' condition, close the block MOV upstream of the stuck open PZR PORV prior to receiving an automatic reactor trip signal.
- CT-1, Manually trips the Reactor from the Control Room before completing Step 1 of 0POP05-EO-EO00, Reactor Trip or Safety Injection.
- CT-17, Isolate a Faulted Steam Generator before transitioning out of 0POP05-EO-EO20, Faulted Steam Generator Isolation.

**Source:** New

## Appendix D

## Scenario Outline

Form ES-D-1

Facility: South Texas Project

Scenario No.: 2

Op-Test No.: LOT 21 NRC

Examiners: \_\_\_\_\_Operators: \_\_\_\_\_Initial Conditions:

- Unit 1 is at 100% Reactor Power. BOL (IC #190)

Turnover:

- ESF DG #12 is OOS for Maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1 (1 min)	N/A	RO (C) SRO (C)	SFP Pump 1A trips. (60 seconds after crew takes the watch.)
2 T (15 min)	05-22-01 1	BOP (I) SRO (I, TS)	SG 1A controlling Steam pressure channel PT-0514 fails high.
3 T (30 min)	01-07-07 1	RO (R) BOP (R) SRO (R, TS)	One Dropped Control Rod M12. The Crew will start a down power to less than 75%.
4 T (50 min)	10-14-01 1	ALL (M)	Loss of Offsite Power, 345KV, causes a Reactor Trip.
5 (N/A)	04-09-01 1	RO (C) SRO (C)	ECW Pump 1A fails to re-start on the LOOP forcing the crew to secure ESF DG #11. (Trips on restart after LOOP) <b>(Critical Task)</b>
6 (N/A)	50-GD-06 1	ALL (C) ALL (M)	ESF DG #13 trips. Crew will enter 0POP05-EO-EC00, Loss of All AC Power (SBO). (Trips 10 minutes after LOOP) <b>(2 Critical Tasks)</b>
* (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. Entry into a contingency EOP with substantive actions ( $\geq 1$ per scenario set)	1
6. Preidentified critical tasks ( $\geq 2$ )	3

STP LOT-21  
NRC Scenario #2 Description

**Initial Conditions:** Unit 1 is at 100% Reactor Power. ESF DG #12 is OOS for Maintenance.

**Event 1:** Spent Fuel Pool (SFP) Cooling Pump 1A will trip. The Crew will respond using 0POP09-AN-22M2, F-6, SFP TROUBLE and start SFP Cooling Pump 1B per 0POP02-FC-0001, Spent Fuel Pool Cooling and Cleanup System.

**Event 2:** SG 1A controlling Steam pressure channel PT-0514 fails high. The Crew will respond using 0POP04-FW-0001, Loss of Steam Generator Level Control. The SRO will address Tech Spec implications.

**Event 3:** The unit will experience a dropped Control Rod (M12). The Crew will respond using 0POP04-RS-0001, Control Rod Malfunction. The Crew will start a down power to less than 75%. The SRO will address Tech Spec implications.

**Event 4:** Loss of Offsite Power (LOOP) causes a Reactor Trip. The Crew will respond using 0POP05-EO-EO00, Reactor Trip or Safety Injection.

**Event 5:** On the LOOP, ECW PUMP 1A fails to re-start forcing the Crew to have to emergency stop ESF DG #11. **(Critical Task)**

**Event 6:** After transitioning to 0POP05-EO-ES01, Reactor Trip Response, ESF DG #13 trips. This forces the crew to enter 0POP05-EO-EC00, Loss of All AC Power. The 138 KV Emergency Transformer will be available. **(2 Critical Tasks)**

STP LOT 21  
NRC Scenario #2 Description

**Termination:** When the Crew establishes AFW flow to at least 2 SGs from AFW Pump 14 at a rate of at least 576 gpm.

**Critical Tasks:**

- CT-9, Manually Trip Diesel Generator prior to the Diesel Generator automatically tripping from an emergency mode trip signal.
- EC00-H, Establishes seal injection flow to RCP seals that have Seal 1 inlet temperatures that are less than 230°F.
- CT-23, Establish 576 GPM AFW flow to the SGs prior to completing step 5.b of OPOP05-EO-EC00, Loss of All AC Power.

**Source:** New

## Appendix D

## Scenario Outline

Form ES-D-1

Facility: South Texas Project

Scenario No.: 3

Op-Test No.: LOT 21 NRC

Examiners: Operators:Initial Conditions:

- Unit 1 is at 100% Reactor Power. BOL (IC #189)

Turnover:

- ESF DG #12, Starting Air Receiver #14 is OOS for Maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	04-01-01 1	RO (C) SRO (C, TS)	Component Cooling Water Pump 1A Sheared Shaft. (60 seconds after crew takes the watch.)
2 T (20 min)	05-12-03 1	RO (I) BOP (C) SRO (I, TS)	Power Range NI Channel 43 Fails High.
3 T (45 min)	11-01-07 0.063	All (R)	ISO-Phase Fans trip. Crew will have to perform a Fast Load reduction to about 50% power.
4 T (55 min)	02-01-02 .005	ALL (M)	SBLOCA on LOOP B Cold Leg. <b>(Critical Task)</b>
5 (N/A)	50-KA-05 (1)	BOP (C) SRO (C)	CCW Pump 1B fails to Auto start and CCW fails to transfer to the RCFC coolers on Train B. Operator will manually start CCW Pump 1B and align CCW to RCFC coolers if RCB temperature $\leq 116^{\circ}\text{F}$ . (Initial condition of Lesson Plan) <b>(Critical Task)</b>
6 (N/A)	02-01-02 0.4	ALL (M)	LBLOCA and Containment Spray Pumps fail to Auto Start. (Occurs 6 minutes after the RCPs have stopped and CCW Pump 1B has been started.) <b>(Critical Task)</b>

\* (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)	2
4. EOPs entered/requiring substantive actions (1–2)	1
5. Entry into a contingency EOP with substantive actions ( $\geq 1$ per scenario set)	2
6. Preidentified critical tasks ( $\geq 2$ )	3

STP LOT-21  
NRC Scenario #3 Description

**Initial Conditions:** Unit 1 is at 100% Reactor Power. ESF DG #12 is OOS for Maintenance.

**Event 1:** Component Cooling Water Pump 1A sheared shaft. The Crew will respond using 0POP09-AN-02M3 E-5, CCW HX 1A(2A) OUTL PRESS LO. The SRO will address Tech Spec implications.

**Event 2:** Power Range Channel NI 43 will fail high. The Crew will respond using 0POP04-NI-0001, Nuclear Instrument Malfunction. The SRO will address Tech Spec implications.

**Event 3:** ISO Phase Fan 1A trips and ISO Phase Fan 1B fails to start. The Crew will respond by performing a turbine load reduction to about 50% power using 0POP04-TM-0005, Fast Load Reduction.

**Event 4:** During the load reduction a SBLOCA will occur which will require the Crew to trip the Reactor and perform a Safety Injection. The Crew will respond using 0POP05-EO-EO00, Reactor Trip or Safety Injection and 0POP05-EO-EO10, Loss of Reactor or Secondary Coolant. **(Critical Task)**

**Event 5:** On the Safety Injection, CCW Pump 1B fails to Auto start and CCW fails to transfer to the RCFC coolers on Train B. The Crew must manually start CCW Pump 1B and align CCW to RCFC coolers if RCB temperature is  $\leq 116^{\circ}\text{F}$ . **(Critical Task)**

**Event 6:** The SBLOCA turns into a LBLOCA with the Containment Spray Pumps failing to Auto Start. The crew will use 0POP09-EO-FRZ1, Response to High Containment Pressure, to manually start the Containment Spray Pumps. **(Critical Task)**

STP LOT-21  
NRC Scenario #3 Description

**Termination:** When the Crew starts at least 2 Containment Spray Pumps and ensures they are properly aligned with flow to containment.

**Critical Tasks:**

- CT-16, Manually trip the Reactor Coolant Pumps when RCS pressure is less than 1430 psig and at least one HHSI Pump is injecting during a SBLOCA.
- CT-8, Manually start CCW pump 1B so that two CCW Pumps provide adequate cooling to safeguards trains during a SBLOCA.
- CT-3, Manually start at least one containment spray pump to provide Containment Cooling

**Source:** New

## Appendix D

## Scenario Outline

Form ES-D-1

Facility: South Texas Project

Scenario No.: 4

Op-Test No.: LOT 21 NRC

**Examiners:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Operators:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Initial Conditions:**

- Unit 1 is at 100% Reactor Power. BOL (IC #190)

**Turnover:**

- The Crew will start Open Loop Pump #11 and secure Open Loop Pump #12.
- ESF DG #12 is OOS for Maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1 (1 min)	N/A	BOP (N)	Start Open Loop Pump #11 and Secure Open Loop Pump #12. (60 seconds after crew takes the watch.)
2 T (6 min)	02-19-03 0.0	RO (I) SRO (I, TS)	Controlling Channel of Pressurizer Pressure, PT-0457, fails low.
3 (N/A)	POSBBA RG2290 4TCC 1	SRO (TS)	PZR PORV isolation valve, RC-MOV-0001B, loses control power. (This malfunction will be inserted 1 minute after PT-0457 fails high.)
4 T (20 min)	HCPD96 23REV 1	RO (C) SRO (C)	CRDM Vent Fan 11A Trouble.
5 T (30 min)	08-28-01 1	BOP (C) SRO (C)	LPHD Pump #11 Trip.
6 T (40 min)	05-03-04 0.44	ALL (M)	SG 1D Tube Rupture. (~450 GPM & Ramps in over 2 minute period.) <b>(3 Critical Tasks)</b>
7 (N/A)	Manually Inserted	BOP (C)	SG 1D FWIV fails to close on the Feedwater Isolation Signal. (Integrated with SGTR)
8 (N/A)	PV7485 PV7489 PV7493 0.0	BOP (C) SRO (C)	Group 1 Steam Dumps fail to open. Crew will use SG PORVs to perform SGTR cooldown. (Initial condition of Lesson Plan)

\* (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. Entry into a contingency EOP with substantive actions ( $\geq 1$ per scenario set)	0
6. Preidentified critical tasks ( $\geq 2$ )	3



STP LOT-21

NRC Scenario #4 Description

**Initial Conditions:** Unit 1 is at 100% Reactor Power. Due to an issue with Seal Water to Open Loop Pump #12, the Crew is to secure Open Loop Pump #12 after taking the watch.

ESF DG #12 is OOS for Maintenance.

**Event 1:** The BOP will start Open Loop Pump #11 and secure Open Loop Pump #12 using 0POP02-OC-0001, Open Loop Auxiliary Cooling System.

**Event 2:** The controlling channel of Pressurizer Pressure, PT-0457, will fail low. The Crew will respond using 0POP04-RP-0001, Loss of Automatic Pressurizer Pressure Control. The SRO will address Tech Spec implications.

**Event 3:** PZR PORV RC-PCV-0656A isolation valve RC-MOV-0001B loses control power. The SRO will address Tech Spec implications.

**Event 4:** CRDM Vent Fan 11A will develop a problem that causes a reduction in air flow and require starting CRDM Vent Fan 11C. The Crew will respond using 0POP09-AN-22M1, F-2, CRDM VENT FAN TRBL.

**Event 5:** LPHD Pump #11 trips. The Crew will respond using 0POP04-CD-0001, Loss of Condensate Flow.

**Event 6:** A SGTR will occur on SG 1D. The Crew will respond using 0POP05-EO-EO00, Reactor Trip or Safety Injection, and transition to 0POP05-EO-EO30, Steam Generator Tube Rupture.

**Event 7:** SG 1D FWIV, FW-FV-7144, will fail to automatically close. The crew will have to manually close the valve as part of isolating SG 1D.

**Event 8:** The Steam Dumps will have an integral failure of the Group 1 cooldown valves. The crew will have to use the SG PORVs to perform the SGTR cooldown below 563°F in 0POP05-EO-EO30, Steam Generator Tube Rupture.

STP LOT-21  
NRC Scenario #4 Description

**Termination:** After the crew secures HHSI pumps

**Critical tasks:**

- CT-18, Isolate Steam and Feedwater to a Ruptured SG.
- CT-20, Depressurize RCS to SI Termination Criteria.
- CT-21, Terminate SI by stopping HHSI Pumps.

**Source:** New