Facility: South Texas Project Date of Exam: November 7, 2018

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	3	3	N/A			3	3	N/A		3	18				6
	2	2	2	1				1	1			2	9				4
	Tier Totals	5	5	4				4	4			5	27				10
2. Plant Systems	1	2	2	3	3	2	3	3	3	2	2	2	28				5
	2	1	1	1	1	0	1	1	1	1	1	1	10				3
	Tier Totals	3	3	4	4	2	4	4	4	3	3	3	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 ±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/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			X				Knowledge of the reasons for the following as the apply to a reactor trip: (CFR 41.5 /41.10 / 45.6 / 45.13) EK3.01 Actions contained in EOP for reactor trip	4.0	1
000008 (APE 8) Pressurizer Vapor Space Accident / 3		X					Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: (CFR 41.7 / 45.7) AK2.01 Valves	2.7*	2
000009 (EPE 9) Small Break LOCA / 3									
000011 (EPE 11) Large Break LOCA / 3			X				Knowledge of the reasons for the following responses as the apply to the Large Break LOCA: (CFR 41.5 / 41.10 / 45.6 / 45.13) EK3.09 Maintaining D/Gs available to provide standby power	4.2	3
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4									
000022 (APE 22) Loss of Reactor Coolant Makeup / 2				X			Ability to operate and / or monitor the following as they apply to the Loss of Reactor Coolant Makeup: (CFR 41.7 / 45.5 / 45.6) AA1.02 CVCS charging low flow alarm, sensor, and indicator	3.0	4
000025 (APE 25) Loss of Residual Heat Removal System / 4					X		Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: (CFR: 43.5 / 45.13) AA2.04 Location and isolability of leaks	3.3*	5
000026 (APE 26) Loss of Component Cooling Water / 8						X	2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)	3.8	6
000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3						X	2.4.46 Ability to verify that the alarms are consistent with the plant conditions. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.2	7
000029 (EPE 29) Anticipated Transient Without Scram / 1	X						Knowledge of the operational implications of the following concepts as they apply to the ATWS: (CFR 41.8 / 41.10 / 45.3) EK1.03 Effects of boron on reactivity	3.6	8
000038 (EPE 38) Steam Generator Tube Rupture / 3									
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									
000055 (EPE 55) Station Blackout / 6						X	2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. (CFR: 41.10 / 43.2 / 45.13)	3.1	9

000056 (APE 56) Loss of Offsite Power / 6	X						Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: CFR 41.8 / 41.10 / 45.3) AK1.03 Definition of subcooling: use of steam tables to determine it	3.1*	10
000057 (APE 57) Loss of Vital AC Instrument Bus / 6			X				Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.01 Actions contained in EOP for loss of vital ac electrical instrument bus	4.1	11
000058 (APE 58) Loss of DC Power / 6				X			Ability to operate and / or monitor the following as they apply to the Loss of DC Power: (CFR 41.7 / 45.5 / 45.6) AA1.03 Vital and battery bus components	3.1	12
000062 (APE 62) Loss of Nuclear Service Water / 4					X		Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13) AA2.04 The normal values and upper limits for the temperatures of the components cooled by SWS	2.5	13
000065 (APE 65) Loss of Instrument Air / 8				X			Ability to operate and/or monitor the following as they apply to the Loss of Instrument Air: (CFR 41.7, 41.10 / 45.5 / 45.6) AA1.04 Emergency air compressor	3.5*	14
000077 (APE 77) Generator Voltage and Electric Grid Disturbances / 6					X		Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.5 and 43.5 / 45.5, 45.7, and 45.8) AA2.08 Criteria to trip the turbine or reactor	4.3	15
(W E04) LOCA Outside Containment / 3		X					Knowledge of the interrelations between the (LOCA Outside Containment) and the following: (CFR: 41.7 / 45.7) EK2.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.5	16
(W E11) Loss of Emergency Coolant Recirculation / 4		X					Knowledge of the interrelations between the (Loss of Emergency Coolant Recirculation) and the following: (CFR: 41.7 / 45.7) EK2.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.6	17
(~~BW E04;~~ W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4	X						Knowledge of the operational implications of the following concepts as they apply to the (Loss of Secondary Heat Sink) (CFR: 41.8 / 41.10, 45.3) EK1.1 Components, capacity, and function of emergency systems.	3.8	18
K/A Category Totals:	3	3	3	3	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/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									
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			X				Knowledge of the reasons for the following responses as they apply to the Fuel Handling Incidents: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.03 Guidance contained in EOP for fuel handling incident	3.7	19
000037 (APE 37) Steam Generator Tube Leak / 3									
000051 (APE 51) Loss of Condenser Vacuum / 4									
000059 (APE 59) Accidental Liquid Radwaste Release / 9									
000060 (APE 60) Accidental Gaseous Radwaste Release / 9						X	2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. (CFR: 41.7 / 45.7 / 45.8)	4.5	20
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	X						Knowledge of the operational implications of the following concepts as they apply to Loss of Containment Integrity: (CFR 41.8 / 41.10 / 45.3) AK1.01 Effect of pressure on leak rate	2.6	21
000074 (EPE 74; W E06 & E07) Inadequate Core Cooling / 4									
000076 (APE 76) High Reactor Coolant Activity / 9		X					Knowledge of the interrelations between the High Reactor Coolant Activity and the following: (CFR 41.7 / 45.7) AK2.01 Process radiation monitors	2.6	22
000078 (APE 78*) RCS Leak / 3									
(W E01 ~~& E02~~) Rediagnosis ~~& SI Termination~~ / 3	X						Knowledge of the operational implications of the following concepts as they apply to the (Reactor Trip or Safety Injection/Rediagnosis) (CFR: 41.8 / 41.10 / 45.3) EK1.1 Components, capacity, and function of emergency systems.	3.1	23

(W E13) Steam Generator Overpressure / 4				X			Ability to operate and / or monitor the following as they apply to the (Steam Generator Overpressure) (CFR: 41.7 / 45.5 / 45.6) EA1.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.1	24
(W E15) Containment Flooding / 5						X	2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 41.10 / 43.5 / 45.12)	4.2	25
(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—Depressurization / 4		X					Knowledge of the interrelations between the (LOCA Cooldown and Depressurization) and the following: (CFR: 41.7 / 45.7) EK2.2 Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.7	26
(~~BW E09; CE A13**~~; W E09 ~~& E10~~) Natural Circulation/4					X		Ability to determine and interpret the following as they apply to the (Natural Circulation Operations) (CFR: 43.5 / 45.13) EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.4	27
(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	1	2	Group Point Total:		9

ES-401	PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/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			X									Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: (CFR: 41.7 / 45.6) K3.02 S/G	3.5	28
004 (SF1; SF2 CVCS) Chemical and Volume Control									X			Ability to monitor automatic operation of the CVCS, including: (CFR: 41.7 / 45.5) A3.16 Interpretation of emergency borate valve position indicating lights	3.8	29
005 (SF4P RHR) Residual Heat Removal							X					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including: (CFR: 41.5 / 45.5) A1.03 Closed cooling water flow rate and temperature	2.5	30
006 (SF2; SF3 ECCS) Emergency Core Cooling				X								Knowledge of ECCS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.09 Valve positioning on safety injection signal	3.9	31
007 (SF5 PRTS) Pressurizer Relief/Quench Tank			X									Knowledge of the effect that a loss or malfunction of the PRTS will have on the following: (CFR: 41.7 / 45.6) K3.01 Containment	3.3	32
008 (SF8 CCW) Component Cooling Water	X											Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.9) K1.05 Sources of makeup water	3.0	33
010 (SF3 PZR PCS) Pressurizer Pressure Control	X											Knowledge of the physical connections and/or cause-effect relationships between the PZR PCS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.06 CVCS	2.9	34
012 (SF7 RPS) Reactor Protection									X			Ability to monitor automatic operation of the RPS, including: (CFR: 41.7 / 45.5) A3.07 Trip breakers	4.0	35
013 (SF2 ESFAS) Engineered Safety Features Actuation						X						Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: (CFR: 41.7 / 45.5 to 45.8) K6.01 Sensors and detectors	2.7*	36
022 (SF5 CCS) Containment Cooling											X	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 / 43.5 / 45.13)	3.8	37
025 (SF5 ICE) Ice Condenser														

026 (SF5 CSS) Containment Spray				X							Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.08 Automatic swapover to containment sump suction for recirculation phase after LOCA (RWST low-low level alarm)	4.1*	38
039 (SF4S MSS) Main and Reheat Steam					X						Knowledge of the operational implications of the following concepts as the apply to the MRSS: (CFR: 441.5 / 45.7) K5.05 Bases for RCS cooldown limits	2.7	39
059 (SF4S MFW) Main Feedwater								X			Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.12 Failure of feedwater regulating valves	3.1*	40
061 (SF4S AFW) Auxiliary/Emergency Feedwater						X					Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: (CFR: 41.7 / 45.7) K6.01 Controllers and positioners	2.5	41
062 (SF6 ED AC) AC Electrical Distribution										X	Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 / to 45.8) A4.01 All breakers (including available switchyard)	3.3	42
063 (SF6 ED DC) DC Electrical Distribution		X									Knowledge of bus power supplies to the following: (CFR: 41.7) K2.01 Major DC loads	2.9*	43
064 (SF6 EDG) Emergency Diesel Generator								X			Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.09 Synchronization of the ED/G with other electric power supplies	3.1	44
073 (SF7 PRM) Process Radiation Monitoring										X	Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.02 Radiation monitoring system control panel.	3.7	45
076 (SF4S SW) Service Water							X				Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: (CFR: 41.5 / 45.5) A1.02 Reactor and turbine building closed cooling water temperatures	2.6*	46
078 (SF8 IAS) Instrument Air										X	2.1.31 Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. (CFR: 41.10 / 45.12)	4.6	47

103 (SF5 CNT) Containment								X				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 (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2 03 Phase A and B isolation	3.5*	48
053 (SF1; SF4P ICS*) Integrated Control													
008 (SF8 CCW) Component Cooling Water				X								Knowledge of CCWS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Automatic start of standby pump	3.1	49
012 (SF7 RPS) Reactor Protection						X						Knowledge of the effect of a loss or malfunction of the following will have on the RPS: (CFR: 41.7 / 45/7) K6.03 Trip logic circuits	3.1	50
026 (SF5 CSS) Containment Spray		X										Knowledge of bus power supplies to the following: (CFR: 41.7) K2.02 MOVs	2.7*	51
061 (SF4S AFW) Auxiliary/Emergency Feedwater					X							Knowledge of the operational implications of the following concepts as the apply to the AFW: (CFR: 41.5 / 45.7) K5.03 Pump head effects when control valve is shut	2.6	52
063 (SF6 ED DC) DC Electrical Distribution							X					Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including: (CFR: 41.5 / 45.5) A1.01 Battery capacity as it is affected by discharge rate	2.5	53
064 (SF6 EDG) Emergency Diesel Generator			X									Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: (CFR: 41.7 / 45.6) K3.03 ED/G (manual loads)	3.6	54
073 (SF7 PRM) Process Radiation Monitoring				X								Knowledge of PRM system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Release termination when radiation exceeds setpoint.	4.0	55
K/A Category Point Totals:	2	2	3	3	2	3	3	3	2	2	2	Group Point Total:		28

ES-401	PWR Examination Outline												Form ES-401-2	
	Plant Systems—Tier 2/Group 2 (RO/SRO)													
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
001 (SF1 CRDS) Control Rod Drive	X											Knowledge of the physical connections and/or cause-effect relationships between the CRDS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.03 CRDM	3.4	56
002 (SF2; SF4P RCS) Reactor Coolant														
011 (SF2 PZR LCS) Pressurizer Level Control		X										Knowledge of bus power supplies to the following: (CFR: 41.7) K2.01 Charging pumps	3.1	57
014 (SF1 RPI) Rod Position Indication														
015 (SF7 NI) Nuclear Instrumentation														
016 (SF7 NNI) Nonnuclear Instrumentation					X							Knowledge of the operational implication of the following concepts as they apply to the NNIS: (CFR: 41.5 / 45.7) K5.01 Separation of control and protection circuits	2.7*	58
017 (SF7 ITM) In-Core Temperature Monitor														
027 (SF5 CIRS) Containment Iodine Removal														
028 (SF5 HRPS) Hydrogen Recombiner and Purge Control										X		Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.03 Location and operation of hydrogen sampling and analysis of containment atmosphere, including alarms and indications	3.1	59
029 (SF8 CPS) Containment Purge														
033 (SF8 SFPCS) Spent Fuel Pool Cooling														
034 (SF8 FHS) Fuel-Handling Equipment									X			Ability to monitor automatic operation of the Fuel Handling System, including: (CFR: 41.7 / 45.5) A3.02 Load limits	2.5*	60
035 (SF 4P SG) Steam Generator														
041 (SF4S SDS) Steam Dump/Turbine Bypass Control			X									Knowledge of the effect that a loss or malfunction of the SDS will have on the following: (CFR: 41.7 / 45.6) K3.04 Reactor power	3.5	61
045 (SF 4S MTG) Main Turbine Generator								X				Ability to (a) predict the impacts of the following malfunctions or operation on the MT/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.5) A2.08 Steam dumps are not cycling properly at low load, or stick open at higher load (isolate and use atmospheric reliefs when necessary)	2.8	62
055 (SF4S CARS) Condenser Air Removal											X	2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.1	63
056 (SF4S CDS) Condensate														
068 (SF9 LRS) Liquid Radwaste														
071 (SF9 WGS) Waste Gas Disposal														

072 (SF7 ARM) Area Radiation Monitoring							X					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ARM system controls including: (CFR: 41.5 / 45.5) A1.01 Radiation levels	3.4	64
075 (SF8 CW) Circulating Water														
079 (SF8 SAS**) Station Air														
086 Fire Protection						X						Knowledge of the effect of a loss or malfunction on the Fire Protection System following will have on the: (CFR: 41.7 / 45.7) K6.04 Fire, smoke, and heat detectors	2.6	65
050 (SF 9 CRV*) Control Room Ventilation														
K/A Category Point Totals:	1	1	1	1	0	1	1	1	1	1	1	Group Point Total:		10

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Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.21	Ability to verify the controlled procedure copy.	3.5*	66		
	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	67		
	2.1.29	Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.	4.1	68		
	Subtotal					
2. Equipment Control	2.2.12	Knowledge of surveillance procedures.	3.7	69		
	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings.	3.5	70		
	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	71		
	Subtotal					
3. Radiation Control	2.3.7	Ability to comply with radiation work permit requirements during normal or abnormal conditions.	3.5	72		
	2.3.11	Ability to control radiation releases.	3.8	73		
	Subtotal					
4. Emergency Procedures/Plan	2.4.32	Knowledge of operator response to loss of all annunciators.	3.6	74		
	2.4.46	Ability to verify that the alarms are consistent with the plant conditions.	4.2	75		
	Subtotal					
Tier 3 Point Total				10		7

Tier/Group	Randomly Selected K/A	Reason for Rejection
1/2	WE09 EA2.1	This K/A tests the ability to assess facility conditions and select an appropriate procedure. This is not an RO level K/A. Therefore the K/A was replaced with WE09 EA2.2.
2/1	073 A4.03	This K/A tests the ability to manually operate and/or monitor in the control room a radiation monitor check source for operability determination. This is not an RO task at STP. Therefore the K/A was replaced with 073 A4.02.
2/1	073 K4.02	This K/A tests the knowledge of Process Radiation Monitoring design features or interlocks which provide for letdown isolation on high RCS activity. STP does not have this feature. Therefore the K/A was replaced with 073 K4.01

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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		2	1		3
	Tier Totals												38	5		3		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 ±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/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					X		Ability to determine or interpret the following as they apply to a small break LOCA: (CFR 43.5 / 45.13) EA2.34 Conditions for throttling or stopping HPI	4.2	76
000011 (EPE 11) Large Break LOCA / 3									
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4						X	2.4.6 Knowledge of EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)	4.7	77
000022 (APE 22) Loss of Reactor Coolant Makeup / 2									
000025 (APE 25) Loss of Residual Heat Removal System / 4					X		Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: (CFR: 43.5 / 45.13) AA2.06 Existence of proper RHR overpressure protection	3.4*	78
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					X		Ability to determine or interpret the following as they apply to a SGTR: (CFR 43.5 / 45.13) EA2.16 Actions to be taken if S/G goes solid and water enters steam line	4.6	79
~~000040~~ (~~APE 40; BW E05; CE E05~~; W E12) ~~Steam Line Rupture - Excessive Heat Transfer~~ Uncontrolled Depressurization of all Steam Generators/ 4						X	2.4.44 Knowledge of emergency plan protective action recommendations. (CFR: 41.10 / 41.12 / 43.5 / 45.11)	4.4	80
000054 (APE 54; ~~CE E06~~) Loss of Main Feedwater /4						X	2.4.11 Knowledge of abnormal condition procedures (CFR 41.10 / 43.5 / 45.13)	4.2	81
000055 (EPE 55) Station Blackout / 6									
000056 (APE 56) Loss of Offsite Power / 6									
000057 (APE 57) Loss of Vital AC Instrument Bus / 6									
000058 (APE 58) Loss of DC Power / 6									
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									
(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:	0	0	0	0	3	3	Group Point Total:		6

ES-401	PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)									
E/APE # / Name / Safety Function	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									
000005 (APE 5) Inoperable/Stuck Control Rod / 1									
000024 (APE 24) Emergency Boration / 1									
000028 (APE 28) Pressurizer (PZR) Level Control Malfunction / 2						X	2.2.37 Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)	4.6	82
000032 (APE 32) Loss of Source Range Nuclear Instrumentation / 7									
000033 (APE 33) Loss of Intermediate Range Nuclear Instrumentation / 7					X		Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: (CFR: 43.5 / 45.13) AA2.12 Maximum allowable channel disagreement	3.1*	83
000036 (APE 36; BW/A08) Fuel-Handling Incidents / 8									
000037 (APE 37) Steam Generator Tube Leak / 3									
000051 (APE 51) Loss of Condenser Vacuum / 4									
000059 (APE 59) Accidental Liquid Radwaste Release / 9									
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						X	2.4.50 Ability to verify system alarm setpoints and operate controls identified in the alarm response manual. (CFR: 41.10 / 43.5 / 45.3)	4.0	84
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									
(W E16) High Containment Radiation /9					X		Ability to determine and interpret the following as they apply to the (High Containment Radiation) (CFR: 43.5 / 45.13) EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.3	85
(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—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									
K/A Category Point Totals:	0	0	0	0	2	2	Group Point Total:		4

ES-401	PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/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								X				Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5/ 45.3 / 45/13) A2.01 Problems with RCP seals, especially rates of seal leak-off	3.9	86
004 (SF1; SF2 CVCS) Chemical and Volume Control														
005 (SF4P RHR) Residual Heat Removal								X				Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.04 RHR valve malfunction	2.9	87
006 (SF2; SF3 ECCS) Emergency Core Cooling											X	2.1.32 Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	4.0	88
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														
022 (SF5 CCS) Containment Cooling														
025 (SF5 ICE) Ice Condenser														
026 (SF5 CSS) Containment Spray														
039 (SF4S MSS) Main and Reheat Steam								X				Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Flow paths of steam during a LOCA	3.2	89
059 (SF4S MFW) Main Feedwater											X	2.2.38 Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)	4.5	90
061 (SF4S AFW) Auxiliary/Emergency Feedwater														
062 (SF6 ED AC) AC Electrical Distribution														
063 (SF6 ED DC) DC Electrical Distribution														

064 (SF6 EDG) Emergency Diesel Generator													
073 (SF7 PRM) Process Radiation Monitoring													
076 (SF4S SW) Service Water													
078 (SF8 IAS) Instrument Air													
103 (SF5 CNT) Containment													
053 (SF1; SF4P ICS*) Integrated Control													
K/A Category Point Totals:	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:	5

ES-401	PWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)											Form ES-401-2	
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														
014 (SF1 RPI) Rod Position Indication								X				Ability to (a) predict the impacts of the following malfunctions or operations on the RPIS; and (b) based on those on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.04 Misaligned rod	3.9	91
015 (SF7 NI) Nuclear Instrumentation														
016 (SF7 NNI) Nonnuclear Instrumentation														
017 (SF7 ITM) In-Core Temperature Monitor														
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														
034 (SF8 FHS) Fuel-Handling Equipment														
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											X	2.2.40 Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)	4.7	92
086 Fire Protection								X				Ability to (a) predict the impacts of the following malfunctions or operations on the Fire Protection System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Manual shutdown of the FPS	3.1	93
050 (SF 9 CRV*) Control Room Ventilation														
K/A Category Point Totals:	0	0	0	0	0	0	0	2	0	0	1	Group Point Total:		3

Facility: South Texas Project		Date of Exam: November 7, 2018				
Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.14	Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc.			3.1	94
	2.1.32	Ability to explain and apply system limits and precautions.			4.0	95
	Subtotal					
2. Equipment Control	2.2.6	Knowledge of the process for making changes to procedures.			3.6	96
	2.2.25	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.			4.2	97
	Subtotal					
3. Radiation Control	2.3.6	Ability to approve release permits.			3.8	98
	Subtotal					
4. Emergency Procedures/Plan	2.4.20	Knowledge of the operational implications of EOP warnings, cautions, and notes.			4.3	99
	2.4.12	Knowledge of general operating crew responsibilities during emergency operations.			4.3	100
	Subtotal					
Tier 3 Point Total				10		7

Tier/Group	Randomly Selected K/A	Reason for Rejection
1/1	APE 54 2.4.34	This K/A tests, for a loss of main feedwater, the knowledge of RO tasks performed outside the main control room and the resultant operational effects. A question cannot be written at the SRO level. Therefore, this K/A was replaced by APE 054 2.4.11.
3	2.4.50	This K/A tests the ability to verify alarm setpoints and operate controls identified in the alarm response manual. A question cannot be written at the SRO level. Therefore, this K/A was replaced by 2.4.12

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

Facility: South Texas Project **Date of Examination:** 10-22-18

Examination Level: RO ■ SRO □ **Operating Test Number:** LOT 22 NRC

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations RA(1) K/A Importance: 4.6	D,P,R	2.1.20 Ability to interpret and execute procedure steps. Verify an Excore QPTR Calculation
Conduct of Operations RA(2) K/A Importance: 3.9	M,R	2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. RO Complete ESF Power Availability Surveillance
Equipment Control RA(3) K/A Importance: 4.1	D,R	2.2.13 Knowledge of Tagging and Clearance Procedures. Prepare ECO for SFP Skimmer Pump
Radiation Control RA(4) K/A Imprortance: 3.5	D,R	2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions. Determine RWP Requirements for Work in RRA (SFP)
Emergency Plan	N/A	N/A

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)

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

Facility: South Texas Project **Date of Examination:** 10-22-18

Examination Level: RO ☐ SRO ■ **Operating Test Number:** LOT 22 NRC

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations SA(5) K/A Importance: 4.6	D,P,R	2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management. Calculate SDM with a Misaligned Control Rod and Determine Applicable Technical Specifications.
Conduct of Operations SA(6) K/A Importance: 4.2	M,R	2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. SRO Review ESF Power Availability Surveillance
Equipment Control SA(7) K/A Importance: 4.3	D,R	2.2.13 Knowledge of Tagging and Clearance Procedures. Review Faulted ECO for CCW Pump
Radiation Control SA(8) K/A Importance: 3.7	D,R	2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. Determine Personnel Exposure Limits (E-Plan)
Emergency Plan SA(9) K/A Importance: 4.4	M,R	2.4.41 Knowledge of the emergency action level thresholds and classifications. Determine EAL

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) Verify Excore QPTR Calculation
Demonstrate the ability to perform and/or verify a QPTR.

(A2) RO Complete ESF Power Availability Surveillance
Demonstrate the ability to determine power availability using the switch yard table in 0PSP03-EA-0002, ESF Power Availability, and given switchyard breaker positions.

(A3) Prepare ECO for SFP Skimmer Pump
Demonstrate the ability to prepare an ECO for equipment maintenance.

(A4) Determine RWP Requirements for Work in RRA (SFP)
Demonstrate the ability to extract necessary information from survey maps and RWP to perform work in the RRA.

SRO

(A5) Calculate SDM with a Misaligned Control Rod and Determine Applicable Technical Specifications
Demonstrate the ability perform a SDM and apply appropriate TSs if required. 0PSP10-ZG-0005, Shutdown Margin Verification – Modes 1 and 2.

(A6) SRO Review ESF Power Availability Surveillance
Demonstrate the ability to determine power availability using the switch yard table in 0PSP03-EA-0002, ESF Power Availability, and determine Technical Specification action requirements.

(A7) Review faulted ECO for CCW Pump
Demonstrate the ability perform a technical review of an ECO for equipment maintenance.

(A8) Determine Personnel Exposure Limits (E-Plan)
Demonstrate the ability to determine personnel exposure margins during an emergency.

(A9) Determine Appropriate Emergency Plan Action Levels
Demonstrate the ability to correctly determine an Emergency Plan Action Level for a given condition requiring entry into the STPNOC Emergency Action Plan in accordance with 0ERP01-ZV-IN01, Emergency Classification.

ES-301 Control Room/In-Plant Systems Outline Form ES-301-2

Facility: South Texas Project Date of Examination: 10-22-18

Exam Level: RO ■ SRO-I □ SRO-U □ Operating Test No.: LOT 22 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. (S1) Start an RCP and Respond to High Temperature KA: 002 A3.03 (4.4/4.6)	A,D,L,S	2
b. (S2) Fill and SI Accumulator KA: 006 A4.07 (4.4/4.4)	D,EN,S	3
c. (S3) On Loss of ESF BUS, Manually Start DG and Load to BUS KA: 064 A4.06 (3.9/3.9)	A,E,EN,N,S	6
d. (S4) Containment Spray Pump Performance Test KA: 026 A2.08 (3.2/3.7)	A,D,S	5
e. (S5) Start an RHR Pump during Mode 4. KA: 005 A4.01 (3.6/3.4)	L,M,S	4P
f. (S6) Perform CCW Valve Operability Test KA: 008 A4.01 (3.3/3.4)	D,P,S	8
g. (S7) Monthly Control Rod Operability Test KA: 001 A4.03(4.0/3.7)	M,S	1
h. (S8) Respond to Failed Source Range NI KA: 015 A4.03 (3.8/3.9)	D,L,S	7
In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. (P1) Locally Operate a SG PORV. KA: 039 A4.07(2.8/2.9)	D,E,L,P	4S
j. (P2) Commence Liquid Waste Release KA: 068 A4.02 (3.2/3.1)	A,D,P,R	9
k. (P3) Place Rod Drive MG Set in Service KA: 001 A4.08 (3.7/3.4)	A,D,E,L	1

* 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	

Facility: South Texas Project Date of Examination: 10-22-18

Exam Level: RO ☐ SRO-I ■ SRO-U ☐ Operating Test No.: LOT 22 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. (S1) Start an RCP and Respond to High Temperature KA: 002 A3.03 (4.4/4.6)	A,D,L,S	2
b. (S2) Fill and SI Accumulator KA: 006 A4.07 (4.4/4.4)	D,EN,S	3
c. (S3) On Loss of ESF BUS, Manually Start DG and Load to BUS KA: 064 A4.06 (3.9/3.9)	A,E,EN,N,S	6
d. (S4) Containment Spray Pump Performance Test KA: 026 A2.08 (3.2/3.7)	A,D,S	5
e. (S5) Start an RHR Pump during Mode 4. KA: 005 A4.01 (3.6/3.4)	L,M,S	4P
f. (S6) Perform CCW Valve Operability Test KA: 008 A4.01 (3.3/3.4)	D,P,S	8
g. (S7) Monthly Control Rod Operability Test KA: 001 A4.03(4.0/3.7)	M,S	1
h.		
In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. (P1) Locally Operate a SG PORV. KA: 039 A4.07(2.8/2.9)	D,E,L,P	4S
j. (P2) Commence Liquid Waste Release KA: 068 A4.02 (3.2/3.1)	A,D,P,R	9
k. (P3) Place Rod Drive MG Set in Service KA: 001 A4.08 (3.7/3.4)	A,D,E,L	1

* 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	

Facility: South Texas Project Date of Examination: 10-22-18

Exam Level: RO ☐ SRO-I ☐ SRO-U ■ Operating Test No.: LOT 22 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. (S1) Start an RCP and Respond to High Temperature KA: 002 A3.03 (4.4/4.6)	A,D,L,S	2
b. (S2) Fill and SI Accumulator KA: 006 A4.07 (4.4/4.4)	D,EN,S	3
c. (S3) On Loss of ESF BUS, Manually Start DG and Load to BUS KA: 064 A4.06 (3.9/3.9)	A,E,EN,N,S	6
d.		
e.		
f.		
g.		
h.		

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

i. (P1) Locally Operate a SG PORV. KA: 039 A4.07(2.8/2.9)	D,E,L,P	4S
j. (P2) Commence Liquid Waste Release KA: 068 A4.02 (3.2/3.1)	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-22
NRC Systems JPM Description

Control Room Systems JPMs

(S1) Start RCP and Respond to High Temperature
Demonstrate the ability to start a Reactor Coolant Pump and take appropriate action when a Reactor Coolant Pump critical parameter is not within band in accordance with 0POP02-RC-0004, Operation of Reactor Coolant Pumps, and 0POP04-RC-0002, Reactor Coolant Pump Off Normal. This is an Alternate Path JPM.

(S2) Fill an SI Accumulator
Demonstrate the ability to control Safety Injection System pumps and valves in order to fill a Safety Injection Accumulator to the proper level in accordance with 0POP02-SI-0001, Safety Injection Accumulators.

(S3) On Loss of ESF Bus, Manually Start DG and Load to Bus
On a loss of power, demonstrate the ability to start an ESF DG and power the associated 4.16KV Bus in accordance with 0POP04-AE-0001, First Response to Loss of any or all 13.8 KV or 4.16 KIV Bus. This is an Alternate Path JPM.

(S4) Containment Spray Pump Performance Test
Demonstrate the ability to operate the Containment Spray Pumps in accordance with 0POP07-CS-0001, Containment Spray Pump 1A(2A) Functional Test. This is an Alternate Path JPM.

(S5) Start an RHR Pump during Mode 4
Demonstrate the ability to operate RHR pumps to control RCS temperature in accordance with 0POP02-RH-0001, Residual Heat Removal System Operation.

(S6) Perform CCW Valve Operability Test
Demonstrate the ability to perform a CCW System Valve Operability Surveillance in accordance with 0PSP03-CC-0008, Component Cooling Water System Train 1B(2B) Valve Operability Test.

(S7) Control Rod Operability Test
Demonstrate the ability to operate the Control Rod Mode Select switch in other than Auto or Manual and monitor RCS response in accordance with 0POP03-RS-0001, Control Rod Operability.

(S8) Respond to Failed Source Range NI
Demonstrate the ability to respond to the failure of a Source Range Nuclear Instrument in accordance with 0POP04-NI-0001, Nuclear Instrument Malfunction.

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

STP LOT-22
NRC Systems JPM Description

In Plant Systems JPMs

(P1) Locally Operate a SG PORV
Demonstrate the ability to locally operate a SG PORV in accordance with 0POP05-EO-EC00, Loss of All AC Power, Addendum 6.

(P2) Commence a Liquid Waste Release
Demonstrate the ability to perform a rad waste release and terminate the release when needed in accordance with 0POP02-WL-0100, Liquid Waste Release. This is an Alternate Path JPM.

(P3) Place a Rod Drive MG Set in Service
Demonstrate the ability to operate and monitor a Rod Drive MG Set in accordance with 0POP02-RS-0001, Rod Control. This is an Alternate Path JPM.

Facility: South Texas Project		Date of Exam: 10-22-18															
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1			2			3			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
Crew A		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO ☐ SRO-I1 ■ SRO-U ☐	RX	1					3		1					3	1	1	0
	NOR													0	1	1	1
	I/C	2,3, 4					1,7		2,4					7	4	4	2
	MAJ	5,6					5		5					4	2	2	1
	TS	2,3												2	0	2	2
RO ☐ SRO-I2 ■ SRO-U ☐	RX		1		3			1						3	1	1	0
	NOR													0	1	1	1
	I/C		4		1,2, 4			2,3, 4						7	4	4	2
	MAJ		5,6		5			5						4	2	2	1
	TS				1,2			2,3						4	0	2	2
RO-1 ■ SRO-I ☐ SRO-U ☐	RX					3				1				2	1	1	0
	NOR													0	1	1	1
	I/C			2,3, 7		2,4, 6				3,6				8	4	4	2
	MAJ			5,6		5				5				4	2	2	1
	TS													0	0	2	2

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls" (ATC) and "balance-of-plant" (BOP) positions. Instant SROs (SRO-I) must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an SRO-I *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.
4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

Facility: South Texas Project		Date of Exam: 10-22-18																
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)			
		1			2			3			4							
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION							
Crew B		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U	
RO ☐ SRO-I ☐ SRO-U1 ■	RX	1				3								2	1	1	0	
	NOR													0	1	1	1	
	I/C	2,3, 4				2,4, 6								6	4	4	2	
	MAJ	5,7				5								3	2	2	1	
	TS	2,3												2	0	2	2	
RO ☐ SRO-I3 ■ SRO-U ☐	RX		1		3					1				3	1	1	0	
	NOR													0	1	1	1	
	I/C		4		1,2, 4					3,6				6	4	4	2	
	MAJ		5,7		5					5				4	2	2	1	
	TS				1,2									2	0	2	2	

Instructions:

5. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls" (ATC) and "balance-of-plant" (BOP) positions. Instant SROs (SRO-I) must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an SRO-I *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
6. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
7. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.
8. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

Facility: South Texas Project	Date of Exam: 10-22-18	Operating Test No.: LOT 22

APPLICANT Crew C	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1			2			3			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO ☐ SRO-I ☐ SRO-U2 ■	RX	1					3							2	1	1	0
	NOR													0	1	1	1
	I/C	2,3, 4					1,7							5	4	4	2
	MAJ	5,7					5							3	2	2	1
	TS	2,3												2	0	2	2
RO ☐ SRO-I4 ■ SRO-U ☐	RX		1		3				1					3	1	1	0
	NOR													0	1	1	1
	I/C		4		1,2, 4				2,4					6	4	4	2
	MAJ		5,7		5				5					4	2	2	1
	TS				1,2									2	0	2	2
RO ☐ SRO-I5 ■ SRO-U ☐	RX					3		1						2	1	1	0
	NOR													0	1	1	1
	I/C			2,3, 6		2,4, 6		2,3, 4						9	4	4	2
	MAJ			5,7		5		5						4	2	2	1
	TS							2,3						2	0	2	2

Instructions:

9. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls" (ATC) and "balance-of-plant" (BOP) positions. Instant SROs (SRO-I) must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an SRO-I *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
10. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
11. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.
12. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

Facility: South Texas Project		Date of Exam: 10-22-18												Operating Test No.: LOT 22			
APPLICANT Crew D	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1			2			3			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION				R	I	U
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP				
RO ☐ SRO-I6 ■ SRO-U ☐	RX	1					3		1					3	1	1	0
	NOR													0	1	1	1
	I/C	2,3, 4					1,7		2,4					7	4	4	2
	MAJ	5,7					5		5					4	2	2	1
	TS	2,3												2	0	2	2
RO ☐ SRO-I7 ■ SRO-U ☐	RX		1		3					1				3	1	1	0
	NOR													0	1	1	1
	I/C		4		1,2, 4					3,6				6	4	4	2
	MAJ		5,7		5					5				4	2	2	1
	TS				1,2									2	0	2	2
RO ☐ SRO-I8 ■ SRO-U ☐	RX					3		1						2	1	1	0
	NOR													0	1	1	1
	I/C			2,3, 6		2,4, 6		2,3, 4						9	4	4	2
	MAJ			5,7		5		5						4	2	2	1
	TS							2,3						2	0	2	2

Instructions:

13. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls" (ATC) and "balance-of-plant" (BOP) positions. Instant SROs (SRO-I) must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an SRO-I *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
14. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
15. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.
16. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

Highlited events are those that have not been used on the last two NRC exams.

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

Facility: South Texas Project **Scenario No.: 1** **Op-Test No.: LOT 22 NRC**

Examiners: _____ **Operators:** _____

_____ _____

_____ _____

Initial Conditions:

- **Reactor is in Mode 2 at 10^{-8} Amps and Stable. (IC 201)**

Turnover:

- **Condensate Pump #13 is OOS**

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	N/A	RO (R) SRO (R)	Withdraw control rods to raise reactor power to 1% - 3%
2 (10 min)	50-R3-06 1.0	BOP (I) SRO (I, TS)	Power Range Channel NI 42 Fails High
3 (25 min)	05-17-02 1.0	BOP (I) SRO (I, TS)	SG 1B PORV pressure transmitter (PT-7421) fails high.
4 (35min)	01-01-02 True	RO (I) SRO (I)	Continuous Control Rod Withdrawal Malfunction.
5 (N/A)	01-12-02 True	All (M)	ATWS – Reactor fails to trip. Enter 0POP05-EO-FRS1 **(Critical Task)** (Integral to scenario)
6 (N/A)	05-02-02 0.5	All (M)	Main Steam Line Break in Containment on SG 1B. **(Critical Task)** (Manual trigger after transition back to 0POP05-EO-EO00)
7 (N/A)	04-09-08 True	BOP (C)	Failure of Train B Essential Chiller to start – (Integral to Scenario)

Lot* (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)	1
2.	Abnormal events (2–4)	4
3.	Major transients (1–2)	2
4.	EOPs entered/requiring substantive actions (1–2)	2
5.	Entry into a contingency EOP with substantive actions (≥1 per scenario set)	1
6.	Preidentified critical tasks (≥2)	2

Rev. 0

Highlited events are those that have not been used on the last two NRC exams.

STP LOT-22

NRC Scenario #1 Description

Initial Conditions: Unit 1 is at 10^{-8} AMPS and stable. The crew is to continue with the reactor startup at Step 6.33 of 0POP03-ZG-0004, Reactor Startup.

Condensate Pump #13 is OOS.

Event 1: The RO and SRO will start at Step 6.33 of 0POP03-ZG-0004, Reactor Startup, and raise reactor power to between 1% and 3%.

Event 2: After stabilizing at 1% and 3%, Power Range NI Channel 42 will fail high. The crew will respond using 0POP04-NI-0001, Nuclear Power Malfunction. The SRO will address Tech Spec implications.

Event 3: SG 1B Pressure Transmitter PT-7421 will fail high. The crew will respond using 0POP04-MS-0001, Excessive Steam Demand. The SRO will address Tech Spec implications.

Event 4: A continuous Control Rod malfunction will occur. The crew will respond using 0POP04-RS-0001, Control Rod Malfunction. The malfunction will occur during Auto and Manual Rod Control and will require the crew to manually trip the reactor.

Event 5: The crew is unable to manually trip the reactor from the control room and responds by entering 0POP05-EO-FRS1, Response to Nuclear Power Generation – ATWS. **(CT-52)**

Event 6: After initiating Emergency Boration to the Reactor Coolant System at Step 4 of 0POP05-EO-FRS1, Response to Nuclear Power Generation – ATWS, the Reactor Trip Breakers will be locally opened and the Crew will enter 0POP05-EO-EO00, Reactor Trip or Safety Injection at which time a Main Steam line break on SG 1B will occur in containment. When procedurally required the crew will respond using 0POP05-EO-EO20, Faulted Steam Generator Isolation. **(CT-17)**

Event 7: On the initiation of safety injection the Train B Essential Chiller fails to start. The crew will have to secure EAB HVAC on Train B.

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

Critical Tasks:

- CT-52, Insert negative reactivity into the core by establishing emergency Boration flow to the RCS and/or insert control rods.
- CT-17, Isolate a Faulted Steam Generator before transitioning out of 0POP05-EO-EO20, Faulted Steam Generator Isolation.

Source: New

Facility: South Texas Project **Scenario No.: 2** **Op-Test No.: LOT 22 NRC**

Examiners: _____ **Operators:** _____

_____ _____

_____ _____

Initial Conditions:

- **Unit 1 is at 100% Reactor Power. (IC 202)**

Turnover:

- **Train C HHSI and LHSI Pumps are OOS.**

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	CI_PDISL9733CLSP 0.5	BOP (C) SRO (C, TS)	CRE HVAC Train C Supply Fan becomes inoperable.
2 (10 min)	02-25-02 0.0	RO (I) SRO (I, TS)	Loop 1A Cold Leg RTD T-0410B Fails Low
3 (25 min)	07-04-03 True	RO (R) BOP (R) SRO (R)	SGFPT #13 Trips and SGFP #14 fails to start. Crew will start a down power to about 80% power.
4 (N/A)	02-26-02 0.0 06-02-01 True	RO (C) SRO (C)	RTD T-420B fails low causing the reactor to trip and the Main Turbine fails to auto trip. (Triggers at 95% power) **(Critical Task)**
5 (N/A)	02-01-02 0.5	All (M)	LBLOCA. (Triggers 2 minutes after tripping SGFPT #11)
6 (N/A)	50-BF-04 & 05 True	RO (C)	LHSI Pumps 1A & 1B fail to Auto Start. (Integral to Scenario) **(Critical Task)**
7 (N/A)	01-12-04B True	BOP (C)	Train B of Phase A fails to auto actuate with CV-MOV-0023 failed open. (BM_XCV0023TVFAILSP)

* (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)	2
5.	Entry into a contingency EOP with substantive actions (≥1 per scenario set)	0
6.	Preidentified critical tasks (≥2)	2

Highlited events are those that have not been used on the last two NRC exams.

STP LOT-22

NRC Scenario #2 Description

Initial Conditions: Unit 1 is at 100% Reactor Power.

Train C HHSI and LHSI Pumps are OOS.

Event 1: 'CR SPLY FAN TRBL' alarm is received due to malfunction of the CRE HVAC Train C Supply Fan. The crew will respond using 0POP09-AN-22M3, Window C-5 and 0POP02-HE-0001, Electrical Auxiliary Building HVAC System. The SRO will address Tech Spec implications.

Event 2: Loop 1A Cold Leg RTD T-0410B will fail low. The crew will respond using 0POP04-RP-0004, Failure of RCS Loop RTD Protection Channel. The SRO will address Tech Spec implications.

Event 3: SGFPT #13 Trips and SGFP #14 fails to start. Crew will start a down power to about 80% power using 0POP04-FW-0002, Steam Generator Feed Pump Trip.

Event 4: At about 95% power Loop 1B Cold Leg RTD T-420B will fail low causing a reactor trip and the Main Turbine fails to auto trip. The crew will manually trip the Main Turbine as they respond using 0POP05-EO-EO00, Reactor Trip or Safety Injection and then transition to 0POP05-EO-ES01, Reactor Trip Response. **(CT-13)**

Event 5: About 2 minutes after tripping SGFPT #11 during performance of 0POP05-EO-ES01, Reactor Trip Response, a LBLOCA will occur. The crew will respond by re-entering 0POP05-EO-EO00, Reactor Trip or Safety Injection.

Event 6: On the Safety Injection LHSI Pumps 1A and 1B fail to auto start. The crew must manually start the LHSI pumps. **(CT-5)**

Event 7: On the Safety Injection Train B of Phase A isolation fails with CV-MOV-0023, Letdown ICIV failed open. CV-MOV-0024, Letdown OCIV, must be manually closed to isolate the penetration.

Termination: Complete Step 3 of 0POP05-EO-EO10, Loss of Reactor or Secondary Coolant.

Critical Tasks:

- CT-13, Manually trip the Main Turbine before a severe (orange-path) challenge develops to either the subcriticality or integrity CSF or before transitioning to EC21, whichever happens first.
- CT-5, Manually start at least one LHSI pump during a Large Break where RCS pressure decreases to less than 400 psig.

Source: New

Highlited events are those that have not been used on the last two NRC exams.

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

Facility: South Texas Project **Scenario No.: 3** **Op-Test No.: LOT 22 NRC**

Examiners: _____ **Operators:** _____

_____ _____

_____ _____

Initial Conditions:

- **Unit 1 is at 46% Reactor Power. (IC 203)**

Turnover:

- **Raise Power**

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	N/A	RO (R) BOP (R) SRO (R)	Raise Reactor Power.
2 (15 min)	03-09-02 True	RO (C) SRO (C, TS)	Over current trip on Charging Pump 1B
3 (25 min)	01-14-08 True	BOP (I) SRO (I, TS)	DRPI indication for rod F8 fails (both channels).
4 (35 min)	03-23-05 0.125/0.15	RO (C) SRO (C)	RCP 1C #1 seal leakage ramped in over 3 minutes and then increases in severity after 7 minutes.
5 (N/A)	02-01-04 0.015/0.005	All (M)	SBLOCA (30 seconds after the reactor is tripped) **(2 Critical Tasks)**
6 (N/A)	50-AF-04 True	BOP (C)	AFWP #14 fails to auto start.

* (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)	1
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 (≥1 per scenario set)	0
6.	Preidentified critical tasks (≥2)	2

Rev. 0

Highlited events are those that have not been used on the last two NRC exams.

STP LOT-22

NRC Scenario #3 Description

Initial Conditions: Unit 1 is at 46% Reactor Power. The crew will raise reactor power after taking the watch.

No equipment is OOS.

Event 1: The crew will raise reactor power from 50% starting at Step 7.46 of 0POP03-ZG-0005, Plant Startup to 100%

Event 2: An overcurrent trip will occur on Centrifugal Charging Pump 1B. The crew will respond using 0POP09-AN-04M8, Window F-3, 'CHG FLOW HI/LO.' The SRO will address Tech Spec implications.

Event 3: Both DRPI channels for Control Rod F8 will fail. The crew will use 0POP09-AN-05M3, Window A-5, RPI TRBL and Window D-5, ROD SUPV MNTR ROD POSITION TRBL to address the failures. The SRO will address Tech Spec implications.

Event 4: Indications of high seal leakoff flow will be received for RCP 1C. The crew will respond using 0POP04-RC-0002, RCP Off Normal. Leakage will then escalate to the point a manual reactor trip and tripping RCP 1C is required.

Event 5: About 30 seconds after the crew trips the reactor and RCP 1C, a significant Small Break LOCA will occur. An automatic safety injection will not occur and the crew will have to manually actuate SI. **(CT-2)** the SBLOCA will be of such size that the crew will have to trip the remaining RCPs. **(CT-16)**

Event 6: AFWP #14 fails to auto start. During 0POP05-EO-EO00, Reactor Trip or Safety Injection, the crew will manually open the steam supply valves for AFWP #14.

Termination: Complete Step 3 of 0POP05-EO-EO10, Loss of Reactor or Secondary Coolant.

Critical Tasks:

- CT-2, Manually actuate at least one train of SI-actuated safeguards before transitioning past Step 4 of 0POP05-EO-EO00, Reactor Trip of Safety Injection.
- CT-16, Trip RCPs so that an Orange Path on Core Cooling (CET temperatures > 707°F) does not occur when forced circulation in the RCS stops.

Source: New

Highlited events are those that have not been used on the last two NRC exams.

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

Facility: South Texas Project **Scenario No.: 4** **Op-Test No.: LOT 22 NRC**

Examiners: _____ **Operators:** _____

_____ _____

_____ _____

Initial Conditions:

- **Reactor Power 12% (IC 204)**

Turnover:

- **Perform OPC Test**

Event No.	Malf. No.	Event Type*	Event Description
1 (0 min)	N/A	BOP (N)	Perform OPC Test on Main Turbine and then continue with Plant Startup. (0POP03-ZG-0005 Step 6.39)
2 (10 min)	02-20-01 0.0	RO (I) SRO (I, TS)	PZR level channel LT-0465 fails high
3 (20 min)	03-05-01 1.0	RO (I) SRO (I)	VCT Level Transmitter LT-0112 fails high.
4 (30 min)	05-12-02A 1.0	BOP (I) SRO (I, TS)	SG 1B Level Channel LT-0572 fails high.
5 (40 min)	12-12-01 .06/.012	All (M)	PZR Steam Space SBLOCA **(Critical Task)**
6 (N/A)		RO (C) SRO (C)	On the Reactor Trip and SI, a Loss of offsite power will occur with the following: Train A 4160V bus lockout, Train B Sequencer fails to actuate and ECW Pump 1C fails to auto start. The crew will manually start the ECW Pumps on Train B and C to supply cooling water to the respective ESF DGs. **(Critical Task)**
7 (N/A)		BOP (C)	RCFC Fans on Train B did not auto start because of Train B Sequencer and RCFC Fans on Train C fail to auto start.

* (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 (≥1 per scenario set)	0
6.	Preidentified critical tasks (≥2)	2

Rev. 0

Highlited events are those that have not been used on the last two NRC exams.

STP LOT-22

NRC Scenario #4 Description

Initial Conditions: Reactor power is 12%.

After taking the watch the crew will perform the Main Turbine OPC test.

Event 1: The crew will perform the OPC Test on the Main Turbine. 0POP03-ZG-0005, Plant Startup to 100%, Step 6.39 and then continue with Plant Startup.

Event 2: PZR level channel LT-0465 fails high. The crew will respond using 0POP04-RP-0002, Loss of Automatic Pressurizer Level Control. The SRO will address Tech Spec implications.

Event 3: VCT Level Transmitter LT-0112 fails high. The crew will respond using 0POP09-AN-04M8, Window E-2, VCT LEVEL HI/LO.

Event 4: SG 1B Level Channel LT-0572 fails high. The crew will respond using 0POP04-FW-0001, Loss of Steam Generator Level Control. The SRO will address Tech Spec implications.

Event 5: A PZR Steam Space SBLOCA will occur. The leak will lower PZR pressure requiring an SI but pressure will stay right at about HHSI shutoff head with minimal HHSI Pump flow. The crew will respond by entering 0POP05-EO-EO00, Reactor Trip or Safety Injection. **(CT-EO10-D-STP)**

Event 6: On the Reactor Trip and SI, a Loss of offsite power will occur with the following: Train A 4160V bus lockout, Train B Sequencer fails to actuate and ECW Pump 1C fails to auto start. The crew will manually secure the ESF DG for Train A and start the ECW Pumps on Train B and C to supply cooling water to the respective ESF DGs. **(CT-9)**

Event 7: RCFC Fans on Train B did not auto start because of Train B Sequencer and RCFC Fans on Train C fail to auto start. The crew will have to manually start RCFCs on Trains B and C.

Termination: Complete Step 3 of 0POP05-EO-EO10, Loss of Reactor or Secondary Coolant.

Critical tasks:

- EO10-D-STP, Reduce SG PORV or Steam Dump setpoint to 1000 psig within 45 minutes of initiation of the SBLOCA.
- CT-9, Manually start ECW Pump per available train or manually trip the associated ESF SG prior to any of the following occurring:
  - Diesel Generator Trip
  - Exiting EO00 during a LOCA, Steam Break or SGTR

Source: New