

Facility: Wolf Creek		Date of Exam: November 2015																	
Tier	Group	RO K/A Category Points											SRO-Only Points						
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	Total	A2	G*	Total			
1. Emergency & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A			3	18			6		
	2	1	2	0	N/A			2	2	N/A			2	9			4		
	Tier Totals	4	5	3	N/A			5	5	N/A			5	27			10		
2. Plant Systems	1	3	4	4	2	2	3	2	2	2	2	2	2	28			5		
	2	1	0	1	2	1	1	1	1	0	1	1	10			3			
	Tier Totals	4	3	5	4	3	4	3	3	2	3	3	4	38			8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10		1	2	3	4	7
					3		2		2		3								

Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A 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 associated 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' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in 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

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G *	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1			X				EK3.01 - Actions contained in EOP for reactor trip	4.0	1
000008 Pressurizer Vapor Space Accident / 3		X					AK2.01 - Valves	2.7	2
000009 Small Break LOCA / 3				X			EA1.15 - PORV and PORV block valve	3.9	3
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4						X	2.1.45 - Ability to identify and interpret diverse indications to validate the response of another indication.	4.3	4
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4									
000026 Loss of Component Cooling Water / 8				X			AA1.05 - The CCWS surge tank, including level control and level alarms, and radiation alarm	3.1	6
000027 Pressurizer Pressure Control System Malfunction / 3	X						AK1.01 - Definition of saturation temperature	3.1	7
000029 ATWS / 1					X		EA2.07 - Reactor trip breaker indicating lights	4.2	8
000038 Steam Gen. Tube Rupture / 3				X			EA1.04 – PZR spray to reduce coolant system pressure	4.3	5
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4		X					EK2.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.4	9
000054 (CE/E06) Loss of Main Feedwater / 4					X		AA2.04 - Proper operation of AFW pumps and regulating valves	4.2	10
000055 Station Blackout / 6	X						EK1.01 - Effect of battery discharge rates on capacity	3.3	11
000056 Loss of Off-site Power / 6						X	2.4.45 - Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	12
000057 Loss of Vital AC Inst. Bus / 6									
000058 Loss of DC Power / 6			X				AK3.01 - Use of dc control power by D/Gs	3.4	14
000062 Loss of Nuclear Svc 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.	4.2	15
000065 Loss of Instrument Air / 8									
W/E04 LOCA Outside Containment / 3	X						EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the (LOCA Outside Containment).	3.5	16
W/E11 Loss of Emergency Coolant Recirc. / 4		X					EK2.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.6	17
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4			X				EK3.2 – Normal abnormal and emergency operating procedures associated with loss of secondary heat sink	3.7	13
000077 Generator Voltage and Electric Grid Disturbances / 6					X		AA2.09 - Operational status of emergency diesel generators	3.9	18
K/A Category Totals:	3	3	3	3	3	3	Group Point Total:		18

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G *	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1	X						AK1.01 - Reason for turbine following reactor on dropped rod event	3.2	19
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1				X			AA1.02 - Boric acid pump	3.7	20
000028 Pressurizer Level Malfunction / 2									
000032 Loss of Source Range NI / 7					X		AA2.04 - Satisfactory source-range / intermediate-range overlap	3.1	21
000033 Loss of Intermediate Range NI / 7				X			AA1.02 - Level trip bypass	3.0	22
000036 (BW/A08) Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid Radwaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8					X		AA2.16 - Vital equipment and control systems to be maintained and operated during a fire	3.3	24
000068 (BW/A06) Control Room Evac. / 8									
000069 (W/E14) Loss of CTMT Integrity / 5						X	2.3.11 - Ability to control radiation releases	3.8	25
000074 (W/E06&E07) Inad. Core Cooling / 4		X					EK2.05 LPI pump's	3.9	27
000076 High Reactor Coolant Activity / 9		X					AK2.01 - Process radiation monitors	2.6	23
W/E01 & E02 Rediagnosis & SI Termination / 3									
W/E13 Steam Generator Over-pressure / 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 Subcooling Margin / 4									
BW/E08; W/E03 LOCA Cooldown - Depress. / 4						X	2.1.25 - Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	26
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4									
BW/E13&E14 EOP Rules and Enclosures									
CE/A11; W/E08 RCS Overcooling - PTS / 4									
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:	1	2	0	2	2	2	Group Point Total:		9

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)										Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	K/A Topic(s)	IR	#
003 Reactor Coolant Pump					X							K5.02 - Effects of RCP coastdown on RCS parameters	2.8	28
004 Chemical and Volume Control					X							K5.20 - Reactivity effects of xenon, boration, and dilution A3.11 - Charging/letdown	3.6 3.6	29 30
005 Residual Heat Removal		X										K2.01 - RHR pumps K2.03 - RCS pressure boundary motor - operated valves.	3.0 2.7	31 54
006 Emergency Core Cooling						X						K6.02 - Core flood tanks (accumulators) K6.10 - Valves	3.4 2.6	32 41
007 Pressurizer Relief/Quench Tk	X											K1.01 - Containment system	2.9	33
008 Component Cooling Water								X				A2.04 - PRMS alarm	3.3	34
010 Pressurizer Pressure Control											X	2.1.23 - Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	35
012 Reactor Protection		X										K2.01 - RPS channels, components, and interconnections	3.3	36
013 Engineered Safety Features Actuation	X						X					K1.18 - Premature reset of ESF actuation A1.06 - RWST level	3.7 3.6	37 38
022 Containment Cooling			X									K 3.01 - Containment equipment subject to damage by high or low temperature, humidity, and pressure.	2.9	39
025 Ice Condenser														
026 Containment Spray											X	2.2.12 - Knowledge of surveillance procedures.	3.7	40
039 Main and Reheat Steam				X								K4.05 - Automatic isolation of steam line	3.7	42
059 Main Feedwater			X									K3.03 - S/GS	3.5	43
061 Auxiliary/Emergency Feedwater		X				X						K2.01 - AFW system MOVs K6.02 - Pumps	3.2 2.6	44 45
062 AC Electrical Distribution	X						X					K1.03 - DC distribution A1.01 - Significance of D/G load limits	3.5 3.4	46 47
063 DC Electrical Distribution									X			A3.01 - Meters, annunciators, dials, recorders, and indicating lights	2.7	48
064 Emergency Diesel Generator				X							X	K4.11 - Automatic load sequencer: safeguards A4.07 - Transfer ED/G (with load) to grid	3.5 3.4	49 50
073 Process Radiation Monitoring											X	A4.03 - Check source for operability demonstration	3.1	51
076 Service Water								X				A2.01 - Loss of SWS	3.5	52
078 Instrument Air			X									K3.02 - Systems having pneumatic valves and controls	3.4	53
103 Containment			X									K3.03 - Loss of containment integrity under refueling operations	3.7	55
K/A Category Point Totals:	3	4	4	2	2	3	2	2	2	2	2	Group Point Total:		28

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO)											Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	K/A Topic(s)	IR	#
001 Control Rod Drive				X								K4.07 – Rod Stops	3.7	58
002 Reactor Coolant	X											K1.08 - ECCS	4.5	56
011 Pressurizer Level Control			X									K3.03 - PZR PCS	3.2	57
014 Rod Position Indication														
015 Nuclear Instrumentation														
016 Non-Nuclear Instrumentation														
017 In-Core Temperature Monitor							X					A1.01 - Core exit temperature	3.7	59
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling								X				A2.03 - Abnormal spent fuel pool water level or loss of water level	3.1	60
034 Fuel Handling Equipment					X							K6.02 - Radiation monitoring systems	2.6	61
035 Steam Generator											X	2.1.27 - Knowledge of system purpose and/or function.	3.9	62
041 Steam Dump/Turbine Bypass Control										X		A4.04 - Pressure mode	2.7	63
045 Main Turbine Generator					X							K5.23 - Relationship between rod control and RCS boron concentration during T/G load increases	2.7	64
055 Condenser Air Removal														
056 Condensate														
068 Liquid Radwaste														
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
075 Circulating Water														
079 Station Air														
086 Fire Protection				X								K4.03 - Detection and location of fires	3.1	65
K/A Category Point Totals:	1	0	1	2	1	1	1	1	0	1	1	Group Point Total:		10

Facility: Wolf Creek			Date of Exam: November 2015			
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements.	3.8	66		
	2.1.32	Ability to explain and apply system limits and precautions.	3.8	67		
	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management.	4.3	68		
	Subtotal			3		
2. Equipment Control	2.2.38	Knowledge of conditions and limitations in the facility license.	3.6	69		
	2.2.43	Knowledge of the process used to track inoperable alarms.	3.0	70		
	Subtotal			2		
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	71		
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	72		
	Subtotal			2		
4. Emergency Procedures / Plan	2.4.5	Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.	3.7	73		
	2.4.9	Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	3.8	74		
	2.4.39	Knowledge of RO responsibilities in emergency plan implementation.	3.9	75		
	Subtotal			3		
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1	076 AK 2.01	Difficulty is writing plausible distractors without giving to much information in the stem so the question becomes too simple to answer. 036 AK 1.03 rejected. See write up.
2/1	008 A2.04	Loss of air to these valves causes little affect to the plant. 008 A 2.05 rejected. See write up.
2/1	039 K4.05	Knowledge of the function of the strainer for containment spray pumps is simple but all distractors are eliminated by the strainer function as well. 026 K 4.05 rejected. See write up.
2/1	022 K 3.01	Wolf Creek does not have pumps in our containment cooler system, only fans. 022 A 4.02 rejected. See write up.
2/1	005 K 2.03	Instrument Air is not represented on our plant computer with enough detail to determine any system status without giving up to much information which makes the question to simple. 078 2.1.19 rejected. See write up.
1/1	038 EA 1.04	This K/A deals with isolation of the low pressure RHR piping if pressure rises to a given point. At Wolf Creek the procedure for Loss of RHR does not isolate the RHR piping for this event. 025 AK 3.02 rejected. See write up.
2/2	001 K4.07	No auto selection for inputs to control systems at Wolf Creek. See write up.
2/1	006 K6.10	Cannot exceed design limits of main steam pressure without multiple failures. See write up.
1/2	074 EK2.05	Only using primary coolant, emergency coolant, or decay heat removal systems Wolf Creek cannot get into a PTS concern. See write up.
1/1	E05 EK3.2	Overlap with the SRO section for system

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		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1												18	3	3	6		
	2				N/A					N/A			9	3	1	4		
	Tier Totals												27	6	4	10		
2. Plant Systems	1												28	3	2	5		
	2												10	2	0	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:
- Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category).
 - The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
 - Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted 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.
 - Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
 - Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
 - Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
 - The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
 - On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in 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.
 - 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

ES-401		PWR Examination Outline						Form ES-401-2	
		Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
000011 Large Break LOCA / 3					X		EA2.13 - Difference between overcooling and LOCA indications	3.7	76
000015/17 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4						X	2.1.23 - Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.4	77
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3									
000029 ATWS / 1									
000038 Steam Gen. Tube Rupture / 3						X	2.2.22 - Knowledge of limiting conditions for operations and safety limits.	4.7	78
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4									
000054 (CE/E06) Loss of Main Feedwater / 4									
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6									
000057 Loss of Vital AC Inst. Bus / 6						X	2.4.4 - Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.7	79
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4									
000065 Loss of Instrument Air / 8					X		AA2.08 - Failure modes of air-operated equipment	3.3	80
W/E04 LOCA Outside Containment / 3									
W/E11 Loss of Emergency Coolant Recirc. / 4									
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
000077 Generator Voltage and Electric Grid Disturbances / 6					X		AA2.07 - Operational status of engineered safety features	4.0	81
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 (RO / SRO)										
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#	
000001 Continuous Rod Withdrawal / 1										
000003 Dropped Control Rod / 1										
000005 Inoperable/Stuck Control Rod / 1										
000024 Emergency Boration / 1										
000028 Pressurizer Level Malfunction / 2										
000032 Loss of Source Range NI / 7						X	AA2.02 - Expected change in source range count rate when rods are moved	3.9		82
000033 Loss of Intermediate Range NI / 7										
000036 (BW/A08) Fuel Handling Accident / 8										
000037 Steam Generator Tube Leak / 3						X	AA2.12 – Flow rate of leak	4.1		85
000051 Loss of Condenser Vacuum / 4										
000059 Accidental Liquid Radwaste Rel. / 9										
000060 Accidental Gaseous Radwaste Rel. / 9										
000061 ARM System Alarms / 7										
000067 Plant Fire On-site / 8										
000068 (BW/A06) Control Room Evac. / 8										
000069 (W/E14) Loss of CTMT Integrity / 5						X	AA2.02 - Verification of automatic and manual means of restoring integrity	4.4		83
000074 (W/E06&E07) Inad. Core Cooling / 4										
000076 High Reactor Coolant Activity / 9										
W/E01 & E02 Rediagnosis & SI Termination / 3						X	2.1.20 - Ability to interpret and execute procedure steps.	4.6		84
W/E13 Steam Generator Over-pressure / 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 Subcooling Margin / 4										
BW/E08; W/E03 LOCA Cooldown - Depress. / 4										
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4										
BW/E13&E14 EOP Rules and Enclosures										
CE/A11; W/E08 RCS Overcooling - PTS / 4										
CE/A16 Excess RCS Leakage / 2										
CE/E09 Functional Recovery										
K/A Category Point Totals:						3	1	Group Point Total:		4

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)											Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
003 Reactor Coolant Pump														
004 Chemical and Volume Control														
005 Residual Heat Removal														
006 Emergency Core Cooling											X	2.2.25 - Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	4.2	86
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water														
010 Pressurizer Pressure Control														
012 Reactor Protection														
013 Engineered Safety Features Actuation											X	2.4.30 - Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	4.1	87
022 Containment Cooling														
025 Ice Condenser														
026 Containment Spray								X				A2.07 - Loss of containment spray pump suction when in recirculation mode, possibly caused by clogged sump screen, pump inlet high temperature exceeded cavitation, voiding), or sump level below cutoff (interlock) limit	3.9	88
039 Main and Reheat Steam														
059 Main Feedwater								X				A2.05 - Rupture in MFW suction or discharge line	3.4	89
061 Auxiliary/Emergency Feedwater														
062 AC Electrical Distribution														
063 DC Electrical Distribution														
064 Emergency Diesel Generator								X				A2.09 - Synchronization of the ED/G with other electric power supplies	3.3	90
073 Process Radiation Monitoring														
076 Service Water														
078 Instrument Air														
103 Containment														
K/A Category Point Totals:								3			2	Group Point Total:		5

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)											Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
001 Control Rod Drive														
002 Reactor Coolant														
011 Pressurizer Level Control														
014 Rod Position Indication								X				A2.05 – Reactor trip	4.1	92
015 Nuclear Instrumentation														
016 Non-Nuclear Instrumentation														
017 In-Core Temperature Monitor														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment														
035 Steam Generator											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.	4.6	91
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator														
055 Condenser Air Removal														
056 Condensate														
068 Liquid Radwaste								X				A2.04 - Failure of automatic isolation	3.3	93
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
075 Circulating Water														
079 Station Air														
086 Fire Protection														
K/A Category Point Totals:								2			1	Group Point Total:		3

Facility: Wolf Creek		Date of Exam: November 2015				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.	2.1.32 – Ability to explain and apply system limits and precautions.			4.0	94
	2.1.	2.1.41 - Knowledge of the refueling process.			3.7	95
	2.1.					
	2.1.					
	2.1.					
	Subtotal					2
2. Equipment Control	2.2.	2.2.7 - Knowledge of the process for conducting special or infrequent tests.			3.6	96
	2.2.	2.2.17 - Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator.			3.8	97
	2.2.					
	2.2.					
	2.2.					
	Subtotal					2
3. Radiation Control	2.3.	2.3.14 - Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.			3.8	98
	2.3.					
	2.3.					
	Subtotal					1
4. Emergency Procedures / Plan	2.4.	2.4.8 - Knowledge of how abnormal operating procedures are used in conjunction with EOPs.			4.5	99
	2.4.	2.4.23 - Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.			4.4	100
	2.4.					
	2.4.					
	2.4.					
	Subtotal					2
Tier 3 Point Total				10		7

Facility: WCNOC Exam Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>	Date of Examination: _____ Operating Test No.: 2015
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Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	(R), (N)	Given the indications of a steam generator tube leak, the data for GE RE-92, and the Setpoint Adjustment And Conversion Graphs From Theoretical Monitor Response form, the Applicant will determine that a prompt and controlled plant shutdown to less than or equal to 50% power within 1 hour is required. Additional actions are to be in Mode 3 within the next 2 hours (total of 3 hours), and that a Plant cooldown to Mode 5 is required per OFN BB-07A, Steam Generator Tube Leakage. 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. Imp Rating: 4.4/4.7
Conduct of Operations	(R), (N)	The Applicant will use the supplied chemistry sample results to perform the calculations for EMG ES-04, Attachment A, Determination Of RCS Boron Concentration Based On Total Mass. 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc Imp Rating: 3.9
Equipment Control	(R), (M)	The Applicant will determine that per STS AL-101, the MDAFW Pump A has a test deficiency on the outboard seal leakage. The Applicant will document the data and report the findings to the CRS. 2.2.37 Ability to determine operability and/or <u>availability</u> of safety related equipment. Imp Rating 3.6
Radiation Control	(R), (N)	The Applicant will determine and the maximum authorized emergency stay times for three individual associated with isolating the ARV. 2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. Imp Rating: 3.2/3.7

Emergency Plan		Not Used.
<p>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).</p>		
<p>* Type Codes & Criteria:</p> <ul style="list-style-type: none"> (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1; randomly selected) 		

Facility: WCNOC		Date of Examination: _____
Exam Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test No.: 2015
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	(R), (N)	<p>Given the indications of a steam generator tube leak, the data for GE RE-92, and the Setpoint Adjustment And Conversion Graphs From Theoretical Monitor Response form, the Applicant will determine that a prompt and controlled plant shutdown to less than or equal to 50% power within 1 hour is required. Additional actions are to be in Mode 3 within the next 2 hours (total of 3 hours), and that a Plant cooldown to Mode 5 is required per OFN BB-07A, Steam Generator Tube Leakage.</p> <p>2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.</p> <p>Imp Rating: 4.4/4.7</p>
Conduct of Operations	(R), (N)	<p>The Applicant will review the Reactor Operator's calculations for EMG ES-04, Attachment A, Determination Of RCS Boron Concentration Based On Total Mass, and determine that there are errors. The Applicant will correct the errors and determine that the RCS boron concentration is less than the required Xenon free cold shutdown concentration.</p> <p>2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.</p> <p>Imp Rating: 4.2</p>
Equipment Control	(R), (M)	<p>The Applicant will review STN BG-202 and determine the operability of the BG HV-8357A and CCP A. The Applicant will determine that BG HV-8357A is INOPERABLE. Per T.S. 3.5.2 Bases, CCP A will remain OPERABLE.</p> <p>2.2.37 Ability to determine operability and/or availability of safety related equipment.</p> <p>Imp Rating: 4.6</p>

<p>Radiation Control</p>	<p>(R), (N)</p>	<p>The Applicant will determine the maximum authorized emergency exposure and stay times for three individuals and document the results on their EPF 06-013-02 forms.</p> <p>2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions.</p> <p>Imp Rating: 3.7</p>
<p>Emergency Plan</p>	<p>(R), (N)</p>	<p>The Applicant will make a "PAR Only" Emergency Notification that is accurate and within the 15 minute requirement. The initial dose calculation (EDCP) is incorrect. The Applicant is required to recognize the error and get a corrected EDCP, and then document the Immediate Notification.</p> <p>2.4.44 Knowledge of emergency plan protective action recommendations.</p> <p>Imp Rating: 4.4</p>
<p>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).</p>		
<p>* Type Codes & Criteria:</p> <ul style="list-style-type: none"> (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1; randomly selected) 		

Facility: WCNOG	Date of Examination: _____	
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	Operating Test No.: 2015	
Control Room Systems:* 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U		
System / JPM Title	Type Code*	Safety Function
1. CVCS/Transfer from the NCP to a CCP. 004 A2.22, IR: 3.2/3.1	(A), (M), (S)	1
2. CCW/Respond to the loss of CCW flow to the Service Loop. APE026AK3.03 IR: 4.0/4.2	(A), (M), (S)	8
3. ECCS/Isolation of BIT IAW EMG ES-03. E02 EA1.1 IR: 4.0/3.9	(L), (N), (S)	3
4. Steam Dump System/Respond to failed open steam dumps. 041 A4.08 IR 3.0/3.1	(A), (L), (M), (S)	4
5. Process Radiation Monitoring System/Change GE RE-92 setpoints on RM-11R for S/G tube leak. 073A4.02 IR: 3.7/3.7	(M), (S)	7
6. Containment Iodine Removal System/Start the Containment Atmospheric Control System IAW SYS GR-120. 027A4.01 IR: 3.3/3.3	(N), (S)	5
7. ESFAS/Complete Attachment A Pre Test and Post Test Alignments for STS IC-601A, SLAVE RELAY TEST K601 TRAIN A SAFETY INJECTION. 013 A3.02 IR: 4.1/4.2	(N), (EN), (S)	2
8. Class IE 4160V buses/Restore power to NB02 using the SBO diesels. EPE055 EA2.03 IR: 3.9/4.7	(A), (N), (S)	6
In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
9. ECCS/Establish Alternate High Head Injection. 006 G 2.1.30 IR: 4.4/4.0	(A), (E), (L), (M), (R)	2
10. RCPs/Perform the Turbine Bldg Operators actions of OFN RP-017 to trip the RCPs and remove control power to the breakers. 003 G 2.1.23 IR: 4.3/4.4	(E), (L), (M)	4
11. 120VAC Class IE Instrument Buses/Energize Bus NN01(02) from NN15(16). APE057 AA1.01 IR: 3.7/3.7	(E), (N)	6
* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety		

<p>functions; all five SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>	
* Type Codes	Criteria for RO / SRO-I / SRO-U
<p>(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator</p>	<p>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) $\geq 1 / \geq 1 / \geq 1$</p>

Facility: WCNOC	Date of Examination: _____	
Exam Level: RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	Operating Test No.: 2015 _____	
Control Room Systems:* 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U		
System / JPM Title	Type Code*	Safety Function
1. CVCS/Transfer from the NCP to a CCP. 004 A2.22, IR: 3.2/3.1	(A), (M), (S)	1
2. CCW/Respond to the loss of CCW flow to the Service Loop. APE026AK3.03 IR: 4.0/4.2	(A), (M), (S)	8
3. ECCS/Isolation of BIT IAW EMG ES-03. E02 EA1.1 IR: 4.0/3.9	(L), (N), (S)	3
4. Steam Dump System/Respond to failed open steam dumps. 041 A4.08 IR 3.0/3.1	(A), (L), (M), (S)	4
5. Process Radiation Monitoring System/Change GE RE-92 setpoints on RM-11R for S/G tube leak. 073A4.02 IR: 3.7/3.7	(M), (S)	7
6. Containment Iodine Removal System/Start the Containment Atmospheric Control System IAW SYS GR-120. 027A4.01 IR: 3.3/3.3	(N), (S)	5
7. ESFAS/Complete Attachment A Pre Test and Post Test Alignments for STS IC-601A, SLAVE RELAY TEST K601 TRAIN A SAFETY INJECTION. 013 A3.02 IR: 4.1/4.2	(N), (EN), (S)	2
8.		
In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
9. ECCS/Establish Alternate High Head Injection. 006 G 2.1.30 IR: 4.4/4.0	(A), (E), (L), (M), (R)	2
10. RCPs/Perform the Turbine Bldg Operators actions of OFN RP-017 to trip the RCPs and remove control power to the breakers. 003 G 2.1.23 IR: 4.3/4.4	(E), (L), (M)	4
11. 120VAC Class IE Instrument Buses/Energize Bus NN01(02) from NN15(16). APE057 AA1.01 IR: 3.7/3.7	(E), (N)	6
* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.		

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (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) $\geq 1 / \geq 1 / \geq 1$

Facility: WCNOG			Date of Exam: Nov 16, 2015						Operating Test No.: 2015								
A P P L I C A N T	E V E N T T Y P E	Scenarios												T O T A L	M I N I M U M (*)		
		1			2			3			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P				
													R	I	U		
RO1 <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX		5										1	1			
	NOR					1						4	2	1			
	I/C		1,3			2,5,8						2,3	7	4			
	MAJ		6			6						5	3	2			
	TS												0	0			
RO2 <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX				1								1	1			
	NOR			5								4	2	1			
	I/C			2,4		3,4,7						2,3	7	4			
	MAJ			6		6						5	3	2			
	TS												0	0			
RO3 <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX		5										1	1			
	NOR					1						4	2	1			
	I/C		1,3			2,5,8						2,3	7	4			
	MAJ		6			6						5	3	2			
	TS												0	0			
RO4 <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX				1								1	1			
	NOR			5								4	2	1			
	I/C			2,4		3,4,7						2,3	7	4			
	MAJ			6		6						5	3	2			
	TS												0	0			

Instructions:

- 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.
- 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.
- 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.
- 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: WCNOG			Date of Exam: Nov 16, 2015						Operating Test No.: 2015								
A P P L I C A N T	E V E N T T Y P E	Scenarios												T O T A L	M I N I M U M (*)		
		1			2			3			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P				
													R	I	U		
RO5 <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX		5										1	1			
	NOR					1			5				2	1			
	I/C		1,3			2,5,8			3,4,8				8	4			
	MAJ		6			6			6				3	2			
	TS												0	0			
RO6 <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX				1								1	1			
	NOR			5					5				2	1			
	I/C			2,4		3,4,7			3,4,8				8	4			
	MAJ			6		6			6				3	2			
	TS												0	0			
RO7 <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX		5										1	1			
	NOR					1			5				2	1			
	I/C		1,3			2,5,8			3,4,8				8	4			
	MAJ		6			6			6				3	2			
	TS												0	0			
RO8 <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX				1								1	1			
	NOR			5					5				2	1			
	I/C			2,4		3,4,7			3,4,8				8	4			
	MAJ			6		6			6				3	2			
	TS												0	0			

Instructions:

- 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.
- 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.
- 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.
- 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: WCNOG			Date of Exam: Nov 16, 2015						Operating Test No.: 2015								
A P P L I C A N T	E V E N T T Y P E	Scenarios															
		1			2			3			4			T O T A L	M I N I M U M (*)		
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P				
RO <input type="checkbox"/>	RX	5					5				4		3		1		
SRO-I1 <input checked="" type="checkbox"/>	NOR												0		1		
SRO-U <input type="checkbox"/>	I/C	1,2,3,4					1,2,4				1,3		9		4		
	MAJ	6					6				5		3		2		
	TS	3,5					1,2,4						5		2		
RO <input type="checkbox"/>	RX	5					5				4		3		1		
SRO-I2 <input checked="" type="checkbox"/>	NOR												0		1		
SRO-U <input type="checkbox"/>	I/C	1,2,3,4					1,2,4				1,3		9		4		
	MAJ	6					6				5		3		2		
	TS	3,5					1,2,4						5		2		
RO <input type="checkbox"/>	RX	5					5				4		3		1		
SRO-I3 <input checked="" type="checkbox"/>	NOR												0		1		
SRO-U <input type="checkbox"/>	I/C	1,2,3,4					1,2,4				1,3		9		4		
	MAJ	6					6				5		3		2		
	TS	3,5					1,2,4						5		2		
RO <input type="checkbox"/>	RX	5					5				4		3		1		
SRO-I4 <input checked="" type="checkbox"/>	NOR												0		1		
SRO-U <input type="checkbox"/>	I/C	1,2,3,4					1,2,4				1,3		9		4		
	MAJ	6					6				5		3		2		
	TS	3,5					1,2,4						5		2		
Instructions:																	
<ol style="list-style-type: none"> 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. 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. 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. 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: WCNOG			Date of Exam: Nov 16, 2015						Operating Test No.: 2015										
A P P L I C A N T	E V E N T T Y P E	Scenarios																	
		1			2			3			4			T O T A L	M I N I M U M (*)				
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION								
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P						
R	I	U																	
RO <input type="checkbox"/> SRO-I5 <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	RX				1						5			4			3	1	
	NOR																0	1	
	I/C				2,3,4,5						1,2,7			1,2,3			10	4	
	MAJ				6						6			5			3	2	
	TS				2,3,4									1,3,4			6	2	
RO <input type="checkbox"/> SRO-I6 <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	RX				1						5			4			3	1	
	NOR																0	1	
	I/C				2,3,4,5						1,2,7			1,2,3			10	4	
	MAJ				6						6			5			3	2	
	TS				2,3,4									1,3,4			6	2	
RO <input type="checkbox"/> SRO-I7 <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	RX				1						5			4			3	1	
	NOR																0	1	
	I/C				2,3,4,5						1,2,7			1,2,3			10	4	
	MAJ				6						6			5			3	2	
	TS				2,3,4									1,3,4			6	2	
RO <input type="checkbox"/> SRO-I8 <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	RX				1						5			4			3	1	
	NOR																0	1	
	I/C				2,3,4,5						1,2,7			1,2,3			10	4	
	MAJ				6						6			5			3	2	
	TS				2,3,4									1,3,4			6	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: Wolf Creek Scenario No.: 1 (New) Op-Test No.: 2015

Examiners: _____ Operators: _____

Initial Conditions: 100% power, 'A' MDAFW OOS for scheduled maintenance.

Turnover:

T.S. 3.7.5 Condition B entered based on AFW pump OOS. Expected return is 48 hours.

Event No.	Malf. No.	Event Type*	Event Description
	scn SimGroup\Tag A MDAFW		Setup IC: Tag out 'A' MDAFW pump.
1.	IMF mBB23A f:100 r:10 k:1	C (ATC SRO)	PZR spray valve BB PK-455B fails open, manual control available. The ATC will take manual control of the spray valve and close it. Alarm response procedure ALR 00-033C provides guidance on how to mitigate the failure.
2.	ICM trAEPT0508 t:2 d:0 k:2	I (BOP SRO)	Main feedwater header pressure detector AE PI-508 failure high. The failure causes the MFP speed to slow. The BOP will take manual control of FC SK-509A and restore feed pump speed to normal value. SROI will direct OFN SB-008, ATTACHMENT B, for mitigation of the failure.
3.	IMF mBB22A f:0 r:60 k:3	I (ATC SRO) T.S. (SRO)	PZR level channel 459 fails low over 60 seconds. Letdown isolates and manual restoration will be required. The SROI will direct OFN SB-008, ATTACHMENT J, for mitigation of the failure. SROI will enter T.S. 3.3.1, Condition M.
4.	ICM fbxECE01A_ S t:1 f:0.7 d:0 r:0 k:4 {x26i33r}ICM fbxECE01A_ S t:1 f:0.5 d:0 r:60	C (BOP SRO)	Stator cooling water HX ECE01A shell side fouling causes stator cooling water inlet and outlet temperatures to rise. The crew will respond using alarm response procedure ALR 00-130E. The SROI will direct the BOP to start the second stator cooling pump. A local operator will be dispatched to assess the problem.

5.	IMF mSF04H8 f:1 k:5 {Key[6]} DMF mSF04H8 IRF rSF05 f:1 k:6	R (ATC SRO) T.S. (SRO) N (BOP)	Control rod H8 will suffer a stationary gripper failure and fall into the core. The SRO will direct recovery of the rod once the reason for the failure is resolved. The ATC will withdraw the rod IAW OFN SF-011. SRO will enter 3.1.4, Conditions A and B. QPTR and AFD will be monitored to determine if the T.S. limit is exceeded.
6.	IMF mSF05H8 f:800 k:7 {jpplsi} IMF mNB04 IMF mAL02 i:-1 f:-1	M (ALL)	Ejected rod during recovery. NB02 faults. Turbine-driven Auxiliary Feedwater Pump fails to start due to seized pump bearings. The crew will perform EMG E-0, EMG FR-H1, then EMG E-1.
7.	IMF mEG14A i:-1 f:-1 IMF mEG14C i:-1 f:-1	C (ANY)	'A' CCW train pumps fail to auto-start. The crew will manually start at least one CCW pump in the train. This is an EOP critical task critical task (CT: Start Train A CCW pump within 30 minutes (TSA OPA-ECCSTRP2) to maintain ECCS pump operability). Train 'A' ECCS is the only available train due to the loss of NB02.
8.	{Key[8]} scn SimGroup\St art PAP01	C (ANY)	The crew will establish flow from Non-Safety Related AFW Pump. This is an EOP critical task (CT: Start NSAFP prior to initiating bleed and feed criteria). Starting the NSAFP before bleed and feed criteria are met ensures heat sink is restored and allows exit to procedure and step in effect.
9.			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	3
2. Abnormal events (2-4)	5
3. Major transients (1-2)	1
4. EOPs entered/requiring substantive actions (1-2)	1 (EMG E-0, EMG FR-H1)
5. EOP contingencies requiring substantive actions (0-2)	2
6. EOP based Critical tasks (2-3)	2
7. Total Malfunctions (5-8)	9

Critical Task	Justification	References
Start Train A CCW pump within 30 minutes.	TSA OPA-ECCSTRP2 provides 30 minutes to trip CCP/SIP, or start within that time frame or lose ECCS pumps needed for LOCA.	AI 21-016, Rev 10
Start NSAFP before bleed and feed criteria are met.	Starting the NSAFP before bleed and feed criteria are met ensures heat sink is restored and allows exit to procedure and step in effect.	BD-EMG FR-H1, Rev 15

Scenario # 1 Objectives

1. Evaluate the crew's ability to mitigate an instrument failure; i.e., Pzr level channel failure.
2. Evaluate the crew's ability to perform a reactivity manipulation; i.e., recovery of a dropped rod.
3. Evaluate the SROI's ability to identify and apply technical specifications.
4. Evaluate the crew's ability to mitigate a major plant transient using emergency operating procedures; i.e., EMG E-0, EMG FR-H1.
5. Evaluate the crew's ability to mitigate post-accident failures; i.e., CCW pump fails to auto start and TDAFW pump fails to auto start.

SCENARIO # 1 NARRATIVE

Turnover: Scenario starts out at 97% power MOL. Motor Driven AFW pump 'A' is tagged out for maintenance activities. Technical Specification (TS) 3.7.5 Condition B.1 (restore AFW train to OPERABLE in 72 hours) was entered. Expected return is 48 hours. The crew is preparing to restore the 'A' HDT pump to service after maintenance.

Event 1: PZR level channel BB LI-459 fails low over 60 seconds. This will cause multiple alarms and PZR heaters and letdown to secure. The crew identifies and diagnoses the level channel failure and enters OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment J, PZR level channel malfunction, to mitigate the instrument failure. TS are identified by the SRO and 3.3.1 condition M is entered off of table 3.3.1-1 function 9.

Event 2: Control rod H8 will drop due to a stationary gripper failure. Crew identifies the dropped rod and enters either ALR 081B, ROD AT BOTTOM, or OFN SF-011, REALIGNMENT OF DROPPED, MISALIGNED ROD(S) AND ROD CONTROL MALFUNCTIONS, to mitigate the event. The crew will try to recover the dropped rod after I&C replaces the discovered blown fuse. The SRO will identify and comply with TS 3.1.4 condition B.

Event 3: Control rod H8 will eject during the rod recovery AND bus NB02 will fault and lock out. The ejected rod will cause an 800 gpm unisolable leak from the RCS. At the same time NB02 bus faults which results in a loss of all safety related 'B' train equipment. The reactor will either be tripped manually by the crew or auto on low PZR pressure forcing the crew to enter EMB E-0, REACTOR TRIP OR SAFETY INJECTION.

During the performance of EMG E-0, REACTOR TRIP OR SAFETY INJECTION, the crew will diagnose a loss of all AFW due to the 'A' MDAFWP being tagged out, loss of NB02 causing the loss of 'B' MDAFWP, and the failure to auto start of the TDAFWP. The crew will complete the immediate actions of E-0 and will transition to EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, to start the NSAFP.

CT: Start the NSAFP prior to bleed and feed criteria being met.

After the reactor trip both the 'A' train CCW pumps will fail to start on the LOCA sequencer. The ATC operator will start one 'A' train pump during the performance of E-0 Attachment F.

CT: Start an 'A' train CCW pump prior to exceeding the TSA requirement for running ECCS pumps with no cooling.

Crew continues from EMG FR-H1 back to E-0 then to EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT. The crew will continue in E-1 until SI is reset after which the scenario can be terminated.

Facility: Wolf Creek Scenario No.: 2 (New) Op-Test No.: 2015

Examiners: _____ Operators: _____

Initial Conditions: Rx is at 0.7% power with no equipment OOS.

Turnover:

Continue to raise power to between 5 – 10% power.

Event No.	Malf. No.	Event Type*	Event Description
1.		R (ATC SRO) N (BOP)	Withdraw control rods in manual, to establish Reactor Power stable between 5% and 10% per GEN 00-003, HOT STANDBY TO MINIMUM LOAD. The SRO will direct and monitor the ATC and the BOP. The ATC will withdraw rods in manual to establish reactor power while the BOP ensures S/G levels are maintained between 40% and 60%.
2.	IMF mAE15A4 f:0 r:60 k:2	I (BOP, SRO) T.S. (SRO)	'A' S/G level channel fails low. The crew will mitigate using OFN SB-008, ATTACHMENT F. The BOP will initially take manual control of the MFW regulating bypass valve and control S/G level. SROI will direct the procedure. Automatic control will be restored once an alternate control channel is selected. The SRO will enter T.S. 3.3.1, Condition E and 3.3.2, Conditions D & I.
3.	IMF mSE03C f:80 t:15 k:3	I (ATC SRO) TS (SRO)	SE NI-43, Power Range Channel failure upscale to 80% over 15 seconds. The ATC will check no runback in progress and then ensure rods are in manual. The crew will diagnose the failure and enter OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment R and bypass the failed channel. The SRO will enter TS 3.3.1.T and depending on where power level is possible TS 3.3.1.S
4.	IMF mBB011 f:656 k:4	I (ATC, SRO) T.S. (SRO)	Loop A Primary RTD 411C – THOT fails high. The crew will mitigate using OFN SB-008, ATTACHMENT L. No immediate actions are required due to the low power level. SRO will direct the procedure. The ATC will select out the failed channel. The SRO will enter T.S. 3.3.1, Condition E.
5.	ICM bkrDPAD01B t:1 d:0 k:5	C (BOP SRO)	Condensate pump 'B' trips. The crew will respond to the associated alarms. The alarm response procedures for MFP suction pressure low will provide guidance to start the non-running condensate pump.

6.	IMF mAB04A f:4e+006 r:60 k:6 IMF mSF12M12 f:1	M (ALL)	'A' S/G fault inside CTMT – One rod will stick in the full out position. The crew will enter and perform EMG E-0. EMG E-2 is the mitigation procedure for a faulted S/G. The crew will eventually reach EMG ES-03. CT: Isolate AFW to a faulted SG within 10 minutes (USAR 6.2.1.4.1.12)
7.	IMF mSA14A f:1 IMF mSA14B f:1	I (ATC)	SIS fails to auto initiate. The crew must recognize the requirement for SIS and manually initiate both trains. This will be performed by the ATC. This is an EOP critical task CT: Actuate SI after SLB failure to do so will violate the facility license and make FSAR assumptions invalid.
8.	IMF mSA24A f:1 IMF mSA24B f:1	I (BOP)	The MSIVs fail to auto close. The BOP will be required to All Close MSIVs using either AB HS-79 or AB HS-80. This is an EOP critical task (CT: Isolate the faulted SG from the non-faulted SGs before ANY RCS Cold Leg temperatures reach 240°F or before transition to EMG C-21.)
9.			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	3
2. Abnormal events (2-4)	4
3. Major transients (1–2)	1
4. EOPs entered/requiring substantive actions (1–2)	3(EMG E-2, EMG E-1, EMG ES-03, step 5)
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2–3)	3
7. Total Malfunctions (5–8)	8

Critical Task	Justification	References
Manually initiate SIS.	USAR Section 15.1.5; Manually initiates SIS prior to reactor restart.	USAR Section 15.1.5.
All Close MSIVs.	Isolate the faulted SG from the non-faulted SGs before ANY RCS Cold Leg temperatures reach 240°F or before transition to EMG C-21. An excessive cooldown could result in PTS concerns.	BD-EMG E-0, Rev 26A.
CT: Isolate AFW to a faulted SG within 10 minutes	Limit CTMT peak pressure	(USAR 6.2.1.4.1.12)

Scenario # 2 Objectives

1. Evaluate the crew's ability to perform a reactivity manipulation; i.e., withdraw control rods in manual, to establish Reactor Power stable between 5% and 10%.
2. Evaluate the crew's ability to mitigate an instrument failure; i.e., S/G level channel failure, SE NI-43 channel failure, and loop A primary RTD 411C – THOT.
3. Evaluate the crew's ability to mitigate a component failure; i.e., Condensate pump 'B'.
4. Evaluate the SRO's ability to identify and apply technical specifications.
5. Evaluate the crew's ability to mitigate a major plant transient using emergency operating procedures; i.e., EMG E-0, EMG E-2, and EMG ES-03.
6. Evaluate the crew's ability to mitigate post-accident failures; i.e., SIS fails to auto initiate, and MSIVs fail to auto close.

SCENARIO # 2 NARRATIVE

Initial conditions: Rx is at 0.7% power with no equipment OOS.

Turnover: Ready for GEN 00-003, step 6.11.2.1, (p) WITHDRAW control rods in MANUAL, to establish Reactor Power stable between 5% and 10% while continuing with this procedure.

Event 1: Raise power to 5 – 10% using GEN 00-003, HOT STANDBY TO MINIMUM LOAD, step 6.11.2

Event 2: 'A' S/G level channel fails low. The crew will mitigate using OFN SB-008, ATTACHMENT F. The BOP will initially take manual control of the MFW regulating bypass valve and control S/G level. SRO will direct the procedure. Automatic control will be restored once an alternate control channel is selected. The SRO will enter T.S. 3.3.1, Condition E and 3.3.2, Conditions D & I. The SRO will monitor T.S. 3.3.3 and 3.3.4.

Event 3: SE NI-43, Power Range Channel failure upscale to 80% over 15 seconds. The ATC will check no runback in progress and then ensure rods are in manual. The crew will diagnose the failure and enter OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment R and bypass the failed channel. The SRO will enter TS 3.3.1.T and depending on where power level is possible TS 3.3.1.S

Event 4: Loop A Primary RTD 411C – THOT fails high. The crew will mitigate using OFN SB-008, ATTACHMENT L. No immediate actions are required due to the low power level. SRO will direct the procedure. The ATC will select out the failed channel. The SRO will enter T.S. 3.3.1, Condition E.

Event 5: Condensate pump 'B' trips. The crew will respond to the associated alarms. The alarm response procedures for MFP suction pressure low will provide guidance to start the non-running condensate pump.

Event 6: 'A' S/G fault inside CTMT. One rod will stick in the full out position. The crew will enter and perform EMG E-0. EMG E-2 is the mitigation procedure for a faulted S/G. The crew will eventually reach EMG ES-03. **CT: Isolate AFW to a faulted SG within 10 minutes (USAR 6.2.1.4.1.12)**

Event 6: SIS fails to auto initiate. The crew must recognize the requirement for SIS and manually initiate both trains. This will be performed by the ATC. This is an EOP critical task. **CT: Actuate SI after SLB failure to do so will violate the facility license and make FSAR assumptions invalid.**

Event 7: The MSIVs fail to auto close. The BOP will be required to All Close MSIVs using either AB HS-79 or AB HS-80. This is an EOP critical task (**CT: Isolate the faulted SG from the non-faulted SGs before ANY RCS Cold Leg temperatures reach 240**

2F) or before transition to EMG C

Facility: Wolf Creek Scenario No.: 3 (New) Op-Test No.: 2015

Examiners: _____ Operators: _____

Initial Conditions: 100% power. Service Water pump 'B' is tagged out for maintenance.

Turnover:

Maintain 100% power. Thunderstorm warning is in effect. T.R 3.7.8, Condition A, is in effect.

Event No.	Malf. No.	Event Type*	Event Description
1.	ICM bkrWS01PC t:1 d:0 k:1	C (ATC, SRO) T.R. (SRO)	Service Water pump 'C' trips. The Low Flow pump cannot increase service water pressure enough – PRA #3. Put ESW trains in service IAW ALR 00-008B. The SRO the ATC to perform the ALR. SRO enters T.R 3.7.8, Conditions B and C. Condition A was already in effect for Service Water pump 'B'.
2.	IMF mBB21C f:1692 r:60 k:2	I (ATC, SRO) T.S (SRO)	PZR pressure channel 457 fails low. The crew will perform OFN SB-008, ATTACHMENT K. The ATC will place the PZR master controller in manual, control pressure, and then select an alternate control channel. The SRO will direct placing the PZR master controller back in auto once pressure is stabilized. SRO will enter T.S. 3.3.1, Conditions E, and M, and 3.3.2, Conditions D, and L.
3.	IMF mAE08C f:0 r:120 k:3	C (BOP, SRO)	Main feedwater regulating valve, AE FV-530, will fail closed in automatic over a 2 minute period. The BOP will take manual control and maintain S/G level within the band provided by the SRO. The crew will mitigate with the associated alarm response procedures.
4.	IMF trACPT0505 f:0 k:4	I (BOP SRO)	AC PT-505, HP Turbine 1 st stage pressure, fails low causing rods to step in. The ATC will place rods in manual after verifying no turbine runback. The BOP will identify the failure and the crew will enter OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment D to select an alternate channel for control. SRO will enter TS 3.3.1.T

5.	IMF mAD01 f:50 k:4 {P24115A.Cu rrValue>4.5} MMF mAD01 f:30 {P24115A.Cu rrValue>5.5} MMF mAD01 f:4	R (ATC, SRO) N (BOP)	Abnormal condenser vacuum requiring load decrease IAW OFN AF-025, ATTACHMENT F. Crew will reduce turbine loading using GEN 00-004 or OFN MA-038.
6.	{jpplp4} IMF mSY01 i:-1 f:-1 IMF mBB02B f:500 r:120 k:5 ICM vmodABHV0 011 t:1 d:0 ICM vmodABHV0 014 t:1 d:0 ICM vmodABHV0 017 t:1 d:0 ICM vmodABHV0 020 t:1 d:0	M (ALL)	500 gpm SGTR in 'B' S/G – PRA#5. Loss of off-site power when reactor is tripped – PRA#1. MSIVs fail open and cannot be closed. Crew will perform EMG E-0, EMG E-3 and transfer to EMG C-31.
7.	IMF mNE02A i:-1 f:-1 IMF mNE02B i:-1 f:-1	C (ATC)	EDGs fail to auto start. The ATC will start both EDGs at step 3 of EMG E-0. This is an EOP critical task (CT: Manual start of EDGs before placing safeguards equipment handswitches in the pull-to-lock position.))
8.	ICM vmodALHV0 009 t:1 d:0 IRF rAL13 f:0 d:300 r:120 k:6	C (BOP)	'B' MDAFW valve fails open. The BOP will stop the 'A' MDAFW pump and dispatch an operator to locally isolate AL HV-9. This is an EOP critical task (CT: Terminate AFW with a failed open AFW Control Valve from MD AFWP to Ruptured S/G within 18 min of safety injection initiation (note: will place MDAFW pump in PTL until locally isolated).) TCA USAR 15.6.3, NE 05-0037 (prevent overfill of the ruptured S/G).
9.			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	3
2. Abnormal events (2-4)	5
3. Major transients (1–2)	1
4. EOPs entered/requiring substantive actions (1–2)	2 (EMG E-3, EMG C-31, step 1)
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2–3)	2
7. Total Malfunctions (5–8)	10

Critical Task	Justification	References
Manual start of EDGs before placing safeguards equipment handswitches in the pull-to-lock position.	Energize at least one ac emergency bus before placing safeguards equipment handswitches in the pull-to-lock position. This action prevents an unneeded entry into a contingency procedure.	BD-EMG E-0, Rev 26A.
Terminate AFW with a failed open AFW Control Valve from MD AFWP to Ruptured S/G within 18 min of safety injection initiation (note: will place MDAFW pump in PTL until locally isolated)	TCA USAR 15.6.3, NE 05-0037 (prevent overflow of the ruptured S/G).	AI 21-016, Rev 10.

Scenario # 3 Objectives

- Evaluate the crew's ability to mitigate a component failure; i.e., Service Water pump trips; place ESW trains in service, Main feedwater regulating valve failing closed, and main turbine impulse pressure failure low.
- Evaluate the crew's ability to mitigate an instrument failure; i.e., PZR pressure channel failure,
- Evaluate the crew's ability to perform a reactivity manipulation; i.e., abnormal condenser vacuum requiring load decrease.
- Evaluate the SROI's ability to identify and apply technical specifications.
- Evaluate the crew's ability to mitigate a major plant transient using emergency operating procedures; i.e., EMG E-0, EMG E-3 and EMG C-31.
- Evaluate the crew's ability to mitigate post-accident failures; i.e., EDGs fail to auto start and AFW valve to ruptured S/G fails open.

SCENARIO # 3 NARRATIVE

Turnover: Scenario starts with the unit at 100% power. Service Water pump 'B' is tagged out for maintenance, not expected to return this shift. The crew is to maintain 100% power. A Thunderstorm warning is in effect. T.R 3.7.8, Condition A, has been entered.

Event 1: Service Water pump 'C' trips. The Low Flow pump cannot increase service water pressure enough – PRA #3. Put ESW trains in service IAW ALR 00-008B. The SROI the ATC to perform the ALR. SROI enters T.R 3.7.8, Conditions B and C. Condition A was already in effect for Service Water pump 'B'.

Event 2: PZR pressure channel 457 fails low. The crew will perform OFN SB-008, ATTACHMENT K. The ATC will place the PZR master controller in manual, control pressure, and then select an alternate control channel. The SROI will direct placing the PZR master controller back in auto once pressure is stabilized. SROI will enter T.S. 3.3.1, Conditions E, and M, and 3.3.2, Conditions D, and L.

Event 3: Main feedwater regulating valve, AE FV-530, will fail closed in automatic over a 2 minute period. The BOP will take manual control and maintain S/G level within the band provided by the SROI. The crew will mitigate with the associated alarm response procedures.

Event 4: AC PT-505, HP Turbine 1st stage pressure, fails low causing rods to step in. The ATC will place rods in manual after verifying no turbine runback. The BOP will identify the failure and the crew will enter OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment D to select an alternate channel for control. SRO will enter TS 3.3.1.T

Event 5: Abnormal condenser vacuum requiring load decrease IAW OFN AF-025, ATTACHMENT F. Crew will reduce turbine loading using GEN 00-004 or OFN MA-038.

Event 6: 500 gpm SGTR in 'B' S/G – PRA#5 at the same time a Loss of off-site power when reactor is tripped – PRA#1. MSIVs fail open and cannot be closed. Crew will perform EMG E-0, EMG E-3 and transfer to EMG C-31.

Event 7: EDGs fail to auto start. The ATC will start both EDGs at step 3 of EMG E-0.

CT: Manual start of EDGs before placing safeguards equipment handswitches in the pull-to-lock position.

Event 8: 'B' MDAFW valve fails open. The BOP will stop the 'A' MDAFW pump and dispatch an operator to locally isolate AL HV-9.

CT: Terminate AFW with a failed open AFW Control Valve from MD AFWP to Ruptured S/G within 18 min of safety injection initiation (note: will place MDAFW pump in PTL until locally isolated).

The crew will enter EMG E-0 then transition to EMG E-3 and finally to EMG C-31. After verifiable actions are complete and at the discretion of the lead evaluator the scenario can be stopped.

Facility: <u>Wolf Creek</u>		Scenario No.: <u>4 (New)</u>		Op-Test No.: <u>2015</u>	
Examiners: _____		Operators: _____		_____	
_____		_____		_____	
_____		_____		_____	
Initial Conditions: 100% power. EDG 'A' is OOS.					
Turnover: T.S. 3.8.1, Condition B for EDG 'A' OOS. 24 hours remain to restore EDG 'A' to operable condition.					
Event No.	Malf. No.	Event Type*	Event Description		
	scn SimGroup\T AGDGA		Setup IC: Tag out of the EDG 'A'		
1.		C (ATC, SRO TS)	Loss of NI42 fails high. The ATC will have to determine that there is no turbine runback in progress and place rods in manual to stop inward rod motion. The crew will diagnose the failure and enter OFN SB-008. ALR 078A, 82A, and 83C will come in and they could use any of these to get to the OFN. The OFN will have the crew bypass the channel and restore rods to auto. The SRO will determine TS 3.3.1 condition A, D, E, S, and T		
2.	IMF mFC02 f:3650 r:120 k:2	C (BOP, SRO)	FC SK-509A fails low over 2 minutes. The BOP will have to diagnose that the main feedwater pumps are slowing down SRO directs the BOP to take manual control of FC SK-509A and restore to original setpoint.		
3.	ebNN012_B YPASS t:1 d:0 {Key[5]}DCM ebNN012_B YPASS	I (ATC, BOP, SRO) T.S.	The crew will respond to a Loss of NN02. The SRO will direct OFN NN-021, ATTACHMENT. The ATC will select the alternate PZR pressure channel for control, adjusting pressure control as needed and then select an alternate channel for PZR level control. The BOP will select the red train instruments for S/G level and steam flow. Once the alternate channels are selected, the NN02 bus may be reenergized per procedure since the bypass switch is still functioning. The SRO will direct OFN NN-021 to stabilize the plant. SRO will enter T.S 3.8.7, Condition A, 3.3.1, Conditions S and T, and 3.3.2, Condition L for the NN bus failure		
4.	IMF mSY03F i:-1 f:-1 k:4 IMF mSY03A i:-1 f:-1 d:30 k:6	R (ATC, SRO) T.S. N (BOP)	The crew responds to loss of Wolf Creek-Benton 345 kV offsite line IAW OFN AF-025, ATTACHMENT A; reducing unit load to less than 800 MWE NET (845 MWE GROSS). SRO will enter TR 3.8.1 condition A.		

5.	IMF mSA01B i:-1 f:-1 k:5	M (ALL)	The crew will respond to an inadvertent SI, train 'B', IAW EMG E-0. This is an EOP critical task (CT: Isolate BIT inlet and outlet valves (TCA USAR 15.5.1; Terminate ECCS injection following an inadvertent ECCS operation event within 8 minutes from initiation)). The crew will transition to EMG ES-03 to mitigate the inadvertent SIS.
6.	IMF mSY01 i:-1 f:-1 k:6 IMF mNE01B f:0	M (ALL)	The crew will respond to a loss of all AC IAW EMG C-0.
7.	{Key[9]}scn SimGroup\N F39A 8N28-1 - OFF {Key[10]}scn SimGroup\S BO Start and Energize NB01 {Key[11]}scn SimGroup\N F39B 8N28-1 - OFF {Key[12]}scn SimGroup\S BO Start and Energize NB02	C (ALL)	EMG C-0 will direct the crew to OFN NB-030 to restore power to the NB busses. OFN NB-030 has provisions to restore power using the SBO diesels. The SRO will assign either the ATC or the BOP to energize either NB01 or NB02 using SYS KU-121 or SYS KU-122. This is an EOP critical task (CT: Energize either NB01 or NB02 using SYS KU-121 or SYS KU-122 before monitoring RCS integrity is required.)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

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 (EMG ES-03, EMG C-0)
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2–3)	2
7. Total Malfunctions (5–8)	6

Critical Task	Justification	References
Isolate BIT inlet and outlet valves within 8 minutes from ECCS initiation.	TCA USAR 15.5.1; Terminate ECCS injection following an inadvertent ECCS operation event (Close BIT inlet and outlet isolation valves) within 8 minutes from initiation.	AI 21-016, Rev 10.
Energize either NB01 or NB02 using SYS KU-121 or SYS KU-122 before monitoring RCS integrity is required.	Energizing at least one NB bus in a timely manner ensures RCS integrity does not become an issue.	BD-EMG C-0, Rev 21.

Scenario # 4 Objectives

1. Evaluate the crew's ability to mitigate a component failure; i.e., NI42 fails high and FCS509A fails low.
2. Evaluate the crew's ability to mitigate an instrument failure; i.e., loss of AC instrument busses.
3. Evaluate the crew's ability to perform a reactivity manipulation; i.e., reduce load due to loss of 345 kV offsite line.
4. Evaluate the SROI's ability to identify and apply technical specifications.
5. Evaluate the crew's ability to mitigate a major plant transient using emergency operating procedures; i.e., EMG E-0, EMG ES-03, and EMG C-0.
6. Evaluate the crew's ability to mitigate post-accident failures; i.e., EDG 'B' fails.

SCENARIO # 4 NARRATIVE

Turnover: 100% power. EDG 'A' is OOS. T.S. 3.8.1, Condition B for EDG 'A' OOS. 24 hours remain to restore EDG 'A' to operable condition.

Event 1: Loss of NI42 fails high. The ATC will have to determine that there is no turbine runback in progress and place rods in manual to stop inward rod motion. The crew will diagnose the failure and enter OFN SB-008. ALR 078A, 82A, and 83C will come in and they could use any of these to get to the OFN. The OFN will have the crew bypass the channel and restore rods to auto. The SRO will determine TS 3.3.1 condition A, D, E, S, and T

Event 2: FC SK-509A fails low over 2 minutes. The BOP will have to diagnose that the main feedwater pumps are slowing down SRO directs the BOP to take manual control of FC SK-509A and restore to original setpoint.

Event 3: The crew will respond to a Loss NN02. The SRO will direct OFN NN-021, ATTACHMENT B. The ATC will select the alternate PZR pressure channel for control, adjusting pressure control as needed and then select an alternate channel for PZR level control. The BOP will select the red train instruments for S/G level and steam flow. Once the alternate channels are selected, the NN02 bus may be reenergized. The SRO will direct OFN NN-021 to stabilize the plant. SRO will enter T.S 3.8.7, Condition A, 3.3.1, Conditions S and T, and 3.3.2, Condition L for the NN bus.

Event 4: The crew responds to loss of Wolf Creek-Benton 345 kV offsite line IAW OFN AF-025, ATTACHMENT A; reducing unit load to less than 800 MWE NET (845 MWE GROSS). SRO will enter T.S. 3.8.1, Conditions A and E as the 'A' EDG is also OOS. 3.8.1, Condition B was in effect at turnover. SRO will enter TR 3.8.1 condition A as well

Event 5: The crew will respond to an inadvertent SI, train 'B', IAW EMG E-0. This is an EOP critical task **(CT: Isolate BIT inlet and outlet valves (TCA USAR 15.5.1; Terminate ECCS injection following an inadvertent ECCS operation event within 8 minutes from initiation))**. The crew will transition to EMG ES-03 to mitigate the inadvertent SIS.

Event 6: The crew will respond to a loss of all AC IAW EMG C-0 after a transition to ES-03 has occurred.

Event 7: EMG C-0 will direct the crew to OFN NB-030 to restore power to the NB busses. OFN NB-030 has provisions to restore power using the SBO diesels. The SRO will assign either the ATC or the BOP to energize either NB01 or NB02 using SYS KU-121 or SYS KU-122. This is an EOP critical task **(CT: Energize either NB01 or NB02 using SYS KU-121 or SYS KU-122 before monitoring RCS integrity is required.)**

Facility: Wolf Creek Scenario No.: 5 (New) Op-Test No.: 2015

Examiners: _____ Operators: _____

Initial Conditions: 35% power MOL with MFRV's in auto; RHR pump 'A' tagged out for emergent work.

Turnover:

RHR pump 'A' was tagged out one hour ago for an emergent electrical issue with the pump motor. T.S. 3.5.2, condition A and 3.5.2, condition A are in effect. The repair to the motor is expected to be completed in the next 36 hours.

Upper management has directed that the load increase continue to 40% and hold for chemistry.

Event No.	Malf. No.	Event Type*	Event Description
1.		R (ATC, SRO) N (BOP)	The crew will raise power to 40% IAW GEN 00-004.
2.		I BOP SRO TS	The SRO and BOP will respond to C SG level channel failure high. The BOP will place the C MFRV in manual and control level then select away from the failed channel. SRO will enter TS 3.3.1 condition E, 3.3.2 condition D and I.
3.	ICM bkrPB00301 t:1 d:0 k:3	C (ATC, SRO)	The SRO and ATC will respond to a trip of the NCP using alarm response ALR 00-042A and/or ALR 00-042E. The ATC will isolate letdown, then restore normal charging and letdown using CCP 'A'.
4.		I BOP SRO TS	AE PT-508 Feedwater header pressure detector fails low. BOP response is to place the MFP speed in manual and control speed to maintain Dp to the steam pressure. SRO will direct OFN SB-008
5.		I (RO SRO) TS (SRO)	The ATC will respond to a VCT channel failure low. BG LI-185 will fail low causing a VCT to RWST swap over. The SRO will direct entry into OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment U to reopen the valve and then open the valve breaker. TR 3.1.9.A

6.	IMF mSG01 f:60 k:5 IMF mMR02B i:-1 f:-1 d:10 k:5 ICM vIEJHV8701 B t:1 f:1 d:0 r:0 k:5 IMF mEJ04B f:3500 d:60 ICM movBBPV87 02B t:1 d:0 ICM vIEPHV8808 A t:2 f:0 d:0 r:0 ICM vIEPHV8808 D t:2 f:0 d:0 r:0 ICM sovEPHV895 0D t:1 d:0 k:5 ICM sovEPHV895 0E t:1 d:0 k:5 ICM vIEP8855C t:2 d:0 k:5 IMF mEP01B f:100 k:5 ICM movEMHV88 03B t:2 d:0 ICM mtrDPBG05 A t:1 d:0 k:5 {jpplsi}DMF mSG01	M (ALL)	<p>The crew will respond to an earth quake and the resultant equipment failures. Failures include a fault on the startup transformer, which results in the loss of both 13.8 KV non vital PA busses. The earthquake will cause a 4 inch LOCA inside containment from the 'D' hot leg. With the loss of the startup transformer NB02 is being carried by NE02. The 'B' ESW pump fails to start in auto (manual available). CT: Start B ESW pump prior to NE02 tripping on high temperature.</p>
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7.	{jpl42(1)} IMF mSG01 f:25 d:116 {jpl42(1)} IMF mSY01 i:-1 f:-1 d:120 {jpl42(1)} ICM vIEMHV8923 B t:2 f:0 d:120 r:0 {jpl42(1)} ICM bkrNB00202 t:1 d:180	M (ALL)	Two minutes after SIS is reset an aftershock causes a loss of off-site power. Additionally, EM HV-8923B, SI pump 'A' suction valve, will suffer a stem separation causing the loss of flow from 'A' train SI pump. 'A' SI pump will run an additional minute before it fails. SI pump 'B' will have to be restarted to provide the only source of ECCS flow available. This is an EOP critical task (CT: Start at least one SIP before RVLIS Natural Circ. Range is < 45% to prevent core uncover).
8.			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

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(EMG C-12)
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2-3)	2
7. Total Malfunctions (5-8)	7

Critical Task	Justification	References
Start the B ESW pump prior to NE02 tripping on high temperature	If the ESW pump is not started NE02 will trip losing power to the B train safeguards causing a reduction in emergency power capacity and ECCS flow	BD EMG E-0, Rev 26a
Start at least one SIP before RVLIS Natural Circ. Range is < 45%.	If the SIPs are not started, core uncover will occur and the fuel will be damaged.	BD-EMG FR-C2, Rev 11

Scenario # 5 Objectives

1. Evaluate the crew's ability to perform a reactivity manipulation; i.e., raise power to 40%.
2. Evaluate the crew's ability to mitigate an instrument failure; i.e., S/G level channel failing high, feedwater header pressure channel failing low, and VCT level channel failing low.
3. Evaluate the crew's ability to mitigate a component failure; i.e., NCP trip.
4. Evaluate the SROI's ability to identify and apply technical specifications.
5. Evaluate the crew's ability to mitigate a major plant transient using emergency operating procedures; i.e., EMG E-0, EMG E-1, and EMG ES-11
6. Evaluate the crew's ability to mitigate post-accident failures; i.e., loss of all but one ECCS water source (SIP'A').

SCENARIO # 5 NARRATIVE

Turnover: 35% power MOL with MFRV's in auto; RHR pump 'A' tagged out for emergent work. RHR pump 'A' was tagged out one hour ago for an emergent electrical issue with the pump motor. T.S. 3.5.2, condition A and 3.5.2, condition A are in effect. The repair to the motor is expected to be completed in the next 36 hours.

Upper management has directed that the load increase to 40% will continue.

Event 1: The SRO and BOP will respond to C SG level channel failure high. The BOP will place the C MFRV in manual and control level then select away from the failed channel. SRO will enter TS 3.3.1 condition E, 3.3.2 condition D and I.

Event 2: The SRO and ATC will respond to a trip of the NCP using alarm response ALR 00-042A and/or ALR 00-042E. The ATC will isolate letdown, then restore normal charging and letdown using CCP 'A'.

Event 3: AE PT-508 Feedwater header pressure detector fails low. BOP response is to place the MFP speed in manual and control speed to maintain Dp to the steam pressure. SRO will direct OFN SB-008

Event 4: The ATC will respond to a VCT channel failure low. BG LI-185 will fail low causing a VCT to RWST swap over. The SRO will direct entry into OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment U to reopen the valve and then open the valve breaker. TR 3.1.9.A

Event 5: The crew will respond to an earth quake and the resultant equipment failures. Failures include a fault on the startup transformer, which results in the loss of both 13.8 KV non vital PA busses. This fault causes the loss of normal power to NB02 so the emergency diesel must sync on the bus but the ESW pump fails to auto start. The crew must start the pump prior to the diesel tripping on high temperature. **CT: Start the B ESW pump prior to the diesel tripping on high temperature.**

Event 6: Two minutes after SIS is reset an aftershock causes a loss of off-site power. Additionally, EM HV-8923A, SI pump 'A' suction valve, will suffer a stem separation causing the loss of flow from 'A' train SI pump. 'A' SI pump will run an additional minute before it fails. SI pump 'B' will have to be restarted to provide the only source of ECCS flow available. This is an EOP critical task (**CT: Start at least one SIP before RVLIS Natural Circ. Range is < 45% to prevent core uncover**).