

Facility:		Wolf Creek 2009 NRC Examination					Date of Exam:		8/17/2009								
Tier	Group	RO K/A Category Points										SRO-Only Points					
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total	
1. Emergency & Plant Evolutions	1	3	3	3				3	3			3	18	3	3	6	
	2	2	2	1				1	2			1	9	2	2	4	
	Tier Totals	5	5	4				4	5			4	27	5	5	10	
2. Plant Systems	1	2	2	2	3	2	2	3	3	3	3	3	28	2	3	5	
	2	0	1	0	1	1	1	1	1	1	2	1	10	0	2	1	3
	Tier Totals	2	3	2	4	3	3	4	4	4	5	4	38	4	4	8	
3. Generic Knowledge & Abilities Categories				1		2		3		4		10	1	2	3	4	7
				2		3		2		3			1	2	2	2	
<p>Note:</p> <ol style="list-style-type: none"> 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two). 2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points. 3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to section D.1.b of ES-401, for guidance regarding 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 KAs 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/A's 8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. If fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams. 9. For Tier 3, select topics from Section 2 of the K/A Catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10CFR55.43 																	

Wolf Creek 2009 NRC Examination
Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
056 / Loss of Off-site Power / 6					X		AA2.32 - Ability to determine and interpret the following as they apply to the Loss of Offsite Power: Transient trend of coolant temperature toward no-load T-ave	4.3	76
011 / Large Break LOCA / 3					X		EA2.14 - Ability to determine or interpret the following as they apply to a Large Break LOCA: Actions to be taken if limits for PTS are violated	4.0	77
058 / Loss of DC Power / 6					X		AA2.02 - Ability to determine and interpret the following as they apply to the Loss of DC Power: 125V dc bus voltage, low/critical low, alarm	3.6	78
E05 / Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4						X	2.4.18 - Emergency Procedures / Plan: Knowledge of the specific bases for EOPs.	4.0	79
009 / Small Break LOCA / 3						X	2.1.25 - Conduct of Operations: Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	80
E12 / Steam Line Rupture - Excessive Heat Transfer / 4						X	2.4.2 - Emergency Procedures / Plan: Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.6	81
055 / Station Blackout / 6	X						EK1.02 - Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : Natural circulation cooling	4.1	39
054 / Loss of Main Feedwater / 4	X						AK1.02 - Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): Effects of feedwater introduction on dry S/G	3.6	40
011 / Large Break LOCA / 3	X						EK1.01 - Knowledge of the operational implications of the following concepts as they apply to the Large Break LOCA: Natural circulation and cooling, including reflux boiling.	4.1	41
E11 / Loss of Emergency Coolant Recirculation / 4		X					EK2.1 - Knowledge of the interrelations between the (Loss of Emergency Coolant Recirculation) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.6	42
E12 / Steam Line Rupture - Excessive Heat Transfer / 4		X					EK2.1 - Knowledge of the interrelations between the (Uncontrolled Depressurization of all Steam Generators) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.4	43
008 / Pressurizer Vapor Space Accident / 3		X					AK2.01 - Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: Valves	2.7	44
007 / Reactor Trip - Stabilization - Recovery / 1			X				EK3.01 - Knowledge of the reasons for the following as they apply to a reactor trip: Actions contained in EOP for reactor trip	4.0	45
056 / Loss of Off-site Power / 6			X				AK3.01 - Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: Order and time to initiation of power for the load sequencer	3.5	46

Wolf Creek 2009 NRC Examination
Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
E05 / Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4			X				EK3.4 - Knowledge of the reasons for the following responses as they apply to the (Loss of Secondary Heat Sink) RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.	3.7	47
E04 / LOCA Outside Containment / 3				X			EA1.2 - Ability to operate and / or monitor the following as they apply to the (LOCA Outside Containment) Operating behavior characteristics of the facility.	3.6	48
038 / Steam Generator Tube Rupture / 3				X			EA1.19 - Ability to operate and monitor the following as they apply to a SGTR: MFW System status indicator	3.4	49
025 / Loss of Residual Heat Removal System / 4				X			AA1.11 - Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: Reactor building sump level indicators	2.9	50
027 / Pressurizer Pressure Control System Malfunction / 3					X		AA2.13 - Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: Seal return flow	2.8	51
057 / Loss of Vital AC Electrical Instrument Bus / 6					X		AA2.19 - Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: The plant automatic actions that will occur on the loss of a vital ac electrical instrument bus	4.0	52
077 / Generator Voltage and Electric Grid Disturbances					X		AA2.07 - Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: Operational status of engineered safety features	3.6	53
026 / Loss of Component Cooling Water / 8						X	2.1.23 - Conduct of Operations: Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	54
022 / Loss of Reactor Coolant Makeup / 2						X	2.2.40 - Equipment Control: Ability to apply technical specifications for a system.	3.4	55
029 / Anticipated Transient Without Scram (ATWS) / 1						X	2.1.30 – Conduct of Operations: Ability to locate and operate components, including local controls	4.4	56
K/A Category Totals:	3	3	3	3	3/3	3/3	Group Point Total:	18/6	

Wolf Creek 2009 NRC Examination
Written Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
037 / Steam Generator Tube Leak / 3					X		AA2.05 - Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Past history of leakage with current problem	3.3	82
E10 / Natural Circulation with Steam Void in Vessel with/without RVLIS / 4					X		EA2.1 - Ability to determine and interpret the following as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.9	83
E06 / Degraded Core Cooling / 4						X	2.1.28 - Conduct of Operations: Knowledge of the purpose and function of major system components and controls.	4.1	84
076 / High Reactor Coolant Activity / 9						X	2.4.4 - Emergency Procedures / Plan: Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.7	85
061 / Area Radiation Monitoring (ARM) System Alarms / 7	X						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to Area Radiation Monitoring (ARM) System Alarms: Detector limitations	2.5	57
036 / Fuel Handling Incidents / 8		X					AK2.01 - Knowledge of the interrelations between the Fuel Handling Incidents and the following: Fuel handling equipment	2.9	58
E14 / High Containment Pressure / 5			X				EK3.1 - Knowledge of the reasons for the following responses as they apply to the (High Containment Pressure) Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	3.2	59
051 / Loss of Condenser Vacuum / 4				X			AA1.04 - Ability to operate and / or monitor the following as they apply to the Loss of Condenser Vacuum: Rod position	2.5	60
059 / Accidental Liquid RadWaste Release / 9					X		AA2.04 - Ability to determine and interpret the following as they apply to the Accidental Liquid Radwaste Release: The valve lineup for a release of radioactive liquid	3.2	61
003 / Dropped Control Rod / 1						X	2.2.39 - Equipment Control: Knowledge of less than one hour technical specification action statements for systems.	3.9	62
076 / High Reactor Coolant Activity / 9		X					AK2.01 - Knowledge of the interrelations between the High Reactor Coolant Activity and the following: Process radiation monitors	2.6	63
028 / Pressurizer Level Control Malfunction / 2					X		AA2.03 - Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Charging subsystem flow indicator and controller	2.8	64
005 / Inoperable/Stuck Control Rod / 1	X						AK1.04 - Knowledge of the operational implications of the following concepts as they apply to Inoperable / Stuck Control Rod: Definitions of axial imbalance, neutron error, power demand, actual power tracking mode, ICS tracking	3.0	65

Wolf Creek 2009 NRC Examination
 Written Examination Outline
 Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
K/A Category Totals:	2	2	1	1	2/2	1/2	Group Point Total:		9/4

Wolf Creek 2009 NRC Examination
 Written Examination Outline
 Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q#
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007 Pressurizer Relief/Quench Tank								X				A2.02 - Ability to (a) predict the impacts of the following malfunctions or operations on the P S; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal pressure in PRT	3.2	86
010 Pressurizer Pressure Control								X				A2.03 - Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: PORV failures	4.2	87
022 Containment Cooling											X	2.4.9 - Emergency Procedures / Plan: Knowledge of low power / shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	88
003 Reactor Coolant Pump											X	2.4.30 – Emergency procedures/plan: 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	89
039 Main and Reheat Steam											X	2.1.25 - Conduct of Operations: Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	90
103 Containment	X											K1.08 - Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: SIS, including action of safety injection reset	3.6	1
010 Pressurizer Pressure Control	X											K1.08 - Knowledge of the physical connections and/or cause-effect relationships between the PZR PCS and the following systems: PZR LCS	3.2	2
003 Reactor Coolant Pump		X										K2.01 - Knowledge of bus power supplies to the following: RCPS	3.1	3
006 Emergency Core Cooling		X										K2.02 - Knowledge of bus power supplies to the following: Valve operators for accumulators	2.5	4
073 Process Radiation Monitoring			X									K3.01 - Knowledge of the effect that a loss or malfunction of the PRM system will have on the following: Radioactive effluent releases	3.6	5
064 Emergency Diesel Generator			X									K3.01 - Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: Systems controlled by automatic loader	3.8	6
076 Service Water				X								K4.02 - Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following: Automatic start features associated with SWS pump controls	2.9	7

Wolf Creek 2009 NRC Examination
Written Examination Outline
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q#
008 Component Cooling Water				X								3.1	8
005 Residual Heat Removal					X							3.2	9
061 Auxillary/Emergency Feedwater					X							2.6	10
004 Chemical and Volume Control						X						3.1	11
013 Engineered Safety Features Actuation						X						2.7	12
012 Reactor Protection							X					2.9	13
063 DC Electrical Distribution							X					2.5	14
059 Main Feedwater								X				3.4	15
022 Containment Cooling								X				2.9	16
039 Main and Reheat Steam									X			3.1	17
026 Containment Spray									X			4.3	18
062 AC Electrical Distribution										X		3.3	19
078 Instrument Air										X		3.1	20

Wolf Creek 2009 NRC Examination
Written Examination Outline
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q#	
007 Pressurizer Relief/Quench Tank											X	2.4.50 - Emergency Procedures / Plan: Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.2	21
063 DC Electrical Distribution											X	2.4.6 - Emergency Procedures / Plan: Knowledge of EOP mitigation strategies.	3.7	22
078 Instrument Air									X			A3.01 - Ability to monitor automatic operation of the IAS, including: Air pressure	3.1	23
076 Service Water							X					A1.02 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: Reactor and turbine building closed cooling water temperatures.	2.6	24
005 Residual Heat Removal				X								K4.06 - Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following: Function of RHR pump miniflow recirculation	2.7	25
026 Containment Spray											X	2.1.20 – Conduct of Operations: Ability to interpret and execute procedure steps..	4.6	26
012 Reactor Protection								X				A2.05 - Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Faulty or erratic operation of detectors and function generators	3.1	27
004 Chemical and Volume Control										X		A4.18 - Ability to manually operate and/or monitor in the control room: Emergency borate valve	4.3	28
K/A Category Totals:	2	2	2	3	2	2	3	3 / 2	3	3	3 / 3	Group Point Total:		28/5

Wolf Creek 2009 NRC Examination
Written Examination Outline
Plant Systems – Tier 2 Group 2

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q#
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075 Circulating Water								X				A2.01 - Ability to (a) predict the impacts of the following malfunctions or operations on the circulating water system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of intake structure	3.2	91
011 Pressurizer Level Control											X	2.1.28 - Conduct of Operations: Knowledge of the purpose and function of major system components and controls.	4.1	92
002 Reactor Coolant								X				A2.03 - Ability to (a) predict the impacts of the following malfunctions or operations on the RCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of forced circulation	4.3	93
014 Rod Position Indication										X		A4.01 - Ability to manually operate and/or monitor in the control room: Rod selection control	3.3	29
015 Nuclear Instrumentation						X						K6.02 - Knowledge of the effect of a loss or malfunction on the following will have on the NIS: Discriminator/compensation circuits	2.6	30
016 Non-nuclear Instrumentation											X	2.4.6 - Emergency Procedures / Plan: Knowledge of EOP mitigation strategies.	3.7	31
045 Main Turbine Generator				X								K4.02 - Knowledge of MT/G system design feature(s) and/or inter-lock(s) which provide for the following: Automatic shut of reheat stop valves as well as main control valves when tripping turbine	2.5	32
027 Containment Iodine Removal		X										K2.01 - Knowledge of bus power supplies to the following: Fans	3.1	33
068 Liquid Radwaste	X											K1.07 - Knowledge of the physical connections and/or cause effect relationships between the Liquid Radwaste System and the following systems: Sources of liquid wastes for LRS	2.7	34
028 Hydrogen Recombiner and Purge Control							X					A1.02 - Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: Containment pressure	3.4	35
086 Fire Protection										X		A4.01 - Ability to manually operate and/or monitor in the control room: Fire Water pumps	3.3	36
017 In-core Temperature Monitor									X			A3.02 - Ability to monitor automatic operation of the ITM system including: Measurement of in-core thermocouple temperatures at panel outside control room	3.4	37

Wolf Creek 2009 NRC Examination
Written Examination Outline
Plant Systems – Tier 2 Group 2

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Imp.	Q#	
041 Steam Dump/Turbine Bypass Control								X				A2.02 - Ability to (a) predict the impacts of the following malfunctions or operations on the SDS; and (b) based on those predictions or mitigate the consequences of those malfunctions or operations: Steam valve stuck open	3.6	38
K/A Category Totals:	1	1	0	1	0	1	1	1 / 2	1	2	1 / 1	Group Point Total:	10/3	

Facility: Wolf Creek 2009 NRC Examination Date: 8/17/2009						
Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.36	Knowledge of procedures and limitations involved in core alterations.			4.1	94
	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	66		
	2.1.13	Knowledge of facility requirements for controlling vital / controlled access.	2.5	67		
	Subtotal				2	
2. Equipment Control	2.2.43	Knowledge of the process used to track inoperable alarms.			3.3	95
	2.2.6	Knowledge of the process for making changes to procedures.			3.6	98
	2.2.35	Ability to determine Technical Specification Mode of Operation.	3.6	68		
	2.2.36	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	3.1	69		
	2.2.1	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.	4.5	75		
	Subtotal				3	
3. Radiation Control	2.3.13	Knowledge of Radiological Safety Procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high radiation areas, aligning filters, etc.			3.8	96
	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.			3.7	99
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	70		
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	71		

	Subtotal			2		2
4. Emergency Procedures / Plan	2.4.5	Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.			4.3	97
	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.			4.3	100
	2.4.25	Knowledge of fire protection procedures.	3.3	72		
	2.4.11	Knowledge of abnormal condition procedures.	4.0	73		
	2.4.34	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	74		
	Subtotal			3		2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1 / 1	065 / 2.1.30 replaced by 029 / 2.1.30	Excessive similar topic coverage for Instrument Air system
2 / 1	103 / K1.07 replaced by 103 / K1.08	System does not exist at this facility
2 / 1	005 / K4.12 replaced by 005 / K4.06	Piggyback mode not used at facility
2 / 2	014 / A4.03 replaced by 014 / A4.01	Operationally insignificant and indication is not available in control room
2 / 2	072 / K1.03 replaced by 072 / A4.01	No interface between ARMs and FHB Ventilation at this facility
2 / 2	072 / K1.02 replaced by 072 / A4.01	This was a replacement for K1.03 but this is also not supported at facility.
2 / 2	072 / K4.02 replaced by 072 / A4.01	This topic was a random reselection but topic not supported by facility design
2 / 1	059 / A2.04 replaced by 059 / A2.01	Original topic was direct overlap with another test item on exam (Question 40)
2 / 2	068 K5.04 replaced by 068 K1.07	Original topic not operationally significant and no facility reference to support a test item at the license level required for examination
2 / 2	072 A4.01 replaced by 086 A4.01	Original topic operationally insignificant and function not performed by operations staff. No operations references support topic.
2 / 1	007 A2.06 replaced by 007 A2.02	Formation of a pressurizer bubble has no impact on the PRT, and the PRT is not used in any way for bubble formation at this facility.
2 / 1	003 G2.2.36 replaced by 003 G2.4.30	There is no LCO related to component related to degraded power sources, and the reference for degraded power sources is very limited, resulting in overlap with Question 53.
2 / 1	026 G2.2.22 replaced by 026	Could not develop question at appropriate license level for selected topic

	G2.1.20	
3 / 2	G2.2.7 replaced by G2.2.1	Could not develop question at appropriate license level for selected topic

{PRIVATE }Facility: <u>Wolf Creek</u>		Date of Examination: <u>Aug 31 – Sept 4, 2009</u>
Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: _____
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations (S.A.1.a)	R, M	Complete a I/M plot and determine the estimated critical position and required actions. 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of operation. (CFR 41.10 / 43.5 / 45.2 / 45.6) (RO/SRO IR = 4.3 / 4.4)
Conduct of Operations (S.A.1.b)	N, R	Review completed dilution requirement calculation for one hour after a power reduction. 2.1.37 Knowledge of procedures, guidelines or limitations associated with reactivity management. (CFR 41.1 / 43.6 / 45.6) (RO / SRO IR = 4.3 / 4.6)
Equipment Control (S.A.2)	R, N	Using a completed surveillance (STS AL-101, MDAFW Pump A Inservice Pump Test), evaluate acceptance criteria. 2.2.12 Knowledge of surveillance procedures (CFR 41.10 / 45.13) (RO / SRO IR = 3.7 / 4.1)
Radiation Control (S.A.3)	N, R	Given a Liquid Release Permit determine if it is ready to be authorized for release to the environment. 2.3.6 Ability to approve release permits. (CFR 41.13 / 43.4 / 45.10) (RO / SRO IR = 2.0 / 3.8)
Emergency Plan (S.A.4)	S, N	In the simulator setting, perform the E-Plan classification. 2.4.41 Knowledge of the emergency action level thresholds and classifications. (CFR 41.10 / 43.5 / 45.11) (RO/SRO IR = 2.9 / 4.6)
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1; randomly selected)		

{PRIVATE }Facility: <u>Wolf Creek</u>		Date of Examination: <u>Aug 31 – Sept 4, 2009</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: _____
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations (R.A.1.a)	R, M	Complete 1/M plot and determine the estimated critical position. 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of operation. (CFR 41.10 / 43.5 / 45.2 / 45.6) (RO/SRO IR = 4.3 / 4.4)
Conduct of Operations (R.A.1.b)	R, N	Determine dilution requirements for one hour after a power reduction. 2.1.37 Knowledge of procedures, guidelines or limitations associated with reactivity management. (CFR 41.1 / 43.6 / 45.6) (RO /SRO IR = 4.3 / 4.6)
Equipment Control (R.A.2)	N, R	Complete the calculation for surveillance STS AL-101, MDAFW Pump A Inservice Pump Test, evaluate/recommend operable/inoperable and required actions. 2.2.12 Knowledge of surveillance procedures (CFR 41.10 / 45.13) (RO / SRO IR = 3.7 / 4.1)
Radiation Control (R.A.3)	R, N	Given radiological conditions evaluate the most efficient method to limit radiological exposure based on DAC hours. 2.3.12 Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR 41.12 / 45.9 / 45.10) (RO/SRO IR = 3.2 / 3.7)
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1; randomly selected)		

Facility: Wolf Creek		Date of Examination: Aug. 31 – Sept. 4, 2009	
Examination Level: RO <input checked="" type="checkbox"/> SRO <input checked="" type="checkbox"/>		Operating Test Number: _____	
Control Room Systems [®] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
Bolded font = alternate path			
System / JPM Title		Type Code*	Safety Function
a. 014 – Rod Position Indication System S1 -- Perform actions to retrieve a dropped or misaligned control rod. (A2.04) RO/SRO-I		N, E, S	1
b. 013 – Engineered Safety Features Actuation System (ESFAS) S2 -- Perform actions to ensure CSAS actuated correctly. (Auto CSAS failed, candidate manually initiates CSAS) (A4.01) PRA: ESFAS is a Top 10 Risk Significant System at Wolf Creek RO/SRO-I/SRO-U		N, EN, S, A	2
c. 006 – Emergency Core Cooling System (ECCS) S3 -- Perform action to ensure transfer of ECCS flowpath. (EJ HIS-8840 fails to open) (A3.08) PRA: BN & EJ are Top 10 Risk Significant System. RO/SRO-I		M, A, S, E	3

<p>d. 076 – Service Water System (SWS)</p> <p>S4 -- Perform actions to start Service Water pump or an Essential Service Water pump. (Service water pumps fail to start) (A2.01)</p> <p>PRA: Core Damage Frequency by Initiating Event (Loss of Service Water)</p> <p>RO/SRO-I</p>	<p>N, S, A</p>	<p>4S</p>
<p>e. 071 – Waste Gas Disposal System (WGDS)</p> <p>S5 -- Perform actions to set process radiation monitor alarm setpoints for Vent Release Permit for Waste Gas Decay Tank. (A4.25)</p> <p>RO/SRO-I/SRO-U</p>	<p>N, S</p>	<p>9</p>
<p>f. 016 – Non-Nuclear Instrumentation System</p> <p>S6 -- Perform actions to manually trip the Main Turbine. (Auto Turbine trip fails) (K4.03)</p> <p>RO/SRO-U</p>	<p>N, A, S</p>	<p>7</p>
<p>g. 029 – Containment Purge System (CPS)</p> <p>S7 -- Perform actions to ensure Containment Purge System isolation. (Auto CPIS fails, manual action required) (A3.01)</p> <p>RO/SRO-I</p>	<p>N, A, S</p>	<p>8</p>
<p>h. 007 – Pressurizer Relief Tank (PRT)</p> <p>S8 -- Perform actions to identify and isolate stuck open PORV. (A2.01)</p> <p>RO/SRO-I</p>	<p>N, S</p>	<p>5</p>

In-Plant Systems® (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
<p>i. 063 – DC Electrical Distribution System</p> <p>P1 -- Perform actions of EMG C-0 Attachment C, DC Load Shed for NK11, NK12, NK13 and NK14. (K2.01)</p> <p>PRA: Risk significant system (NK); Core Damaging Frequency by Initiating Event (Loss of Offsite Power); CD Events – LERF</p> <p>(P = 2004 NRC exam)</p> <p>RO/SRO-I/SRO-U</p>	D, P, L, E	6
<p>j. 061 – Auxiliary / Emergency Feedwater (AFW) System</p> <p>P2 -- Perform actions to cooldown the TDAFWP piping to restore AFW to > 270,000 LBM per hour. (A2.06)</p> <p>PRA: Risk significant system (AL)</p> <p>RO/SRO-I</p>	N, EN, L	4S
<p>k. 006 – Emergency Core Cooling System (ECCS)</p> <p>P3 -- Perform Attachment B of OFN BG-045, Gas Binding of CCPs or SI Pumps – vent the SI pump due to gas binding. (A2.04)</p> <p>SOER 97-1, Potential Loss of High Pressure Injection and Charging Capability from Gas Intrusion</p> <p>RO/SRO-I/SRO-U</p>	N, R, E	3

<p>@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>	
* 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	$\leq 9 / \leq 8 / \leq 4$
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$
(EN)gineered safety feature	- / - / ≥ 1 (control room system)
(L)ow-Power / Shutdown	$\geq 1 / \geq 1 / \geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)
(R)CA	$\geq 1 / \geq 1 / \geq 1$
(S)imulator	

Facility: Wolf Creek Scenario No.: 1 Op-Test No.: _____

Examiners: _____ Operators: _____

Initial Conditions: The plant is at 100% power. The A ESW pump and the A EDG are tagged out of service.

Turnover: The A ESW pump is OOS for an upper motor bearing replacement, which causes the A EDG to be OOS. The National Weather Service has issued a Severe Thunderstorm Warning for Shawnee and Butler counties. Topeka System Dispatch (TSD) has notified WC of abnormal grid conditions based on weather conditions. TSD reports that under the current grid conditions, predicted grid voltage is 98.7% if WC were to come offline. OFN AF-025 Unit Limitations has been completed for the current plant conditions, and no further actions are required.

Event No.	Malf. No.	Event Type*	Event Description
1 t+1	mSE03B	I – ATC, BOP, SRO	Power range instrument SE NI-42B fails high. Rods step in. Manual Rod Control must be selected (or the reactor trips).
2 t+9	mBB21B fails to 2508 psig	I – ATC, SRO	Pressurizer Pressure Channel 456 fails high (PORV 456 cycles)
3 t+16	mSY03F	R -- ATC N – BOP, SRO	Loss of 345 kV Benton line. TSD will request Wolf Creek to lower load to 950 MWe. (~78-80% power)
4 t+25	IRF pMA02 to 310 kV	C -- All	Grid voltage droops to 89.9% (310kV). Class 1E busses NB01/2 voltage will decrease to the point where the degraded voltage alarms come in.
	mNE04B		After a 94 sec time delay, the busses will shed and attempt to repower on the EDG's. Both EDG's are inoperable at this point.
5 t+28	mAL01	C – BOP, SRO	The TDAFP fails to start in Auto, but can be started in manual. (CT Manually start the Turbine Driven Auxiliary Feed Pump)
6 t+28	mSY01	M -- All	Loss All AC Power. The crew will enter EMG C-0, Loss of All AC Power, as neither safeguards bus is energized. (CT Depressurize intact Steam Generator(s) at maximum rate)

7 t+35	Delete mNE04B		NB01/2 bus is restored (EDG B supplying NB02 bus)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: Wolf Creek Scenario No.: 2 Op-Test No.: _____

Examiners: _____ Operators: _____

Initial Conditions: The plant is restarting after a forced outage that lasted 96 hours. The Main Turbine is synchronized to the grid. The plant is at BOL conditions. RCS boron concentration is @ 2022 ppm. Rod Control is in Manual with bank D at 183 steps. GEN 00-003, Hot Standby to Minimum Load, is complete to step 6.42.

Turnover: Shift orders are to continue the plant startup. Continue the start up per Step 6.42 of GEN 00-003. Fuel conditioning limits are not in effect. The "B" Stator Cooling water pump is Out of Service for a rework condition following the outage. It is currently in PMT and is expected back in 3 hours.

Event No.	Malf. No.	Event Type*	Event Description
1 t + 1	mBG01A	R -- ATC I -- SRO	Volume Control Tank Level control channel BG LI-112 fails low. The result is a ½ swapover from the VCT to the RWST.
2 t + 16	mAE15A 4	I – BOP, SRO	Steam Generator Level Control channel AE LI-551 fails low.
3 t + 25	mAC06H	C -- All	The turbine trips on HI-HI bearing vibration.
4 t + 32	mAE14A	C -- All	A feedwater leak (8E6 lbm/hr) in Containment develops on the "A" Steam Generator feedline. (CT Isolate faulted Steam Generator)
5 t + 32	mSF17A mSF17B	M -- All	Failure of the RX to trip in Auto and Manual (CT Direct local Reactor Trip)
6 t + 32	mAL04A	C – BOP, SRO	Post trip malfunction Failure of the A MDAFP to auto start
7 t + 32	mSA27A B08, 09, 10 & 07	C – BOP, SRO	Post trip malfunction Failure of the MSIV's to auto close (CT Manually close the MSIV's)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: Wolf Creek Scenario No.: 3 Op-Test No.: _____

Examiners: _____ Operators: _____

Initial Conditions: 100% power, EOL

Turnover: EDG “B” out of service for MTN PM’s – expected back in six hours. TS 3.8.1 conditions A & B entered; STS NB-005, Breaker Alignment Verification has been completed – due in seven hours.

MDAFW pump “B” tagged out/out of service for due to Emergent work (SM Concern). Expected return is six hours. TS 3.7.5 condition B entered.

Event No.	Malf. No.	Event Type*	Event Description
1 t+2	mBB22 A	I -- ATC, SRO	PZR level channel BB LI-459A failure high. OFN SB-008, Instrument Malfunctions, Attachment J
2 t+8	bkrDPA D01A	R – ATC C – BOP, SRO	Condensate pump “A” trip OFN AF-025, Unit Limitations, Attachment A OFN MA-038, Rapid Plant Shutdown
3 t+25	ANN- E098 ANN- D099 ANN- C098 mSF15A mSF15B	M- All	Seismic event followed by a Reactor trip occurs. EMG E-0, Reactor Trip or Safety Injection This event series sets up the scenario for the Major event EMG FR-H1, Response to Loss of Secondary Heat Sink.

4 t+25	mNB01 mNB02 mNE02 A	C -- ATC, SRO	(Post Reactor trip) NB01 & NB02 trip (Post reactor trip) EDG A autostart feature disabled – manual available (CT – start EDG “A” in order to energize NB01 bus) Recall NB02 bus unavailable because EDG “B” out of service as part of Turnover item.
5 t+25	mAL02 mtrDPA L01A mBG13 A	M – All	TDAFW pump trip (broken linkage) MDAFW pump “A” trip (shaft seizure) CCP “A” trips due to overcurrent Loss of all Auxiliary Feedwater EMG FR-H1, Response to Loss of Secondary Heat Sink (CT - Establish RCS bleed and feed before Steam Generators dry out)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: <u>Wolf Creek</u> Scenario No.: <u>4</u> Op-Test No.: _____			
Examiners: _____ Operators: _____ _____ _____			
Initial Conditions: 65% power			
Turnover: Load reduction in progress per GEN 00-004, Power Operations, section 6.2, in order to remove "A" Main Feed pump from service due to high vibration. Main Feed Pump "A" is not expected to be out of service very long.			
Use SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown.			
Event No.	Malf. No.	Event Type*	Event Description
1 t+1		R – ATC N – BOP, SRO	Reduce power using GEN 00-004, Power Operations and remove "A" Main Feed Pump from service using SYS AE-320, Turbine Driven Main Feedwater Pump Shutdown (crew may reference / enter OFN AF-025, Unit Limitations, also)
2 t+15	mBB23 A	I – ATC, SRO	Pressurizer Spray valve (BB PCV-455B) fails open because PZR Spray Controller BB PK-455B fails high – manual control available OFN SB-008, Instrument Malfunctions, Attachment V
3 t+20	mAE15 C4	I -- BOP, SRO	S/G C level AE LI-553 failure high OFN SB-008, Instrument Malfunctions, Attachment F ALR 00-110C, SG C Flow Mismatch ALR 00-110B, SG C Lev Dev
4 t+27	mBG13 C	C -- ATC, SRO	Normal Charging Pump (NCP) trip; a Centrifugal Charging Pump must be started, letdown restored etc ALR 00-042A, Charging Line Flow HiLo (SYS BG-120, CVCS Startup or SYS BG-201, Shifting Charging Pumps – either may be used to restore letdown) ALR 00-042E, Charging Pump Trouble (Step 7 re-establishes letdown)

5 t+35	mBB02 B	M -- All	500 gpm Steam Generator Tube Rupture on S/G A OFN BB-07A, Steam Generator Tube Leakage (eventually EMG E-0, Reactor Trip or Safety Injection & EMG E-3, Steam Generator Tube Rupture)
5			EMG E-3, Steam Generator Tube Rupture actions: CT – Isolate feed flow to the ruptured SG before Steam Generator overfills. CT – Cooldown & Depressurize RCS to minimize RCS inventory leakage into the ruptured Steam Generator.
6 t+43	mSA27 EM01 and mSA27 EM02	C – ATC, SRO	Post trip: BIT outlet valves (EM HIS-8801A and EM HIS-8801B) do not open. Manual open available CT - Open BIT outlet valves (EM HIS-8801A and EM HIS-8801B) before the end of the scenario or before needless Red or Orange path occurs. EMG E-0, Reactor Trip or Safety Injection, Attachment F or allowed post Immediate Action completion
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility:		Wolf Creek		Date of Exam:		Aug 31 – Sept 4		Operating Test No.:									
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 (BU)			4 (BU)						
		C R E W P O S I T I O N			C R E W P O S I T I O N			C R E W P O S I T I O N			C R E W P O S I T I O N						
		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 checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX			0		1							1	1	1	0	
	NOR			3		0							1	1	1	1	
	I/C			145		34							5	4	4	2	
	MAJ			67		5							3	2	2	1	
	TS			0		0							0	0	2	2	
RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	RX		3		0								1	1	1	0	
	NOR		0		0								0	1	1	1	
	I/C		124		1234 67								9	4	4	2	
	MAJ		67		5								3	2	2	1	
	TS		0		12								2	0	2	2	
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>	RX	0				0							0	1	1	0	
	NOR	3				0							1	1	1	1	
	I/C	1245				234 67							9	4	4	2	
	MAJ	67				5							3	2	2	1	
	TS	12				0							2	0	2	2	
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	RX							0	2	0	0	1	0		1	1	0
	NOR							0	0	0	1	0	1		1	1	1
	I/C							124	14	2	2346	246	3		4	4	2
	MAJ							35	35	35	5	5	5		2	2	1
	TS							1	0	0	3	0	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 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 Instant SRO *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 1-for-1 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.