

Facility:		SONGS 2 & 3 NRC										Date of Exam:		10/19/09				
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	4	3	2				2	5				2	18	3	3	6	
	2	0	1	3				3	1				1	9	2	2	4	
	Tier Totals	4	4	5				5	6				3	27	5	5	10	
2. Plant Systems	1	3	3	2	2	2	1	3	4	1	3	4	28	2	3	5		
	2	1	0	1	0	1	2	1	2	1	1	0	10	0	1	3		
	Tier Totals	4	3	3	2	3	3	4	6	2	4	4	38	3	5	8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	
					3		3		2		2			2	2	1	2	
<p>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).</p> <p>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 <math>\pm 1</math> 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.</p> <p>3. Systems / evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems / evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.</p> <p>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.</p> <p>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.</p> <p>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</p> <p>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.</p> <p>8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.</p> <p>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.</p>																		

SONGS 2 & 3  
NRC Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

E/APE # / Name Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
040 / Steam Line Rupture - Excessive Heat Transfer / 4					X		AA2.05	Ability to determine or interpret the following as they apply to the Steam Line Rupture: When ESFAS systems may be secured	4.5	76
CE / E02 / Reactor Trip - Stabilization - Recovery / 1					X		EA2.2	Ability to determine and interpret the following as they apply to the Reactor Trip Recovery: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	4.0	77
015/17 RCP Malfunctions / 4						X	2.1.20	Conduct of Operations: Ability to interpret and execute procedure steps	4.6	78
009 / Small Break LOCA / 3						X	2.2.37	Equipment Control: Ability to determine operability and/or availability of safety related equipment	4.6	79
025 Loss of RHR System / 4					X		AA2.07	Ability to determine the following as they apply to the Loss of Residual Heat Removal System: Pump cavitation	3.7	80
011 Large Break LOCA / 3						X	2.2.42	Equipment Control: Ability to recognize system parameters that are entry-level conditions for Technical Specifications	4.6	81
007 Reactor Trip - Stabilization - Recovery / 1		X					EK2.03	Knowledge of the interrelations between a reactor trip and the following: Reactor trip status panel	3.5	39
008 / Pressurizer Vapor Space Accident / 3	X						AK1.02	Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident: Change in leak rate with change in pressure	3.1	40
009 / Small Break LOCA / 3		X					EK2.03	Knowledge of the interrelations between the small break LOCA and the following: SGs	3.0	41
011 / Large Break LOCA / 3				X			EA1.05	Ability to operate and/or monitor the following as they apply to a large break LOCA: Manual and/or automatic transfer of suction of charging pump to borated source	4.3	42
015 / 17 / RCP Malfunctions / 4					X		AA2.01	Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Cause of RCP failure	3.0	43

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E/APE # / Name Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
025 / Loss of RHR System / 4					X		AA2.05	Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Limitations on LPI flow and temperature rates of change	3.1	44
026 / Loss of Component Cooling Water / 8			X				AK3.02	Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS resulting from the actuation of ESFAS	3.6	45
027 / Pressurizer Pressure Control System Malfunction / 3	X						AK1.02	Knowledge of the operational implications of the following concepts as they apply to the Pressurizer Pressure Control Malfunctions: Expansion of liquids as temperature increases	2.8	46
029 / ATWS / 1					X		EA2.07	Ability to determine or interpret the following as they apply to a ATWS: Reactor trip breaker indicating lights	4.2	47
038 / Steam Generator Tube Rupture / 3	X						EK1.01	Knowledge of the operational implications of the following concepts as they apply to the SGTR: Use of steam tables	3.1	48
055 / Station Blackout / 6						X	2.2.44	Equipment Control: 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	49
056 / Loss of Offsite Power / 6					X		AA2.20	Ability to determine and interpret the following as they apply to the Loss of Offsite Power: AFW flow indicator	3.9	50
057 / Loss of Vital AC Instrument Bus / 6			X				AK3.01	Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital AC electrical instrument bus	4.1	51
058 / Loss of DC Power / 6	X						AK1.01	Knowledge of the operational implications of the following concepts as they apply to Loss of DC power: Battery charger equipment and instrumentation	2.8	52
062 / Loss of Nuclear Service Water / 4						X	2.4.35	Emergency Procedures/Plan: Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects	3.8	53

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Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

E/APE # / Name Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
065 / Loss of Instrument Air / 8					X		AA2.03	Ability to determine and interpret the following as they apply to the Loss of the Instrument Air: Location and isolation of leaks	2.6	54
077 / Generator Voltage and Electric Grid Disturbances / 6				X			AA1.05	Ability to operate and/or monitor the following as they apply to Generator Voltage and Electric Grid Disturbances: Engineered safety features	3.9	55
CE / E05 / Steam Line Rupture - Excessive Heat Transfer / 4		X					EK2.2	Knowledge of the interrelations between the Excess Steam Demand and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.7	56
K/A Category Point Totals:	4	3	2	2	5 / 3	2 / 3	Group Point Total:			18 / 6

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

E/APE # / Name Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
032 / Loss of Source Range NI / 7					X		AA2.07	Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation: Maximum allowable channel disagreement	3.4	82
068 / Control Room Evacuation / 8						X	2.4.41	Emergency Procedures / Plan: Knowledge of the emergency action level thresholds and classifications	4.6	83
067 / Plant Fire on Site / 8					X		AA2.03	Ability to determine and interpret the following as they apply to the Plant Fire on Site: Fire alarm	3.5	84
CE / E09 / Functional Recovery						X	2.2.42	Equipment Control: Ability to recognize system parameters that are entry level conditions for Technical Specifications	4.6	85
060 / Accidental Gaseous Radwaste Release / 9				X			AA1.02	Ability to operate and/or monitor the following as they apply to the Accidental Gaseous Radwaste: Ventilation system	2.9	57
051 / Loss of Condenser Vacuum / 4			X				AK3.01	Knowledge of the reasons for the following responses as they apply to the Loss of Condenser Vacuum: Loss of steam dump capability upon loss of condenser vacuum	2.8	58
032 / Loss of Source Range NI / 7						X	2.1.27	Conduct of Operations: Knowledge of system purpose and/or function	3.9	59
037 / Steam Generator Tube Leak / 3			X				AK3.06	Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: Normal operating precautions to preclude or minimize SGTR	3.6	60
059 / Accidental Liquid Radwaste Release / 9		X					AK2.01	Knowledge of the interrelations between the accidental liquid Radwaste release and the following: Radioactive liquid monitors	2.7	61
067 / Plant Fire on Site / 8					X		AA2.05	Ability to determine and interpret the following as they apply to the Plant Fire on Site: Ventilation alignment necessary to secure affected area	3.2	62

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Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

E/APE # / Name Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Q#
CE / A13 / Natural Circulation / 4			X				AK3.4	Knowledge of the reasons for the following responses as they apply to the Natural Circulation Operations: 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 facility license and amendments are not violated	3.1	63
CE / A16 / Excess RCS Leakage / 2				X			AA1.1	Ability to operate and monitor the following as they apply to the Excess RCS Leakage: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.4	64
068 / Control Room Evacuation / 8				X			AA1.28	Ability to operate and / or monitor the following as they apply to the Control Room Evacuation: PZR level control and pressure control	3.8	65
K/A Category Point Totals:	0	1	3	3	1 / 2	1 / 2	Group Point Total:			9 / 4

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NRC Written Examination Outline  
Plant Systems – Tier 2 Group 1

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
010 / Pressurizer Pressure Control								X				A2.01	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: Heater failures	3.6	86
059 / Main Feedwater											X	2.2.44	Equipment Control: Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions affect plant and system conditions	4.4	87
007 / Pressurizer Relief/Quench Tank											X	2.2.40	Equipment Control: Ability to apply Technical Specifications for a system	4.7	88
013 / Engineered Safety Features Actuation								X				A2.06	Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Inadvertent ESFAS actuation	4.0	89
076 / Service Water											X	2.4.21	Emergency Procedures/Plan: Knowledge of the parameters and logic used to assess safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	4.6	90
003 / Reactor Coolant Pump											X	2.4.11	Emergency Procedures/Plan: Knowledge of abnormal condition procedures	4.0	1
003 / Reactor Coolant Pump	X											K1.10	Knowledge of the physical connections and/or cause-effect relationships between the RCPs and the following systems: RCS	3.0	2
004 / Chemical and Volume Control								X				A2.25	Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Uncontrolled boration or dilution	3.8	3

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Plant Systems – Tier 2 Group 1

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
005 / Residual Heat Removal					X							K5.03	Knowledge of the operational implications of the following concepts as they apply to the RHRS: Reactivity effects of RHR fill water	2.9	4
005 / Residual Heat Removal		X										K2.01	Knowledge of bus power supplies to the following: RHR pumps	3.0	5
006 / Emergency Core Cooling					X							K5.07	Knowledge of the operational implications of the following concepts as they apply to ECCS: Expected temperature levels in various locations of the RCS due to various plant conditions	2.7	6
007 / Pressurizer Relief / Quench Tank				X								K4.01	Knowledge of the PRTS feature(s) and/or interlock(s) which provide for the following: Quench tank cooling	2.6	7
008 / Component Cooling Water								X				A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: PRMS alarm	3.3	8
008 / Component Cooling Water											X	2.4.46	Emergency Procedures/Plan: Ability to verify that the alarms are consistent with plant conditions	4.2	9
010 / Pressurizer Pressure Control			X									K3.02	Knowledge of the effect that a loss or malfunction of the PZR PCS will have on the following: RPS	4.0	10
012 / Reactor Protection		X										K2.01	Knowledge of bus power supplies to the following: RPS channels, components, and interconnections	3.3	11
013 / Engineered Safety Features Actuation						X						K6.01	Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: Sensors and detectors	2.7	12
022 / Containment Cooling							X					A1.04	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Cooling water flow	3.2	13
026 / Containment Spray										X		A4.01	Ability to manually operate and/or monitor in the control room: CSS controls	4.5	14



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Plant Systems – Tier 2 Group 1

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
026 / Containment Spray								X				A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Reflux boiling pressure spike when first going on recirculation	2.7	15
039 / Main and Reheat Steam										X		A4.01	Ability to manually operate and/or monitor in the control room: Main steam supply valves	2.9	16
059 / Main Feedwater											X	2.1.27	Conduct of Operations: Knowledge of system purpose and/or function	3.9	17
061 / Auxiliary/Emergency Feedwater							X					A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including: Steam generator pressure	3.3	18
061 / Auxiliary/Emergency Feedwater	X											K1.07	Knowledge of the physical connections and/or cause-effect relationships between the AFW system and the following systems: Emergency water source	3.6	19
062 / AC Electrical Distribution			X									K3.02	Knowledge of the effect that a loss or malfunction of the AC distribution system will have on the following: Emergency diesel generator	4.1	20
063 / DC Electrical Distribution				X								K4.02	Knowledge of DC electrical system feature(s) and/or interlock(s) which provide for the following: Breaker interlocks, permissives, bypasses and cross-ties	2.9	21
064 / Emergency Diesel Generator		X										K2.02	Knowledge of the bus power supplies to the following: Fuel oil pumps	2.8	22
064 / Emergency Diesel Generator								X				A2.08	Ability to (a) predict the impacts of the following malfunctions or operations on the EDG system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Consequences of opening closing breaker between buses (VARS, out of phase, voltage)	2.7	23

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Plant Systems – Tier 2 Group 1

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
073 / Process Radiation Monitoring							X					A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRM system controls including: Radiation levels	3.2	24
076 / Service Water										X		A4.02	Ability to manually operate and/or monitor in the control room: SWS valves	2.6	25
076 / Service Water											X	2.1.25	Conduct of Operations: Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	26
078 / Instrument Air	X											K1.02	Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: Service air	2.7	27
103 / Containment									X			A3.01	Ability to monitor automatic operation of the containment system, including: Containment isolation	3.9	28
K/A Category Point Totals:	3	3	2	2	2	1	3	4 / 2	1	3	4 / 3	Group Point Total:			<b>28 / 5</b>

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NRC Written Examination Outline  
Plant Systems – Tier 2 Group 2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
045 / Main Turbine Generator											X	2.1.20	Conduct of Operations: Ability to interpret and execute procedure steps	4.6	91
071 / Waste Gas Disposal											X	2.1.32	Conduct of Operations: Ability to explain and apply system limits and precautions	4.0	92
034 / Fuel Handling Equipment									X			A3.02	Ability to monitor automatic operation of the Fuel Handling System, including: Load limits	3.1	93
002 / Reactor Coolant					X							K5.01	Knowledge of the operational implications of the following concepts as they apply to the RCS: Basic heat transfer concepts	3.2	29
015 / Nuclear Instrumentation								X				A2.05	Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Core void formation	3.3	30
016 / Non-nuclear Instrumentation										X		A4.01	Ability to manually operate and/or monitor in the control room: NNI channel select controls	2.9	31
029 / Containment Purge			X									K3.01	Knowledge of the effect that a loss or malfunction of the Containment Purge System will have on the following: Containment parameters	2.9	32
035 / Steam Generator						X						K6.03	Knowledge of the effect of a loss or malfunction on the following will have on the SGs: Steam generator level detector	2.6	33
041 / Steam Dump/Turbine Bypass Control								X				A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the SDS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of IAS	2.8	34
055 / Condenser Air Removal									X			A3.03	Ability to monitor automatic operation of the CARS, including: Automatic diversion of CARS exhaust	2.5	35

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Plant Systems – Tier 2 Group 2

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topics	Imp.	Q#
056 / Condensate	X											K1.03	Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: MFW	2.6	36
072 / Area Radiation Monitoring							X					A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ARM system controls including: Radiation levels	3.4	37
086 / Fire Protection						X						K6.04	Knowledge of the effect of a loss or malfunction of the following will have on the Fire Protection System: Fire, smoke, and heat detectors	2.6	38
K/A Category Point Totals:	1	0	1	0	1	2	1	2	1 / 1	1	0 / 2	Group Point Total:			<b>10 / 3</b>

Facility: SONGS 2& 3		Date of Exam: 10/19/2009				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, over time limitations, etc.			3.9	94
	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation			4.4	95
	2.1.21	Ability to verify the controlled procedure copy	3.5	66		
	2.1.15	Knowledge of administrative requirements for temporary management directives, such as standing orders, night orders, Operations memos, etc	2.7	67		
	2.1.31	Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup	4.6	68		
	Subtotal			3		2
2. Equipment Control	2.2.6	Knowledge of the process for making changes to procedures			3.6	96
	2.2.25	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits			4.2	97
	2.2.22	Knowledge of limiting conditions for operations and safety limits	4.0	69		
	2.2.39	Knowledge of less than or equal to one hour Technical Specification action statements for systems	3.9	70		
	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings	3.5	71		
	Subtotal			3		2
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions			3.7	98
	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.	3.2	72		
	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions	3.2	73		
	Subtotal			2		1
4. Emergency Procedures / Plan	2.4.6	Knowledge of EOP mitigation strategies			4.7	99
	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			4.2	100
	2.4.2	Knowledge of system setpoints, interlocks and automatic actions associated with EOP entry conditions	4.5	74		
	2.4.39	Knowledge of RO responsibilities in emergency plan implementation	3.9	75		
	Subtotal			2		2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1 / 1	011 G2.1.28	Q #81 – This K/A does not meet the requirements of 10 CFR 55.43 for SRO-only questions. Randomly reselected 011 G2.2.42.
2 / 1	076 A1.02	Q #25 – This specific K/A does not apply at SONGS. The Turbine Building Closed Cooling Water System is cooled by the Circulating Water System and the Reactor Building Closed Cooling Water System does not exist. Randomly reselected 076 A4.02.
1 / 2	067 AA2.10	Q #62 – This specific K/A does not apply at SONGS as there is no installed long-term breathing air system. Randomly reselected 067 AA2.05.
2 / 1	008 G 2.4.3	Q #09 – This specific K/A does not apply at SONGS as there is no Post Accident Monitoring Instrumentation associated with the Component Cooling Water System. Randomly reselected G 2.4.46.
1 / 1	065 G 2.1.25	Q #79 – Coverage of the Instrument Air System deemed adequate per Questions #27 and #54. Randomly reselected 003 G 2.2.37.
2 / 2	017 G 2.4.34	Q #92 – Unable to develop an appropriate SRO Level question using the Incore Temperature Monitoring System with this generic K/A. Plant monitoring outside the Control Room is limited to Thot and Tcold indications on the Emergency Plant Parameters Monitoring (EPPM) Panel. Randomly reselected 071 G 2.4.20.
2 / 1	013 K4.19	Q #12 – Unable to develop a psychometrically sound question that discriminates at the appropriate license level. Reselected 013 K6.01 to improve the balance of exam outline.
2 / 1	039 A4.04	Q #16 – Unable to develop a psychometrically sound question that discriminates at the appropriate license level. Reselected 039 A4.01 to improve the balance of the exam.
2 / 2	072 G 2.4.6	Q #37 – Unable to develop a psychometrically sound question that discriminates at the RO level. Reselected 072 A1.01.
1 / 1	029 G 2.2.38	Q #47 – Unable to develop a psychometrically sound question that discriminates at the RO level. Reselected 029 EA2.07.
1 / 2	068 AA2.05	Q #65 – Unable to develop a psychometrically sound question that discriminates at the RO level. Reselected 068 AA1.28.
3 / 1	G 2.1.14	Q #67 – Unable to develop a psychometrically sound question that discriminates at the RO level. Reselected G 2.1.15.
1 / 2	068 G 2.4.18	Q #83 – Unable to develop a psychometrically sound question that discriminates at the SRO level. Reselected 068 G 2.4.41.
2 / 2	071 G 2.4.20	Q #92 – Unable to develop a psychometrically sound question that discriminates at the SRO level. Reselected 071 G 2.1.32.
3 / 3	G 2.3.14	Q #98 – Unable to develop a psychometrically sound question that discriminates at the SRO level. Reselected G 2.3.4.

2 / 1	026 A2.03	Q #87 – Coverage of the Containment Spray System deemed adequate per Questions #14, #15 and JPM S-5, Terminate Containment Spray which includes RNO actions due to failure of Engineered Safety Feature equipment. Reselected 059 G 2.2.44.

Facility: SONGS 2 & 3		Date of Examination: 10/19/09
Examination Level	RO <input type="checkbox"/>	Operating Test Number: NRC
Administrative Topic (see Note)	Type Code*	Describe Activity to be Performed
Conduct of Operations	N, R	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation (4.3).  JPM: Perform an RCS Inventory Balance (New).
Conduct of Operations	M, R	2.1.25 Ability to interpret reference materials such as graphs, curves, tables, etc. (3.9).  JPM: Determine Time to Boil (J213A).
Equipment Control	N, R	2.2.12 Knowledge of Surveillance Procedures (3.7).  JPM: Perform Core Exit Thermocouple Channel Checks. (New)
Radiation Control	M, S	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. (3.2).  JPM: Determine Dose for Maintenance Activities (J236A2).
Emergency Plan	-	
<b>NOTE:</b> 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.		
<b>*Type Codes &amp; Criteria:</b> (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank ( $\leq 3$ for ROs; $\leq$ for 4 for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		



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## Administrative Topics Outline

### Task Summary

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- RO A.1.a     The candidate will perform a Reactor Coolant System Inventory Balance per SO23-3-3.37, Reactor Coolant System Inventory Balance. The critical steps include correctly documenting parameters and performing calculations within allowable tolerances. This is a new JPM.
- RO A.1.b     The candidate will calculate Time-to-Boil per SO23-5-1.8.1, Shutdown Nuclear Safety, Attachment 9, Calculation of RCS Time-to-Boil Margin. The critical steps include correctly interpreting curves within tolerances and performing the final calculation within given tolerances. This is a modified bank JPM.
- RO A.2        The candidate will be provided with a set of Core Exit Thermocouple data and will determine if the required OPERABILITY is met using SO23-3-3.35, PAMI / Safe Shutdown Monthly Checks, Attachment 2, Core Exit Thermocouples and Heated Junction Thermocouple System Monthly Channel Checks. The critical steps include identifying any out-of-service thermocouples and correctly determining OPERABILITY of the Core Exit Thermocouple System. This is a new JPM.
- RO A.3        The candidate will be required to calculate stay time based on a maintenance activity. The critical steps require determining the optimum total dose using either time, distance or shielding for performing the task. This is a modified bank JPM.
- RO A.4        N/A

Facility: SONGS 2 & 3		Date of Examination: 10/19/09
Examination Level	SRO <input type="checkbox"/>	Operating Test Number: NRC
Administrative Topic (see Note)	Type Code*	Describe Activity to be Performed
Conduct of Operations	M, R	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation (4.4).  JPM: Determine Azimuthal Power Tilt (J250A).
		2.1.25 Ability to interpret reference materials such as graphs, curves, tables, etc. (4.2).  JPM: Determine Time to Boil (J213A).
Equipment Control	N, R	2.2.12 Knowledge of Surveillance Procedures (4.1).  JPM: Review Core Exit Thermocouple Channel Check surveillance and verify Technical Specification Compliance. (New)
Radiation Control	N, R	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. (3.7).  JPM: Determine Containment Access Requirements (New).
Emergency Plan	M, R	2.4.44 Knowledge of emergency plan protective action recommendations. (4.4).  JPM: Determine Protective Actions (J126A).
<b>NOTE:</b> 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.		
<b>*Type Codes &amp; Criteria:</b> (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank ( $\leq 3$ for ROs; $\leq$ for 4 for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		

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Administrative Topics Outline  
Task Summary

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- SRO A.1.a The candidate will perform an Azimuthal Power Tilt calculation per SO23-3-3.6, COLSS Out of Service Surveillance, attachment 3, Azimuthal Power Tilt Determination. The critical steps include correctly transposing data, accurately performing all calculations, correctly identifying out of tolerance conditions and identifying required actions. Additionally, a determination of actions for out-of-tolerance Azimuthal Tilt is required. This is a modified bank JPM.
- SRO A.1.b The candidate will calculate Time-to-Boil per SO23-5-1.8.1, Shutdown Nuclear Safety, Attachment 9, Calculation of RCS Time-to-Boil Margin. The critical steps include correctly interpreting curves within tolerances and performing the final calculation within given tolerances. This is a modified bank JPM.
- SRO A.2 The candidate will be provided with a set of Core Exit Thermocouple data and will determine if the required OPERABILITY is met using SO23-3-3.35, PAMI / Safe Shutdown Monthly Checks, Attachment 2, Core Exit Thermocouples and Heated Junction Thermocouple System Monthly Channel Checks. The critical steps include identifying any out-of-service thermocouples, correctly determining OPERABILITY, and recording entry into any required Technical Specification LCOs for the Core Exit Thermocouple System. This is a new JPM.
- SRO A.3 The candidate will determine the requirements for Containment access per SO23-3-2.34, Containment Access Control, Inspections and Airlocks Operation. The critical steps include properly identifying all requirements on Attachment 1, Containment Access Requirements. This is a new JPM.
- SRO A.4 The candidate will review given plant conditions and offsite dose information and determine required protective actions per SO123-VIII-10.3, Protective Action Recommendations. The critical steps include determining the affected areas and the recommended protective actions. This is a modified bank JPM.

Facility:		SONGS Units 2 and 3		Date of Examination:		10/19/09	
Exam Level:		RO <input type="checkbox"/> SRO(I) <input type="checkbox"/> <b>SRO (U) <input checked="" type="checkbox"/></b>		Operating Test No.:		NRC	
Control Room Systems <sup>®</sup> (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U, including 1 ESF)							
System / JPM Title				Type Code*		Safety Function	
<b>S-1</b>	<b>001 – Control Rod Drive System (New)</b> <b>Perform Immediate Actions for Control Room Evacuation</b>			<b>A, N, S</b>		<b>1</b>	
S-2	004 – Chemical and Volume Control System (J083S) Secure Charging and Letdown			D, S		2	
<b>S-3</b>	<b>006 – Emergency Core Cooling System (J073S)</b> <b>Align Simultaneous Hot Leg and Cold Leg Injection</b>			<b>A, EN, M, S</b>		<b>3</b>	
<b>S-4</b>	<b>003 – Reactor Coolant Pump System (J027FS)</b> <b>Start a Reactor Coolant Pump</b>			<b>A, D, L, S</b>		<b>4-P</b>	
S-5	022 – Containment Spray System (J049FS) Terminate Containment Spray			A, D, EN, S		5	
S-6	064 – Emergency Diesel Generator System (J054S) Restore 1E Bus 2A06 From Cross-Tie Operations			D, S		6	
C-7	073 – Process Radiation Monitoring System (J120S) (RO only) Reset and Restore Fuel Handling Isolation System			C, M		7	
C-8	029 – Containment Purge System (J147FS) Place Containment Mini-Purge in Service			A, C, M		8	
In-Plant Systems <sup>®</sup> (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)							
P-1	059 – Main Feedwater System (J109) Locally Operate Main Feedwater Regulating Valve			D		4-S	
<b>P-2</b>	<b>004 – Chemical and Volume Control System (New)</b> <b>Locally Align Charging Pump Suction to RWST</b>			<b>E, N, R</b>		<b>2</b>	
<b>P-3</b>	<b>012 – Reactor Protection System (J021F)</b> <b>Locally Open Reactor Trip Breakers (TIME CRITICAL)</b>			<b>D, E, R</b>		<b>7</b>	

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.	
* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	$\leq 9 / \leq 8 / \leq 4$
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$
(EN)gineered safety feature	- / - / $\geq 1$ (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	

**NRC JPM Examination  
Summary Description**

- S-1 The candidate will perform the immediate operator actions for a Control Room Evacuation per Abnormal Operating Instruction SO23-13-02, Shutdown from Outside the Control Room. The alternate path is performed when a Reactor Coolant Pump breaker fails to open. This is a new JPM under the Control Rod Drive System - Reactivity Control safety function. This is a PRA significant action.
- S-2 The candidate will secure Charging and Letdown as part of an RCS leak investigation per SO23-3-2.1.02, Chemical and Volume Control System Outage Evolutions. This is a bank JPM under the Chemical and Volume Control System - Reactor Coolant Inventory Control safety function.
- S-3 The candidate will align simultaneous Hot Leg and Cold Leg Injection during a Loss of Coolant Accident per SO23-12-11, EOI Supporting Attachments, Attachment 11, Simultaneous Hot / Cold Leg Injection. The alternate path requires the operator to perform actions with a High Pressure Safety Injection Pump out-of-service. This is a modified bank JPM under the Emergency Core Cooling System - Reactor Pressure Control safety function. This is a PRA significant action.
- S-4 The candidate will start the fourth Reactor Coolant Pump during a Plant Startup per SO23-3-1.7, Reactor Coolant Pump Operation. The alternate path occurs when Component Cooling Water flow is lost to the RCP and the operator trips the Reactor Coolant Pump per the alarm response procedure. This is a bank JPM

under the Reactor Coolant Pump System - Heat Removal from Reactor Core safety function.

- S-5 The candidate will be required to terminate Containment Spray per SO23-12-11, EOI Supporting Attachments, Attachment 2, Floating Steps. The alternate path occurs when there is only one Containment Emergency Cooling Unit operating and the actions of the RNO path are required. This is a bank JPM under the Containment Spray System - Containment Integrity safety function.
- S-6 The candidate will be required to restore from 1E 4160V unit cross-tie operations per SO23-6-2, Transferring of 4 kV Buses, Section 6.9, Restoring from 1E 4kV Bus 3A06 to 2A06 Cross-Tie Operation. This is a bank JPM under the AC Electrical Distribution System - Electrical safety function.
- C-7 The candidate will reset and re-establish normal Fuel Building Ventilation after isolation due to a high radiation signal per SO23-3-2.22, Engineered Safety Features Actuation Systems Operation, Attachment 23, FHIS Reset and Restoration. This is a modified bank JPM under the Area Radiation Monitoring System - Instrumentation safety function.
- C-8 The candidate will place the Containment Mini-Purge System in operation to support a Containment entry per SO23-1-4.2, Containment Purge and Recirculation Filtration System. The alternate path occurs when a Containment Radiation High alarm is received and the operator isolates mini-purge per the alarm response. This is a modified bank JPM under the Containment Purge System - Plant Service Systems safety function.
- P-1 The candidate will perform the local actions to operate a Main Feedwater Regulating Valve per SO23-9-6, Feedwater Control System Operation, Section 6.4, Local-Manual Operation of Main Feedwater Control Valves. This is a bank JPM under the Main Feedwater System - Secondary System Heat Removal from Reactor Core safety function.
- P-2 The candidate will perform the actions to align Charging Pump suction to the Refueling Water Storage Tank per SO23-13-2, Shutdown from Outside the Control Room, Attachments 10 and 11. This is a new JPM under the Chemical and Volume Control System - Reactor Coolant System Inventory Control safety function. This is a PRA significant action.
- P-3 The candidate will locally open Reactor Trip breakers per SO23-12-1, Standard Post Trip Actions. This is a time critical, bank JPM under the Reactor Protection System – Instrumentation safety function. This is a PRA significant action.

Facility: SONGS 2 and 3      Scenario No.: 1      Op Test No.: October 2009 NRC

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_

- Initial Conditions:
- 99% power MOC - RCS Boron is 1003 ppm (by sample).
  - Train A Component Cooling Water Pump (P-025) in service.
  - Train A Low Pressure Safety Injection Pump (P-015) OOS for oil change.
  - Train A Emergency Diesel Generator (G-002) OOS for governor repair.
  - Fire Computer is OOS.

Turnover: Maintain steady-state power conditions.

- Critical Tasks:
- Trip the Reactor following multiple CEA drops.
  - Establish minimum design Safety Injection flow rate (SIAS component failure).

Event No.	Malf. No.	Event Type*	Event Description
1 +10 min	CH04D	TS (CRS)	Containment Wide Range Pressure Transmitter (PT-0352-4) fails high.
2 +20 min	FC05B	I (BOP, CRS)	Steam Generator (E-088) Main Feedwater Master Controller setpoint fails to 50% level on 60 second ramp.
3 +30 min	RD4403	C (BOP, CRS) TS (CRS)	Dropped CEA #44.
4 +45 min		R (RO) N (BOP, CRS)	Power reduction for dropped CEA.
5 +45 min	RD0303	C (RO, CRS)	Dropped CEA #3. Manual Reactor trip required.
6 +50 min	RC01A	M (RO, BOP, CRS)	Large Break Loss of Coolant Accident upon Unit trip.
7 +50 min	Bus 2A07 XFR LP	I (BOP)	Non-1E 4160 Volt Bus 2A07 auto transfer failure upon Unit trip.
8 +55 min	RP01E	C (RO)	Low Pressure Safety Injection Pump (P-016) fails to auto start.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specifications			

### **SCENARIO SUMMARY NRC #1**

The crew will assume the watch and maintain steady-state conditions per Operating Instruction (OI) SO23-5-1.7, Power Operations.

The first event is a Containment Wide Range Pressure Transmitter failure. The crew will respond per Abnormal Operating Instruction (AOI) SO23-13-18, Reactor Protection System Failure/Loss of Vital Bus and Operating Instruction (OI) SO23-3-2.12, Reactor Protective System Operation. The CRS will evaluate Technical Specifications.

When Technical Specification actions are complete, Steam Generator E-088 Master Controller Setpoint fails to 50%. Entry into AOI SO23-13-24, Feedwater Control System Malfunction is required. The CRS will analyze the cause of the failure using Attachment 1 of SO23-13-24. Steam Generator level control is restored by placing the Master Controller in Manual. When Steam Generator level control is achieved the controller will be returned to automatic operation.

When level control is regained, Control Element Assembly #44 will drop into the core. Crew actions are per AOI SO23-13-13, Misaligned or Immovable Control Element Assembly and include a power reduction as required per procedure. The crew will restore RCS Cold Leg temperature per OI SO23-5-1.7, Power Operations and block any further load changes and then continue with a power reduction as required per SO23-13-13. The CRS will evaluate Technical Specifications.

When the crew commences recovery of CEA #44, a second Control Element Assembly will drop into the core necessitating a manual Reactor trip.

When the Reactor is tripped, a Large Break Loss of Coolant Accident will occur. The crew will enter Emergency Operating Instruction (EOI) SO23-12-1, Standard Post Trip Actions and then transition to EOI SO23-12-3, Loss of Coolant Accident. Post trip events include a Non-1E 4160 Volt Bus that fails to transfer as well as a Low Pressure Safety Injection Pump start failure. Both of these failures require actions on the part of the Reactor and Balance of Plant Operators.

The scenario is terminated when conditions for reactor coolant system cooldown is reached.

#### **Risk Significance:**

- Risk important components out of service: LPSI Pump (P-015)  
Emergency Diesel Generator (G-002)
- Failure of risk important system prior to trip: Dropped Control Element Assembly
- Risk significant core damage sequence: Large Break LOCA
- Risk significant operator actions: Trip Reactor Following Multiple CEA Drop  
Trip RCPs Due to Loss of CCW  
Establish Minimum Safety Injection Flowrate



Scenario Event Description

NRC Scenario #1

SONGS

2009 Facility NRC Initial License Examination  
Simulator Scenario Setup

**Machine Operator:**    **EXECUTE IC #221 and NRC Scenario #1 SETUP file to align components.**  
**HANG Control Board Tags on P-015 and G-002.**  
**CHANGE Operator Aid Tags #029 (CVCS) and #005-4 (CVCS Ion Exchanger) to reflect the scenario boron concentration.**  
**VERIFY both Pressurizer Spray Valves in AUTO.**  
**PLACE 2G002 EDG in MAINTENANCE LOCKOUT.**  
**PLACE procedures in progress on the RO desk:**  
**- Copy of SO32-5-1.7, Power Operations open to Section 6.1, Guidelines for Steady State Operation.**  
**PLACE the MOC copies of OPS Physics Summary Book on RO Desk and SO23-5-1.7, Attachment 8 on Control Board.**

**Control Room Annunciators in Alarm:**

**57A51 – SI / ECW TRAIN A INOPERABLE**  
**57A55 – STANDBY POWER SYS TRAIN A INOPERABLE**  
**63B07 – DIESEL GEN 2G002 LOCKOUT RELAY TRIPPED**

Facility:	SONGS 2 and 3	Scenario No.:	2	Op Test No.:	October 2009 NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions: <ul style="list-style-type: none"> <li>99% power MOC - RCS Boron is 1003 ppm (by sample).</li> <li>Train A Component Cooling Water Pump (P-025) in service.</li> <li>Train A Low Pressure Safety Injection Pump (P-015) OOS for oil change.</li> <li>Train A Emergency Diesel Generator (G-002) OOS for governor repair.</li> <li>Fire Computer is OOS.</li> </ul>					
Turnover:		Maintain steady-state power conditions.			
Critical Tasks:		<ul style="list-style-type: none"> <li>Restore Component Cooling Water flow to the Non-Critical Loop.</li> <li>Restore power to at least one 1E 4 kV Bus (Station Blackout).</li> <li>Restore Feedwater flow to at least one Steam Generator (Loss of Feedwater).</li> </ul>			
Event No.	Malf. No.	Event Type*	Event Description		
1 +10 min	ED11	TS (CRS)	Loss of Control Room Annunciators.		
2 +15 min	FW08B	C (BOP, CRS)	Main Feedwater Pump Turbine (P-063) loss of oil pressure.		
3 +35 min		R (RO) N (CRS)	Rapid Power Reduction for loss of one Main Feed Pump.		
4 +50 min	ED03A	C (RO, BOP, CRS) TS (CRS)	Loss of 1E 4160 Volt Bus 2A04.		
5 +50 min	TU08 PG24	M (RO, BOP, CRS)	Loss of Offsite Power.		
6 +50 min	EG08B	M (RO, BOP, CRS)	Emergency Diesel Generator (G-003) fails to start. Station Blackout.		
7 +55 min	FW25	C (BOP)	Turbine Driven Auxiliary Feedwater Pump (P-140) trips on overspeed (300 seconds post-trip). Loss of Feedwater.		
8 +55 min	CVCS LP	I (RO)	Boric Acid Makeup Tank Gravity Feed Valves fail to open during boration.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specifications					

**SCENARIO SUMMARY NRC #2**

The crew will assume the watch and maintain steady-state conditions per Operating Instruction (OI) SO23-5-1.7, Power Operations.

The first event is a Loss of Control Room Annunciators. The crew will respond per Abnormal Operating Instruction (AOI) SO23-13-22, Loss of Control Room Annunciators. Actions include aligning an alternate power supply to the Control Room Annunciators. The CRS will evaluate Technical Specifications.

When the annunciators are restored, a loss of oil pressure to Main Feedwater Pump P-063 will occur. The crew will respond per the Annunciator Response Procedures (ARP) and AOI SO23-13-24, Feedwater Control System Malfunction and determine that a Main Feedwater Pump trip is warranted. This will necessitate entry into AOI SO23-13-28, Rapid Power Reduction in order to low power below the threshold for one (1) Main Feedwater Pump operation.

When plant conditions are stable, a loss of 1E 4160 Volt Bus 2A04 will occur. The crew will enter the AOI SO23-13-26, Loss of Power to an AC Bus. Crew actions include placing a Charging Pump in service as well as transferring to the Train B Component Cooling Water System. The CRS will evaluate Technical Specifications.

The major event is a Loss of Offsite Power that requires entry into Emergency Operating Instruction (EOI) SO23-12-1, Standard Post Trip Actions. During performance of the Standard Post Trip Actions, the Train B Emergency Diesel Generator fails to start. Additionally, five (5) minutes post-trip the Turbine Driven Auxiliary Feedwater Pump will trip on overspeed. With a Station Blackout and Loss of Feedwater, the CRS will be required to enter Functional Recovery Procedure (FRP) SO23-12-9, Functional Recovery. Boric Acid Makeup Tank Gravity Feed Valves fail to open during boration and the Reactor Operator will be required to manually align the Refueling Water Storage Tank.

With Switchyard power unavailable, restoration of Unit 2 1E 4160 Volt Bus 2A06 will be via a crosstie with Unit 3 1E 4160 Volt Bus 3A06. Once the crosstie is successful, Auxiliary Feedwater Pump P-504 can be started to restore feedwater flow to Steam Generator E-088.

The scenario is terminated when the 1E Bus is reenergized, feedwater flow is restored, and boration via the RWST is commenced.

**Risk Significance:**

- Risk important components out of service: LPSI Pump (P-015)  
Emergency Diesel Generator (G-002)
- Failure of risk important system prior to trip: Loss of 4160 V Bus 2A04
- Risk significant core damage sequence: Station Blackout with Loss of Feedwater
- Risk significant operator actions: Restore Flow to Non-Critical Loop  
Crosstie Bus 3A06 with Bus 2A06  
Align Feedwater Flow to a Steam Generator

Scenario Event Description

NRC Scenario #2

SONGS

2009 Facility NRC Initial License Examination  
Simulator Scenario Setup

**Machine Operator:**    **EXECUTE IC #222 and NRC Scenario #2 SETUP file to align components.**  
**HANG Control Board Tags on P-015 and G-002.**  
**CHANGE Operator Aid Tags #029 (CVCS) and #005-4 (CVCS Ion Exchanger) to reflect the scenario born concentration.**  
**RESET CVCS Batch Counters to zero (0).**  
**VERIFY both Pressurizer Spray Valves in AUTO.**  
**PLACE Channel X Pressurizer Pressure and Pressurizer Level in service.**  
**PLACE procedures in progress on the RO desk:**  
**- Copy of SO23-5-1.7, Power Operations open to Section 6.1, Guidelines for Steady State Operation.**  
**PLACE the MOC copies of OPS Physics Summary Book on RO Desk and SO23-5-1.7, Attachment 8 on Control Board.**

**Control Room Annunciators in Alarm:**

**57A51 – SI / ECW TRAIN A INOPERABLE**  
**57A55 – STANDBY POWER SYS TRAIN A INOPERABLE**  
**63B07 – DIESEL GEN 2G002 LOCKOUT RELAY TRIPPED**

Facility:	SONGS 2 and 3	Scenario No.:	3	Op Test No.:	October 2009 NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions: <ul style="list-style-type: none"> <li>31% power MOC - RCS Boron is 1243 ppm (by sample).</li> <li>Train A Component Cooling Water Pump (P-025) in service.</li> <li>Train A Low Pressure Safety Injection Pump (P-015) OOS for oil change.</li> <li>Fire Computer is OOS.</li> </ul>					
Turnover: Dilution and power ascension in progress at 10% per hour.					
Critical Tasks: <ul style="list-style-type: none"> <li>Establish Reactivity Control (Two Full Length CEAs Not Fully Inserted &amp; No SIAS).</li> <li>Manually Initiate Main Steam Isolation Signal (Auto Actuation failure).</li> </ul>					
Event No.	Malf. No.	Event Type*	Event Description		
1 +15 min		R (RO) N (BOP, CRS)	Dilution and power ascension at 10% per hour.		
2 +25 min	RC09A	TS (CRS)	Reactor Coolant Pump (P-002) Speed Sensor (SE-0143-1) failure.		
3 +35 min	CV16B	I (RO, CRS)	Volume Control Tank Level Transmitter (LT-0227) fails low.		
4 +50 min	ED06D	C (RO, BOP, CRS) TS (CRS)	Overcurrent trip of Feeder Breaker to 1E 480 Volt Bus 2B04.		
5 +55 min	FW LP RX LP	C (BOP, CRS)	Main Feedwater Pump trip. Primary Side Reactor Trip pushbuttons disabled.		
6 +60 min	MS04B	M (RO, BOP, CRS)	Excess Steam Demand Event downstream of Main Steam Isolation Valves (300 second ramp).		
7 +60 min	RD1402 RD1502	C (RO)	Two CEAs fail to insert on the trip. Emergency boration via gravity feed due to loss of 1E Bus 2B04.		
8 +65 min	MSIS LP	I (BOP)	Main Steam Isolation Signal fails to actuate; manual actuation required.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specifications					

**SCENARIO SUMMARY NRC #3**

The crew will assume the watch and resume a dilution and power ascension per Operating Instruction (OI) SO23-5-1.7, Power Operations at 10% per hour.

The next event is a Reactor Coolant Pump speed sensor failure. The crew will respond per the Annunciator Response Procedures (ARP) and place the appropriate Reactor Protection System trips in Bypass per Abnormal Operating Instruction (AOI) SO23-13-18, Reactor Protection System Failure/Loss of Vital Bus and Operating Instruction (OI) SO23-3-2.12, Reactor Protective System Operation. The CRS will evaluate Technical Specifications.

When Technical Specifications have been addressed, a Volume Control Tank (VCT) level transmitter fails low and transfers Charging Pump suction to the Refueling Water Storage Tank. The crew will align LV-0227B, VCT Outlet Valve and refer to Operating Instruction (OI) SO23-3-2.1, CVCS Operations and/or SO23-3-2.2, Makeup Operations.

The next event is the overcurrent trip of the feeder breaker to 1E 480 Volt Bus 2B04. The crew will respond per AOI SO23-13-26, Loss of Power to an AC Bus. Crew actions include restoring Charging flow as required and placing the Train A Emergency Diesel Generator in Maintenance Lockout. The CRS will evaluate Technical Specifications.

During the next event, the running of Main Feedwater Pump will trip. The crew will determine that a Reactor and Turbine trip are required. The Primary Side Reactor Trip pushbuttons are disabled and the BOP will trip the Reactor.

When the Reactor and Turbine are tripped, an Excess Steam Demand Event (ESDE) downstream of the Main Steam Isolation Valves will occur. The crew should determine that an ESDE is occurring and manually trip the Reactor and Turbine. Entry into Emergency Operating Instruction (EOI) SO23-12-1, Standard Post Trip Actions is required. A transition will then be made to EOI SO23-12-5, Excess Steam Demand Event. Two (2) Control Element Assemblies will fail to insert on the trip and an emergency boration using the Gravity Feed Valves is required. Additionally, a manual Main Steam Isolation Signal must be generated.

This scenario is terminated when the Main Steam Isolation Valves are closed and Reactor Coolant System temperature control is restored using the Atmospheric Dump Valves.

**Risk Significance:**

- Risk important components out of service: Low Pressure Safety Injection Pump (P-015)
- Failure of risk important system prior to trip: Loss of 1E 480 V Bus 2B04
- Risk significant core damage sequence: ESDE with MSIS failure
- Risk significant operator actions:
  - Initiate Emergency Boration
  - Manually Initiate MSIS
  - Establish RCS Temperature Control

Scenario Event Description

NRC Scenario #3

SONGS

2009 Facility NRC Initial License Examination  
Simulator Scenario Setup

**Machine Operator:** EXECUTE IC #223 and NRC Scenario #3 SETUP file to align components.  
HANG Control Board Tags on P-015.  
CHANGE Operator Aid Tags #029 (CVCS) and #005-4 (CVCS Ion Exchanger) to reflect the scenario born concentration.  
VERIFY CVCS PMW Batch Counter indicates ~269 gallons to match SO23-5-1.7, Attachment 9.  
VERIFY both Pressurizer Spray Valves in AUTO.  
ENSURE Main Turbine Load is set for 1.9 MWe/min.  
VERIFY 2FV-9253 is in AUTO / CLOSE when stopping the dilution for turnover.  
PLACE procedures in progress on the RO desk:

- Copy of SO32-5-1.7, Power Operations open to Section 6.3, Turbine Load Change Using Setpoint Adjustment.
- MARKED UP copy of SO23-5-1.7, Attachment 9.
- MARKED UP copy of SO23-3-2.2 with Steps 6.5.1 through 6.5.8 checked off.
- Copy of SO23-3-1.10 open to Section 6.3, Forcing Pressurizer Sprays.
- Copy of SO23-10-1, Turbine Startup and Normal Operation, Attachment 6, MSR Warmup.

VERIFY MOC copies of OPS Physics Summary Book on RO Desk and SO23-5-1.7, Attachment 8 on Control Board.  
If Group Position(s) is (are) not correct, MOVE CEAs and then RETURN CEAs to Shift Turnover Sheet position (Group 6 @ 125 / PLCEAs @ 115).

**Significant Control Room Annunciators in Alarm:**

57A51 – SI / ECW TRAIN A INOPERABLE  
56A30/40/50/60 – LOSS OF LOAD CHANNEL 1/2/3/4 TRIP DISABLED  
53A03 – MFWP TURBINE K006 TRIP  
53B23 – CONDENSATE FLOW BALANCE TROUBLE

Facility:	SONGS 2 and 3	Scenario No.:	4	Op Test No.:	October 2009 NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions: <ul style="list-style-type: none"> <li>Reactor Critical at <math>2 \times 10^{-3}\%</math> power MOC - RCS Boron is 1466 ppm (by sample).</li> <li>Train B Component Cooling Water Pump (P-026) in service.</li> <li>Channel X Pressurizer Level and Pressure Control in service.</li> <li>Fire Computer is OOS.</li> </ul>					
Turnover: Power increase in progress to ~ 2% power.					
Critical Tasks: <ul style="list-style-type: none"> <li>Restore Component Cooling Water flow due to Train B leakage.</li> <li>Reduce Reactor Coolant System Thot to less than 530°F (SGTR).</li> <li>Isolate the most affected Steam Generator (SGTR).</li> </ul>					
Event No.	Malf. No.	Event Type*	Event Description		
1 +15 min		R (RO) N (BOP, CRS)	Rod withdrawal and power increase in progress to ~2% power.		
2 +25 min	CVCS LP	I (RO, CRS)	Letdown Heat Exchanger Temperature Instrument power failure. TV-0224A and TV-0224B fail to reposition.		
3 +35 min	CC05B	C (BOP, CRS) TS (CRS)	Train B Component Cooling Water Heat Exchanger (E-002) tube leak.		
4 +45 min	RX08	C (BOP, CRS)	Steam Bypass Control Valves close. Transfer SBCS Master Controller (PIC-8431) to Local-Manual to open valves.		
5 +50 min	SG06B	C (RO, CRS) TS (CRS)	Steam Generator Tube Leak (E-089) at 50 gpm.		
6 +50 min	SG06B	M (RO, BOP, CRS)	Steam Generator Tube Rupture (E-089) at 300 gpm upon Unit trip.		
7 +60 min	CCAS LP	I (RO)	Containment Cooling Actuation Signal fails to actuate.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specifications					



### **SCENARIO SUMMARY NRC #4**

The crew will assume the watch with the Reactor critical at  $\sim 2 \times 10^{-3}\%$  power. The crew will raise power using CEA withdrawal per Operating Instruction (OI) SO23-5-1.3.1, Plant Startup from Hot Standby to Minimum Load.

The next event is a power failure of a Letdown Temperature Instrument that provides input to TIC-0223, Letdown Temperature Controller. Letdown temperature quickly rises, causing a high temperature alarm, with a failure of automatic actions to isolate the Boronometer and bypass the Letdown Demineralizers. The crew will respond per the Annunciator Response Procedures (ARP) to manually satisfy the automatic actions and restore Letdown temperature to normal

When Letdown conditions are normal, a tube leak will develop on the Train B Component Cooling Water Heat Exchanger. The crew will respond per Abnormal Operating Instruction (AOI) SO23-13-7, Loss of Component Cooling Water/Salt Water Cooling. Crew actions include transferring to the Train A Component Cooling Water System as well as attempting to isolate Train B leakage. The CRS will evaluate Technical Specifications.

When CCW flow is restored, the Steam Bypass Control System (SBCS) Valves will close. Crew actions are per OI SO23-3-2.18, Steam Bypass System Operation and include transferring the SBCS Master Controller to Local-Manual control or operating individual SBCS Valves and restoring Reactor Coolant System temperature and Reactor power level to normal.

When plant conditions are stable, a Steam Generator tube leak will occur. The crew will enter AOI SO23-13-4, RCS Leak and take actions to minimize tube leakage. The size of the leak will require an immediate plant trip and at that time the leak will escalate to a rupture. The crew will enter Emergency Operating Instruction (EOI) SO23-12-1, Standard Post Trip Actions and transition to EOI SO23-12-5, Steam Generator Tube Rupture.

Following the Safety Injection Actuation Signal, the Containment Cooling Actuation Signal fails to actuate requiring manual actions by the crew.

The event is terminated when the affected Steam Generator is cooled down and the Reactor Coolant System is depressurized.

#### **Risk Significance:**

- |   |   |
|---|---|
| • Risk important components out of service:       | None                                    |
| • Failure of risk important system prior to trip: | Loss of Train B Component Cooling Water |
| • Risk significant core damage sequence:          | SGTR with MSIV failure                  |
| • Risk significant operator actions:              | Restore Non-Critical CCW Loop flow      |
|   | Isolate Ruptured Steam Generator        |
|   | Cooldown and Depressurize RCS           |

Scenario Event Description

NRC Scenario #4

SONGS

2009 Facility NRC Initial License Examination  
Simulator Scenario Setup

**Machine Operator:** EXECUTE IC #224 and NRC Scenario #4 SETUP file to align components.  
VERIFY Control Board Tags removed on P-050, P-015, and G-002.  
CHANGE Operator Aid Tags #029 (CVCS) and #005-4 (CVCS Ion Exchanger) to reflect the scenario born concentration.  
CHANGE Operator Aid Tag #005-9 (AFW T-120/121 alignment) to AUTO MAKEUP for both T-120 and T-121.  
VERIFY both Pressurizer Spray Valves in AUTO.  
ENSURE two (2) Charging Pumps running.  
ENSURE Train B Component Cooling Water in service.  
MOVE Component Cooling Water OOS Tags to Train A components.  
ENSURE Steam Generator level is controlled at 50% to 55%.  
PLACE Channel X Pressurizer Pressure and Pressurizer Level in service.  
PLACE procedures in progress on the RO desk:  
- Copy of SO23-5-1.3.1, Plant Startup from Hot Standby to Minimum Load INITIALED through Step 6.5.1.  
- MARKED UP copy of SO23-5-1.7, Attachment 9.  
- MARKED UP copy of SO23-2-4, Auxiliary Feedwater System Operation Section 6.2.  
PLACE the MOC copies of OPS Physics Summary Book on RO Desk and SO23-5-1.7, Attachment 8 on Control Board.  
If Group Position(s) is (are) not correct, MOVE CEAs and then RETURN CEAs to Shift Turnover Sheet position (Group 6 @ 80; PLCEAs @ 75).

**Significant Control Room Annunciators in Alarm:**

50A02 – COLSS ALARM  
53A(B)03 – MFWP TURBINE K006 (K005) TRIP  
56A30/40/50/60 – LOSS OF LOAD CHANNEL 1/2/3/4 TRIP DISABLED  
63E10 – SCE CB TRIP  
99A24 – TURBINE TRIP RELAY TRIPPED  
99B01 – GENERATOR TRIP  
99B19 – VACUUM PROTECTION PLC TROUBLE

Facility:		SONGS 2 and 3		Date of Exam:		10/19/09		Operating Test No.:		NRC							
A P P L I C A N T	E V E N T  T Y P E	SCENARIOS												T O T A L	MINIMUM(*)		
		SONGS #1			SONGS #2			SONGS #3			SONGS #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
SROU	RX	-			-			-			-				1	1	0
	NOR	4			3			1			1				1	1	1
	I/C	1,2,3,5			1,2,4			2,3,4,5			2,3,4,5				4	4	2
	MAJ	6			6,7			6			6				2	2	1
	TS	1,3			1,4			2,4			3,5				0	2	2
SROI	RX	-	4		-	3		-	1		-	1			1	1	0
	NOR	4	-		3	-		1	-		1	-			1	1	1
	I/C	1,2,3,5	5,8		1,2,4	4,8		2,3,4,5	3,4,7		2,3,4,5	2,7			4	4	2
	MAJ	6	6		6,7	6,7		6	6		6	6			2	2	1
	TS	1,3	-		1,4	-		2,4	-		3,5	-			0	2	2
RO	RX		4	-		3	-		1	-		1	-		1	1	0
	NOR		-	4		-	-		-	1		-	1		1	1	1
	I/C		5,8	2,3,7		4,8	2,4,7		3,4,7	4,5,8		2,7	3,4		4	4	2
	MAJ		6	6		6,7	6,7		6	6		6	6		2	2	1
	TS		-	-		-	-		-	-		-	-		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 <i>additionally</i> 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 <i>controlled</i> 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.

Facility: SONGS		Date of Examination: 10/19/09		Operating Test No. NRC 1-4								
Competencies	SRO				RO (ATC)				BOP			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions	1,2,3,4,5,6	1,2,4,5,6,7	1,2,3,4,5	2,3,4,5,6	1,3,5,6,8	1,4,5,6,8	1,2,3,6,7	2,5,6,7	2,3,6,7	2,4,5,6,7	4,5,6,8	3,4,6
Comply With and Use Procedures (1)	ALL	ALL	ALL	ALL	1,3,4,5,6,8	1,3,4,5,6,8	1,2,3,4,6,7	1,2,5,6,7	2,3,4,6,7	2,3,4,5,6,7	1,4,5,6,8	1,3,4,6
Operate Control Boards (2)	N/A	N/A	N/A	N/A	3,4,5,6,8	1,3,4,5,6,8	1,2,3,4,6,7	1,2,5,6,7	2,3,4,6,7	1,2,3,4,5,6,7	1,4,5,6,8	1,3,4,6
Communicate and Interact	ALL	ALL	ALL	ALL	1,3,4,5,6,8	1,3,4,5,6,8	1,2,3,4,6,7	1,2,5,6,7	2,3,4,6,7	1,2,3,4,5,6,7	1,4,5,6,8	1,3,4,6
Demonstrate Supervisory Ability (3)	ALL	ALL	ALL	ALL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Comply With and Use Tech. Specs. (3)	1,3	1,4	2,4	3,5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs.												

**Instructions:**

*Circle the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.*