

2

ES-401		PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						Form ES-401-3		Rev 1								
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Points								
1 - 000001 Continuous Rod Withdrawal / 1 (3)					X		000001AA2.03	Action taken if automatic functions have not taken place	4.8	1								
2 - 000003 Dropped Control Rod / 1 (3)					X		000003AA2.01	Ability to determine and interpret rod position indication to actual rod position	3.9	1								
3 - 000005 Inoperable/Stuck Control Rod / 1 (4)			X				000005AK3.04	Knowledge of the reason for the Tech Spec for INOPERABLE rods	4.1	1								
4 - 000011 Large Break LOCA / 3 (8)	X						000011EK1.01	Natural circulation and cooling, including reflux boiling	4.4	1								
5 - E04 LOCA Outside Containment / 3 (4)	X						E04EK1.3	Knowledge of the operational implications of annunciators and conditions indicating signals, and remedial ...	3.9	1								
6 - E01 & E02 Rediagnosis & SI Term / 3 (5)		X					E02EK2.1	Knowledge of the interrelations between SI termination and components and functions of control and safety ...	3.9	1								
7 - 000015/17 RCP Malfunctions / 4 (5)						X	2.1.7	Ability to evaluate plant performance and make operational judgements based on operating ...	4.4	1								
8 - E09&E10 Natural Circ. / 4 (5)		X					E09EK2.2	Knowledge of the interrelations between natural circulation and the facility's heat removal systems ...	3.9	1								
9 - 000024 Emergency Boration / 1 (3)	X						000024AK1.02	Relationship between boron addition and reactor power	3.9	1								
10 - 000026 Loss of CCW / 8 (4)					X		000026AA2.01	Ability to determine location of a leak in the CCWS	3.5	1								
11 - 000029 ATWAS/ 1 (8)			X				000029EK3.12	Knowledge of the reason for actions contained in the EOP for ATWS	4.7	1								
12 - 000040 (E12) Steam Line Rupture - Excessive Heat Transfer / 4 (4)					X		E12EA2.2	Adherence to appropriate procedures and operation within the limitations in the facility's license ...	(3.9)	1								
13 - E08 RCS Overcooling - PTS / 4 (3)			X				E08EK3.1	Facility operational characteristics during transient conditions, including coolant chemistry, and the effects of ...	3.9	1								
14 - 000051 Loss of Condenser Vacuum / 4 (5)					X		000051AA2.02	Ability to determine and interpret conditions requiring reactor and / or turbine trip	4.1	1								
15 - 000055 Station Blackout / 6 (3)				X			000055EA1.04	Reduction of battery loads	3.9	1								
16 - 000057 Loss of Vital AC Elec. Inst. Bus / 6 (4)					X		000057AA2.06	Ability to determine and interpret AC instrument bus alarms for the inverter and alternate power source	(3.7)	1								
17 - 000059 Accidental Liq RadWaste Rel. / 9 (3)			X				000059AK3.01	Termination of liquid radwaste release	3.9	1								
18 - 000062 Loss of Nuclear Service Water / 4 (8)						X	2.1.12	Ability to apply Technical Specifications for a system	4.0	1								
19 - 000067 Plant Fire On-site / 9 (4)			X				000067AK3.04	Knowledge of the reasons for actions contained in EOP for plant fire.	4.1	1								
20 - 000068 Control Room Evac. / 8 (4)				X			000068AA1.21	Ability to operate and / or monitor transfer of controls from the control room to shutdown panel or local control	4.1	1								
21 - 000069 (E14) Loss of CTMT Integrity / 5 (8)				X			000069AA1.01	Ability to operate and / or monitor isolation valves, dampers, and electromagnetic devices ...	3.7	1								
22 - 000074 (E06&E07) ICC/ 4 (3)		X					E06EK2.1	Knowledge of the interrelationships between Degraded Core Cooling and components, and functions of ...	3.8	1								
23 - 000076 High Reactor Coolant Activity / 9 (8)			X				000076AK3.05	Knowledge of the reasons for the corrective actions as a result of high fission-product radioactivity ...	3.6	1								
24 - 000055 Station Blackout / 6 (1) (3)			X				000055EK3.02	Knowledge of the reasons for actions contained in the EOP for loss of offsite and onsite power	4.6	1								
K/A Category Totals:										3	3	7	3	6	2	Group Point Total:		24

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2						Form ES-401-3		Rev 1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	Number	K/A Topic(s)	Imp.	Points
000007 Reactor Trip - Stabilization - Recovery (2)										
25 - 000008 PZR Vapor Space Accident / 3 (3)			X				000008AK3.02	Knowledge of the reason why PORV or code safety valve exit temperature is below RCS or PZR temperature	4.1	1
26 - 000009 Small Break LOCA / 3 (5)					X		000009EA2.01	Ability to determine actions to be taken, based on RCS temperature and pressure, saturated and . . .	4.8	1
27 - E03 LOCA Cooldown - Depress. / 4 (4)						X	2.4.48	Ability to interpret control room indications to verify the status and operation of system, and . . .	3.8	1
E11 Loss of ECR / 4 (2)										
28 - 000022 Loss of Rx Coolant Makeup / 2 (7)			X				000022AK3.02	Knowledge of the reasons for the following responses as they apply to the loss of reactor . . .	3.8	1
29 - 000025 Loss of RHR System / 4 (8)				X			000025AA1.02	Ability to operate and / or monitor RCS inventory as it applies to loss of RHR system.	3.9	1
30 - 000027 Pressurizer Pressure Control System Malfunction / 3 (9)				X			000027AA1.01	Ability to operate and / or monitor PZR heaters, sprays, and PORVs as they apply to the Pressurizer . . .	3.9	1
31 - 000032 Loss of Source Range NI / 7 (8)		X					000032AK2.01	Knowledge of the interrelations between the Loss of SR NI and power supplies, including proper switch positions	3.1	1
32 - 000033 Loss of Intermediate Range NI / 7 (3)					X		000033AA2.11	Ability to determine and interpret loss of compensating voltage to the IR NIS	3.4	1
33 - 000037 Steam Generator Tube Leak / 3 (8)			X				000037AK3.05	Knowledge of the reasons for actions contained in procedures . . .	4.0	1
34 - 000038 STGR / 3 (3)					X		000038EA2.08	Ability to determine alternative for placing the plant in safe condition when condenser is not available	4.4	1
35 - 000054 Loss of Main Feedwater / 4 (4)					X		000054AA2.03	Ability to determine and interpret conditions and reasons for AFW pump start	4.2	1
36 - E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4 (8)		X					E05EK2.2	Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal . . .	4.2	1
37 - 000058 Loss of DC Power / 6 (4)			X				000058AK3.02	Knowledge of the reasons for actions contained in the EOP for loss of DC power	4.2	1
38 - 000060 Accid.Gas Radwaste Rel. / 9 (8)	X						000060AK1.04	Knowledge of the operational implications of calculation of off-site doses due to a release from the power plant.	3.7	1
39 - 000061 ARM System Alarms / 7 (7)					X		000061AA2.06	Ability to determine and interpret the following as they apply to the Area Radiation System alarms	4.1	1
40 - E16 High Containment Radiation / 9 (8)	X						E16EK1.2	Knowledge of the operational implications of normal, abnormal, and emergency operating procedures . . .	3.2	1
000065 Loss of Instrument Air / 8 (2)										
K/A Category Point Totals:	2	2	4	2	5	1			Group Point Total:	16



System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topic(s)	Imp.	Points
44 - 001 Control Rod Drive (3)				X								001K4.14	Operating parameters, including proper rod speed	2.8	1
45 - 003 Reactor Coolant Pump (8)								X				003A2.02	Conditions which exist for an abnormal shutdown of an RCP in comparison . . .	3.9	1
46 - 004 Chemical and Volume Control (7)					X							004K4.05	Knowledge of the CVCS design features and / or interlocks which provide . . .	3.2	1
47 - 013 ESF Actuation (5)							X					013A1.02	Ability to predict and / or monitor containment pressure, temperature and humidity	4.2	1
48 - 014 Rod Position Indication (3)					X							014K5.02	Rod Position Indication independent of demand	3.3	1
49 - 015 Nuclear Instrumentation (3)	X											015K1.01	Knowledge of the physical connections and / or cause-effect . . . RPS	4.2	1
50 - 017 In-core Temperature Monitor (5)				X								017K4.01	Knowledge of the ITM system design features which input to subcooling monitors	3.7	1
51 - 022 Containment Cooling (5)									X			022A3.01	Ability to monitor automatic operation of the CCS including initiation of safeguards mode . . .	4.3	1
52 - 026 Containment Spray (3)			X									026K3.02	Knowledge of the effect a loss or malfunction of the CSS will have on recirculation	4.3	1
53 - 056 Condensate (3)								X				056A2.04	Effects of loss of condensate pumps	2.8	1
54 - 059 Main Feedwater (9)											X	2.4.11	Knowledge of abnormal condition procedures	3.6	1
55 - 061 Auxiliary/Emergency Feedwater (8)		X										061K2.02	Knowledge of the bus power supplies to the AFW electric pumps (Address SUFP RMO)	3.7	1
56 - 063 DC Electrical Distribution (4)	X											063K1.03	Knowledge of the physical connections and / or cause-effect relationship between the . . .	3.5	1
57 -068 Liquid Radwaste (4)										X		068A4.04	Ability to manually operate and / or monitor in the control room: automatic isolation	3.7	1
58 -071 Waste Gas Disposal (8)									X			071A3.03	Ability to monitor automatic operation of the WGDS including . . .	3.8	1
59 -072 Area Radiation Monitoring (8)				X								072K4.03	Knowledge of the ARM system design features and / or interlocks . . .	3.6	1
60 -001 Control Rod Drive (1) (4)					X							001K5.04	Knowledge of the Rod Insertion Limits as they apply to the CRDS	4.7	1
61 - 022 Containment Cooling (1) (8)										X		022A4.01	Ability to manually operate and / or monitor in the control room . . .	3.6	1
62 -059 Main Feedwater (1) (8)						X						059K6.09	Knowledge of the effect of a loss or malfunction of the MFP speed. (Loss of speed signal)	2.6	1
K/A Category Point Totals:	2	1	1	3	3	1	1	2	2	2	1			Group Point Total:	19

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topic(s)	Imp.	Points
63 - 002 Reactor Coolant (3)	X											002K1.07	Knowledge of the physical connections and / or cause-effect relationship between . . . RVLIS	3.7	1
64 - 006 Emergency Core Cooling (3)										X		006A4.05	Ability to manually operate and/or monitor the transfer flow paths prior to recirculation	3.8	1
65 - 010 Pressurizer Pressure Control (8)									X			010A3.02	Ability to monitor automatic operation of the PZR, PCS including . . .	3.5	1
011 Pressurizer Level Control (2)															
66 - 012 Reactor Protection (8)	X											012K1.01	Knowledge of the physical connections and / or cause effect relationships between . . .	3.7	1
67 - 016 Non-nuclear Instrumentation (8)			X									016K3.12	Knowledge of the effect that a loss or malfunction of the NNIS will have on S/G	3.6	1
68 - 027 Containment Iodine Removal (8)		X										027K2.01	Knowledge of the bus power supplies to the CRIS fans	3.4	1
69 028 H <sub>2</sub> Recombiner and Purge Control (8)					X							028K5.02	Knowledge of the operational implications of flammable hydrogen concentration as . . .	3.9	1
70 - 029 Containment Purge (8)							X					029A1.03	Ability to predict and / or monitor changes in containment pressure, temperature and . . .	3.3	1
033 Spent Fuel Pool Cooling (2)															
71 - 034 Fuel Handling Equipment (8)						X						034K6.02	Knowledge of the effect of a loss or malfunction of radiation monitoring systems on . . .	3.3	1
72 - 035 Steam Generator (5)						X						035K6.01	Knowledge of the effect of a malfunction of the MSIVs will have on the S/G system	3.6	1
039 Main and Reheat Steam (2)															
73 - 055 Condenser Air Removal (8)											X	2.4.16	<b>Plant specific priority in place of this topic</b>	4.0	1
74 - 062 AC Electrical Distribution (4)				X								062K4.01	Knowledge of AC distribution system design feature(s) and / or interlocks which provide . . .	3.2	1
75 - 064 Emergency Diesel Generator (3)										X		064A4.01	Diesel Generator local / remote operation	4.3	1
76 - 073 Process Radiation Monitoring (3)	X											073K1.01	Knowledge of the physical connections and / or cause-effect relationship between . . .	3.9	1
77 - 075 Circulating Water											X	2.1.33	<b>Plant specific priority in place of this topic</b>	4.0	1
78 - 079 Station Air (3)								X				079A2.01	Ability to (a) predict the impacts of cross-connect with IAS malfunctions or . . .	3.2	1
79 - 086 Fire Protection (8)											X	2.4.27	Knowledge of fire in the plant procedure	3.5	1
103 Containment (2)															
K/A Category Point Totals:	3	1	1	1	1	2	1	1	1	2	3	Group Point Total:			17

ES-401		PWR SRO Examination Outline Plant Systems - Tier 2/Group 3											Form ES-401-3		Rev 1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Number	K/A Topic(s)	Imp.	Points	
80 - 005 Residual Heat Removal (3)				X								005K4.10	Control of the RHR heat exchanger outlet flow	3.1	1	
007 Pressurizer Relief/Quench Tank (2)																
81 - 008 Component Cooling Water (3)			X									008K3.01	Knowledge of the effect that a loss of PCCW will have on loads cooled by PCCW	3.5	1	
82 - 041 Stm Dump/Turb Bypass Control (8)							X					041A1.02	Ability to predict and / or monitor changes in parameters . . .	3.2	1	
045 Main Turbine Generator (2)																
83 - 076 Service Water (7)				X								076K4.02	Knowledge of the SWS design feature(s) and / or interlocks which provide for automatic . . .	3.2	1	
078 Instrument Air (2)																
K/A Category Point Totals:	0	0	1	2	0	0	1	0	0	0	0	Group Point Total:			4	
Plant-Specific Priorities																
System / Topic	Recommended Replacement for...		Reason											Imp	Points	
Generic 2.1.33 / Application of < 1 hour TS (8)	075 (T2G2) question # 77		Very low K/A for the original topic / new topic important SRO task.											4.0	1	
Generic 2.4.16 / Transition from EOPs to SAMGs (8)	055 (T2G2) question # 73		Very low K/A for the original topic / new topic important SRO task.											4.0	1	
Plant-Specific Priority Total: (limit 10)															2	

Generic Knowledge and Abilities				Rev 1
Number	K / A Topic	Imp	Points	
<b>2.1 Conduct of Operations</b>				
<b>84 - 2.1.2 (8)</b>	Knowledge of operator responsibilities during all mode of plant operation	4.0	1	
<b>85 - 2.1.25 (8)</b>	<b>Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data</b>	3.1	1	
<b>86 - 2.1.29 (7)</b>	Knowledge of how to conduct and verify valve lineups	3.3	1	
<b>87 - 2.1.32 (4)</b>	<b>Ability to explain and apply all system limits and precautions</b>	3.8	1	
<b>88 - 2.1.34 (8)</b>	<b>Ability to maintain primary and secondary plant chemistry within allowable limits.</b>	2.9	1	
<b>2.2 Equipment Control</b>				
<b>89 - 2.2.11 (8)</b>	<b>Knowledge of the process for controlling temporary changes</b>	3.4	1	
<b>90 - 2.2.12 (8)</b>	Knowledge of surveillance procedures	3.4	1	
<b>91 - 2.2.13 (5)</b>	Knowledge of tagging and clearance procedures	3.8	1	
<b>92 - 2.2.14 (8)</b>	<b>Knowledge of the process for making configuration changes</b>	3.0	1	
<b>93 - 2.2.15 (7)</b>	<b>Ability to identify and utilize as-built design and configuration change documentation to ascertain expected current plant configuration and operate the plant</b>	2.9	1	
<b>2.3 Radiation Control</b>				
<b>94 - 2.3.2 (8)</b>	<b>Knowledge of facility ALARA program</b>	2.9	1	
<b>95 - 2.3.4 (5)</b>	<b>Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized</b>	3.1	1	
<b>96 - 2.3.9 (6)</b>	<b>Knowledge of the process for performing a containment purge</b>	3.4	1	
<b>2.4 Emergency Procedures / Plan</b>				
<b>97 - 2.4.6 (8)</b>	<b>Knowledge of symptom based EOP mitigation strategies</b>	4.0	1	
<b>98 - 2.4.11 (8)</b>	<b>Knowledge of abnormal condition procedures</b>	3.6	1	
<b>99 - 2.4.18 (7)</b>	<b>Knowledge of the specific bases for EOPs</b>	3.6	1	
<b>100 - 2.4.40 (3)</b>	<b>Knowledge of the SRO's responsibilities in emergency plan implementation (SRO level based on SRO specific task)</b>	4.0	1	
			<b>Category Point Totals</b>	<b>17</b>

Legend:

- (1) Added to meet Tier / Group requirements
- (2) Removed to meet Tier / Group requirements
- (3) Taken directly from '98 NRC exam
- (4) Modified question taken from '96 NRC exam
- (5) Modified question taken from '98 NRC exam
- (6) Direct from '96 NRC exam
- (7) Direct from facility exam bank
- (8) New
- (9) Modified from facility bank

Items in **BOLD** test 10 CFR 55.43(b) topics.