

ES-401 PWR Examination Outline ES-401-2 Rev 9 (Errata)

Indian Facility: Point 2		Date of Exam: Date															
Tier	Group	RO K/A Category Points											SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total	
1 Emergency & Abnormal Plant Evolutions	1	3	3	3				3	3				3	18	3	3	6
	2	1	3	1				1	2				1	9	2	2	4
	Tier Totals	4	6	4				4	5				4	27	5	5	10
2 Plant Systems	1	3	3	3	3	3	2	3	2	2	2	2	2	28	2	3	5
	2	1	0	1	1	1	1	0	2	1	1	1	10	2	1	3	
	Tier Totals	4	3	4	4	4	3	3	4	3	3	3	38	4	4	8	
3 Generic Knowledge and Abilities Categories		1		2		3		4						1	2	3	4
		2		3		2		3						2	2	1	2
Note:		<p>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 ±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.</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 that are not included on the outline should be added. Refer to ES-401, Attachment 2, 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.</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</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>															

ES-401		PWR Examination Outline						ES-401-2 Rev 9 (Errata)	
Emergency and Abnormal Plant Evolutions - Tier 1 Group 1 (RO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G 2	K/A Topic(s)	Imp.	#
000007 Reactor Trip - Stabilization - Recovery / 1					2.04		Ability to determine or interpret the following as they apply to a reactor trip: (CFR 41.7 / 45.5 / 45.6) EA2.04 If reactor should have tripped but has not done so, manually trip the reactor and carry out actions in ATWS EOP. 4.4 4.6	4.4	1
000008 Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)						2.4.6	2.4.6 Knowledge symptom based EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13) 3.1, 4.0	3.1	2
000009 Small Break LOCA / 3	1.01						Knowledge of the operational implications of the following concepts as they apply to the small break LOCA: (CFR 41.8 / 41.10 / 45.3) EK1.01 Natural circulation and cooling, including reflux boiling 4.2 4.7	4.2	3
000011 Large Break LOCA / 3		2.02					Knowledge of the interrelations between the and the following Large Break LOCA: (CFR 41.7 / 45.7) EK2.02 Pumps 2.6* 2.7*	2.6*	4
000015/17 RCP Malfunction / 4			3.04				Knowledge of the reasons for the following responses as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): (CFR 41.5, 41.10 / 45.6 / 45.13) AK3.04 Reduction of power to below the steady state power-to-flow limit 3.1* 3.2*	3.1*	5
000022 Loss of Reactor Coolant Makeup / 2				1.02			Ability to operate and / or monitor the following as they apply to the Loss of Reactor Coolant Pump Makeup: (CFR 41.7 / 45.5 / 45.6) AA1.02 CVCS charging low flow alarm, sensor, and indicator 3.0 2.9	3.0	6
000025 Loss of RHR System / 4					2.07		Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: (CFR: 43.5 / 45.13) AA2.07 Pump cavitation 3.4 3.7	3.4	7
000026 Loss of Component Cooling Water / 8						2.4.4	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6) 4.0, 4.3	4.0	8
000027 Pressurizer Pressure Control System Malfunction / 3	1.03						Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: (CFR 41.8 / 41.10 / 45.3) AK1.03 Latent heat of vaporization/condensation 2.6 2.9	2.6	9
000029 Anticipated Transient w/o Scram / 1							Not selected		
000038 Steam Generator Tube Rupture / 3			3.08				Knowledge of the reasons for the following responses as they apply to the SGTR: (CFR 41.5 / 41.10 / 45.6 / 45.13) EK3.08 Criteria for securing RCP 4.1 4.2	4.1	10
000040 (WE12) Steam Line Rupture - Excessive Heat Transfer / 4		2.2					Knowledge of the interrelations between the (Uncontrolled Depressurization of all Steam Generators) and the following: (CFR: 41.7 / 45.7) EK2.2 Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility. IMPORTANCE RO 3.6 SRO 3.9	3.6	11
000054 Loss of Main Feedwater / 4				1.02			Ability to operate and / or monitor the following as they apply to the Loss of Main Feedwater (MFW): (CFR 41.7 / 45.5 / 45.6) AA1.02 Manual startup of electric and steam-driven AFW pumps 4.4 4.4	4.4	12
000055 Station Blackout / 6					2.01		Ability to determine or interpret the following as they apply to a Station Blackout: (CFR 43.5 / 45.13) EA2.01 Existing valve positioning on a loss of instrument air system 3.4 3.7	3.4	13
000056 Loss of Off-site Power / 6						2.1.23	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 45.2 / 45.6)	3.9	14
000057 Loss of Vital Ac Elec. Inst. Bus. / 6							Not selected		
000058 Loss of DC Power / 6							Not selected		
000062 Loss of Nuclear Service Water / 4			3.02				Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: (CFR 41.4, 41.8 / 45.7) AK3.02 The automatic actions (alignments) within the nuclear service water resulting from the actuation of the ESFAS 3.6 3.9	3.6	15
000065 Loss of Instrument Air / 8				1.05			Ability to operate and / or monitor the following as they apply to the Loss of Instrument Air: (CFR 41.7 / 45.5 / 45.6) AA1.05 RPS 3.3* 3.3*	3.3*	16
WE04 LOCA Outside Containment / 3	1.2						Knowledge of the operational implications of the following concepts as they apply to the (LOCA Outside Containment) (CFR: 41.8 / 41.10, 45.3) EK1.2 Normal, abnormal and emergency operating procedures associated with (LOCA Outside Containment). IMPORTANCE RO 3.5 SRO 4.2	3.5	17
WE 11 Loss of Emergency Coolant Recirc / 4							Not selected		
WE05 Inadequate Heat Sink Transfer - Loss of Secondary Heat Sink / 4		2.2					Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following: (CFR: 41.7 / 45.7) EK2.2 Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility. IMPORTANCE RO 3.9 SRO 4.2	3.9	18
K/A Category Totals:									
	3	3	3	3	3	3		Group Point Total:	
								18	18

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Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G 2	K/A Topic(s)	Imp.	#
000015/IT BCP Malfunction / 4						2.4.4	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6)	4.3	84
W/E 11 Loss of Emergency Coolant Recirc / 4					2.1		Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation) (CFR: 43.5 / 45.13) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. IMPORTANCE RO 3.4 SRO 4.2	4.2	85
000062 Loss of Nuclear Service Water / 4						2.4.6	2.4.6 Knowledge symptom based EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)	4.0	86
000022 Loss of Reactor Coolant Makeup / 2					2.02		Reactor Coolant Pump Makeup: (CFR: 43.5 / 45.13) AA2.02 Charging pump problems 3.2 3.7	3.7	87
000029 Anticipated Transient w/o Scram / 1						2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6) IMPORTANCE RO 4.0 SRO 4.0	4.0	88
000057 Loss of Vital Ac Elec. Inst. Bus. / 6					2.06		Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: (CFR: 43.5 / 45.13) AA2.06 AC instrument bus alarms for the inverter and alternate power source 3.2 3.7	3.7	89
K/A Category Totals:	0	0	0	0	3	3		Group Point Total:	6

ES-401 PWR Examination Outline							ES-401 - Rev 0 (Errata)		
Emergency and Abnormal Plant Operations - Tier 1/Group 2 (RO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G 2	K/A Topic(s)	Imp.	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1									
000005 Inoperable/Stuck Control Rod / 1		2.01					Knowledge of the interrelations between the Inoperable / Stuck Control Rod and the following: (CFR 41.7 / 45.7) AK2.01 Controllers and positioners 2.5 2.5	2.5	25
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2			3.02				Knowledge of the reasons for the following responses as they apply to the Pressurizer Level Control Malfunctions: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.02 Relationships between PZR pressure increase and reactor makeup/letdown imbalance 2.9 3.2	2.9*	26
000032 Loss of Source Range NI / 7				1.01			Ability to operate and / or monitor the following as they apply to the Loss of Source Range Nuclear Instrumentation: (CFR 41.7 / 45.5 / 45.6) AA1.01 Manual restoration of power 3.1* 3.4*	3.1*	27
000033 Loss of Intermediate Range NI / 7									
000036 Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3					2.06		Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: (CFR: 43.5 / 45.13) AA2.06 S/G tube failure 4.3 4.5	4.3	28
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid Radwaste Rel. / 9						2.4.49	2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)	4.0	29
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 9		1.01					Knowledge of the operational implications of the following concepts as they apply to Plant Fire on Site: (CFR 41.8 / 41.10 / 45.3) AK1.01 Fire classifications, by type 2.9 3.9	2.9	30
000068 Control Room Evac. / 8									
000069 (W/E14) Loss of CTMT Integrity / 5		2.03					Knowledge of the interrelations between the Loss of Containment Integrity and the following: (CFR 41.7 / 45.7) AK2.03 Personnel access hatch and emergency access hatch 2.8* 2.9	2.8*	31
000074 (W/E06&E07) Inad. Core Cooling / 4		2.20					W/E07 Knowledge of the interrelations between the (Saturated Core Cooling) and the following: (CFR: 41.7 / 45.7) EK2.2 Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility. IMPORTANCE RO 3.5 SRO 3.9	3.5	32
000076 High Reactor Coolant Activity / 9					2.02		Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: (CFR: 43.5 / 45.13) AA2.02 Corrective actions required for high fission product activity in RCS 2.8 3.4	3.2	33
W/E01 & E02 Rediagnosis and SI Termination / 3									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
W/E16 High Containment Radiation / 9									
W/E09&E10 Natural Circ / 4									
W/E08 RCS Overcooling - PTS / 4									
K/A Category Totals:	1	3	1	1	2	1		Group Point Total:	9

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Emergency and Abnormal Plant Evolutions - Tie 1/Group 1 (SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G 2	K/A Topic(s)	Imp.	#
000028 Pressurizer Level Malfunction / 2					2.09		Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: (CFR: 43.5 / 45.13) AA2.09 Charging and letdown flow capacities 2.9 3.2	3.2	90
000001 Continuous Rod Withdrawal / 1					2.4.4		Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6) IMPORTANCE RO 4.0 SRO 4.3	4.0	91
W/E13 Steam Generator Overpressure / 4					2.1		Ability to determine and interpret the following as they apply to the (Steam Generator Overpressure) (CFR: 43.5 / 45.13) EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. IMPORTANCE RO 2.9 SRO 3.4	3.4	92
000051 Loss of Condenser Vacuum / 4					2.4.8		2.4.8 Knowledge symptom based EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)	4.0	93
K/A Category Totals:	0	0	0	0	2	2		Group Point Total:	4

PWR Examination Outline													E8-001, 1 Rev 0		
Plant Systems - Tier 2 Group 1 (RC)													(Errata)		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G 2	K/A Topic(s)	Imp.	#	
003 Reactor Coolant Pump		2.02										Knowledge of bus power supplies to the following: (CFR: 41.7) K2.02 CCW pumps 2.5* 2.6*	2.5*	38	
004 Chemical Volume Control			3.04									Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: (CFR: 41.7/45/6) K3.04 RCPS 3.7 3.9	3.7	39	
005 Residual Heat Removal				4.12								Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following: (CFR: 41.7) K4.12 Lineup for piggyback mode with CSS 3.1* 3.7*	3.1*	40	
006 Emergency Core Cooling					5.06							Knowledge of the operational implications of the following concepts as they apply to ECCS: (CFR: 41.5 / 45.7) K5.06 Relationship between ECCS flow and RCS pressure 3.5 3.9	3.5	41	
007 Pressurizer Relief/Quench Tank							1.03					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: (CFR: 41.5 / 45.5) A1.03 Monitoring quench tank temperature 2.6 2.7	2.6	42	
008 Component Cooling Water	1.03											Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.9) K1.03 PRMS 2.8* 3.0	2.8*	43	
010 Pressurizer Pressure Control								2.01				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: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Heater failures 3.3 3.6	3.3	44	
012 Reactor Protection									3.03			Ability to monitor automatic operation of the RPS, including: (CFR: 41.7 / 45.5) A3.03 Power supply 3.4 3.5	3.4	45	
013 Engineered Safety Features Actuation										3.02		Ability to monitor automatic operation of the ESFAS including: (CFR: 41.7 / 45.5) A3.02 Operation of actuated equipment 4.1 4.2	4.1	46	
022 Containment Cooling											2.1.28	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	3.2	47	
025 Ice Condenser												N/A			
026 Containment Spray	1.02											Knowledge of the physical connections and/or cause effect relationships between the CSS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.02 Cooling water 4.1 4.1	4.1	48	
039 Main and Reheat Steam			3.06									Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: (CFR: 41.7 / 45.6) K3.06 SDS 2.8* 3.1	2.8*	49	
059 Main Feedwater				4.02								Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.02 Automatic turbine/reactor trip runback 3.3 3.5	3.3	50	
061 Auxiliary/Emergency Feedwater					5.01							Knowledge of the operational implications of the following concepts as they apply to the AFW: (CFR: 41.5 / 45.7) K5.01 Relationship between AFW flow and RCS heat transfer 3.6 3.9	3.6	51	
082 AC Electrical Distribution		2.01										Knowledge of bus power supplies to the following: (CFR: 41.7) K2.01 Major system loads 3.3 3.4	3.3	52	
063 DC Electrical							1.01					A1 Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including: (CFR: 41.5 / 45.5) A1.01 Battery capacity as it is affected by discharge rate 2.5 3.3	2.5	53	
084 Emergency Diesel Generator						6.08						Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: (CFR: 41.7 / 45.7) K6.08 Fuel oil storage tanks 3.2 3.3	3.2	54	
073 Process Radiation Monitoring								2.02				Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.02 Detector failure 2.7 3.2	2.7	55	
076 Service Water									3.02			A3 Ability to monitor automatic operation of the SWS, including: (CFR: 41.7 / 45.5) A3.02 Emergency heat loads 3.7 3.7	3.7	56	
078 Instrument Air										4.01		A4 Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.01 Pressure gauges 3.1 3.1	3.1	57	
103 Containment											2.1.28	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	2.8	58	
005 Residual Heat Removal	1.06											Knowledge of the physical connections and/or cause effect relationships between the RHRS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.06 ECCS 3.5 3.6	3.5	59	
013 Engineered Safety Features Actuation		2.01										Knowledge of bus power supplies to the following: (CFR: 41.7) K2.01 ESFAS/safeguards equipment control 3.6* 3.8	3.6*	60	
076 Service Water			3.02									K3 Knowledge of the effect that a loss or malfunction of the SWS will have on the following: (CFR: 41.7 / 45.6) K3.02 Secondary closed cooling water 2.5* 2.8*	2.5*	61	
063 DC Electrical				4.02								Knowledge of DC electrical system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.02 Breaker interlocks, permissives, bypasses and cross-ties. 2.9* 3.2*	2.9*	62	
004 Chemical Volume Control						6.20						Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following: K6.20 Function of demineralizer, including boron loading and temperature limits 2.5.3.1	2.5	63	
006 Emergency Core Cooling					5.08							Knowledge of the operational implications of the following concepts as they apply to ECCS: (CFR: 41.5 / 45.7) K5.08 Operation of pumps in parallel 2.9* 3.1*	2.9*	64	
039 Main and Reheat Steam							1.06					Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MRSS controls including: (CFR: 41.5 / 45.5) A1.06 Main steam pressure 3.0 3.1	3.0	65	
K/A Category Totals:	3	3	3	3	3	2	3	2	2	2	2		Group Point Total:	28	28

EE-441	PWR Examination Outline												1-2 Rev 9 (Errata)		
	Plant Systems - Tier 2 Group 1 (SRO)														
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G 2	K/A Topic(s)	Imp.	#	
001 Auxiliary/Emergency Feedwater												2.4.30	2.4.30 Knowledge of which events related to system operations/status should be reported to outside agencies. (CFR: 43.5 / 45.11)	3.6	76
002 DC Electrical								2.01					A2 Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Grounds 2.5 3.2*	3.2*	77
004 Chemical Volume Control												2.1.33	2.1.33 Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications. (CFR: 43.2 / 43.3 / 45.3)	4.0	78
005 Residual Heat Removal								2.02					Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.02 Pressure transient protection during cold shutdown 3.5 3.7	3.7	79
020 Containment Spray System												2.2.25	2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. (CFR: 43.2)	3.7	80
K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	3		Group Point Total:	5	5

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Plant Systems - Top 2 Group 2 (RO)													(EIT/AT)	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G 2	K/A Topic(s)	Imp.	#
001 Control Rod Drive												Not selected		
002 Reactor Coolant									3.03			Ability to monitor automatic operation of the RCS, including: (CFR: 41.7 / 45.5) A3.03 Pressure, temperatures, and flows. 4.4 4.6	4.4	71
011 Pressurizer Level Control												Not selected		
014 Rod Position Indication										4.02		Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.02 Control rod mode-select switch 3.4 3.2	3.4	72
015 Nuclear Instrumentation												Not selected		
016 Non-nuclear Instrumentation												Not selected		
017 In-core Temperature Monitor											2.4.31	2.4.31 Knowledge of annunciators alarms and indications, and use of the response instructions. (CFR: 41.10 / 45.3)	3.3	73
027 Containment Iodine Removal												Not selected		
028 Hydrogen Recombiner and Purge Control												Not selected		
029 Containment Purge												Not selected		
033 Spent Fuel Pool Cooling												Not selected		
034 Fuel Handling Equipment	1.01											Knowledge of the physical connections and/or cause effect relationships between the Fuel Handling System and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.01 RCS 2.5 3.2	2.5	74
035 Steam Generator										2.06		Ability to (a) predict the impacts of the following malfunctions or operations on the GS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.5) A2.06 Small break LOCA 4.5 4.6	4.5	75
041 Steam Dump/Turbine Bypass Control			3.01									Knowledge of the effect that a loss or malfunction of the SDS will have on the following: (CFR: 41.7 / 45.6) K3.01 S/G 3.2* 3.3	3.2*	66
045 Main Turbine Generator				4.01								Knowledge of MT/G system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Programmed controller for relationship between steam pressure at T/G inlet (impulse, first stage) and plant power level 2.7 2.9	2.7	67
055 Condenser Air Removal												Not selected		
068 Liquid Rad Waste												Not selected		
071 Waste Gas Disposal					5.04							Knowledge of the operational implication of the following concepts as they apply to the Waste Gas Disposal System: (CFR: 41.5 / 45.7) K5.04 Relationship of hydrogen/oxygen concentrations to flammability 2.5 3.1	2.5	68
072 Area Radiation Monitoring												Not selected		
075 Circulating Water												Not selected		
079 Station Air										2.01		Ability to (a) predict the impacts of the following malfunctions or operations on the SAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Cross-connection with IAS 2.9 3.2	2.9	69
086 Fire Protection						6.04						Knowledge of the effect of a loss or malfunction on the Fire Protection System following will have on the : (CFR: 41.7 / 45.7) K6.04 Fire, smoke, and heat detectors 2.6 2.9	2.6	70
K/A Category Totals:	1	0	1	1	1	1	0	2	1	1	1	Group Point Total:	10	10

ES-401	PWR Examination Outline											11-2 Rev 9 (Errata)		
Plant Systems - Tier 2 Group 2 (SRO)														
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G 2	K/A Topic(s)	Imp.	#
029 Containment Purge								2.01				Ability to (a) predict the impacts of the following malfunctions or operations on the Containment Purge System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 5.13) Maintenance or other activity taking place inside containment. 3.6	3.6	81
071 Waste Gas Disposal											2.4.30	2.4.30 Knowledge of which events related to system operations/status should be reported to outside agencies. (CFR: 43.5 / 45.11)	3.6	82
011 Pressurizer Level Control								2.07				Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.07 Isolation of letdown .3.0 3.3	3.3	83
K/A Category Totals:	0	0	0	0	0	0	0	0	2	0	0	Group Point Total:	3	3

ES-401		Generic Knowledge and Abilities Outline (Tier 3)			ES-401-2 Rev 9 (Errata)
Facility	Indian Point 2		Date of Exam	Date	Level RO
Category	K/A #	Topic	Imp.		#
1 Conduct of Operations	2.1.18	2.1.18 Ability to make accurate, clear and concise logs, records, status boards, and reports. (CFR: 45.12 / 45.13) IMPORTANCE RO 2.9 SRO 3.0	2.9		19
	2.1.22	2.1.22 Ability to determine Mode of Operation. (CFR: 43.5 / 45.13) IMPORTANCE RO 2.8 SRO 3.3	2.8		20
			Subtotal	2	
2 Equipment Control	2.2.22	2.2.22 Knowledge of limiting conditions for operations and safety limits. (CFR: 43.2 / 45.2) IMPORTANCE RO 3.4 SRO 4.1	3.4		21
	2.2.2	2.2.2 Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels. (CFR: 45.2) IMPORTANCE RO 4.0 SRO 3.5	4.0		22
	2.2.13	2.2.13 Knowledge of tagging and clearance procedures. (CFR: 41.10 / 45.13) IMPORTANCE RO 3.6 SRO 3.8	3.6		23
			Subtotal	3	
3 Radiation Protection	2.3.2	2.3.2 Knowledge of facility ALARA program. (CFR: 41.12 / 43.4 / 45.9 / 45.10) IMPORTANCE RO 2.5 SRO 2.9	2.5		24
	2.3.4	2.3.4 Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. (CFR: 43.4 / 45.10) IMPORTANCE RO 2.5 SRO 3.1	2.5		34
			Subtotal	2	
4 Emergency Procedures and Plan	2.4.12	2.4.12 Knowledge of general operating crew responsibilities during emergency operations. (CFR: 41.10 / 45.12) IMPORTANCE RO 3.4 SRO 3.9	3.4		35
	2.4.4	2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6) IMPORTANCE RO 4.0 SRO 4.3	4.0		36
	2.4.39	2.4.39 Knowledge of the RO's responsibilities in emergency plan implementation. (CFR: 45.11) IMPORTANCE RO 3.3 SRO 3.1	3.3		37
			Subtotal	3	
Tier 3 Point Total			10		10

ES-401		Generic Knowledge and Abilities Outline (Tier 3)			ES-401-3 Rev 0	
Facility	Indian Point		Date of Exam	Date	Level	SRO
Category	K/A #	Topic	Imp.			#
1 Conduct of Operations	2.1.7	2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 43.5 / 45.12 / 45.13) IMPORTANCE RO 3.7 SRO 4.4	4.4			94
	2.1.10	2.1.10 Knowledge of conditions and limitations in the facility license. (CFR: 43.1 / 45.13) IMPORTANCE RO 2.7 SRO 3.9	3.9			95
			Subtotal	2		
2 Equipment Control	2.2.7	2.2.7 Knowledge of the process for conducting tests or experiments not described in the safety analysis report. (CFR: 43.3 / 45.13) IMPORTANCE RO 2.0 SRO 3.2	3.2			96
	2.2.17	2.2.17 Knowledge of the process for managing maintenance activities during power operations. (CFR: 43.5 / 45.13) IMPORTANCE RO 2.3 SRO 3.5	3.5			97
			Subtotal	2		
3 Radiation Protection	2.3.1	2.3.1 Knowledge of 10 CFR: 20 and related facility radiation control requirements. (CFR: 41.12 / 43.4. 45.9 / 45.10) IMPORTANCE RO 2.6 SRO 3.0	3.0			98
			Subtotal	1		
4 Emergency Procedures and Plan	2.4.29	2.4.29 Knowledge of the emergency plan. (CFR: 43.5 / 45.11) IMPORTANCE RO 2.6 SRO 4.0	4.0			99
	2.4.36	2.4.36 Knowledge of chemistry / health physics tasks during emergency operations. (CFR: 43.5) IMPORTANCE RO 2.0 SRO 2.8	2.8			100
			Subtotal	2		
Tier 3 Point Total			7			7

Facility: <u>Indian Point Unit 2</u> Date of Examination: <u>1/7/08-1/11/08</u> Examination Level : RO X SRO <input type="checkbox"/> Operating Test Number: <u>1</u>		
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	P,S	(2.1.18) Take a set of manual logs. Note readings out of specification and required action(s) (2003 exam, modified)
Conduct of Operations	N/A	N/A
Equipment Control	M, R	(2.2.13) Create a manual tagout.
Radiation Control	M, R	(2.3.11) Determine the Primary to Secondary Leak Rate using R-45 activity and determine frequency for data collection based upon the leak rate estimate.
Emergency Plan	D, S or C	CCR Offsite Communicator - NUE Notification Given completed forms for initial notification following a NUE declaration, the candidate simulates performing the initial Control Room NUE Notification Checklist. An alternate path will be used. The normal method for notifications to state and local government will not function requiring use of alternate means (local government radio).
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: Indian Point Unit 2 Date of Examination: 1/7/08-1/11/08
 Examination Level : RO SRO Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	P, R	(2.1.18) Review a set of manual logs. Note readings out of specification and required action(s) (2003 exam, modified).
Conduct of Operations	M, R	(2.1.29) Review a completed COL and document Deviations to COL Configurations per OAP-019, Component Verification and System Status Control. Candidate performs review of completed COL and identifies two incorrectly positioned components along with other admin. errors.
Equipment Control	M, R	(2.2.13) Review a tagout and determine the boundaries are inadequate.
Radiation Control	M, R	(2.3.11) Review the calculated Primary to Secondary Leak Rate using R-45 activity and determine frequency for data collection based upon the leak rate estimate (calculations/data sheets will contain error(s))
Emergency Plan	D, R	(2.4.44) Given plant conditions and weather data, the candidate makes Classification and Protective Action Recommendations (PARS) using alternate means (computer and overlays not available) in accordance with IP-EP-410.

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: Indian Point Unit 2 Date of Examination: 1/7/08-1/11/08
 Exam Level: : **RO X** SRO-I SRO-U Operating Test No.: 1

Control Room Systems[®] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety
a. 004 CVCS/ Perform actions of ES-0.1 with a malfunctioning atmospheric dump which will require isolation (Alt Path) and stuck rods requiring Emergency Boration (Alt. Path)	M, S, A	1
b. 013 ESFAS/ perform ATT 1 of E-0 that will require manual actuation of Phase A and alignment of CNMT Spray. (Alt. Path)	M, S, A	2
c. 006 ECCS/ Perform alignment to Cold Leg Recirculation per. ES-1.3 without Recirculation pumps available. (Alt. Path)	D, S, A	3
d. 003 RCP/ 22 RCP bearing failure requiring RCP trip and reactor trip from < 20% power with a failure of main turbine to trip requiring MSIV closure. (Alt. Path)	M, S, A	4P
e. 022 Containment Cooling System/ Respond to an "Yellow" condition on containment status tree due to high radiation per FR-Z.3. Operator will need to start and align FCUs that fail to start and align cooling water. (Alt. Path)	N, S, A	5
f. 062 AC Electrical/Transfer electrical loads on Bus to Station Aux. X-former per 2-SOP-27.1.4, 6900 Volt System.	D, S	6
g. 015 Nuclear Instrumentation/ Deenergize Inter. Range NI (N35)	D, S, L	7
h. 008 Comp. Cooling Water/ respond to a thermal barrier leak with failure of auto isolations (Alt. Path). (RCP trip not required)	N, S, A	8

In-Plant Systems[®] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. 004 CVCS/Locally isolate RCP seals per 2-ECA-0.0 step 8.	N, R, E	2
j. 039 Main and Reheat Steam/ Locally close 23 MSIV	D, E	4S
k. 071 Waste Gas Disposal System/ Align 24 WGDT for discharge (2004 exam item)	P, R	9

Note: 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	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: Indian Point Unit 2 Date of Examination: 1/7/08-1/11/08

Exam Level: : RO **SRO-I** SRO-U Operating Test No.: 1

Control Room Systems[@] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety
a. 004 CVCS/ Perform actions of ES-0.1 with a malfunctioning atmospheric dump which will require isolation (Alt path) and stuck rods requiring Emergency Boration (Alt. Path)	M, S, A	1
b. 013 ESFAS/ perform ATT 1 of E-0 that will require manual actuation of Phase A and alignment of CNMT Spray. (Alt. Path)	M, S, A	2
c. 006 ECCS/ Perform alignment to Cold Leg Recirculation per. ES-1.3 without Recirculation pumps available. (Alt. Path)	D, S, A	3
d. 003 RCP/ 22 RCP bearing failure requiring RCP trip and reactor trip from < 20% power with a failure of main turbine to trip requiring MSIV closure. (Alt. Path)	M, S, A	4P
f. 062 AC Electrical/Transfer electrical loads on Bus to Station Aux. X-former per 2-SOP-27.1.4, 6900 Volt System.	D, S	6
g. 015 Nuclear Instrumentation/ Deenergize Intermediate Range NI (N35)	D, S, L	7
h. 008 Comp. Cooling Water/ respond to a thermal barrier leak with failure of auto isolations (Alt. Path). (RCP trip not required)	N, S, A	8

In-Plant Systems[@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. 004 CVCS/ Locally isolate RCP seals per 2-ECA-0.0 step 8.	N, R, E	2
j. 039 Main and Reheat Steam/ Locally close 23 MSIV	D, E	4S
k. 071 Waste Gas Disposal System/ Align 24 WGDT for discharge (2004 exam item)	P, R	9

@ 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)ternate Path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: <u>Indian Point Unit 2</u> Date of Examination: <u>1/7/08-1/11/08</u> Exam Level: : RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U X Operating Test No.: 1		
Control Room Systems [®] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety
b. 013 ESFAS/ perform attachment 1 of E-0 that will require manual actuation of Phase A and manual alignment of Containment Spray. (Alt. Path)	M, S, A	2
e. 022 Containment Cooling System/ Respond to a "Yellow" condition on containment status tree due to high radiation per FR-Z.3. Operator will need to start and align FCUs that fail to start and align cooling water. (Alt. Path)	N, S, A	5
g. 015 Nuclear Instrumentation/ Deenergize Intermediate Range NI (N35)	D, S, L	7
In-Plant Systems [®] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
j. 039 Main and Reheat Steam/ Locally close 23 MSIV	D, E	4S
k. 071 Waste Gas Disposal System/ Align 24 WGDT for discharge (2004 exam item)	P, R	9
Note: 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	≤ 9 / ≤ 8 / ≤ 4	
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1	
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	
(R)CA	≥ 1 / ≥ 1 / ≥ 1	
(S)imulator		

IPEC comments after validation of Written Exam rev.1 on 9/27/07

3. Replace “and’ with “or” between “natural circulation” and “reflux cooling”
NRC-Change made as requested.
9. Question appears ok as is
NRC-No change made as requested.
13. Add to the given after first bullet “138KV and 13.8KV power sources are not available”
NRC-Change made as requested.
19. Answer appears to be correct but not specially spelled out in the procedure for circling in red. Must look at two areas of the procedure for answer.
NRC-No change made as requested.
25. Question is OK
NRC-No change made as requested.
29. Question is OK
NRC-No change made as requested.
31. Change 80” to 80’
NRC-Change made as requested.
44. I could not figure out what question had on this one. Maybe your notes will help
NRC- Underline and bold “no” was suggested and for consistency the NO was underlined.
55. Remove “from” in first line of stem
NRC-Change made as requested.
57. Remove “with the following indications and” replace with “when”
NRC-Change made as requested.
62. Question correct as written. Main steam Isolation signal will still close the valves but 86 need power to cause a turbine trip
NRC-No change made as requested.
65. Change “C.” from “Load Reject” to “Turbine Not Tripped”
NRC-Change made as requested.
69. Make all N2 or Nitrogen
NRC-Change made as requested. N2’s changed to Nitrogen; also underlined NO in stem.

75. Change "decalibration" to "adverse affects on calibration"
NRC-Change made as requested.
79. Change given info from "RH" to "RHR" letdown
NRC-Change made as requested.
91. Question OK since you said IAW 2-AOP-ROD-1. B and D would require a manual trip since the operators are required to manually trip the reactor, when possible, prior to reaching an auto trip setpoint.
NRC-No change made as requested.

Question Analysis for IP2 Written
 Questions missed by 50% or more of validators with # of distracters picked

Q#	# Missed	# Dist.Picked	Comments
13	3	2	Requested Additional info in given statement – See Management Comment (MC) #1
16	2	2	Question OK – parameter from procedure
21	4	3	TS value – See MC #2
22	2	2	Question OK – System knowledge
23	2	2	Question OK – Administrative
25	3	2	Question OK – Lack of attention to detail
29	4	1	Negative question administrative – See MC #3
34	2	1	Administrative – See MC #4
35	2	2	Question OK – no excuse for missing
40	2	1	Procedure usage, Distracter “A” is labeled “D” - See MC #5
42	2	1	Question OK – normal values
50	4	1	Auto actions, read question, attention to detail - See MC #6
53	2	1	Question OK – Equip design basis
54	4	2	Question OK – Equip operation, system knowledge
58	2	1	See MC #7
69	3	2	Question OK – Equip operation, system knowledge
72	4	2	Question OK – System knowledge
74	4	2	Question OK – System knowledge
76	1	1	Question OK – Admin, negative question
78	2	2	Question OK – Admin, using reference provided
79	1	1	System knowledge/operation - See MC #8
80	1	1	Question OK – No excuse
81	1	1	Question OK – Procedure usage
86	2	1	Very tough question with very plausible distracter since similar type question used in Requal with distracter as correct answer - See MC #9
88	1	1	Question OK – Setpoint
90	1	1	Question OK – Plant control
96	1	1	Question OK – Administrative

IP2 Written Questions Management Comments from Art Singer, Training Superintendent

1. Question 13:
Concur with the validation comments previously sent to the NRC.
NRC- requested changes made.

2. Question 21:
Answer "C"
Lower the pressure in part 1 to less than 2735 psig (i.e. 2730 psig, etc.)
OR
Raise the time in part 2 to greater than 1 hour (i.e. 2, 3, 4 hours, etc.)

NRC- Requested change made to lower pressure in distracter "C".

3. Question 29:
For Answer "A", change to:
"A. The 4 running Service Water pumps trip."
Distracter Analysis: 4 Service Water pumps X 5000 gpm/pump = 20,000 gpm. The 1 Circulating Water pump continuing to operate at High Speed provides 140,000 gpm which satisfies the minimum flow required for a release.
Add to the question:
- "1 Circulating Water pump is running in high speed and 4 Service Water pumps are in operation. (no Circulating Water pumps operating on Unit 3)"
The reason for the deletion of the current answer "A" is that there are notes on pages 32 and 37 of 2-SOP-5.1.3 that state, "An NPO SHOULD be present on the Support Facility Nuclear Side throughout the discharge."

For Answer "D", use the actual Annunciator window name, "R-54 Liquid Waste Distillate Hi Rad/Trouble" due to low flow.

NRC- Although the original intent of the question was to test knowledge of "should" vs. "shall" procedural guidance by making the requested changes the question still matches the K/A and better fits the target for level of difficulty. Requested changes made but altered recommended change to "A" from 4 SW pumps to 3 SW pumps trip to avoid possible actions based on prudence with a complete loss of SW.

4. Question 34
Change "Valuable Property" to Vital Plant Equipment" to match plant procedures.
Distracter Analysis needs revision: "B is correct, A, C, D are incorrect combinations."
NRC- Requested change made.

5. Question 40
Answer "A" currently has a "D" in front of it.
NRC- Requested change made.

6. Question 50
In the question stem, replace "790 MWE" with 79% power.
NRC- After discussion with IPEC added 78% (not 79%) power to the stem instead of replacing 790 MWE.

7. Question 58
In the question "incompliance" needs to be two words (in compliance)
NRC- Requested change made.

8. Question 79

Add to question – “Charging is in service”
NRC- Requested changes made.

9. Question 86

Change answer “A”

Rather than “Place ALL safeguards pumps....”

Change to “Place ALL ECCS (Emergency Core Cooling System) pumps...”

This change allows this answer to be incorrect, as Recirculation pumps are not placed in trip pullout and is in compliance with IPEC and UFSAR terminology.

NRC- The terminology change was made to both answers “A” & B” to better match plant.

Scenario Event Description

Scenario 1

Facility: Indian Point 2 Scenario No: 1 Op-Test No: 1

Examiners: _____ Operators: _____

Initial Conditions:

100% power MOL with power reduction in progress.

- 21 ABFP OOS for planned maintenance. Return expected in approximately 6 hours.
- PORV 456 leakage exists. Block valve closed.
- MOV-1802A removed from service 1 hour ago for MOVATS testing. Expected return to service in 4 hours.
- Severe thunderstorms expected over the next 4 hours

Reduce load to 800 MWe to remove 21 Condensate from service within 60 minutes to investigate abnormal noise.

Critical Tasks:

1. Manually initiate Main Steam Line Isolation
2. Isolate AFW to faulted/ruptured SG.

Event No:	Malf. No.	Event Type*	Event Description
1		R (RO), N (BOP) N (CRS)	Reduce power
2	MAL-CRF001AT	C(CRS)	Stuck control rod B-10.
3	XMT-SGN018A (sev.- 0)	I (RO) I (CRS)	22 SG Level 'B' Transmitter fails low during power reduction (~99% power). Trigger 1
4	MOC-CFW001	C (ALL)	21 condensate pumps trips at ~92-94% power Trigger 2
5	MAL-RCS014B	C(ALL)	22 Steam Generator tube leak. (ramped in over 5 minutes 0-40 gpm) Trigger 3
6	MAL-SGN004B (Severity 0-100% over 4 minutes)		Steam Line Break outside containment. Trigger 4
7	RLYPPL 501 & 502 (stuck contacts) and AOV-SGN002A (Fail as is)	C (BOP)	Main Steam Line Isolation failure. Manual initiation required and 22 SG MSIV will not close.
8	MAL-RCS014B	M (ALL)	Steam Generator Tube Rupture and Loss of Off-Site Power (after transition to E-2) trigger 5

Scenario Event Description

Scenario 1

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario Event Description

Scenario 1

The team will assume the shift and commence a power reduction IAW POP-2.1.

During the load reduction, one control rod will stick out; requiring the condition to be evaluated IAW AOP-ROD-1. The CRS will address Technical Specifications as well. Power reduction will continue with boration only.

After power reduction recommences, 22 SG level transmitter 'B' will fail low, requiring manual control of 22 SG level IAW AOP-INST-1. The CRS will refer to Technical Specifications.

At approximately 92-94% power, a loss of the 21 condensate pump will require urgent continuation of the power reduction IAW AOP-FW-1.

When the plant is stable, a 22 Steam Generator tube leak will start requiring reduction of letdown and adjustment of charging IAW AOP-SG-1.

A Steam Line Break will occur, requiring a Reactor Trip and Safety Injection. After the trip a MSLI signal will not actuate and the operators will need to close the MSIV's manually and 22 SG MSIV will not close from CCR. Subsequently, a SGTR occurs in the faulted (22) SG and a Loss of Off-Site power,

EOP flow path: E-0 – E-2 – E-3 – ECA-3.1

2007 NRC EXAM SCENARIO 2

Facility: Indian Point 2 Scenario No: 2 Op-Test No: 1

Examiners: _____ Operators: _____

Initial Conditions: Reset simulator to IC-170

- The plant is at 100% normal full power lineup.
 - MOV-1802A is removed from service for MOVATS testing. Expected return to service is 8 hours.
 - 22 Charging pump is removed from service preventive maintenance. Expected return to service is 24 hours.
 - Severe thunderstorms expected over the next 4 hours.
- Turnover: Maintain 100% power.

Critical Tasks:

- (1) Insert negative reactivity into the core by at least one of the following methods before completing FR-S.1 step 4:
 - a. De-energize the control rod drive MG sets
 - b. Place rod control in manual and insert RCCAs
 - c. Establish emergency boration flow to the RCS
- (2) Close the block MOV upstream of the stuck-open PZR PORV by completion of the first step in the ERG network that directs the crew to close the block MOV.
- (3) Establish flow from a least one SI pump before transition out of E-1

Event No:	Malf. No.	Event Type*	Event Description
1	MOC-CVC005 C1	C(RO) C(CRS)	Running Charging pumps trips (at the same time as an earth quake) AOP-CVCS-1 actions taken to restore charging and letdown. Trigger 1
2	XMT-SGN005A	C(RO) C(CRS)	22 S/G Controlling Steam Flow Channel(429B)Fails High Event is concurrent with event #1 Trigger 1
3	N/A	R (RO) N (BOP) N (CRS)	Seismic event reported from Unit 3 with associated alarms requiring a down power (90 min. shutdown).
4	MAL-CVC002A (5.3 gpm) MAL-RCP007A (15 mils then ramp 15-17 over 45 min)	C(CRS)	#21 RCP seal degrades during down power (~99.5%). #21 RCP vibration increase to 15 mils AOP-RCP-1 actions taken. Trigger 2 (6.5mils =15 on malf) Ramp vibration from 15 to 17 mils over 45 minutes (8.5 =17 mils)

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5	LOA-CFW190 (value 90)	C(ALL)	Trip of 21 MBFPs at ~ 97% power due to discharge valve switch malfunction with a failure of the auto runback to function. AOP-FW-1 actions to rapidly reduce power. Trigger 3
6	MAL-ATS011B BKRPPLO03 (value 5) BKRPPLO04 (value 5) AOV-RCS3A	M(ALL)	#22 MBFP trips –after the crew stabilizes the plant from 21 MBFP trip. ATWS. Auto and manual trips fail. Local trip will work Trigger 4 -PORV 456 and block valve fails open Trigger 5 is linked to stop valves being shut.
7	AOV-RCS3A	C (RO) C(CRS)	21 RCP Seal LOCA after transition out of FR.S-1. Trigger 6
8	MAL-EPS001 (set to trigger 30 seconds after SI reset)	M(ALL)	Loss of offsite power after SI reset. 480V buses strip and SI equipment must be manually reload. Trigger 7
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

The evaluation begins with the plant at 100% power steady state operation.

Shortly after the team takes the watch, a seismic event will occur. Two failures occur immediately with the seismic event. The trip of the running charging pump will require the crew to restore charging and letdown per AOP-CVCS-1. The failure of the controlling 22 SG Steam Flow channel will require the crew to remove the channel from service and restore feedwater to automatic per AOP-INST-1. The crew will implement 0-AOP-SEISMIC-1 and due to alarms reported from Unit 3 will start a unit shutdown per POP-3.1 or AOP-RSD-1.

Early in the shutdown, 21 RCP #1 Seal will degrade. The team will respond to increased seal return flow and high vibrations in accordance with AOP-RCP-1, Reactor Coolant Pump Malfunction. The team should recognize the need to perform a controlled shutdown per the AOP.

During the down power at approximately 97% power, a loss of 21 MBFP will occur with a failure of the auto-runback to occur, This timing will allow for actions to stabilize the plant per AOP-FW-1 prior to loss of the second MBFP.

When the second feed pump trips the team should perform the immediate actions of AOP-FW-1, Loss of Feedwater and manually trip the reactor. Auto and manual reactor trips fail to open the reactor trip breakers. In addition, the rod drive MG set supply breakers fail to open. The team will manually insert control rods and align emergency boration. The NPO dispatched to locally trip the reactor will be successful after emergency boration has been initiated.

After the turbine is tripped, RCS pressure will increase and a PORV opens and fails to close. The team will recognize the failed open PORV and will isolate the PORV by closing it or its' block valve. The team will continue through FR-S.1 and then return to E-0 after the reactor is tripped locally. After transition to E-0 the 21 RCP seal will degrade

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resulting in a seal LOCA. The team will recognize that RCP trip criteria exist from lack of subcooling and will stop all RCPs. The E-0 will be performed until transition to E-1.

Following SI reset in E-1, offsite power will be lost. The team will be required to restart safeguards equipment.

The scenario can be terminated when SI pumps and Containment Cooling Equipment have been restarted following the loss of offsite power.

Procedure flow path: AOP-SEISMIC, AOP-RCP-1, AOP-FW-1, E-0, FR-S.1, E-0, E-1

Indian Point Unit 3
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3

Facility: Indian Point 2 Scenario No: 3 Op-Test No: 1

Examiners: _____ Operators: _____

Initial Conditions:

100% power MOL.

22 ABFP is tagged for maintenance

Severe thunderstorms expected over the next 4 hours

Crew is to maintain steady state plant conditions

Critical Tasks:

1. Manually trip the main turbine before a severe (orange-path) challenge develops to either the subcriticality or the integrity CSF or before transition to ECA-2.1, whichever happens first
2. Establish RCS bleed and feed when the average of the three lowest SG levels reaches 41% WR and prior to S/G depressurization.
3. At the discretion of the Lead Evaluator, the following CT may also be evaluated:
Close all reactor vessel head vent valves before the end of the scenario

Event No:	Malf. No.	Event Type*	Event Description
1	MAL-EPS007B	I/R (RO) N (BOP) N (CRS)	480v bus 3A fault. Trigger 1
2	XMT-RCS028A (fail high)	I (All)	PT-455 fails high Trigger 2
3	MAL-RCS010 (0.015)	C (RO) C(CRS)	30 gpm RCS leak Trigger 4
4	-CVH-CFW009B (24 FRV fails closed) -CVH-MSS031A - AOV-MSS038A &031A(stop and control valve open)	M(All)	24 FRV fails closed leading to Auto or manual Reactor Trip with Turbine failure to trip and loss of running AFW pump. Trigger 3

**Indian Point Unit 3
2007 NRC Initial License Examination
Simulator Scenario Turnover Information
Scenario 3**

	AOV-RCS003A (PORV will not open)		

The evaluation begins with the plant at 100% power steady state operation. The following equipment is out of service:

- 22 ABFP has been out-of-service for bearing oil line repair for 4 hours. It is expected back within the next 6 hours (ITS 3.7.5 – 72 hr AOT). 21 and 23 ABFPs are protected equipment.

After taking the watch, a fault will occur on 480V Bus 3A. The team will take actions in accordance with AOP-480V-1, “Loss of Normal Power to any Safeguards 480V Bus.” Due to the fault on Bus 3A, 22 EDG cannot re-energize the bus. TS require plant shutdown. (OTE: Lead may choose to allow or direct a plant shutdown if desired to evaluate an additional event. To accomplish the lead will direct a controlled shutdown to affect repairs to the 3A bus)

Prior to completion of the Subsequent Actions of AOP-480V-1, PRZR Pressure Controlling Transmitter PT-455 will fail high requiring operator actions IAW AOP-INST-1. The CRS will refer to Technical Specifications (T.S.).

After the team stabilized the plant from the PT-455 failure and assesses T.S., an RCS leak will begin. The team will respond IAW AOP-LEAK-1. The leak rate (~30gpm) will allow stabilization of pressurizer level by adjusting charging and letdown.

After the team has stabilized the plant and determined T.S. for the RCS leak, 24 feed regulation valve will slowly fail closed and trigger either an automatic or manual reactor trip. When the reactor is tripped, the turbine upper right stop and control valve pair fail to close. MSIVs must be manually closed to isolate steam to the turbine.

23 ABFP will not auto start and will not be able to be manually started from the Control Room due to 480V circuit breaker failure. (21 ABFP is deenergized due to fault on bus 3A, and 22 ABFP is out of service.)

The team will subsequently transition to FR-H.1, “Loss of Secondary Heat Sink” due to a loss of AFW flow. SG WR levels will lower until bleed and feed is required.

One PRZR PORV will not open when required. The crew will open the Reactor Head Vent valves. 21 AFW pump will then be successfully started from its ASSS supply, or 23 AFW pump from its normal supply after swapping 480V breakers with the spare breaker. The scenario can be terminated after the head vent valves have been closed, or at the discretion of the lead evaluator.

Procedure flow path: AOP-480V-1, AOP-RCP-1, E-0, FR-H.1

Summary of changes to Operating Exam based on Validation/Prep. Visit week of 10/07:

Scenarios:

#1)

- Changed timing of Event 2 and 3 to be earlier in down power.
- Moved Event 3 to occur at 92-94% power vice ~90% to ensure operator response.
- Other editorial enhancements.

#2)

- Added 22 charging pump OOS for IC to allow another opportunity to evaluate TRM/TS for CRS.
- Changed Event 2 to have RO respond vice BOP.
- Made Event 4 a CRS only task.
- Removed timing relationship between event 5 and 6 to allow the lead to control.
- Adjusted PORV malfunction to include the block and add a timing relation to loss of second feed pump.
- Other editorial enhancements.

#3)

- Determined during validation that original scenario as written would progress too slowly to evaluate applicants in an efficient manner. Determined with IPEC input that another scenario sequence would better achieve aims of the back-up scenario. Consequently this scenario was written. This scenario was validated the same week as the other two (primary) scenarios and forwarded to IPEC for review.

JPM's

Simulator:

#1)

- Step added to check temperature
- Other editorial enhancements

#2)

- Added simulator setup details.
- Other editorial enhancements.

#3)

- Added booth operator cues for SWN-35/35-1 and MOV882 & 1810.
- Added simulator setup details.
- Other editorial enhancements.

#4)

- Added simulator setup details.
- Other editorial enhancements.

#5)

- Added simulator setup details.

- Other editorial enhancements.

#6)

- Added potentially critical step for ensuring bus voltage differential is within limits if the applicant makes an adjustment to tap changers.
- Added simulator setup details.
- Other editorial enhancements.

#7)

- Lowered power to more exactly meet definition of low power (<5%)
- Added simulator setup details.
- Other editorial enhancements.

#8)

- Added simulator setup details.
- Other editorial enhancements.

In-Plant:

#1)

- Altered JPM to have MOV-222 closed as IC to avoid entry into HRA/contaminated area that also required climbing.
- Altered step to closed MOV-789 to cue applicant to locate valve from outside HRA and describe actions (actions for operation of an MOV similar to previous 4 valves).
- Other editorial enhancements.

#2)

- Changed MSIV from 23 to 21 due to 23 having an access door that was not see through and would need to be opened to perform JPM which is a plant trip risk.
- Other editorial enhancements.

#3)

- Editorial enhancements.

SRO Admin:

#1) Editorial enhancements.

#2) Editorial enhancements.

#3) Editorial enhancements.

#4) Editorial enhancements.

#5) Editorial enhancements.

RO Admin:

#1) Editorial enhancements.

#2) No #2 for RO's

#3) Editorial enhancements.

#4) Editorial enhancements.

#5) Altered JPM path to use phone back-up communications vice local government radio due to procedural discrepancy that would have made evaluation of performance difficult. After discussing with Chief examiner and IPEC representatives choose to a different alternate path with similar level of difficulty.

Summary of changes to Operating Exam based on 11/6-8/07 visit:

- Simulator JPM's 1-8 editorial changes/enhancements.
- Simulator Scenario 2:
 - Raised power level at which 21 MBFP trips to ~97%
 - Altered timing of PORV failure and RCP seal leak to separate them in time to allow for better evaluation of actions.
 - Altered various triggered and malfunctions to ensure proper simulator response as agreed between IPEC and NRC staff
 - Other editorial changes/enhancements.
- Simulator scenario 3 (back-up):
 - Added various triggers and "IC" information as agreed between IPEC and NRC staff.
 - Other editorial changes/enhancements.