

Facility: Waterford 3												Date of Exam: October 14, 2009						
Tier	Group	RO K/A Category Points												SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1	3	1	4	N/A			3	4	N/A			3	18	4	2	6	
	2	1	2	2				1	2				1	9	2	2	4	
	Tier Totals	4	3	6				4	6				4	27	6	4	10	
2. Plant Systems	1	3	3	2	4	2	1	2	3	2	2	4	28	3	2	5		
	2	2	0	1	1	0	1	2	2	0	1	0	10	0	2	3		
	Tier Totals	5	3	3	5	2	2	4	5	2	3	4	38	5	3	8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7
					2		3		2		3			2	2	2	1	
<p>Note:</p> <ol style="list-style-type: none"> 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). The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ± 1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted 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. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories. * The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43. 																		

PWR Examination Outline										Form ES-401-2	
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	K/A Topic(s)		IR	#	
CE/E02 Reactor Trip - Stabilization - Recovery / 1	X						EK1.3	Knowledge of the operational implications of the following concepts as they apply to the (Reactor Trip Recovery): Annunciators and conditions indicating signals, and remedial actions associated with the (Reactor Trip Recovery).	3.0	1	
000008 Pressurizer Vapor Space Accident / 3					X		AA2.12	Ability to determine and interpret the following as they apply to a Pressurizer Vapor Space Accident: PZR level indications.	3.4	2	
000009 Small Break LOCA / 3					X		EA2.34	Ability to determine or interpret the following as they apply to a small break LOCA: Conditions for throttling or stopping HPI	3.6	3	
000011 Large Break LOCA / 3		X					EK2.02	Knowledge of the interrelations between the and the following Large Break LOCA: Pumps	2.6	18	
000015/17 RCP Malfunctions / 4				X			AA1.22	Ability to operate and / or monitor the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): RCP seal failure/malfunction	4.0	4	
000022 Loss of Rx Coolant Makeup / 2			X				AK3.04	Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup: Isolating letdown	3.2	5	
000025 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	6	
000026 Loss of Component Cooling Water / 8						X	G2.1.30	Conduct of Operations: Ability to locate and operate components, including local controls.	4.4	7	
000027 Pressurizer Pressure Control System Malfunction / 3			X				AK3.03	Knowledge of the reasons for the following responses as they apply to the Pressurizer Pressure Control Malfunctions: Actions contained in EOP for PZR PCS malfunction	3.7	8	
000029 ATWS / 1				X			EA1.11	Ability to operate and monitor the following as they apply to a ATWS: Manual opening of the CRDS breakers	3.9	9	

PWR Examination Outline										Form ES-401-2		
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	K/A Topic(s)			IR	#	
000038 Steam Gen. Tube Rupture / 3			X				EK3.05	Knowledge of the reasons for the following responses as the apply to the SGTR: Normal operating precautions to preclude or minimize SGTR			4.0	10
000040 (CE/E05) Steam Line Rupture - Excessive Heat Transfer / 4					X		EA2.4	Ability to determine and interpret the following as they apply to the Steam Line Rupture: Conditions requiring ESFAS initiation			4.5	11
CE/E06 Loss of Main Feedwater / 4			X				EK3.2	Knowledge of the reasons for the following responses as they apply to the (Loss of Main Feedwater): Normal, abnormal and emergency operating procedures associated with (Loss of Feedwater).			3.2	12
000055 Station Blackout / 6	X						EK1.01	Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : Effect of battery discharge rates on capacity			3.3	13
000056 Loss of Off-site Power / 6			X				AA1.07	Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: Service water pump.			3.2	14
000057 Loss of Vital AC Inst. Bus / 6						X	G2.2.40	Equipment Control: Ability to apply Technical Specifications for a system.			3.4	15
000058 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	16
000062 Loss of Nuclear Svc Water / 4												
000065 Loss of Instrument Air / 8						X	G2.4.4	Emergency Procedures / Plan: Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.			4.5	17
000077 Generator Voltage and Electric Grid Disturbances / 6												
K/A Category Totals:	3	1	4	3	4	3	Group Point Total:				18	

PWR Examination Outline										Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2										RO	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#	
000001 Continuous Rod Withdrawal / 1											
000003 Dropped Control Rod / 1				X			AA1.07	Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: In-core and ex-core instrumentation	3.8	19	
000005 Inoperable/Stuck Control Rod / 1											
000024 Emergency Boration / 1											
000028 Pressurizer Level Malfunction / 2		X					AK2.03	Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following: Controllers and positioners	2.6	20	
000032 Loss of Source Range NI / 7											
000033 Loss of Intermediate Range NI / 7											
000036 Fuel Handling Accident / 8	X						AK1.02	Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents : SDM	3.4	21	
000037 Steam Generator Tube Leak / 3						X	G2.4.47	Emergency Procedures / Plan: Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	4.2	22	
000051 Loss of Condenser Vacuum / 4					X		AA2.02	Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: Conditions requiring reactor and/or turbine trip	3.9	23	
000059 Accidental Liquid RadWaste Rel. / 9			X				AK3.04	Knowledge of the reasons for the following responses as they apply to the Accidental Liquid Radwaste Release: Actions contained in EOP for accidental liquid radioactive-waste release.	3.8	24	
000060 Accidental Gaseous Radwaste Rel. / 9											

ES-401 PWR Examination Outline										Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2										RO	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#	
000061 ARM System Alarms / 7					X		AA2.06	Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Required actions if alarm channel is out of service	3.2	25	
000067 Plant Fire On-site / 8											
000068 Control Room Evac. / 8											
000069 (W/E14) Loss of CTMT Integrity / 5		X					AK2.03	Knowledge of the interrelations between the Loss of Containment Integrity and the following: Personnel access hatch and emergency access hatch	2.8	26	
000074 Inad. Core Cooling / 4											
000076 High Reactor Coolant Activity / 9											
CE/A13 Natural Circ. / 4											
CE/A11 RCS Overcooling - PTS / 4		X					AK3.2	Knowledge of the reasons for the following responses as they apply to the (RCS Overcooling): Normal, abnormal and emergency operating procedures associated with (RCS Overcooling).	2.9	27	
CE/A16 Excess RCS Leakage / 2											
CE/E09 Functional Recovery											
K/A Category Point Totals:	1	2	2	1	2	1	Group Point Total:			9	

PWR Examination Outline															Form ES-401-2	
Plant Systems - Tier 2/Group 1															RO	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)		IR	#	
003 Reactor Coolant Pump				X								K4.04	Knowledge of RCPS design feature(s) and/or interlock(s) which provide for the following: Adequate cooling of RCP motor and seals	2.8	28	
003 Reactor Coolant Pump											X	G2.1.32	Conduct of Operations: Ability to explain and apply system limits and precautions.	3.8	29	
004 Chemical and Volume Control					X							K5.04	Knowledge of the operational implications of the following concepts as they apply to the CVCS Reason for hydrogen cover gas in VCT (oxygen scavenge)	2.8	30	
005 Residual Heat Removal		X										K2.03	Knowledge of bus power supplies to the following: RCS pressure boundary motor-operated valves	2.7	31	
006 Emergency Core Cooling				X								K5.06	Knowledge of the operational implications of the following concepts as they apply to ECCS: Relationship between ECCS flow and RCS pressure	3.5	32	
007 Pressurizer Relief/Quench Tank						X						A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Maintaining quench tank pressure	2.7	33	
008 Component Cooling Water	X											K1.05	Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: Sources of makeup water	3.0	34	
008 Component Cooling Water								X				A3.08	Ability to monitor automatic operation of the CCWS, including: Automatic actions associated with the CCWS that occur as a result of a safety injection signal	3.6	35	
010 Pressurizer Pressure Control				X								K4.03	Knowledge of PZR PCS design feature(s) and/or interlock(s) which provide for the following: Over pressure control	3.8	36	

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Plant Systems - Tier 2/Group 1																	RO		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)					IR	#	
012 Reactor Protection											X	G2.2.39	Equipment Control: Knowledge of less than or equal to one hour Technical Specification action statements for systems.					3.9	37
013 Engineered Safety Features Actuation		X										K2.01	Knowledge of bus power supplies to the following: ESFAS/safeguards equipment control					3.6	38
013 Engineered Safety Features Actuation										X		A4.02	Ability to manually operate and/or monitor in the control room: Reset of ESFAS channels					4.3	39
022 Containment Cooling			X									K3.02	Knowledge of the effect that a loss or malfunction of the CCS will have on the following: Containment instrumentation readings					3.0	40
026 Containment Spray		X										K2.01	Knowledge of bus power supplies to the following: Containment spray pumps					3.4	41
026 Containment Spray							X					A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: Containment pressure					3.9	42
039 Main and Reheat Steam	X											K1.08	Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: MFW					2.7	43
059 Main Feedwater										X		A4.08	Ability to manually operate and monitor in the control room: Feed regulating valve controller					3.0	44
059 Main Feedwater											X	G2.4.11	Emergency Procedures / Plan: Knowledge of abnormal condition procedures.					4.0	45
061 Auxiliary/Emergency Feedwater			X									K4.06	Knowledge of AFW design feature(s) and/or interlock(s) which provide for the following: AFW startup permissives					4.0	46

PWR Examination Outline Plant Systems - Tier 2/Group 1 RO														Form ES-401-2	
ES-401															
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	A G	K/A Topic(s)		IR	#
061 Auxiliary/Emergency Feedwater								X				A2.05	Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Automatic control malfunction	3.1	47
062 AC Electrical Distribution								X				A2.12	Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Restoration of power to a system with a fault on it	3.2	48
063 DC Electrical Distribution		X										K3.02	Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: Components using DC control power	3.7	49
064 Emergency Diesel Generator						X						K6.08	Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Fuel oil storage tanks	3.2	50
064 Emergency Diesel Generator											X	G2.4.31	Emergency Procedures / Plan: Knowledge of annunciator alarms, indications, or response procedures.	4.2	51
073 Process Radiation Monitoring								X				A2.02	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: Detector failure	2.7	52
076 Service Water				X								K4.02	Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following: Automatic start features associated with SWS pump controls	2.9	53
078 Instrument Air									X			A3.01	Ability to monitor automatic operation of the IAS, including: Air pressure	3.1	54

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Plant Systems - Tier 2/Group 1															RO																													
System # / Name		K1	K2	K3	K4	K5	K6	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	A5	A6	G	K/A Topic(s)					IR	#																	
103 Containment		X																			K1.03	Knowledge of the physical connections and/or cause effect relationships between the containment system and the following systems: Shield building vent system					3.1	55																
K/A Category Point Totals:		3	3	2	4	2	1	2	3	2	2	3	2	2	2	3	2	2	4	Group Point Total:					28																			

PWR Examination Outline															Form ES-401-2		
Plant Systems - Tier 2/Group 2															RO		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	A 5	G	K/A Topic(s)		IR	#	
001 Control Rod Drive																	
002 Reactor Coolant						X							K6.12	Knowledge of the effect or a loss or malfunction on the following RCS components: Code Safety valves	3.0	56	
011 Pressurizer Level Control												X	A4.05	Ability to manually operate and/or monitor in the control room: Letdown flow controller	3.2	57	
014 Rod Position Indication								X					A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the RPIs; and (b) based on those on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Misaligned Rod	3.4	63	
015 Nuclear Instrumentation																	
016 Non-nuclear Instrumentation	X												K1.09	Knowledge of the physical connections and/or cause effect relationships between the NNIS and the following systems: ESFAS	3.7	59	
017 In-core Temperature Monitor							X						A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ITM system controls including: Core exit temperature	3.7	58	
027 Containment Iodine Removal																	
028 Hydrogen Recombiner and Purge Control																	
029 Containment Purge																	
033 Spent Fuel Pool Cooling				X									K4.01	Knowledge of design feature(s) and/or interlock(s) which provide for the following: Maintenance of spent fuel level	2.9	60	

PWR Examination Outline															Form ES-401-2	
Plant Systems - Tier 2/Group 2															RO	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)		IR	#	
034 Fuel Handling Equipment																
035 Steam Generator																
041 Steam Dump/Turbine Bypass Control				X								K3.04	Knowledge of the effect that a loss or malfunction of the SDS will have on the following: Reactor power	3.5	61	
045 Main Turbine Generator							X					A1.05	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MT/G system controls including: Expected response of primary plant parameters (temperature and pressure) following T/G trip	3.8	62	
055 Condenser Air Removal																
056 Condensate																
068 Liquid Radwaste																
071 Waste Gas Disposal	X											K1.06	Knowledge of the physical connections and/or cause effect relationships between the Waste Gas Disposal System and the following systems: ARM and PRM systems	3.1	64	
072 Area Radiation Monitoring								X				A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the ARM system- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Erratic or failed power supply	2.7	65	
075 Circulating Water																
079 Station Air																
086 Fire Protection																
K/A Category Point Totals:	2	0	1	1	0	1	2	2	0	1	0	Group Point Total:			10	

PWR Examination Outline											Form ES-401-2
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	K/A Topic(s)		IR	#	
000007 (CE/E02) Reactor Trip - Stabilization - Recovery / 1					X		EA2.1	Ability to determine and interpret the following as they apply to the Reactor Trip Recovery: Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.7	S1	
000008 Pressurizer Vapor Space Accident / 3											
000009 Small Break LOCA / 3											
000011 Large Break LOCA / 3						X	G2.1.7	Conduct of Operations: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	S2	
000015/17 RCP Malfunctions / 4											
000022 Loss of Rx Coolant Makeup / 2											
000025 Loss of RHR System / 4					X		AA2.07	Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Pump cavitation	3.7	S3	
000026 Loss of Component Cooling Water / 8											
000027 Pressurizer Pressure Control System Malfunction / 3											
000029 ATWS / 1											
000038 Steam Gen. Tube Rupture / 3											
CE/E05 Steam Line Rupture - Excessive Heat Transfer / 4					X		EA2.2	Ability to determine and interpret the following as they apply to the (Excess Steam Demand): Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	4.2	S4	
000054 (CE/E06) Loss of Main Feedwater / 4											

PWR Examination Outline										Form ES-401-2	
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	K/A Topic(s)		IR	#	
000055 Station Blackout / 6											
000056 Loss of Off-site Power / 6											
000057 Loss of Vital AC Inst. Bus / 6						X	G2.4.45	Emergency Procedures / Plan: Ability to prioritize and interpret the significance of each annunciator or alarm.	4.3	S5	
000058 Loss of DC Power / 6											
000062 Loss of Nuclear Svc Water / 4											
000065 Loss of Instrument Air / 8											
000077 Generator Voltage and Electric Grid Disturbances / 6				X			AA2.05	Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: Operational status of offsite circuit.	3.8	S6	
K/A Category Totals:							4	2	Group Point Total:		
									6		

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		Emergency and Abnormal Plant Evolutions - Tier 1/Group 2										SRO	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	A 3	G	K/A Topic(s)			IR	#	
000001 Continuous Rod Withdrawal / 1													
000003 Dropped Control Rod / 1													
000005 Inoperable/Stuck Control Rod / 1							X	AA2.03	Ability to determine and interpret the following as they apply to the Inoperable / Stuck Control Rod: Required actions if more than one rod is stuck or inoperable.			4.4	S7
000024 Emergency Boration / 1													
000028 Pressurizer Level Malfunction / 2													
000032 Loss of Source Range NI / 7													
000033 Loss of Intermediate Range NI / 7													
000036 (BW/A08) Fuel Handling Accident / 8													
000037 Steam Generator Tube Leak / 3							X	G2.2.38	Equipment Control: Knowledge of conditions and limitations in the facility license.			4.5	S8
000051 Loss of Condenser Vacuum / 4													
000059 Accidental Liquid RadWaste Rel. / 9													
000060 Accidental Gaseous Radwaste Rel. / 9													
000061 ARM System Alarms / 7													
000067 Plant Fire On-site / 8													
000068 Control Room Evac. / 8													
000069 Loss of CTMT Integrity / 5							X	AA2.01	Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Loss of containment integrity.			4.3	S9
000074 Inad. Core Cooling / 4													
000076 High Reactor Coolant Activity / 9													

PWR Examination Outline										Form ES-401-2	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2										SRO	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#	
CE/A13 Natural Circ. / 4											
CE/A11 RCS Overcooling - PTS / 4						X	G2.4.18	Emergency Procedures / Plan: Knowledge of the specific bases for EOPs.	4.0	S10	
CE/A16 Excess RCS Leakage / 2											
CE/E09 Functional Recovery											
K/A Category Point Totals:									Group Point Total:		
									4		

PWR Examination Outline															Form ES-401-2	
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	K/A Topic(s)	IR	#		
003 Reactor Coolant Pump																
004 Chemical and Volume Control								X				A2.25	4.3	S11		
005 Residual Heat Removal																
006 Emergency Core Cooling																
007 Pressurizer Relief/Quench Tank																
008 Component Cooling Water																
010 Pressurizer Pressure Control											X	G2.1.25	4.2	S12		
012 Reactor Protection								X				A2.01	3.6	S13		
013 Engineered Safety Features Actuation																
022 Containment Cooling																
026 Containment Spray																
039 Main and Reheat Steam																
059 Main Feedwater																

PWR Examination Outline															Form ES-401-2	
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	K/A Topic(s)	IR	#		
061 Auxiliary/Emergency Feedwater								X				A2.04 Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: pump failure or improper operation	3.8	S14		
062 AC Electrical Distribution																
063 DC Electrical Distribution																
064 Emergency Diesel Generator											X	G2.4.45 Emergency Procedures / Plan: Ability to prioritize and interpret the significance of each annunciator or alarm.	4.3	S15		
073 Process Radiation Monitoring																
076 Service Water																
078 Instrument Air																
103 Containment																
K/A Category Point Totals:								3			2	Group Point Total:		5		

PWR Examination Outline																	Form ES-401-2		
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	K/A Topic(s)					IR	#	
001 Control Rod Drive																			
002 Reactor Coolant																			
011 Pressurizer Level Control																			
014 Rod Position Indication																			
015 Nuclear Instrumentation																			
016 Non-nuclear Instrumentation																			
017 In-core Temperature Monitor											X	G2.2..22	Equipment Control: Knowledge of limiting conditions for operations and safety limits.					4.7	S16
027 Containment Iodine Removal																			
028 Hydrogen Recombiner and Purge Control																			
029 Containment Purge																			
033 Spent Fuel Pool Cooling																			
034 Fuel Handling Equipment								X				A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the Fuel Handling System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Dropped fuel element					4.4	S17
035 Steam Generator																			
041 Steam Dump/Turbine Bypass Control																			
045 Main Turbine Generator																			
055 Condenser Air Removal																			

PWR Examination Outline														Form ES-401-2	
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	K/A Topic(s)	IR	#	
056 Condensate															
068 Liquid Radwaste								X				A2.04 Ability to (a) predict the impacts of the following malfunctions or operations on the Liquid Radwaste System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure of automatic isolation	3.3	S18	
071 Waste Gas Disposal															
072 Area Radiation Monitoring															
075 Circulating Water															
079 Station Air															
086 Fire Protection															
K/A Category Point Totals:								2			1	Group Point Total:		3	

Facility: Waterford 3		Date of Exam: October 14, 2009					
Category	K/A #	Topic	RO		SRO-Only		
			IR	#	IR	#	
1. Conduct of Operations	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	66			
	2.1.32	Ability to explain and apply system limits and precautions.	3.8	67			
	2.1.43	Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc.			4.3	S19	
	2.1.6	Ability to manage the control room crew during plant transients.			4.8	S20	
	Subtotal			2		2	
2. Equipment Control	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings.	3.5	68			
	2.2.14	Knowledge of the process for controlling equipment configuration or status.	3.9	69			
	2.2.38	Knowledge of conditions and limitations in the facility license.	3.6	70			
	2.2.20	Knowledge of the process for managing troubleshooting activities.			3.8	S21	
	2.2.42	Ability to recognize system parameters that are entry-level conditions for Technical Specifications.			4.6	S22	
Subtotal				3		2	

3. Radiation Control	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.	3.4	71	
	2.3.7	Ability to comply with radiation work permit requirements during normal or abnormal conditions.	3.5	72	
	2.3.13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.			3.8 S23
	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.			3.1 S24
	Subtotal			2	2
4. Emergency Procedures / Plan	2.4.4	Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5	73	
	2.4.2	Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.5	74	
	2.4.30	Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	2.7	75	
	2.4.38	Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required.			4.4 S25
	Subtotal			3	1
Tier 3 Point Total				10	7

Form ES-401-4

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Tier / Group	Randomly Selected K/A	Reason for Rejection
RO 2 / 2	056 Condensate A2.04	<p>K/A selected directed questioning on the ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations for Loss of condensate pumps. This K/A was selected for the reactor operator portion of the written exam, but NO procedural actions address a loss of condensate pump(s). Randomly selected another system for A2 based upon NO other available K/As for 056 system.</p> <p>K/A 014 A2.04</p>
RO 2 / 2	027 Containment Iodine Removal System K1.01	<p>Waterford's non-accident containment iodine removal is accomplished by a system called Airborne Radioactivity Removal System, ARRS. Containment Spray functions to remove iodine post-LOCA. For the K/A drawn, interrelation between ARRS and Containment Spray, there is no interrelationship. For other K/A statements for this system, there were either no Waterford function or no K/A statement of high enough importance. A new system was selected from Group 2, Tier 2 from the systems not yet sampled. 016, Non-Nuclear Instrumentation, was selected. Since K1 was originally selected, it was still used. There are 12 topics under K1 for Non-Nuclear Instrumentation. K1.09, Knowledge of the physical connections and/or cause effect relationships between the NNIS and the following systems: ESFAS, was randomly drawn.</p> <p>K/A 016 K1.09 was drawn.</p>
RO 3 / 1	Conduct of Operations 2.1.9	<p>K/A selected directed questioning on the ability to direct personnel activities inside the control room. This K/A was selected for the reactor operator portion of the written exam, but does not apply to reactor operator duties. Randomly selected another generic K/A from section 2.1.</p> <p>K/A 2.1.25 was drawn.</p>

Tier / Group	Randomly Selected K/A	Reason for Rejection
RO 1 / 1	077 Generator Voltage and Electric Grid Disturbances AK2.03	K/A selected directed questioning on the knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and sensors, detectors, and indicators. Waterford does not monitor grid disturbance parameters but relies on System Load controllers and Engineering to evaluate these conditions. Randomly selected another system and K2 section K/A for the Large Break LOCA E/APE group. K/A 011 EK2.02 was drawn.
RO 2 / 1	026 Containment Spray A1.02	K/A selected directed questioning on the ability to predict and/or monitor changes in Containment temperature associated with operating the CSS controls. Waterford does not monitor Containment temperature during spray actuation. Randomly selected another K/A from A1. K/A A1.01 was drawn
RO 2 / 1	064 Emergency Diesel Generator G2.4.4	K/A selected directed questioning on the ability to recognize abnormal indications for EDG system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. Waterford exam contains a number of AOP/EOP electrical questions and SRO exam contains a similar K/A for EDG operation. Randomly selected another K/A from 2.4 K/A 2.4.31 was drawn
RO 3 / 1	G2.1.25	K/A selected directed questioning on the ability to interpret reference materials, such as graphs, curves, tables, etc. This K/A was selected for the reactor operator portion of the written exam, but more than 5 questions in Tier 1/2 contain questions needing references to address those questions. Randomly selected another generic K/A from section 2.1. K/A 2.1.5 was drawn.

Tier / Group	Randomly Selected K/A	Reason for Rejection
RO 3 / 4	G2.4.4	<p>K/A selected directed questioning on the ability recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. This K/A was selected for the reactor operator portion of the written exam, but a number of questions in Tier 1/2 contain AOP and EOP related questions. Randomly selected another generic K/A from section 2.4.</p> <p>K/A 2.4.12 was drawn.</p>
END of RO Section		

SRO 1 / 1	077 Electrical Grid Disturbance AA2.06	<p>K/A selected directed questioning on the ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: Generator Frequency limitations. Waterford does not monitor Frequency as a procedural action but rather requires the operator to monitor Volts, MVARs, and MW parameters. Randomly selected another K/A under A2 from those items in section A2 that were applicable to Waterford for a Grid disturbance condition.</p> <p>K/A AA2.05 was drawn.</p>
SRO 2 / 1	026 Containment Spray A2.07	<p>K/A selected directed questioning on the ability to predict the impact of a malfunction 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. This item is being addressed in the operating test section which requires selecting a new system.</p> <p>Topic 012, Reactor Protection, was randomly drawn as a replacement.</p> <p>K/A 012 A2.01</p>
SRO 2 / 2	034 Fuel Handling Equipment A2.03	<p>K/A selected directed questioning on the ability to (a) predict the impact of the following malfunctions or operations on the Fuel Handling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: <u>Mispositioned fuel element</u>. Waterford does not have a comprehensive procedural action but rather requires the operator to stop and contact Engineering for an evaluation/recommendation of corrective action. Randomly selected another K/A under A2 from those items in section A2 that were applicable to Waterford for a Fuel Handling condition.</p> <p>K/A A2.01 was drawn.</p>
END of SRO Section		

Facility: WATERFORD 3		Date of Examination: October 5, 2009
Examination Level: RO		Operating Test Number: 1
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A1 Conduct of Operations K/A Importance: 4.3	S, D	2.1.23, Ability to perform specific system and integrated plant procedures during all modes of plant operation. Calculate Shutdown Margin and Volume of Primary Makeup Water for Dilution to the Volume Control Tank.
A2 Conduct of Operations K/A Importance: 3.6	R, M	2.1.18, Ability to make accurate, clear, and concise logs, records, status boards, and reports. Complete OP-004-005, Core Operating Limits Supervisory System Operation, Attachment 11.6, Calculation of Charging and Letdown Parameters.
A3 Equipment Control K/A Importance: 3.7	R, N	2.2.12, Knowledge of surveillance procedures Complete surveillance OP-903-008, Reactor Coolant System Isolation Leakage Test, Attachment 10.11 for SI-329 A.
A4 Radiation Control K/A Importance: 3.2	R, N	2.3.4, Knowledge of radiation exposure limits under normal and emergency conditions. Calculate stay time to perform a tagout verification in the Regen Heat Exchanger Room. Room dose rate & operator's yearly dose provided.
Emergency Plan		Not selected
<p>NOTE: All items (5 total are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.</p>		
<p>* Type Codes & Criteria:</p> <p>(C)ontrol room, (S)imulator, or Class(R)oom</p> <p>(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)</p> <p>(N)ew or (M)odified from bank (≥ 1)</p> <p>(P)revious 2 exams (≤ 1; randomly selected)</p>		

Facility: WATERFORD 3		Date of Examination: October 5, 2009
Examination Level: SRO		Operating Test Number: 1
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A5 Conduct of Operations K/A Importance: 4.4	R, N	2.1.23, Ability to perform specific system and integrated plant procedures during all modes of plant operation. Verify Core Protection Calculator, Plant Protection System, and Calorimetric power are within limits during power ascension in accordance with OP-010-004 Power Operations, and OP-903-001, Technical Specification Surveillance Logs.
A6 Conduct of Operations K/A Importance: 4.6	R, M	2.1.20, Ability to interpret and execute procedure steps Perform SM/CRS review OP-901-501, PMC or Core Operating Limit Supervisory System Malfunction, Attachments 1, 2, and 3 following a PMC failure.
A7 Equipment Control K/A Importance: 4.7	R, N	2.2.40, Ability to apply Technical Specifications for a system. Review surveillance OP-903-008, Reactor Coolant System Isolation Leakage Test, Attachment 10.11 for SI-329 A.
A8 Radiation Control K/A Importance: 3.7	R, N	2.3.4, Knowledge of radiation exposure limits under normal and emergency conditions. Calculate dose and assign non-licensed operators to vent Safety Injection piping in Safeguards Room A. Given dose rate with and without shielding installed, time to install shielding, and job completion time using 1 operator or using 2 operators, determine proper job assignment.
A9 Emergency Plan K/A Importance: 4.6	S, M	2.4.41, Knowledge of the emergency action level thresholds and classifications. Determine appropriate Emergency Plan EAL.
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 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:	WATERFORD 3	Date of Examination:	October 5, 2009
Exam Level (circle one):	RO	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 Function
S1	001 Control Rod Drive; ATC Operator Immediate Operator Actions on 2 Dropped CEAs from OP-901-102, CEA or CEDMCS Malfunction Fault: The first and second reactor trip options do not function, requires performance of the 2 nd reactor trip contingency from EOP OP-902-000, Standard Post Trip Actions.	A, S, D	1
S2	004 Chemical and Volume Control; VCT Makeup Using the Dilute makeup Mode Fault: PMU-144, Primary Makeup Water Control Valve, will not auto close when Primary Makeup Water Batch Counter counts down to zero.	A, L, S, M	2
S3	006 Emergency Core Cooling System; BOP Operator Actions on RAS This is a time critical task performed in EOP OP-902-002, Loss of Coolant Accident Recovery Procedure.	L, P, S, EN, D	3
S4	005 Shutdown Cooling System / 0025 E/APE Loss of Shutdown Cooling; Place Shutdown Cooling Train B in Service Fault: After LPSI Pump B is running, SI-405 B will fail closed, requiring the operator to take immediate operator actions IAW OP-903-130, Shutdown Cooling Malfunction, to secure LPSI Pump B.	A, L, S, M	4 - P
S5	022 Containment Cooling System; Perform OP-903-037, Containment Cooling Fans Operability Verification	S, D	5
S6	062 AC Electrical Distribution System, Energize 4.16 KV Safety Bus from Offsite Power This task will re-energize the 3A Bus with EDG A powering the 3A Bus using OP-902-009, Standard Appendices, Attachment 12-B.	L, S, D	6
S7.	012 Reactor Protection System; Remove Reactor Trip on Turbine Trip from Service using OP-004-015, Reactor Power Cutback System, and place Reactor Power Cutback in Service. Fault: When Reactor Power Cutback is placed in service, a Reactor Power Cutback will occur. The student will then need to take the immediate operator actions for Reactor Power Cutback.	A, S, M	7
S8	029 Containment Purge System; Secure Containment Purge using OP-002-010, Reactor Auxiliary Building HVAC and Containment Purge	S, D	8

In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	061 Emergency Feedwater; Transfer EFW Pump Suctions to Wet Cooling Tower after Condensate Storage Pool Depletion using EOP OP-902-009, Standard Appendices, Attachment 10	E, L, R, D	4 - S
P2	064 Electrical Diesel Generators, Reset EDG A following an overspeed trip with a LOOP. Reset is accomplished with OP-009-002, Emergency Diesel Generator, Section 8.8.	E, L, R, D	6
P3	006 Emergency Core Cooling System (ECCS), Align HPSI Pump AB for performance of OP-903-030, Safety Injection Pump Operability Verification. Fault: Reach rod for SI-208 A will bottom out during valve alignment, requiring contingencies of EN-OP-115, Conduct of Operations.	A, R, M	2
@ 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		- / - / ≥ 1 (control room system)	
(L)ow-Power / Shutdown		$\geq 1 / \geq 1 / \geq 1$	
(N)ew or (M)odified from bank including 1(A)		$\geq 2 / \geq 2 / \geq 1$	
(P)revious 2 exams		$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	
(R)CA		$\geq 1 / \geq 1 / \geq 1$	
(S)imulator			

Facility:	WATERFORD 3	Date of Examination:	October 5, 2009
Exam Level (circle one):	SRO - I	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 Function
S1	001 Control Rod Drive; ATC Operator Immediate Operator Actions on 2 Dropped CEAs from OP-901-102, CEA or CEDMCS Malfunction Fault: The first and second reactor trip options do not function, requires performance of the 2 nd reactor trip contingency from EOP OP-902-000, Standard Post Trip Actions.	A, S, D	1
S2			
S3	006 Emergency Core Cooling System; BOP Operator Actions on RAS This is a time critical task performed in EOP OP-902-002, Loss of Coolant Accident Recovery Procedure.	L, P, S, EN, D	3
S4	005 Shutdown Cooling System / 0025 E/APE Loss of Shutdown Cooling; Place Shutdown Cooling Train B in Service Fault: After LPSI Pump B is running, SI-405 B will fail closed, requiring the operator to take immediate operator actions IAW OP-903-130, Shutdown Cooling Malfunction, to secure LPSI Pump B.	A, L, S, M	4 - P
S5	022 Containment Cooling System; Perform OP-903-037, Containment Cooling Fans Operability Verification	S, D	5
S6	062 AC Electrical Distribution System, Energize 4.16 KV Safety Bus from Offsite Power This task will re-energize the 3A Bus with EDG A powering the 3A Bus using OP-902-009, Standard Appendices, Attachment 12-B.	L, S, D	6
S7.	012 Reactor Protection System; Remove Reactor Trip on Turbine Trip from Service using OP-004-015, Reactor Power Cutback System, and place Reactor Power Cutback in Service. Fault: When Reactor Power Cutback is placed in service, a Reactor Power Cutback will occur. The student will then need to take the immediate operator actions for Reactor Power Cutback.	A, S, M	7
S8	029 Containment Purge System; Secure Containment Purge using OP-002-010, Reactor Auxiliary Building HVAC and Containment Purge	S, D	8

In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	061 Emergency Feedwater; Transfer EFW Pump Suctions to Wet Cooling Tower after Condensate Storage Pool Depletion using EOP OP-902-009, Standard Appendices, Attachment 10	E, L, R, D	4 - S
P2	064 Electrical Diesel Generators, Reset EDG A following an overspeed trip with a LOOP. Reset is accomplished with OP-009-002, Emergency Diesel Generator, Section 8.8.	E, L, R, D	6
P3	006 Emergency Core Cooling System (ECCS), Align HPSI Pump AB for performance of OP-903-030, Safety Injection Pump Operability Verification. Fault: Reach rod for SI-208 A will bottom out during valve alignment, requiring contingencies of EN-OP-115, Conduct of Operations.	A, R, M	2
@ 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		- / - / ≥ 1 (control room system)	
(L)ow-Power / Shutdown		$\geq 1 / \geq 1 / \geq 1$	
(N)ew or (M)odified from bank including 1(A)		$\geq 2 / \geq 2 / \geq 1$	
(P)revious 2 exams		$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	
(R)CA		$\geq 1 / \geq 1 / \geq 1$	
(S)imulator			

Facility:	WATERFORD 3	Date of Examination:	October 5, 2009
Exam Level (circle one):	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 Function
S1			
S2			
S3 006 Emergency Core Cooling System; BOP Operator Actions on RAS This is a time critical task performed in EOP OP-902-002, Loss of Coolant Accident Recovery Procedure.		L, P, S, EN, D	3
S4 005 Shutdown Cooling System / 0025 E/APE Loss of Shutdown Cooling; Place Shutdown Cooling Train B in Service Fault: After LPSI Pump B is running, SI-405 B will fail closed, requiring the operator to take immediate operator actions IAW OP-903-130, Shutdown Cooling Malfunction, to secure LPSI Pump B.		A, L, S, M	4 - P
S5			
S6			
S7. 012 Reactor Protection System; Remove Reactor Trip on Turbine Trip from Service using OP-004-015, Reactor Power Cutback System, and place Reactor Power Cutback in Service. Fault: When Reactor Power Cutback is placed in service, a Reactor Power Cutback will occur. The student will then need to take the immediate operator actions for Reactor Power Cutback.		A, S, M	7
S8			

In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
P1		
P2 064 Electrical Diesel Generators, Reset EDG A following an overspeed trip with a LOOP. Reset is accomplished with OP-009-002, Emergency Diesel Generator, Section 8.8.	E, L, R, D	6
P3 006 Emergency Core Cooling System (ECCS), Align HPSI Pump AB for performance of OP-903-030, Safety Injection Pump Operability Verification. Fault: Reach rod for SI-208 A will bottom out during valve alignment, requiring contingencies of EN-OP-115, Conduct of Operations.	A, R, M	2
@ 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	- / - / ≥ 1 (control room system)	
(L)ow-Power / Shutdown	$\geq 1 / \geq 1 / \geq 1$	
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$	
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	
(R)CA	$\geq 1 / \geq 1 / \geq 1$	
(S)imulator		

Facility:	WATERFORD 3	Scenario No.: 1	Op Test No.: NRC
Examiners:	_____	Operators:	_____
	_____		_____
	_____		_____
Initial Conditions:	<ul style="list-style-type: none"> 100%, MOC, AB buses aligned to "B" side. Protected Train is B 		
Turnover:	<ul style="list-style-type: none"> Maintain 100 % power Continue with Surveillance OP-903-094, section 7.20 		

Event No.	Malf. No.	Event Type*	Event Description
1	Di08A04S08-1	N – BOP TS - SRO	Perform surveillance OP-903-094, section 7.20. BD-103B fails to close.
2	RC15-A1	I – ATC I - SRO TS-SRO	Pressurizer level instrument RC-ILI-0110-X fails high
3	CC12-E2	I – BOP TS - SRO	Component Cooling Water Surge Tank level instrument CC-ILS-7013A fails low
4	FW21-A	R- ATC N-BOP N-SRO	Main Condenser leak with lowering Main Condenser vacuum requiring a Rapid Plant Power Reduction
5	RC23B	M-All	Small Break LOCA, SIAS and CIAS
	CC12-E2	C-ATC C - SRO	Secure Reactor Coolant Pumps due to the combination of event 3 and event 5.
6	SI02	C – BOP	Low Pressure Safety Injection Pump A fails to auto start on SIAS requiring manual start
7	CS01-A	C-BOP C-SRO	Containment Spray Pump A trip, OP-902-008, Safety Function Recovery Procedure Alignment of LPSI Pump A to replace CS Pump A

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

Scenario Event Description

NRC Scenario 1

The crew assumes the shift at 100% power with instructions to maintain 100% power. Surveillance procedure OP-903-094, ESFAS Subgroup Relay Test – Operating, is in progress. The previous crew stopped at section 7.20, Train A Position 44, Relay K310 (BD-103B). This crew should resume testing. The BOP will secure Blowdown flow for Steam Generator #2 and test BD-103B, which will fail to close. The SRO should enter Tech Spec 3.6.3.

After briefing the failure, Pressurizer level instrument RC-ILI-0110X fails high. Due to the failure, Letdown flow goes to maximum flow of approximately 125 gpm and all Pressurizer Heaters energize. The SRO should enter OP-901-110, Pressurizer Level Control Malfunction. The crew should utilize sub section E1, Pressurizer Level Control Channel Malfunction. The ATC should take manual control of Pressurizer level and select the non-faulted channel. Using Tech Specs and OP-903-013, Monthly Channel Checks, the SRO should enter Tech Spec 3.3.3.5, a 7 day action requirement, and determine Tech Spec 3.3.3.6 entry is not required since QSPDS is operable and meeting the Pressurizer level channel check. SPDS indication of Pressurizer level is affected by this failure.

After the non-faulted channel is selected and Tech Specs are addressed, Component Cooling Water Surge Tank level instrument CC-ILS-7013A fails low. CCW Dry Cooling Tower A will bypass due to the failure. CCW Headers A and B will split, and CCW Loop AB supply and return from the A Header will close. The SRO should enter OP-901-510, Component Cooling Water System Malfunction. The BOP should use Attachment 1 to diagnose which instrument is failed. The crew should verify Auxiliary Component Cooling Water Pump A starts and control CCW system temperature with ACC-126 A. CCW Train A should be declared inoperable and 72 hour action Tech Spec 3.7.3 entered as well as cascading Tech Specs. The SRO should address the need to accomplish surveillance OP-903-066, Electrical Breaker Alignment Checks, within 1 hour to comply with Tech Spec 3.8.1.1.b. They must also address the need to accomplish the requirements of Tech Spec 3.8.1.1.d within 2 hours.

After the crew has addressed Tech Specs, a leak in the Main Condenser develops and Main Condenser vacuum begins to drop. Off normal procedure OP-901-220, Loss of Condenser Vacuum, should be entered. Main Condenser vacuum will drop below 25 inches, requiring a rapid plant power reduction. The SRO should enter OP-901-212, Rapid Plant Power Reduction. Vacuum will drop below 25 inches but remain above 20 inches, the procedure trigger for tripping the Reactor. For the power reduction, the ATC will perform direct Boration to the RCS as well as ASI control with CEAs and Pressurizer boron equalization. The BOP will manipulate the controls to reduce Main Turbine load.

Once the crew has commenced the power reduction and lowered power to ~ 90%, or at the lead examiner's discretion, a small break loss of coolant accident will occur. The crew should diagnose Pressurizer level dropping with all available Charging Pumps operating, trip the Reactor, and initiate Safety Injection Actuation (SIAS) and Containment Isolation Actuation (CIAS). Because of the earlier CCW level instrument failure, all CCW flow will be lost to the Reactor Coolant Pumps; the pumps must be manually secured within 3 minutes of the loss of CCW flow. When Containment Spray is actuated, either manually or automatically, CS-125B will fail to automatically open and will not open using the control switch. This does not create a need for action at this time, but Containment Spray flow will only be provided from Train A with CS-125B failed closed. Low Pressure Safety Injection Pump A will fail to automatically start on SIAS, requiring the BOP operator to manually start LPSI Pump A.

After the crew completes OP-902-000, Standard Post Trip Actions and diagnoses into OP-902-002, Loss of Coolant Accident Recovery, Containment Spray Pump A will trip, resulting in no Containment Spray flow. The crew should recognize that they are not meeting the Safety Function Status Checklist of OP-902-002 and transition to OP-902-008, Safety function Recovery Procedure.

Prioritization in OP-902-008 should result in Containment Isolation being priority 1 and Containment Temperature and Pressure Control being priority 2. The crew should address Containment Isolation by overriding CS-125A closed. The crew should address Containment Temperature and pressure Control by aligning Low Pressure Safety Injection Pump A to replace the failed Containment Spray Pump A. It is acceptable to pursue these tasks in parallel, since establishing flow with LPSI A to the Containment Spray header will also satisfy Containment Isolation concerns.

The scenario can be terminated after Low Pressure Safety Injection Pump A is aligned for Containment Spray, or after the CRS gives the order to perform that alignment, at the lead examiners discretion.

Scenario Event Description

NRC Scenario 1

Critical Tasks

1. Trip any RCP not satisfying RCP operating limits.

This task is satisfied by securing all RCPs within 3 minutes of loss of CCW flow. This task is set up by the failure of CC-ILS-7013 A. The required task becomes applicable after SIAS is initiated following event 5. The time requirement of 3 minutes is based on the RCP operating limit of 3 minutes without CCW cooling.

2. Establish Containment temperature and pressure control.

This task is satisfied by aligning LPSI Pump A to replace CS Pump A prior to exiting the Containment Temperature and Pressure Control safety function in OP-902-008. This task becomes applicable following the failure of Containment Spray Pump A in event 7. The Functional Recovery procedure utilized following this failure will direct this activity to satisfy the Containment Pressure and Temperature Control safety function.

Facility: WATERFORD 3	Scenario No.: 2	Op Test No.: NRC
Examiners: _____	Operators: _____	
_____	_____	
_____	_____	
Initial Conditions: <ul style="list-style-type: none"> 100%, MOC, AB buses aligned to "B" side. Protected Train is B Emergency Diesel Generator A is tagged out for planned maintenance. 		
Turnover: <ul style="list-style-type: none"> Maintain 100 % power 		

Event No.	Malf. No.	Event Type*	Event Description
1		C- ATC C - SRO TS – SRO	Swap Charging Pump using OP-002-005. Charging Pump A develops oil leak.
2	RC22 B1	I – BOP I - SRO TS - SRO	Pressurizer narrow range safety pressure instrument RC-IPI-0101 B fails high
3	SG05 B	I - BOP I - SRO	Steam Generator #2 level instrument, SG ILR1106, fails low.
4	TPR13, 14	R – ATC N – BOP N - SRO	Main Generator Stator Coil Water temperature high, normal plant downpower
5	TU01A, D, R	M - All	Main Turbine High Vibration and Reactor Trip
6	RD11A-10 RD11A-22	C-ATC C - SRO	2 CEAs stuck out requiring Emergency Boration
7	ED01 A, B, C, D	M-All	Loss of Off Site Power
8	EG08B	C- BOP C - SRO	EDG B fails to auto-start

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

Scenario Event Description

NRC Scenario 2

The crew assumes the shift at 100% power with instructions to maintain 100% power. OP-903-003, Charging Pump Operability Check is scheduled for night shift.

The shift manager has instructed the control room supervisor to swap Charging Pumps leaving Charging Pump A running and Charging Pump AB secured and in auto. After starting Charging Pump A, the watchstander will call and report an oil leak, recommending Charging Pump A be secured. With Charging Pump A control switch in off and inoperable, the SRO should recognize that Tech Spec 3.1.2.4 is not met. Additionally, TRM 3.1.2.4 must be entered. Tech Spec 3.1.2.4 is a 72 hour action and TRM 3.1.2.4 is a 7 day action. With the AB Safety Bus aligned to Train B, credit can not be taken for Charging Pump AB and Tech Spec and TRM 3.1.2.4 can not be exited.

After the ATC aligns Charging Pump AB or at the lead examiners direction, Pressurizer narrow range safety pressure instrument RC-IPI-0101 B fails high. After identifying the failure, the SRO should enter Tech Spec 3.3.1. The BOP should be directed to bypass the PPS bistables for High Pressurizer Pressure, Low DNBR, and High LPD within 1 hour.

After the crew bypasses the appropriate bistables, Steam Generator #2 level instrument, SG ILR1106, Steam Generator 2 Downcomer Level (red pen), fails low. The controllers for Main Feedwater Regulating Valve 2, Startup Feedwater Regulating Valve 2, and Main Feedwater Pump B transfer to manual. The crew should enter OP-901-201, Steam Generator Level Control Malfunction. No Tech Spec entries are required and no actions by the Balance of Plant operator are necessary at this time.

After the crew has completed their brief, PMC alarms will come in for Main Generator Stator Coil Water hose temperatures. The crew should enter OP-901-211, Generator Malfunction. Using Attachment 1, SCW High Temperature, the crew will determine the need to commence a normal plant shutdown in accordance with OP-010-005. Due to the earlier Steam Generator level instrument failure, the BOP operator will have to control Steam Generator level in manual for Steam Generator #2. The ATC will perform direct Boration to the RCS as well as ASI control with CEAs and Pressurizer boron equalization. The BOP will manipulate the Main Turbine controls to reduce load.

Once the crew has commenced the power reduction and lowered power to ~ 90%, or at the lead examiner's discretion, high vibration alarms will come in on the Main Turbine. Using annunciator response procedure OP-500-001, Control Room Cabinet A, and OP-901-210, Turbine Trip, the SRO should direct a Reactor trip. The crew should enter OP-902-000, Standard Post Trip Actions, and work this procedure concurrent with the Turbine Trip off normal procedure. OP-901-210 will direct breaking Main Condenser vacuum. On the Reactor Trip, 2 CEAs will stick out, requiring the ATC operator to Emergency Borate. The BOP will have to establish Feedwater Control Reactor Trip Override conditions manually on Steam Generator #2 due to the earlier level instrument failure.

The SRO should direct the BOP to continue with the actions to break Main Condenser vacuum. The crew should diagnose into OP-902-006, Loss of Main Feedwater Recovery, and secure 2 Reactor Coolant Pumps. After 2 RCPs are secured and the BOP has commenced breaking vacuum, a loss of off site power occurs. Emergency Diesel Generator B will fail to auto-start on the LOOP and the BOP will be required to start EDG B. The crew will transition to OP-902-003, Loss of Off Site Power/Loss of Forced Flow Recovery procedure. During the scenario, environmental conditions will have rain occurring. After the LOOP, the high level alarms will come in for Dry Cooling Tower 1 and 2 Sumps. The CRS will direct the performance of OP-902-009, Standard Appendices, Appendix 20, Operation of DCT Sump Pumps.

The scenario can be terminated after the CRS orders the performance of OP-902-009 Appendix 20 or at the lead examiners discretion.

Scenario Event Description

NRC Scenario 2

Critical Tasks

1. Establish reactivity control.

This task is satisfied by establishing Emergency Boration prior to completing Standard Post Trip Actions Reactivity Control verification. The required task becomes applicable after the Reactor is tripped and 2 CEAs remain stuck out following event 5.

2. Energize at least one vital electrical AC bus.

This task is satisfied by starting Emergency Diesel Generator B. This task becomes applicable following the loss of off site power triggered in event 7.

Facility:	WATERFORD 3	Scenario No.: 3	Op Test No.: NRC
Examiners:	_____	Operators:	_____
	_____		_____
	_____		_____
Initial Conditions:			
	<ul style="list-style-type: none"> • 1.2 % Power • Power ascension is being held pending Main Feedwater Pumps governor adjustment • Preparations are being made to start Main Feedwater Pump A • AB Bus is aligned to the A side 		
Turnover:			
	<ul style="list-style-type: none"> • OP-903-052 for CVAS Train A will go late this shift. Complete OP-903-052, section 10.1. • OP-007-004, attachment 11.4 is in the field to discharge Waste Condensate Tank A. 		

Event No.	Malf. No.	Event Type*	Event Description
1	DI-18A4s27-1	N – BOP N - SRO TS – SRO	During performance of OP-903-052, CVAS Fan A will fail to start.
2	AO-04A3a12c-3	C – ATC C – SRO	Waste Condensate Tank A flow controller LWM-IFIC-0647 output fails high
3	CH08-A1	I – BOP I - SRO TS – SRO	Containment pressure instrument CB-IPT-6701-SMC fails high
4	RX14-A	I – ATC I - SRO	Pressurizer pressure instrument RC-IPR-0100 X fails low
5	RX06-D1	C – BOP C - SRO	Steam Bypass Valve MS-320 A fails open
6	FW38-B	M – ALL	Main Feedwater line break in Containment.
7	RP08G	C – BOP C - SRO	Main Feedwater Isolation Valve #1 FW-184A fails to automatically close on MSIS.
8	RP09D	C – ATC C - SRO	RC-606 and FP-601 B fail to auto close on CIAS.

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

The crew assumes the shift at 1.2 % power. Reactor Engineer has completed Low Power Physics Testing. I&C Techs are making adjustments to Main Feedwater Pumps A & B governors based on vendor recommendations. The estimated time to completion is less than 60 minutes. When this is complete, Main Feedwater Pump A will be started and power ascension will commence.

Last shift, it was discovered that OP-903-052, CVAS Operability Test, will exceed its Tech Spec late date this shift. You have been directed to start CVAS Train A in accordance with OP-903-052. This surveillance will have the BOP operator secure RAB Normal Supply and Normal Exhaust Fans A and start CVAS Fan A. After securing both normal ventilation fans, CVAS Fan A will fail to start. This will require entering Tech Spec 3.7.7, a 7 day action requirement. RAB Normal Supply and Normal Exhaust Fans A will have to be re-started.

After the failure of CVAS Fan A, the RCA watch will call and report that he has completed his lineup and is ready for the ATC to perform his actions to discharge Waste Condensate Tank A and is ready for the ATC to continue with step 6.10.7. When the ATC initiates flow on step 6.10.10, LWM-IFIC-0647 will fail high, raising flow in excess of 50 gpm, the discharge permit limit. The ATC should close LWM-441 and LWM-442 from CP-4 to terminate the release.

After the release is secured, Containment pressure instrument CB-IPT-6701 SMC fails high. The SRO should enter Tech Spec 3.3.1 and 3.3.2 and the BOP should bypass PPS bistables 13 and 16.

After the appropriate bistables are bypassed, Pressurizer pressure instrument RC-IPR-0100 X fails low. This causes Pressurizer Backup and Proportional heaters to energize. The SRO should enter OP-901-120, Pressurizer Pressure Malfunction. The ATC will select the non-faulted Pressurizer pressure channel.

After the Pressurizer Pressure Control Channel Y is selected, Steam Bypass valve MS-320A controller will begin to fail high. The crew should respond to the cooldown and reactivity effects by taking manual control of MS-320 A and closing it.

After MS-320 A is closed, a Main Feedwater line break occurs in Containment. If the control room supervisor directs a reactor trip based on the un-controlled power rise, then the trigger for the Main Feedwater line break will be inserted while the crew is performing their standard post trip actions. After the malfunction is inserted, the Main Feedwater Isolation Valve #1 fails to automatically close on the MSIS and must be closed manually by the BOP operator. RC-606 and FP-601 B fail to automatically close on the CIAS and must be manually closed by the ATC and BOP operators. The crew should enter OP-902-004, Excess Steam Demand Recovery.

Scenario Event Description

NRC Scenario 3

Actions to address pressurized thermal shock should be taken when CET temperature and Pressurizer pressure start to rise. This can be accomplished using OP-902-009, Appendix 13 or with OP-902-004, based on whether or not the crew has diagnosed into OP-902-004 before those parameters start to rise. The scenario can be terminated after PTS actions have been accomplished or at the lead examiners discretion.

The conditions in this scenario do not warrant declaration of any Emergency Plan Classification.

Scenario Event Description

NRC Scenario 3

Critical Tasks

1. Establish Containment Isolation

This task is satisfied by taking action to close FW-184 A.

2. Trip any RCP not satisfying RCP operating limits.

This task is satisfied by securing all RCPs within 3 minutes of CSAS initiation.

3. Establish RCS temperature control

This task is satisfied by taking action to stabilize RCS temperature within the limits of the RCS P/T curve using ADV #1 and establishing EFW flow to Steam Generator #1. Action to address this task should commence within 10 minutes after the applicable parameters begin to rise.

4. Establish RCS pressure control

This task is satisfied by taking action to stabilize RCS pressure within the limits of the RCS P/T curve and additionally maintain RCS pressure within 1500-1600 psid of the faulted steam generator. Action to address this task should commence within 10 minutes after the applicable parameters begin to rise.

Facility:	WATERFORD 3	Scenario No.:	4	Op Test No.:	NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions:					
<ul style="list-style-type: none"> 37% Power on RCS chemistry hold Main Feedwater Pump B is running 					
Turnover:					
<ul style="list-style-type: none"> Hold power until directed by plant management Start ACCW Pump A for chemical mixing 					

Event No.	Malf. No.	Event Type*	Event Description
1	CC02A	C – BOP C – SRO TS - SRO	Start Auxiliary Component Cooling Water Pump A for chemical mixing. ACCW Pump A will trip following start.
2	SG11C	I – BOP TS - SRO	Steam Generator Level #2 level instrument SG-ILT1123 C fails low
3	CV05B2	C – ATC C - SRO	Letdown Backpressure Control Valve CVC-123B, fails closed
4		R – ATC N – BOP N – SRO	Direction given to raise power to < 50% using OP-010-004, Power Operations.
5	RP04A3, RP04B3 DI-08A03s14-1 DI-08A03s07-1	I – BOP I - SRO	Inadvertent Containment Spray Actuation Signal, secure Containment Spray Pumps
6		M – All	Manual Reactor trip
7	DI-08A07S26-1	I – ATC I - SRO	CC-641 will fail to reopen, Secure all Reactor Coolant Pumps on loss of Component Cooling Water flow
8	SG01A	M – All	Steam Generator #1 tube rupture ramps in over 3 minute period following reactor trip
8		C – BOP C – SRO	Isolate Steam Generator #1 when < 520 °F hot leg temperature
8		C – ATC C – SRO	Reduce RCS pressure using Auxiliary Spray while maintaining sub-cooled margin.

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

The crew assumes the shift at 37% power with instructions to maintain power.

The crew is directed to start Auxiliary Component Cooling Water Pump A for basin chemical mixing. After the start, ACCW Pump A will trip. The SRO should declare ACCW Pump A inoperable and enter a 72 hour action for Tech Spec 3.7.3 as well as cascading Tech Specs. The SRO should address the need to accomplish surveillance OP-903-066, Electrical Breaker Alignment Checks, within 1 hour to comply with Tech Spec 3.8.1.1.b. They must also address the need to accomplish the requirements of Tech Spec 3.8.1.1.d within 2 hours.

After Tech Specs have been addressed, Steam Generator #2 Level instrument SG-ILT-1123 C fails low. The SRO should enter Tech Spec 3.3.1 and 3.3.2. PPS bistables for Channel C Steam Generator Level Low, Steam Generator Level High, and Steam Generator Differential Pressure for Steam Generator #2 should be placed in bypass within 1 hour.

After the appropriate bistables have been bypassed, CVC-123B, Chemical and Volume Control Backpressure Control Valve B will fail closed. Letdown flow will go to 0 gpm. The SRO should enter OP-901-112, Charging or Letdown Malfunction, and transition to sub-section E2, Letdown Malfunction. The ATC operator should place the standby Letdown Backpressure Control Valve in service and restore Letdown flow.

After Letdown has been restored, the SRO will be given direction to raise power to 50% for placing Main Feedwater Pump A in service. The SRO should use OP-010-004, Power Operations to direct the power ascension. The ATC operator will add Primary Makeup Water to the Volume Control Tank and the BOP operator will raise Main Turbine load.

At the direction of the lead examiner, an inadvertent Containment Spray Actuation Signal will be generated. The SRO should enter OP-901-504, Inadvertent ESFAS Actuation. The BOP should be directed to secure Containment Spray Pumps A and B. The BOP operator will be directed to restore CCW flow to the Reactor Coolant Pumps. CC-641, RCP Inlet Outside Isolation will fail to reopen when attempted by the BOP operator. The SRO should direct the ATC to trip the reactor and secure Reactor Coolant Pumps.

A Steam Generator tube rupture ramps in for Steam Generator #1 during the Containment Spray actions. The crew should diagnose into OP-902-007, Steam Generator Tube Rupture Recovery. The SRO will direct a rapid RCS cooldown to < 520 °F hot leg temperature. Following the rapid cooldown, the BOP should be directed to isolate Steam Generator #1 and the ATC operator should be directed to lower RCS pressure using Auxiliary Spray within the RCS temperature and pressure limits.

The scenario can be terminated after Steam Generator #1 is isolated and the crew has taken action to reduce RCS pressure.

Critical Tasks

1. Trip any RCP not satisfying RCP operating limits.

This task is satisfied by securing all RCPs within 3 minutes of CSAS initiation.

2. Prevent opening the Main Steam Safety valves on Steam Generator #1

This task is satisfied by taking action lower RCS pressure to < 945 PSIA.

3. Isolate Steam Generator #1

This task is satisfied by isolating Steam Generator #1 in accordance with step 17 after RCS T_{HOT} is reduced below 520 °F.