Facility: Waterford 3 Date of Exam: March 29, 2011

Tier	Group	RO K/A Category Points												SRO-Only Points		
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2	G*	Total
1. Emergency & Abnormal Plant Evolutions	1	3	3	3				3	3			3	18	3	3	6
	2	1	2	2				1	1			2	9	2	2	4
	Tier Totals	4	5	5				4	4			5	27	5	5	10
2. Plant Systems	1	2	2	3	2	2	2	3	3	3	3	3	28	3	2	5
	2	1	1	1	1	1	1	1	1	0	1	1	10	2	1	3
	Tier Totals	3	3	4	3	3	3	4	4	3	4	4	38	5	3	8

3. Generic Knowledge and Abilities Categories	1	2	3	4	Total	SRO 1	SRO 2	SRO 3	SRO 4	SRO Total
	3	2	2	3	10	2	1	2	2	7

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/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.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those 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.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.

7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.

8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
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.

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 **(RO)**										Form ES-401-2
Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#
R1	000007 (**CE/E02**) Reactor Trip - Recovery / 1		X					EK2.1	**Knowledge of the interrelations between the (Reactor Trip Recovery) and the following:** Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.3	1
R2	000008 Pressurizer Vapor Space Accident / 3		X					AK2.01	**Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following:** Valves.	2.7*	1
R3	000009 Small Break LOCA / 3						X	2.1.20	**Conduct of Operations:** Ability to interpret and execute procedure steps.	4.6	1
R4	000011 Large Break LOCA / 3						X	2.4.18	**Emergency Procedures / Plan:** Knowledge of the specific bases for EOPs.	3.3	1
R5	000015/17 RCP Malfunctions / 4	X						AK1.04	**Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow):** Basic steady state thermodynamic relationship between RCS loops and S/Gs resulting from unbalanced RCS flow.	2.9	1
R6	000022 Loss of Rx Coolant Makeup / 2					X		AA2.01	**Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup:** Whether charging line leak exists.	3.2	1
N/A	000025 Loss of RHR System / 4							N/A	Randomly Deselected.	N/A	0
R7	000026 Loss of Component Cooling Water / 8				X			AA1.02	**Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water:** Loads on the CCWS in the control room.	3.2	1
R8	000027 Pressurizer Pressure Control System Malfunction / 3				X			AA1.04	**Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions:** Pressure recovery, using emergency-only heaters.	3.9*	1
R9	000029 ATWS / 1		X					EK2.06	**Knowledge of the interrelations between the ATWS and the following:** Breakers, relays, and disconnects.	2.9*	1

ES-401 PWR Examination Outline Form ES-401-2

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 **(RO)**

Q#	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)		IR	#
R10	000038 Steam Gen. Tube Rupture / 3			X				EK3.08	**Knowledge of the reasons for the following responses as they apply to the SGTR:** Criteria for securing RCP.	4.1	1
R11	000040 (**CE/E05**) Steam Line Rupture - Excessive Steam Demand / 4	X						EK1.2	**Knowledge of the operational implications of the following concepts as they apply to the (Excess Steam Demand):** Normal, abnormal and emergency operating procedures associated with (Excess Steam Demand).	3.2	1
R12	**000054** (CE/E06) Loss of Main Feedwater / 4	X						AK1.02	**Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW):** Effects of feedwater introduction on dry S/G.	3.6	1
R13	000055 Station Blackout / 6					X		EA2.03	**Ability to determine or interpret the following as they apply to a Station Blackout:** Actions necessary to restore power.	3.9	1
R14	000056 Loss of Off-site Power / 6			X				AK3.01	**Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power:** Order and time to initiation of power for the load sequencer.	3.5	1
R15	000057 Loss of Vital AC Inst. Bus / 6			X				AK3.01	**Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus:** Actions contained in EOP for loss of vital ac electrical instrument bus.	4.1	1
R16	000058 Loss of DC Power / 6					X		AA2.03	**Ability to determine and interpret the following as they apply to the Loss of DC Power:** DC loads lost; impact on to operate and monitor plant systems.	3.5	1
R17	000062 Loss of Nuclear Svc Water / 4				X			AA1.07	**Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Water (SWS):** Flow rates to the components and systems that are serviced by the SWS; interactions among the components.	2.9	1
R18	000065 Loss of Instrument Air / 8						X	2.4.6	**Emergency Procedures / Plan:** Knowledge of EOP mitigation strategies.	3.7	1
N/A	000077 Generator Voltage and Electric Grid Disturbances / 6							N/A	Randomly deselected.	N/A	0

Q#	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	IR	#
K/A Category Totals:		3	3	3	3	3	3	Group Point Total:		18

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 **(RO)**									Form ES-401-2	
Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#
N/A	000001 Continuous Rod Withdrawal / 1							N/A	Randomly deselected.	N/A	0
R19	000003 Dropped Control Rod / 1				X			AA1.05	**Ability to operate and / or monitor the following as they apply to the Dropped Control Rod:** Reactor power - turbine power.	4.1	1
R20	000005 Inoperable/Stuck Control Rod / 1			X				AK3.06	**Knowledge of the reasons for the following responses as they apply to the Inoperable / Stuck Control Rod:** Actions contained in EOP for inoperable/stuck control rod.	3.9	1
N/A	000024 Emergency Boration / 1							N/A	Randomly deselected.	N/A	0
R21	000028 Pressurizer Level Malfunction / 2						X	2.2.37	**Equipment Control:** Ability to determine operability and/or availability of safety related equipment.	3.6	1
R22	000032 Loss of Source Range NI / 7					X		AA2.03	**Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation:** Expected values of source range indication when high voltage is automatically removed.	2.8	1
N/A	000033 Loss of Intermediate Range NI / 7							N/A	Randomly deselected.	N/A	0
N/A	000036 Fuel Handling Accident / 8							N/A	Randomly deselected.	N/A	0
R23	000037 Steam Generator Tube Leak / 3			X				AK3.09	**Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak:** Maximum load change capability of facility.	2.7*	1
N/A	000051 Loss of Condenser Vacuum / 4							N/A	Randomly deselected.	N/A	0
N/A	000059 Accidental Liquid RadWaste Rel. / 9							N/A	Randomly deselected.	N/A	0
N/A	000060 Accidental Gaseous Radwaste Rel. / 9							N/A	Randomly deselected.	N/A	0

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Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 **(RO)**

Q#	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)		IR	#
N/A	000061 ARM System Alarms / 7							N/A	Randomly deselected.	N/A	0
N/A	000067 Plant Fire On-site / 8							N/A	Randomly deselected.	N/A	0
N/A	000068 Control Room Evac. / 8							N/A	Randomly deselected.	N/A	0
R24	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*	1
N/A	000074 Inad. Core Cooling / 4							N/A	Randomly deselected.	N/A	0
N/A	000076 High Reactor Coolant Activity / 9							N/A	Randomly deselected.	N/A	0
N/A	CE/A13 Natural Circ. / 4							N/A	Randomly deselected.	N/A	0
R25	CE/A11 RCS Overcooling - PTS / 4						X	2.2.25	**Equipment Control:** Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	3.2	1
R26	CE/A16 Excess RCS Leakage / 2	X						AK1.3	**Knowledge of the operational implications of the following concepts as they apply to the (Excess RCS Leakage):** Annunciators and conditions indicating signals, and remedial actions associated with the (Excess RCS Leakage).	3.2	1
R27	CE/E09 Functional Recovery		X					EK2.1	**Knowledge of the interrelations between the (Functional Recovery) and the following:** Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.6	1
K/A Category Point Totals:		1	2	2	1	1	2	Group Point Total:			9

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 **(RO)**														Form ES-401-2	
Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		IR	#
R28	003 Reactor Coolant Pump									X			A3.05	**Ability to monitor automatic operation of the RCPS, including:** RCP lube oil and bearing lift pumps.	2.7*	1
R29	003 Reactor Coolant Pump								X				A2.01	**Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** Problems with RCP seals, especially rates of seal leak-off.	3.5	1
R30	004 Chemical and Volume Control											X	2.4.4	**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	1
R31	004 Chemical and Volume Control				X								K4.13	**Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following:** Interlock between letdown isolation valve and flow control valve.	3.2*	1
R32	005 Residual Heat Removal	X											K1.01	**Knowledge of the physical connections and/or cause-effect relationships between the RHRS and the following systems:** CCWS.	3.2	1
R33	006 Emergency Core Cooling						X						K6.05	**Knowledge of the effect of a loss or malfunction on the following will have on the ECCS:** HPI/LPI cooling water.	3.0	1
R34	007 Pressurizer Relief/Quench Tank							X					A1.01	**Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including:** Maintaining quench tank water level within limits.	2.9	1
R35	008 Component Cooling Water		X										K2.02	**Knowledge of bus power supplies to the following:** CCW pump, including emergency backup.	3.0*	1

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Plant Systems - Tier 2/Group 1 **(RO)**

Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		IR	#
R36	010 Pressurizer Pressure Control			X									K3.02	**Knowledge of the effect that a loss or malfunction of the PZR PCS will have on the following:** RPS.	4.0	1
R37	012 Reactor Protection				X								K4.06	**Knowledge of RPS design feature(s) and/or interlock(s) which provide for the following:** Automatic or manual enable/disable of RPS trips.	3.2	1
R38	012 Reactor Protection										X		A4.04	**Ability to manually operate and/or monitor in the control room:** Bistable, trips, reset and test switches.	3.3*	1
R39	013 Engineered Safety Features Actuation		X										K2.01	**Knowledge of bus power supplies to the following:** ESFAS/safeguards equipment control.	3.6*	1
R40	013 Engineered Safety Features Actuation											X	2.4.11	**Emergency Procedures / Plan:** Knowledge of abnormal condition procedures.	4.0	1
R41	022 Containment Cooling							X					A1.04	**Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including:** Cooling water flow.	3.2	1
R42	026 Containment Spray								X				A2.02	**Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** Failure of automatic recirculation transfer.	4.2*	1
R43	039 Main and Reheat Steam					X							K5.05	**Knowledge of the operational implications of the following concepts as they apply to the MRSS:** Bases for RCS cooldown limits.	2.7	1
R44	039 Main and Reheat Steam										X		A4.01	**Ability to manually operate and/or monitor in the control room:** Main steam supply valves.	2.9*	1
R45	059 Main Feedwater									X			A3.04	**Ability to monitor automatic operation of the MFW, including:** Turbine driven feed pump.	2.5*	1

Plant Systems - Tier 2/Group 1 **(RO)**

Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		IR	#
R46	061 Auxiliary/Emergency Feedwater					**X**							K5.05	**Knowledge of the operational implications of the following concepts as they apply to the AFW:** Feed line voiding and water hammer.	2.7	1
R47	062 AC Electrical Distribution	**X**											K1.03	**Knowledge of the physical connections and/or cause-effect relationships between the ac distribution system and the following systems**: DC distribution.	3.5	1
R48	063 DC Electrical Distribution								**X**				A2.01	**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:** Grounds.	2.5	1
R49	064 Emergency Diesel Generator			**X**									K3.02	**Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following:** ESFAS controlled or actuated systems.	4.2	1
R50	064 Emergency Diesel Generator						**X**						K6.07	**Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system:** Air receivers.	2.7	1
R51	073 Process Radiation Monitoring										**X**		A4.02	**Ability to manually operate and/or monitor in the control room:** Radiation monitoring system control panel.	3.7	1
R52	076 Service Water							**X**					A1.02	**Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including:** Reactor and turbine building closed cooling water temperatures.	2.6*	1
R53	076 Service Water											**X**	2.1.25	**Conduct of Operations:** Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	1
R54	078 Instrument Air									**X**			A3.01	**Ability to monitor automatic operation of the IAS, including:** Air pressure.	3.1	1

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Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G		K/A Topic(s)	IR	#
R55	103 Containment			**X**									K3.03	**Knowledge of the effect that a loss or malfunction of the containment system will have on the following:** Loss of containment integrity under refueling operations.	3.7	1
K/A Category Point Totals:		2	2	3	2	2	2	3	3	3	3	3		Group Point Total:		28

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Plant Systems - Tier 2/Group 2 **(RO)**

Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		IR	#
R56	001 Control Rod Drive	X											K1.01	**Knowledge of the physical connections and/or cause-effect relationships between the CRDS and the following systems:** CCW.	3.0*	1
R57	002 Reactor Coolant				X								K4.03	**Knowledge of RCS design feature(s) and/or interlock(s) which provide for the following**: Venting the RCS.	2.9	1
N/A	011 Pressurizer Level Control												N/A	Randomly deselected.	N/A	0
N/A	014 Rod Position Indication												N/A	Randomly deselected.	N/A	0
R58	015 Nuclear Instrumentation		X										K2.01	**Knowledge of bus power supplies to the following**: NIS channels, components, and interconnections.	3.3	1
N/A	016 Non-nuclear Instrumentation												N/A	Randomly deselected.	N/A	0
R59	017 In-core Temperature Monitor					X							K5.01	**Knowledge of the operational implications of the following concepts as they apply to the ITM system:** Temperature at which cladding and fuel melt.	3.1	1
N/A	027 Containment Iodine Removal												N/A	Randomly deselected.	N/A	0
R60	028 Hydrogen Recombiner and Purge Control										X		A4.03	**Ability to manually operate and/or monitor in the control room:** Location and operation of hydrogen sampling and analysis of containment atmosphere, including alarms and indications.	3.1	1
N/A	029 Containment Purge												N/A	Randomly deselected.	N/A	0
R61	033 Spent Fuel Pool Cooling			X									K3.03	**Knowledge of the effect that a loss or malfunction of the Spent Fuel Pool Cooling System will have on the following:** Spent fuel temperature.	3.0	1

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Q#	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	#
N/A	034 Fuel Handling Equipment												N/A	Randomly deselected.	N/A	0
R62	035 Steam Generator											X	2.4.49	**Emergency Procedures / Plan:** Ability to perform without reference to procedures those actions that require | immediate operation of system components and controls.	4.6	1
R63	041 Steam Dump/Turbine Bypass Control							X					A1.02	**Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including:** Steam pressure.	3.1	1
N/A	045 Main Turbine Generator												N/A	Randomly deselected.	N/A	0
N/A	055 Condenser Air Removal												N/A	Randomly deselected.	N/A	0
N/A	056 Condensate												N/A	Randomly deselected.	N/A	0
R64	068 Liquid Radwaste						X						K6.10	**Knowledge of the effect of a loss or malfunction on the following will have on the Liquid Radwaste System:** Radiation monitors.	2.5	1
N/A	071 Waste Gas Disposal												N/A	Randomly deselected.	N/A	0
N/A	072 Area Radiation Monitoring												N/A	Randomly deselected.	N/A	0
N/A	075 Circulating Water												N/A	Randomly deselected.	N/A	0
N/A	079 Station Air												N/A	Randomly deselected.	N/A	0

Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		IR	#
R65	086 Fire Protection								**X**				A2.04	**Ability to (a) predict the impacts of the following malfunctions or operations on the Fire Protection System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** Failure to actuate the FPS when required, resulting in fire damage.	3.3	1
K/A Category Point Totals:		1	1	1	1	1	1	1	1	0	1	1	Group Point Total:			10

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Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#
N/A	000007 (CE/E02) Reactor Trip - Stabilization - Recovery / 1							N/A	Randomly deselected.	N/A	0
N/A	000008 Pressurizer Vapor Space Accident / 3							N/A	Randomly deselected.	N/A	0
N/A	000009 Small Break LOCA / 3							N/A	Randomly deselected.	N/A	0
N/A	000011 Large Break LOCA / 3							N/A	Randomly deselected.	N/A	0
N/A	000015/17 RCP Malfunctions / 4							N/A	Randomly deselected.	N/A	0
N/A	000022 Loss of Rx Coolant Makeup / 2							N/A	Randomly deselected.	N/A	0
S1	000025 Loss of RHR System / 4					**X**		AA2.02	**Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System:** Leakage of reactor coolant from RHR into closed cooling water system or into reactor building atmosphere.	3.8	1
N/A	000026 Loss of Component Cooling Water / 8							N/A	Randomly deselected.	N/A	0
N/A	000027 Pressurizer Pressure Control System Malfunction / 3							N/A	Randomly deselected.	N/A	0
N/A	000029 ATWS / 1							N/A	Randomly deselected.	N/A	0
S2	000038 Steam Gen. Tube Rupture / 3					**X**		EA2.08	**Ability to determine or interpret the following as they apply to a SGTR:** Viable alternatives for placing plant in safe condition when condenser is not available.	4.4	1

Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#
S3	000040 (CE/E05) Steam Line Rupture - Excessive Heat Transfer / 4						**X**	2.4.6	**Emergency Procedures / Plan:** Knowledge of EOP mitigation strategies.	4.7	1
S4	000054 (CE/E06) Loss of Main Feedwater / 4						**X**	2.4.9	**Emergency Procedures / Plan:** Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	1
N/A	000055 Station Blackout / 6							N/A	Randomly deselected.	N/A	0
N/A	000056 Loss of Off-site Power / 6							N/A	Randomly deselected.	N/A	0
S5	000057 Loss of Vital AC Inst. Bus / 6						**X**	2.1.32	**Conduct of Operations:** Ability to explain and apply system limits and precautions.	4.0	1
N/A	000058 Loss of DC Power / 6							N/A	Randomly deselected.	N/A	0
N/A	000062 Loss of Nuclear Svc Water / 4							N/A	Randomly deselected.	N/A	0
N/A	000065 Loss of Instrument Air / 8							N/A	Randomly deselected.	N/A	0
S6	000077 Generator Voltage and Electric Grid Disturbances / 6					**X**		AA2.04	**Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances:** VARs outside the capability curve.	3.6	1
K/A Category Totals:						3	3	Group Point Total:			6

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Q#	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#
N/A	000001 Continuous Rod Withdrawal / 1							N/A	Randomly deselected.	N/A	0
N/A	000003 Dropped Control Rod / 1							N/A	Randomly deselected.	N/A	0
N/A	000005 Inoperable/Stuck Control Rod / 1							N/A	Randomly deselected.	N/A	0
N/A	000024 Emergency Boration / 1							N/A	Randomly deselected.	N/A	0
N/A	000028 Pressurizer Level Malfunction / 2							N/A	Randomly deselected.	N/A	0
N/A	000032 Loss of Source Range NI / 7							N/A	Randomly deselected.	N/A	0
S7	000033 Loss of Intermediate Range NI / 7						**X**	2.1.20	**Conduct of Operations:** Ability to interpret and execute procedure steps.	4.6	1
S8	000036 (BW/A08) Fuel Handling Accident / 8					**X**		AA2.02	**Ability to determine and interpret the following as they apply to the Fuel Handling Incidents:** Occurrence of a fuel handling incident.	4.1	1
N/A	000037 Steam Generator Tube Leak / 3							N/A	Randomly deselected.	N/A	0
S9	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.	4.1	1
N/A	000059 Accidental Liquid RadWaste Rel. / 9							N/A	Randomly deselected.	N/A	0
N/A	000060 Accidental Gaseous Radwaste Rel. / 9							N/A	Randomly deselected.	N/A	0
S10	000061 ARM System Alarms / 7						**X**	2.2.25	**Equipment Control:** Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	4.2	1
N/A	000067 Plant Fire On-site / 8							N/A	Randomly deselected.	N/A	0

Q#	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)		IR	#
N/A	000068 Control Room Evac. / 8							N/A	Randomly deselected.	N/A	0
N/A	000069 Loss of CTMT Integrity / 5							N/A	Randomly deselected.	N/A	0
N/A	000074 Inad. Core Cooling / 4							N/A	Randomly deselected.	N/A	0
N/A	000076 High Reactor Coolant Activity / 9							N/A	Randomly deselected.	N/A	0
N/A	CE/A13 Natural Circ. / 4							N/A	Randomly deselected.	N/A	0
N/A	CE/A11 RCS Overcooling - PTS / 4							N/A	Randomly deselected.	N/A	0
N/A	CE/A16 Excess RCS Leakage / 2							N/A	Randomly deselected.	N/A	0
N/A	CE/E09 Functional Recovery							N/A	Randomly deselected.	N/A	0
K/A Category Point Totals:						2	2	Group Point Total:			4

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 **(SRO)**														Form ES-401-2	
Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G		K/A Topic(s)	IR	#
S11	003 Reactor Coolant Pump								X				A2.03	**Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** Problems associated with RCP motors, including faulty motors and current, and winding and bearing temperature problems.	3.1	1
N/A	004 Chemical and Volume Control												N/A	Randomly deselected.	N/A	0
N/A	005 Residual Heat Removal												N/A	Randomly deselected.	N/A	0
N/A	006 Emergency Core Cooling												N/A	Randomly deselected.	N/A	0
N/A	007 Pressurizer Relief/Quench Tank												N/A	Randomly deselected.	N/A	0
S12	008 Component Cooling Water								X				A2.01	**Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** Loss of CCW Pump.	3.6	1
S13	010 Pressurizer Pressure Control								X				A2.02	**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:** Spray valve failures.	3.9	1

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ES-401 PWR Examination Outline Form ES-401-2

Plant Systems - Tier 2/Group 1 **(SRO)**

Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		IR	#
N/A	012 Reactor Protection												N/A	Randomly deselected.	N/A	0
N/A	013 Engineered Safety Features Actuation												N/A	Randomly deselected.	N/A	0
N/A	022 Containment Cooling												N/A	Randomly deselected.	N/A	0
N/A	026 Containment Spray												N/A	Randomly deselected.	N/A	0
N/A	039 Main and Reheat Steam												N/A	Randomly deselected.	N/A	0
S14	059 Main Feedwater											**X**	2.1.23	**Conduct of Operations:** Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.4	1
N/A	061 Auxiliary/ Emergency Feedwater												N/A	Randomly deselected.	N/A	0
S15	062 AC Electrical Distribution											**X**	2.4.47	**Emergency Procedures / Plan:** Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	4.2	1
N/A	063 DC Electrical Distribution												N/A	Randomly deselected.	N/A	0
N/A	064 Emergency Diesel Generator												N/A	Randomly deselected.	N/A	0
N/A	073 Process Radiation Monitoring												N/A	Randomly deselected.	N/A	0
N/A	076 Service Water												N/A	Randomly deselected.	N/A	0

ES-401 PWR Examination Outline Form ES-401-2
Plant Systems - Tier 2/Group 1 **(SRO)**

Q#	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		IR	#
N/A	078 Instrument Air												N/A	Randomly deselected.	N/A	0
N/A	103 Containment												N/A	Randomly deselected.	N/A	0
K/A Category Point Totals:									3			2	Group Point Total:			5

ES-401 PWR Examination Outline Form ES-401-2

Plant Systems - Tier 2/Group 2 **(SRO)**

Q#	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	#
N/A	001 Control Rod Drive												N/A	Randomly deselected.	N/A	0
N/A	002 Reactor Coolant												N/A	Randomly deselected.	N/A	0
S16	011 Pressurizer Level Control								**X**				A2.04	**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:** Loss of one, two or three charging pumps.	3.7	1
N/A	014 Rod Position Indication												N/A	Randomly deselected.	N/A	0
N/A	015 Nuclear Instrumentation												N/A	Randomly deselected.	N/A	0
N/A	016 Non-nuclear Instrumentation												N/A	Randomly deselected.	N/A	0
N/A	017 In-core Temperature Monitor												N/A	Randomly deselected.	N/A	0
N/A	027 Containment Iodine Removal												N/A	Randomly deselected.	N/A	0
N/A	028 Hydrogen Recombiner and Purge Control												N/A	Randomly deselected.	N/A	0
N/A	029 Containment Purge												N/A	Randomly deselected.	N/A	0
N/A	033 Spent Fuel Pool Cooling												N/A	Randomly deselected.	N/A	0

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Q#	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	#
S17	034 Fuel Handling Equipment											X	2.1.40	**Conduct of Operations:** Knowledge of refueling administrative requirements.	3.9	1
N/A	035 Steam Generator												N/A	Randomly deselected.	N/A	0
N/A	041 Steam Dump/Turbine Bypass Control												N/A	Randomly deselected.	N/A	0
S18	045 Main Turbine Generator								X				A2.15	**Ability to (a) predict the impacts of the following malfunctions or operation on the MT/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations**: Turbine overspeed.	2.6*	1
N/A	055 Condenser Air Removal												N/A	Randomly deselected.	N/A	0
N/A	056 Condensate												N/A	Randomly deselected.	N/A	0
N/A	068 Liquid Radwaste												N/A	Randomly deselected.	N/A	0
N/A	071 Waste Gas Disposal												N/A	Randomly deselected.	N/A	0
N/A	072 Area Radiation Monitoring												N/A	Randomly deselected.	N/A	0
N/A	075 Circulating Water												N/A	Randomly deselected.	N/A	0
N/A	079 Station Air												N/A	Randomly deselected.	N/A	0
N/A	086 Fire Protection												N/A	Randomly deselected.	N/A	0
K/A Category Point Totals:									2			1	Group Point Total:			3

Facility: Waterford 3			Date of Exam: March 28, 2011				
Category	Q#	K/A #	Topic	RO		SRO-Only	
				IR	#	IR	#
1. Conduct of Operations	R66	2.1.4	Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.	3.3	1		
	R67	2.1.26	Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).	3.4	1		
	R68	2.1.40	Knowledge of refueling administrative requirements.	2.8	1		
	S19	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management.			4.6	1
	S20	2.1.42	Knowledge of new and spent fuel movement procedures.			3.4	1
	Category 1 Point Total				3		2
2. Equipment Control	R69	2.2.21	Knowledge of pre- and post-maintenance operability requirements	2.9	1		
	R70	2.2.25	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	3.2	1		
	S21	2.2.23	Ability to track Technical Specification limiting conditions for operations.			4.6	1
	Category 2 Point Total				2		1

Facility: Waterford 3			Date of Exam: March 28, 2011				
Category	Q#	K/A #	Topic	RO		SRO-Only	
				IR	#	IR	#
3. Radiation Control	R71	2.3.12	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.2	1		
	R72	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	1		
	S22	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personal monitoring equipment, etc.			2.9	1
	S23	2.3.6	Ability to approve release permits.			3.8	1
	Category 3 Point Total				2		2
4. Emergency Procedures / Plan	R73	2.4.13	Knowledge of crew roles and responsibilities during EOP usage.	4.0	1		
	R74	2.4.29	Knowledge of the emergency plan.	3.1	1		
	R75	2.4.34	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	1		
	S24	2.4.29	Knowledge of the emergency plan.			4.4	1
	S25	2.4.44	Knowledge of emergency plan protective action recommendations.			4.4	1
	Category 4 Point Total				3		2
Tier 3 Point Total					10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
Initial Outline Submittal		
1/1 RO	000008 AK2.03	W3 does not have any controllers or positioners that would interrelate with a Pressurizer Vapor Space Accident. Randomly reselected to K/A 000008 AK2.01.
1/1 RO	000009 G2.1.19	Unable to write an operationally valid question to this generic K/A for this subject.. Randomly reselected to K/A 000009 G2.1.20.
1/1 RO	000038 EK3.07	W3 does not have RCS loop isolation valves. Randomly reselected to K/A 000038 EK3.08.
1/2 RO	000037 AK3.04	W3 does not perform feed and bleed operations for a S/G tube leak. Randomly reselected to K/A 000037 AK3.09.
1/2 RO	000059 AK2.02	Reselected system and K/A due to too much overlap concerning radiation monitors. Randomly reselected to CE/E09 EK2.1.
1/2 RO	000069 AK1.01	Unable to write a psychometrically sound question for this topic. Randomly reselected to K/A 000069 AK2.03
2/1 RO	004 G2.4.3	At W3 the CVC system has no post accident instrumentation with the exception of containment isolation valve indication. Unable to write a psychometrically sound question for this topic. Randomly reselected to K/A 004 G2.4.4.
2/1 RO	007 K4.01	W3 does not have a quench tank cooling system. No other K4 K/As 2.5 or greater in this system. Randomly selected to 007 A1.01.
2/1 RO	026 A2.01	CE procedures do not address reflux boiling pressure spike when going on recirculation. Unable to write a psychometrically sound question for this topic. Randomly reselected to K/A 026 A2.02.
2/1 RO	063 A4.02	To address excessive overlap with DC system randomly reselected another system and K/A. Randomly reselected System and K/A to 012 A4.04.
2/1 RO	073 A2.01	Randomly reselected System 003 and retained K/A A2.01 to address excessive overlap issues with Radiation Monitoring systems.
2/2 RO	072 G2.4.49	Randomly reselected system due to excessive overlap for radiation monitors. Additionally there are no immediate operator actions associated with radiation monitors. Reselected to System 035 and retained K/A G2.4.49.
3/1 RO	2.1.6	This K/A is more appropriate for an SRO candidate. The RO does not manage the Control Room crew during transients. Randomly reselected K/A to 2.1.40.
3/4 RO	2.4.26	At W3 the RO is not involved in fire brigade or fire fighting equipment usage. Randomly reselected to K/A 2.4.34.

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1 SRO	000007 EA2.04	Unable to write a question at the SRO level for actions for this topic. Majority of ATWS actions are immediate operator actions required to be known by the RO. Randomly reselected new system and K/A. Reselected to K/A 000038 EA2.08.
1/1 SRO	000040 G2.4.34	Unable to write discriminatory question at the SRO level for this K/A. Randomly reselected K/A to 000040 G2.4.6.
1/1 SRO	000057 G2.1.23	Unable to write discriminatory question to this K/A. The Loss of Vital AC procedures do not contain references to support this K/A. Randomly reselected to K/A 000057 G2.1.32.
1/2 SRO	000076 AA2.04	Unable to write a discriminatory question to this K/A at the SRO level. Radiation monitor in letdown system for detecting high RCS activity is no longer used. Randomly reselected to K/A 000036 AA2.02.
2/1 SRO	010 A2.03	W3 does not have PORVs. Randomly reselected to K/A 010 A2.02.
2/2 SRO	079 A2.01	Unable to write a discriminatory question at the SRO level for this K/A. Randomly reselected system and K/A to 045 A2.15.
3/4 SRO	2.4.1	Unable to write an SRO level question to this K/A. The K/A is RO knowledge. Randomly reselected to 2.4.29.
Initial Examination Submittal		
1/2 RO	028 A4.01	Replace K/A due to overlap with the Operating Test. This K/A tested knowledge required to performed during the Control Room JPM for the Hydrogen Recombiner startup. Randomly reselected another K/A within K4 category for System 028. Replaced by K/A 028 A4.03.
3/2 RO	2.2.21	Unable to write a psychometrically sound question that an RO is required to know for this K/A. Randomly reselected K/A 2.2.14.
Final Exam Submittal		
2/1 RO	003 K5.02	Per NRC initial written exam submittal comments replaced K/A and question. Randomly selected K/A 003 A3.05 as the replacement.
2/2 SRO	034 G2.1.32	Per NRC initial written exam submittal comments replaced K/A and question. Randomly selected K/A 034 G2.1.40 as the replacement.

Facility:	WATERFORD 3	Scenario No.: 1	Op Test No.: **NRC**
Examiners:	______	Operators:	______
	______		______
	______		______

Initial Conditions:
- Reactor power is 100%
- Protected Train is A
- AB Bus is aligned to Train A

Turnover: Maintain 100% power

Event No.	Malf. No.	Event Type*	Event Description
1	RC15A2	I – ATC I – SRO TS – SRO	Pressurizer level instrument RC-ILI-0110 X fails low. OP-901-110, Pressurizer Level Control Malfunction.
2	FW26A	I – BOP I – SRO TS - SRO	Steam Generator #1 Feedwater flow instrument FW-IFR-1111 fails low. OP-901-201, Steam Generator Level Control Malfunction.
3	RD02A52	C – BOP C – SRP TS – SRO	CEA 52 Drops into the core OP-901-102, CEA or CEDMCS Malfunction
3	N/A	R – ATC R – BOP N – SRO	OP-901-212, Rapid Plant Power Reduction.
4	RC23A CS04A	M – All	Loss of Coolant Accident, OP-902-002, Loss of Coolant Accident Recovery. CS-125 A fails closed Secure RCPs (Critical Task 1)
5	CV02A	C – ATC C – SRO	Charging Pump A fails to auto-start.
6	SI02D	C – BOP C – SRO	Low Pressure Safety Injection Pump A fails to auto start on SIAS requiring manual start
7	CS01B	C – BOP C – SRO	Containment Spray Pump B trip, OP-902-008, Safety Function Recovery Procedure Alignment of LPSI Pump B to replace CS Pump B. (Critical Task 2)

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

The crew assumes the shift at 100% power with instructions to maintain 100% power.

After taking the shift, Pressurizer level instrument RC-ILI-0110X fails low. Due to the failure, Letdown flow goes to minimum flow and both backup Charging Pumps start. 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 on the Plant Monitoring Computer is affected by this failure.

After the non-faulted channel is selected and Tech Specs are addressed, Steam Generator #1 Feedwater flow instrument FW-IFR-1111 fails low. The Feedwater Control System will respond by raising Feedwater flow to Steam Generator #1. The SRO should enter OP-901-201, Steam Generator Level Control Malfunction. The BOP will be required to take manual control and match Feedwater and Main Steam flow. The Ultrasonic Flow Meter will fail as a result of the instrument failure and require entry into TRM 3.3.5. The Feedwater controls for Steam Generator #1 will remain in manual as a result of this failure.

After the crew has addressed the Feedwater instrument failure, CEA 52 drops into the core. Off normal procedure OP-901-102, CEA or CEDMCS Malfunction, should be entered. The dropped CEA will require a rapid plant power reduction. The SRO should enter OP-901-212, Rapid Plant Power Reduction. Direct Boration should commence within 15 minutes of the dropped CEA. 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 and manipulate Feedwater to Steam Generator #1 in manual. The SRO should enter Tech Specs 3.2.3, 3.1.3.1, and 3.1.3.5.

Once the crew has commenced the power reduction and lowered power to ~ 90%, or at the lead examiner's discretion, a loss of coolant accident will occur. Charging Pump A will fail to start on the lowering Pressurizer level. The crew should diagnose the Pressurizer level dropping with all available Charging Pumps operating, trip the Reactor, and initiate Safety Injection Actuation (SIAS) and Containment Isolation Actuation (CIAS). When Containment Spray is actuated, either manually or automatically, CS-125 A 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 B with CS-125 A 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 B 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-125 B closed. The crew should address Containment Temperature and Pressure Control by aligning Low Pressure Safety Injection Pump B to replace the failed Containment Spray Pump B. It is acceptable to pursue these tasks in parallel, since establishing flow with LPSI B to the Containment Spray header will also satisfy Containment Isolation concerns.

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

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 becomes applicable after Containment Spray is initiated. 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 B to replace CS Pump B 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 B. The Functional Recovery procedure utilized following this failure will direct this activity to satisfy the Containment Pressure and Temperature Control safety function.

Scenario Quantitative Attributes

1. Total malfunctions (5–8)	7
2. Malfunctions after EOP entry (1–2)	2
3. Abnormal events (2–4)	3
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	2
6. EOP contingencies requiring substantive actions (0–2)	1
7. Critical tasks (2–3)	2

Scenario Notes:

A. Reset Simulator to IC-191.

B. Verify the following Scenario Malfunctions:

1. rc15a for Pressurizer level
2. fw26a for Steam Generator #1 Feedwater flow
3. rd02a52 for CEA 52
4. rc23a for LOCA
5. cv02a for Charging Pump A
6. si02d for Low Pressure Safety Injection Pump A
7. cs01b for Containment Spray Pump B
8. cs04a for CS-125 A

C. Verify the following Override:

1. di-08a04s22-1 for CS-125 A

D. Ensure Protected Train A sign is placed in SM office window.

E. Verify EOOS is 10.0 Green

F. Complete the simulator setup checklist.

G. Start DCS, Record Data, select file PlantParameters.txt.

Simulator Booth Instructions

Event 1 Pressurizer Level Instrument RC-ILI-0110X Fails Low

1. On Lead Examiner's cue, initiate Event Trigger 1.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
3. If sent to LCP-43, report RC-ILI-0110 X1 is failed low.

Event 2 Steam Generator #1 Feedwater Flow Instrument FW-IFR-1111 Fails Low

1. On Lead Examiner's cue, initiate Event Trigger 2.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 3 CEA 52 Drops, Rapid Plant Power Reduction

1. On Lead Examiner's cue, initiate Event Trigger 3.
2. If called to remove Condensate Polishers from service, acknowledge communication and report that you will perform actions requested.
3. If Work Week Manager or I&C is called, inform the caller that a and a team will be sent to the CEDMCS Alley to investigate.

Event 4 LOCA Inside Containment

1. On Lead Examiner's cue, initiate Event Trigger 4.
2. If called as RCA watch report CS-125 A appears to be mechanically bound, the stem looks bent.
3. If called as RAB watch to check the Emergency Diesel Generators, use remote EGR26 and 27. When EDG A & B Trouble alarms clear, report they are running satisfactorily.
4. If the Duty Plant Manager is called, inform the caller that he will make the necessary calls.

Event 5 Low Pressure Safety Injection Pump A fails to start

1. If called to check the LPSI Pump A breaker, report all indications are normal.
2. If called to check the LPSI Pump A locally, report all indications are normal.

Event 6 Containment Spray Pump B Trips

1. After the crew has entered OP-902-002 and on the Lead Examiner's cue, initiate Event Trigger 7.
2. If called to check the Containment Spray Pump B breaker, report over-current flags are picked up on all 3 phases.
3. If called to check the Containment Spray Pump B, report that there are visible charring on the motor with an acrid smell, but no indications of a fire or smoke.
4. If called for TSC concurrence, report SM/EC has granted concurrence.
5. If called as RAB watch to come to the Control Room for over-ride key for CS-125 B, acknowledge communication. Report to the Control Room on lead examiner's cue.
6. If crew does obtain key and over-rides CS-125 B closed, use remote CSR13B for the local key operation.

At the end of the scenario, before resetting, complete data collection by stopping recording and saving the file as 2011 SRO Scenario1.cdf. Save the file into the folder for the appropriate crew.

Scenario Timeline:

Event	Malfunction	Severity	Ramp HH:MM:SS	Delay	Trigger
1	RC15A2	0	N/A	N/A	1
	Pressurizer level instrument RC-ILI-0110 X fails low				
2	FW26A	0	N/A	N/A	2
	Steam Generator #1 Feedwater flow instrument FW-IFR-1111 fails low				
3	RD02A52	N/A	N/A	N/A	3
	CEA 52 Drops into the core				
4	RC23A	3.0 %	8:00	N/A	4
	Loss of Coolant Accident				
5	CV02A	N/A	N/A	N/A	5
	Charging Pump A fails to auto-start				
6	SI02D	N/A	N/A	N/A	N/A
	Low Pressure Safety Injection Pump A fails to auto start				
7	CS04A DI-08a04s22-1	N/A	N/A	N/A	N/A
	CS-125 A Fails to open, will not open manually.				
7	CS01B	N/A	N/A	N/A	7
	Containment Spray Pump B trip				

REFERENCES:

Event	Procedures
1	OP-901-110, Pressurizer Level Control Malfunction OP-903-013, Monthly Channel Checks Tech Spec 3.3.3.5
2	OP-901-201, Steam Generator Level Control Malfunction Tech Requirement Manual 3.3.5
3	OP-901-102, CEA or CEDMCS Malfunction OP-901-212, Rapid Plant Power Reduction OP-004-004, Control Element Drive Tech Spec 3.2.3, 3.1.3.1, 3.1.3.5
4	OP-902-000, Standard Post Trip Actions OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart OP-902-002, Loss of Coolant Accident Recovery
5	OP-902-000, Standard Post Trip Actions OI-038-000, Emergency Operating Procedures Operations Expectations / Guidance
6	OP-902-000, Standard Post Trip Actions OI-038-000, Emergency Operating Procedures Operations Expectations / Guidance
7	OP-902-008, Safety Function Recovery Procedure OP-902-009, Standard Appendices, Appendix 28, Aligning LPSI to Replace CS

Facility:	WATERFORD 3	Scenario No.: 2	Op Test No.: **NRC**
Examiners:		Operators:	

Initial Conditions:
- Reactor power is 77%
- Protected Train is B
- AB Bus is aligned to Train B

Turnover:
- Charging Pumps A & B are operating
- Boron Equalization is in progress

Event No.	Malf. No.	Event Type*	Event Description
1	RX14A	I – ATC I – SRO	Pressurizer pressure instrument RC-IPR-0100 X fails low, OP-901-120, Pressurizer Pressure Control Malfunction
2	RC16B	I – BOP I – SRO TS – SRO	RCP 1A speed instrument failure, Channel B, Core Protection Calculator B trip
3	DI-04a3a02e-5	I – ATC I – SRO	Letdown Back Pressure controller CVC-IPIC-0201 setpoint fails to 100% output. OP-901-112, Charging or Letdown Malfunction.
4	N/A	TS – SRO	Dry Cooling Tower Fan 8B failure
5	DI-07a8s06-1 DI-07a8s12-1	I – BOP I – SRO	Inadvertent Containment Spray Actuation OP-901-504, Inadvertent ESFAS Actuation
6	MS11B	M – All	Main Steam line break inside Containment, S/G #2, OP-902-004, Excess Steam Demand Recovery (Critical Task 1, 3, and 4)
7	N/A	C – BOP C – SRO	Initiate Containment Spray flow (Critical Task 2)
8	RP09E	C – ATC C – SRO	Relay K301 failure, BAM-113 A and CVC-183 fail to position on Safety Injection

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

The crew assumes the shift at ~77% power with instructions to hold power pending planned Chemistry Department hold.

After assuming the shift, Pressurizer pressure instrument RC-IPR-0100 X will fail low. Since Boron Equalization is in progress, the Main Spray valves will close. The SRO will enter OP-901-120, Pressurizer Pressure Control Malfunction, and select the non-faulted pressure channel.

After Channel Y has been selected for Pressurizer pressure control, Reactor Coolant Pump 1A speed sensor for Core Protection Calculator B will fail. CPC B will trip as a result of the failure. The SRO should enter Tech Spec 3.3.1 and have the BOP operator bypass bistables 3 and 4 on Channel B.

After the bypass operation is complete, the Letdown Back Pressure controller, CVC-IPIC-0201, setpoint fails to 700 PSIA, 100% scale. This causes the in service Letdown Back Pressure control valve to close and Letdown flow to go to 0 gpm. The CRS should enter OP-901-112, Charging or Letdown Malfunction, and use sub-section E2 to address the failure. The Letdown Flow controller and the Back Pressure controller will be placed in manual to control Letdown flow.

After the ATC has control of the Letdown System in manual, the Outside Watch will call and report an oil failure on Dry Cooling Tower Fan 8B. The SRO should enter Tech Spec 3.7.4 action d. His review of ambient temperature and Tech Spec 3.7.4 should conclude that Train B Ultimate Heat Sink remains operable and that Tech Spec 3.8.1.1 is being complied with.

After the Tech Spec review is complete, an inadvertent Containment Spray Actuation will occur. Component Cooling Water flow to the Reactor Coolant Pumps will be secured. The SRO should enter OP-901-504, Inadvertent ESFAS Actuation. The Containment Spray Pumps should be secured. If the Component Cooling Water Isolations to the Reactor Coolant Pumps are not restored within 3 minutes, the reactor should be tripped and the Reactor Coolant Pumps secured.

A Main Steam line break will develop on Steam Generator #2 after the preceding event. If the crew restored CCW to the Reactor Coolant Pumps, the crew should perform a manual reactor trip due to the excess steam demand. If the crew tripped the reactor and secured Reactor Coolant Pumps on the previous event, then the Main Steam line break will ramp in after the reactor trip. Because the Containment Spray Pumps control switches maintain off, the BOP should re-start Containment Spray Pumps A and B after Containment pressure rises above 17.7 psia.

Relay K301 will not actuate and BAM-113 A will fail to open and CVC-183 will fail to close on the Safety Injection Actuation. The ATC operator should position these valves to ensure Emergency Boration. After Steam Generator #2 blows down, the crew will take action to maintain RCS temperature and pressure. The scenario can be terminated after these actions are complete.

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. The required task becomes applicable after Containment Spray has been actuated. The time requirement of 3 minutes is based on the RCP operating limit of 3 minutes without CCW cooling. If the crew does not restore CCW flow to the RCPs after the inadvertent CSAS, then the 3 minute criteria starts at the time of that CSAS. If the crew restores CCW flow to the RCPs following the inadvertent CSAS, then the 3 minute criteria starts after the Main Steam line break.

2. Establish Containment temperature and pressure control

This task is satisfied by manually starting at least 1 Containment Spray Pump following the Main Steam line break. This should be completed before completing the review of OP-902-000, Standard Post Trip Actions.

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 prior to RCS temperature exceeding 550 °F.

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 prior to RCS pressure exceeding 2250 PSIA.

Scenario Quantitative Attributes

1. Total malfunctions (5–8)	7
2. Malfunctions after EOP entry (1–2)	2
3. Abnormal events (2–4)	3
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	0
7. Critical tasks (2–3)	4

Scenario Notes:

A. Reset Simulator to IC-192.

B. Verify the following Scenario Malfunctions:

   1. rx14-A for Pressurizer pressure instrument RC-IPT-0100 X
   2. rc16b for RCP 1A speed
   3. ms11b for Main Steam line break S/G #2
   4. rp09e for Relay K301

C. Verify the following Overrides:

   1. di-07a08s06-1 and di-07a08s12-1 for CSAS
   2. di-04a3a02e-5 for Letdown Back Pressure Controller

D. Ensure Protected Train B sign is placed in SM office window.

E. Verify EOOS is 10.0 Green

F. Complete the simulator setup checklist.

G. Start DCS, Record Data, select file PlantParameters.txt.

Simulator Booth Instructions

Event 1 Pressurizer Pressure Instrument Fails Low

1. On Lead Examiner's cue, initiate Event Trigger 1.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 2 RCP 1A Speed Instrument Failure

3. On Lead Examiner's cue, initiate Event Trigger 2.
4. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 3 Letdown Back Pressure Controller Setpoint Failure

1. On Lead Examiner's cue, initiate Event Trigger 3.
2. If called as the RCA Watch to locally monitor the following Letdown DP indications, report that all DP indications are normal.
3. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 4 Dry Cooling Tower Fan 8B Fan Failure

1. On Lead Examiner's cue, call the CRS as the Outside Watch and report that Dry Cooling Tower Fan 8B has no oil in the reduction gear sightglass. There is oil on the ground under the fan. This discovery is made during rounds.
2. If Work Week Manager or PMM is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 5 Inadvertent CSAS

1. On Lead Examiner's cue, initiate Event Trigger 5.
2. No communications should occur for this evolution.

Event 6 Main Steam Line Break S/G #2

1. On the Lead Examiner's cue, or after the reactor is manually tripped in the previous event, initiate Event Trigger 6.
2. When called as the Outside Watch to check Main Steam Safeties not lifting, report that no safety valves are lifting.

At the end of the scenario, before resetting, complete data collection by stopping recording and saving the file as 2011 SRO Scenario 2.cdf. Save the file into the folder for the appropriate crew.

Scenario Timeline:

Event	Malfunction	Severity	Ramp HH:MM:SS	Delay	Trigger
1	RX14A	0%	N/A	N/A	1
	Pressurizer pressure RC-IPR-0100 X fails low				
2	RC16B	N/A	N/A	N/A	2
	RCP 1A Speed failure, Channel B				
3	Di-04a3a02e-5	Push	N/A	N/A	3
	Letdown Back Pressure controller setpoint failure				
4	N/A	N/A	N/A	N/A	N/A
	Dry Cooling Tower Fan 8B failure				
5	Di-07a8a06-1 DI-07a8s12-1	N/A	N/A	N/A	5
	Inadvertent Containment Spray				
6	MS11B	10%	3:00	N/A	6
	Main Steam line break, S/G #2				
7	N/A	N/A	N/A	N/A	N/A
	Initiate Containment Spray flow				
8	RP09E	N/A	N/A	N/A	N/A
	Relay K301 failure				

REFERENCES:

Event	Procedures
1	OP-901-120, Pressurizer Pressure Control Malfunction
2	OP-009-007, Plant Protection System Tech Spec 3.3.1
3	OP-901-112, Charging or Letdown Malfunction
4	Tech Spec 3.7.4 and 3.8.1.1 OP-100-014, Technical Specification and Technical Requirements Compliance
5	OP-901-504, Inadvertent ESFAS Actuation
6	OP-902-000, Standard Post Trip Actions OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart OP-902-004, Excess Steam Demand Recovery
7	OP-902-000, Standard Post Trip Actions OI-038-000, Emergency Operating Procedures Operations Expectations / Guidance
8	OP-902-000, Standard Post Trip Actions OI-038-000, Emergency Operating Procedures Operations Expectations / Guidance

Facility: WATERFORD 3 Scenario No.: 4 Op Test No.: **NRC**

Examiners: ______________________ Operators: ______________________

Initial Conditions:
- Reactor power is 100%
- Protected Train is B
- AB Bus is aligned to Train A

Turnover:
- Maintain 100% power

Event No.	Malf. No.	Event Type*	Event Description
1	SG10D	C – BOP C – SRO TS – SRO	Steam Generator #1 level instrument SG-ILI-1113 D fails high.
2	FW03A	C – ATC C – SRO TS – SRO	Main Feedwater Pump A trips, Reactor Power Cutback OP-901-101, Reactor Power Cutback
3	RD07D	R – ATC	Regulating Group 4 CEAs fail to insert in automatic following Reactor Power Cutback
4	TP01A TP08B	C – BOP C – SRO	Turbine Cooling Water Pump A trips, Turbine Cooling Water Pump B fails to auto start OP-901-512, Loss of Turbine Cooling Water
5	FW03B FW07A	M – All N – SRO	Main Feedwater Pump B trips, manual reactor trip, Emergency Feedwater Pump A fails to run
6	RP03	C – BOP C – SRO	Main Turbine fails to trip following the reactor trip
7	RD11A 28, 37, 79	C – ATC C – SRO	3 CEAs fail to insert following the reactor trip, Emergency Boration (Critical task 1)
8	FW05	C – BOP C – ATC C – SRO	Emergency Feedwater Pump AB trip on overspeed (Critical task 2)

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

The crew assumes the shift at 100% power with instructions to maintain 100% power.

After assuming the shift, Steam Generator #1 level instrument SG-ILI-1113 D fails high. The SRO should review Tech Specs and enter Tech Spec 3.3.1 and 3.3.2 and TRM 3.3.1. The SRO should direct the BOP operator to bypass the bistables for low Steam Generator #1 level, high level and Steam Generator #1 differential pressure for channel D. This instrument does apply to Tech Spec 3.3.3.6 for Accident Monitoring, but the minimum channel requirements are met using other channels.

After the proper bistables are bypassed, Main Feedwater Pump A will trip. A Reactor Power Cutback will occur. The ATC should perform the immediate operator actions. The SRO should enter OP-901-101, Reactor Power Cutback. Following the Cutback, Regulating Group 4 CEAs will fail to insert in automatic. The SRO should enter Tech Spec 3.2.4 for DNBR and 3.2.7 for ASI. The crew should take action to address the DNBR power operating limit within 15 minutes by performing ASI control with Group P CEAs.

After the crew has addressed Tech Specs and commenced ASI control with Group P CEAs, Turbine Cooling Water Pump A trips. Turbine Cooling Water Pump B fails to start. The SRO should enter OP-901-512, Loss of Turbine Cooling Water, and start Turbine Cooling Water Pump B. The Plant Monitoring Computer will display an overload condition for TCW Pump A

After Turbine Cooling Water Pump B is running, Main Feedwater Pump B will trip. The crew should perform a manual reactor trip based on this failure. On the Emergency Feedwater Actuation, Emergency Feedwater Pump A will fail to start and will not start manually. The Main Turbine will fail to trip on the reactor trip. The BOP should manually trip the Main Turbine. 3 CEAs will fail to insert on the reactor trip. The ATC operator should perform Emergency Boration due to this condition. The SRO should enter OP-902-006, Loss of Main Feedwater Recovery. The ATC operator should secure 2 Reactor Coolant Pumps.

After 2 Reactor Coolant Pumps are secured, Emergency Feedwater Pump AB will trip due to operator error locally. The crew should remain in OP-902-006 and secure the remaining Reactor Coolant Pumps. On investigation, the local watchstander will report Emergency Feedwater Pump AB is ready to be reset. The BOP operator should perform the necessary actions for resetting Emergency Feedwater Pump AB.

The scenario can be terminated after Emergency Feedwater Pump AB is reset.

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 3 CEAs remain stuck out.

2. Establish a primary to secondary heat sink

This task is satisfied by securing all RCPs after Emergency Feedwater Pump AB trips. With Emergency Feedwater Pump A off, Emergency Feedwater Pump B does not have the capacity to provide necessary Emergency Feedwater flow. The requirement is that all RCPs be secured within 30 minutes of the loss of Main Feedwater, the time of the reactor trip.

Scenario Quantitative Attributes

1. Total malfunctions (5–8)	8
2. Malfunctions after EOP entry (1–2)	3
3. Abnormal events (2–4)	2
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	0
7. Critical tasks (2–3)	2

Scenario Notes:

A. Reset Simulator to IC-194.

B. Verify the following Scenario Malfunctions:

1. sg10d for S/G #1 level instrument
2. tp01a for TCW Pump A
3. tp08b for TCW Pump B
4. fw03a for Main Feedwater Pump A
5. rd07d for Regulating Group 4 CEAs
6. fw03b for Main Feedwater Pump B
7. fw07a for EFW Pump A
8. rp03 for the Main Turbine failure
9. rd11a28, 37, and 79 for CEAs 28, 37, and 79
10. fw05 for EFW Pump AB

C. Verify the following Override:

1. di-08a04s09-1 for EFW Pump A

D. Ensure Protected Train B sign is placed in SM office window.

E. Verify EOOS is 10.0 Green

F. Complete the simulator setup checklist.

G. Start DCS, Record Data, select file PlantParameters.txt.

Simulator Booth Instructions

Event 1 Steam Generator #1 level instrument failure

1. On the Lead Examiner's cue, initiate Event Trigger 1.
2. If directed to check the remote shutdown panel, report that Channel D S/G #1 level reads 67%.
3. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 2/3 Main Feedwater Pump A trip, Reactor Power Cutback/Reg Group 4 Failure

1. On the Lead Examiner's cue, initiate Event Trigger 3.
2. If directed to check Main Feedwater Pump A locally, report there are no abnormal indications locally.

Event 4 Turbine Cooling Water Pump A trip

1. On the Lead Examiner's cue, initiate Event Trigger 2.
2. If directed to check Turbine Cooling Water Pumps locally, report TCW Pump A has over-current flags tripped and that TCW Pump B looks normal.
3. If Work Week Manager is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 5 MFW Pump B trip, Reactor trip, Emergency Feedwater Pump A trip

1. On the Lead Examiner's cue, initiate Event Trigger 5.
2. If directed to check Main Feedwater Pump B locally, report indications of broken linkages on the governor assembly.
3. If directed to check EFW Pump A locally, report indications of a broken breaker for EFW Pump A at Switchgear 3A.

Event 8 Emergency Feedwater Pump AB trip

1. On the Lead Examiner's cue, initiate Event Trigger 8.
2. After the remaining Reactor Coolant Pumps are tripped, call as the RCA watch and report that the Emergency Feedwater Pump AB tripped on overspeed due to his activities while checking the pump. Recommend performing actions to reset EFW Pump AB.

At the end of the scenario, before resetting, complete data collection by stopping recording and saving the file as 2011 SRO Scenario 4.cdf. Save the file into the folder for the appropriate crew.

Scenario Timeline:

Event	Malfunction	Severity	Ramp HH:MM:SS	Delay	Trigger
1	SG10D	100%	N/A	N/A	1
	S/G #1 level instrument channel D fails high				
	FW03A	N/A	N/A	N/A	2
	MFW Pump A trips				
3	RD07D	N/A	N/A	N/A	N/A
	Regulating Group 4 fails to auto insert				
4	TP01A TP08B	N/A	N/A	N/A	4
	TCW Pump A trips, TCW Pump B fails to auto-start				
5	FW03B FW07A DI-08a04s09-1	N/A	N/A	N/A	5
	MFW Pump B trips, EFW Pump A fails to run				
6	RP03	N/A	N/A	N/A	N/A
	Main Turbine fails to trip on reactor trip				
7	RD11A 28, 37, 79	N/A	N/A	N/A	N/A
	CEAs 28, 37, 79 fail to insert				
8	FW05	N/A	N/A	N/A	8
	EFW Pump AB trips				

REFERENCES:

Event	Procedures
1	OP-009-007, Plant Protection System OP-903-013, Monthly Channel Checks Tech Spec 3.3.1 and 3.3.2
3 & 4	OP-901-101, Reactor Power Cutback Tech Spec 3.2.1
2	OP-901-512, Loss of Turbine Cooling Water
5	OP-902-000, Standard Post Trip Actions OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart OP-902-006, Loss of Main Feedwater Recovery
6	OP-902-000, Standard Post Trip Actions OI-038-000, Emergency Operating Procedures Operations Expectations / Guidance
7	OP-902-000, Standard Post Trip Actions OI-038-000, Emergency Operating Procedures Operations Expectations / Guidance
8	OP-902-006, Loss of Main Feedwater Recovery

Facility: **WATERFORD 3**		Date of Examination:	**March 21, 2011**
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	R, D	2.1.23, Ability to perform specific system and integrated plant procedures during all modes of plant operation. Perform a Shutdown Margin with an immoveable CEA in accordance with OP-903-090, Shutdown Margin, section 7.3, Shutdown Margin Verification - Untrippable CEA.
A2 Conduct of Operations K/A Importance: 3.6	S, M	2.1.18, Ability to make accurate, clear, and concise logs, records, status boards, and reports. Perform OP-903-001, Technical Specification Surveillance Logs, Attachment 11.18, Adjustment of CPC and Excore Nuclear Instrumentation Data.
A3 Equipment Control K/A Importance: 3.7	S, N	2.2.12, Knowledge of surveillance procedures Complete surveillance OP-903-013, Monthly Channel Checks, Attachment 10.3 for Accident Monitoring Instrumentation Channel Checks.
A4 Radiation Control K/A Importance: 3.2	R, M	2.3.4, Knowledge of radiation exposure limits under normal and emergency conditions. Calculate stay time to perform a tagout verification. Room dose rate & operator's yearly dose provided.
Emergency Plan		Not selected

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:	**March 21, 2011**
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: 3.9	R, D	2.1.25, Ability to interpret reference materials, such as graphs, curves, tables, etc. Review and approve a completed Shutdown Margin with an immoveable CEA in accordance with OP-903-090, Shutdown Margin, section 7.3, Shutdown Margin Verification - Un-trippable CEA.
A6 Conduct of Operations K/A Importance: 3.8	S, M	2.1.18, Ability to make accurate, clear, and concise logs, records, status boards, and reports. Review and approve OP-903-001, Technical Specification Surveillance Logs, Attachment 11.18, Adjustment of CPC and Excore Nuclear Instrumentation Data.
A7 Equipment Control K/A Importance: 4.6	S, M	2.2.37, Ability to determine operability and/or availability of safety related equipment. Review and approve a completed Equipment Out of Service document in accordance with OP-100-010, Equipment Out of Service.
A8 Radiation Control K/A Importance: 3.7	R, M	2.3.4, Knowledge of radiation exposure limits under normal and emergency conditions. Calculate dose and assign non-licensed operators to perform work in radiological restricted areas. 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: 4.4	S, M	2.4.38, Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required. Determine appropriate classification and actions based on a toxic gas release in accordance with EP-004-010, Toxic Chemical Contingency Procedure.

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:	**March 21, 2011**
Exam Level	**Reactor Operator**	Operating Test No.:	**NRC**

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, Perform CEA testing for Regulating Group 6 in accordance with OP-903-005, Control Element Assembly Operability Check. Fault: CEA 20 will insert after initially moved, CEA will subsequently drop, the combination requiring a reactor trip. A4.01 Controls for CCWS RO – 3.1, SRO – 2.9	A, D, S	1
S2	004 Chemical and Volume Control System; Makeup to the Volume Control Tank using Boric Acid and Primary Makeup Water batches in accordance with OP-002-005, Chemical and Volume Control. Fault: The Boric Acid counter will fail to secure the Boric Acid addition, requiring the applicant to manually secure Boric Acid flow. The applicant will then need to add the Primary Makeup Water for the initial calculation, plus the additional based on the extra boric acid added. A4.07 Boration/dilution RO – 3.9, SRO – 3.7	A, M, S	2
S3	005 Shutdown Cooling System; Secure Shutdown Cooling Train B and place it in standby in accordance with OP-009-005, Shutdown Cooling. A4.01 Controls and indication for RHR pumps RO – 3.6, SRO – 3.4	D, L, S	4 – P
S4	039 Main and Reheat Steam System; BOP operator immediate operator actions on evacuation of the Control Room in accordance with OP-901-502, Control Room Evacuation Fault: Atmospheric Dump Valve B will spuriously open, requiring the applicant to take contingency actions to control Steam Generator pressure. A4.01 Main steam supply. Valves RO – 2.9, SRO – 2.8	A, M, S	4 – S
S5	028 Hydrogen Recombiner and Purge Control System Start Hydrogen Recombiner A in accordance with OP-008-006. A4.01 HRPS controls RO – 4.0, SRO – 4.0	D, L, P, S	5
S6	064 Emergency Diesel Generator (ED/G) System; Parallel Emergency Diesel Generator A for EDG testing in accordance with OP-009-002, Emergency Diesel Generator. Fault: After EDG A load is raised, EDG A load will rise without manipulation requiring a trip of EDG A. A4.06 Manual start, loading, and stopping of the ED/G RO – 3.9, SRO – 3.9	A, D, S	6
S7.	029 Containment Purge System; Perform surveillance OP-903-052, Controlled Ventilation Area System Operability Check, and secure RAB Normal Ventilation and start CVAS Train A. K1.03 Engineering safeguards RO – 3.6, SRO – 3.8	N, S	8
S8.	012 Reactor Protection System; Place Reactor Power Cutback in service and remove reactor trip on turbine trip in accordance with OP-004-015, Reactor Power Cutback. A4.03 Channel blocks and bypasses RO – 3.6, SRO – 3.6	D, S	7

In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	061 Emergency Feedwater System; Reset overspeed device on Emergency Feedwater Pump AB in accordance with OP-902-005, Station Blackout Recovery. A2.04 Pump failure or improper operation RO – 3.4, SRO – 3.8	D, E, L, P, R	4 – S
P2	064 Emergency Diesel Generator (ED/G) System; Trip Emergency Diesel Generator B locally. Fault: The first method the applicant performs to trip the EDG B will fail, requiring contingency actions to secure EDG B. K4.02 Trips for ED/G while operating (normal or emergency) RO – 3.9, SRO – 4.2	A, D, R	6
P3	068 Control Room Evacuation Close Train B Safety Injection Tank outlet valves during a Control Room Evacuation in accordance with OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown. AA1.28 PZR level control and pressure control RO – 3.8, SRO – 4.0	E, L, N	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	5
(C)ontrol room		0
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4	7
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	2
(EN)gineered safety feature	- / - / ≥1 (control room system)	-
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1	4
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	4
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	2
(R)CA	≥ 1 / ≥ 1 / ≥ 1	2
(S)imulator		8

Facility:	**WATERFORD 3**	Date of Examination:	**March 21, 2011**
Exam Level	**SRO – Instant**	Operating Test No.:	**NRC**

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, Perform CEA testing for Regulating Group 6 in accordance with OP-903-005, Control Element Assembly Operability Check. Fault: CEA 20 will insert after initially moved, CEA will subsequently drop, the combination requiring a reactor trip. A4.01 Controls for CCWS RO – 3.1, SRO – 2.9	A, D, S	1
S2	004 Chemical and Volume Control System; Makeup to the Volume Control Tank using Boric Acid and Primary Makeup Water batches in accordance with OP-002-005, Chemical and Volume Control. Fault: The Boric Acid counter will fail to secure the Boric Acid addition, requiring the applicant to manually secure Boric Acid flow. The applicant will then need to add the Primary Makeup Water for the initial calculation, plus the additional based on the extra boric acid added. A4.07 Boration/dilution RO – 3.9, SRO – 3.7	A, M, S	2
S3	005 Shutdown Cooling System; Secure Shutdown Cooling Train B and place it in standby in accordance with OP-009-005, Shutdown Cooling. A4.01 Controls and indication for RHR pumps RO – 3.6, SRO – 3.4	D, L, S	4 – P
S4	039 Main and Reheat Steam System; BOP operator immediate operator actions on evacuation of the Control Room in accordance with OP-901-502, Control Room Evacuation Fault: Atmospheric Dump Valve B will spuriously open, requiring the applicant to take contingency actions to control Steam Generator pressure. A4.01 Main steam supply. Valves RO – 2.9, SRO – 2.8	A, M, S	4 – S
S5			
S6	064 Emergency Diesel Generator (ED/G) System; Parallel Emergency Diesel Generator A for EDG testing in accordance with OP-009-002, Emergency Diesel Generator. Fault: After EDG A load is raised, EDG A load will rise without manipulation requiring a trip of EDG A. A4.06 Manual start, loading, and stopping of the ED/G RO – 3.9, SRO – 3.9	A, D, S	6
S7.	029 Containment Purge System; Perform surveillance OP-903-052, Controlled Ventilation Area System Operability Check, and secure RAB Normal Ventilation and start CVAS Train A. K1.03 Engineering safeguards RO – 3.6, SRO – 3.8	N, S	8
S8.	012 Reactor Protection System; Place Reactor Power Cutback in service and remove reactor trip on turbine trip in accordance with OP-004-015, Reactor Power Cutback. A4.03 Channel blocks and bypasses RO – 3.6, SRO – 3.6	D, S	7

In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	061 Emergency Feedwater System; Reset overspeed device on Emergency Feedwater Pump AB in accordance with OP-902-005, Station Blackout Recovery. A2.04 Pump failure or improper operation RO – 3.4, SRO – 3.8	D, E, L, P, R	4 – S
P2	064 Emergency Diesel Generator (ED/G) System; Trip Emergency Diesel Generator B locally. Fault: The first method the applicant performs to trip the EDG B will fail, requiring contingency actions to secure EDG B. K4.02 Trips for ED/G while operating (normal or emergency) RO – 3.9, SRO – 4.2	A, D, R	6
P3	068 Control Room Evacuation Close Train B Safety Injection Tank outlet valves during a Control Room Evacuation in accordance with OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown. AA1.28 PZR level control and pressure control RO – 3.8, SRO – 4.0	E, L, N	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	5
(C)ontrol room		0
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4	6
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	2
(EN)gineered safety feature	- / - / ≥1 (control room system)	-
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1	3
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	4
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	1
(R)CA	≥ 1 / ≥ 1 / ≥ 1	2
(S)imulator		7

Facility:	**WATERFORD 3**	Date of Examination:	**March 21, 2011**
Exam Level	**SRO – Upgrade**	Operating Test No.:	**NRC**

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, Perform CEA testing for Regulating Group 6 in accordance with OP-903-005, Control Element Assembly Operability Check. Fault: CEA 20 will insert after initially moved, CEA will subsequently drop, the combination requiring a reactor trip. A4.01 Controls for CCWS RO – 3.1, SRO – 2.9	A, D, S	1
S2			
S3			
S4	039 Main and Reheat Steam System; BOP operator immediate operator actions on evacuation of the Control Room in accordance with OP-901-502, Control Room Evacuation Fault: Atmospheric Dump Valve B will spuriously open, requiring the applicant to take contingency actions to control Steam Generator pressure. A4.01 Main steam supply. Valves RO – 2.9, SRO – 2.8	A, M, S	4 – S
S5			
S6			
S7.	029 Containment Purge System; Perform surveillance OP-903-052, Controlled Ventilation Area System Operability Check, and secure RAB Normal Ventilation and start CVAS Train A. K1.03 Engineering safeguards RO – 3.6, SRO – 3.8	N, EN, S	8
S8.			

In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1			
P2	064 Emergency Diesel Generator (ED/G) System; Trip Emergency Diesel Generator B locally. Fault: The first method the applicant performs to trip the EDG B will fail, requiring contingency actions to secure EDG B. K4.02 Trips for ED/G while operating (normal or emergency) RO – 3.9, SRO – 4.2	A, D, R	6
P3	068 Control Room Evacuation Close Train B Safety Injection Tank outlet valves during a Control Room Evacuation in accordance with OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown. AA1.28 PZR level control and pressure control RO – 3.8, SRO – 4.0	E, L, N	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	3
(C)ontrol room		0
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4	2
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	1
(EN)gineered safety feature	- / - / ≥1 (control room system)	1
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1	1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	3
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	0
(R)CA	≥ 1 / ≥ 1 / ≥ 1	1
(S)imulator		3