

Facility: Waterford 3														Date of Exam: October 10, 2012			
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	2	3	N/A			3	4	N/A		3	18	3	3	6	
	2	2	1	2				2	1			1	9	2	2	4	
	Tier Totals	5	3	5				5	5			4	27	5	5	10	
2. Plant Systems	1	3	2	3	3	2	2	2	3	3	3	2	28	3	2	5	
	2	1	1	1	1	1	0	1	1	1	1	1	10	1	1	3	
	Tier Totals	4	3	4	4	3	2	3	4	4	4	3	38	5	3	8	
3. Generic Knowledge and Abilities Categories					1	2	3	4	10				1	2	3	4	7
					3	3	2	2					2	2	1	2	

Note:

- 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 Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)											Form ES-401-2
ES-401											
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#	
000007 (BW/E02&E10: 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		AA2.30 Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: Inadequate core cooling		4.3	2	
000009 Small Break LOCA / 3						X	2.1.19 Ability to use plant computers to evaluate system or component status.		3.9	3	
000011 Large Break LOCA / 3							Not Selected				
000015/17 RCP Malfunctions / 4	X						AK1.01 Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow): Natural circulation in a nuclear reactor power plant		4.4	4	
000022 Loss of Rx Coolant Makeup / 2						X	2.4.1 Knowledge of EOP entry conditions and immediate action steps.		4.6	5	
000025 Loss of RHR System / 4				X			AA1.03 Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: LPI pumps		3.4	6	
000026 Loss of Component Cooling Water / 8			X				AK3.02 Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS		3.6	7	
000027 Pressurizer Pressure Control System Malfunction / 3		X					AK2.03 Knowledge of the interrelations between the Pressurizer Pressure Control Malfunctions and the following: Controllers and positioners		2.6	8	
000029 ATWS / 1				X			EA1.12 Ability to operate and monitor the following as they apply to a ATWS: M/G set power supply and reactor trip breakers		4.1	9	

PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)											Form ES-401-2	
ES-401												
000038 Steam Gen. Tube Rupture / 3									X	2.2.42 Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	3.9	10
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4								X		EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.4	11
000054 (CE/E06) Loss of Main Feedwater / 4				X						EK2.1 Knowledge of the interrelations between the (Loss of Feedwater) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.3	12
000055 Station Blackout / 6						X				EK3.02 Knowledge of the reasons for the following responses as the apply to the Station Blackout: Actions contained in EOP for loss of offsite and onsite power	4.3	13
000056 Loss of Off-site Power / 6								X		AA2.46 Ability to determine and interpret the following as they apply to the Loss of Offsite Power: That the ED/Gs have started automatically and that the bus tie breakers are closed	4.2	14
000057 Loss of Vital AC Inst. Bus / 6									X	AA2.17 Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: System and component status, using local or remote controls	3.1	15
000058 Loss of DC Power / 6							X			AA1.02 Ability to operate and / or monitor the following as they apply to the Loss of DC Power: Static inverter dc input breaker, frequency meter, ac output breaker, and ground fault detector	3.1	16
000062 Loss of Nuclear Svc Water / 4					X					AK3.03 Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: Guidance actions contained in EOP for Loss of nuclear service water	4.0	17
000065 Loss of Instrument Air / 8										Not Selected		
W/E04 LOCA Outside Containment / 3										Not Applicable		
W/E11 Loss of Emergency Coolant Recirc. / 4										Not Applicable		

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)										Form ES-401-2	
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4											Not Applicable		
000077 Generator Voltage and Electric Grid Disturbances / 6	X										AK1.02 Knowledge of the operational implications of the following concepts as they apply to Generator Voltage and Electric Grid Disturbances: Over-excitation	3.3	18
K/A Category Totals:		3	2	3	3	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				X			AA1.01 Ability to operate and / or monitor the following as they apply to the Continuous Rod Withdrawal: Bank select switch	3.5	19	
000003 Dropped Control Rod / 1							Not Selected			
000005 Inoperable/Stuck Control Rod / 1							Not Selected			
000024 Emergency Boration / 1		X					AK2.01 Knowledge of the interrelations between Emergency Boration and the following: Valves	2.7	20	
000028 Pressurizer Level Malfunction / 2							Not Selected			
000032 Loss of Source Range NI / 7							Not Selected			
000033 Loss of Intermediate Range NI / 7			X				AK3.01 Knowledge of the reasons for the following responses as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Termination of startup following loss of intermediate range instrumentation	3.2	21	
000036 (BW/A08) Fuel Handling Accident / 8	X						AK1.03 Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents: Indications of approaching criticality	4.0	22	
000037 Steam Generator Tube Leak / 3							Not Selected			
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							Not Selected			

PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)										Form ES-401-2
ES-401										
000060 Accidental Gaseous Radwaste Rel. / 9								Not Selected		
000061 ARM System Alarms / 7								Not Selected		
000067 Plant Fire On-site / 8							X	2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	24
000068 (BW/A06) Control Room Evac. / 8				X				AK3.12 Knowledge of the reasons for the following responses as they apply to the Control Room Evacuation: Required sequence of actions for emergency evacuation of control room	4.1	25
000069 (W/E14) Loss of CTMT Integrity / 5								Not Selected		
000074 (W/E06&E07) Inad. Core Cooling / 4					X			EA1.27 Ability to operate and monitor the following as they apply to a Inadequate Core Cooling: ECCS valve control switches and indicators	4.2	26
000076 High Reactor Coolant Activity / 9								Not Selected		
W/E01 & E02 Rediagnosis & SI Termination / 3								Not Applicable		
W/E13 Steam Generator Over-pressure / 4								Not Applicable		
W/E15 Containment Flooding / 5								Not Applicable		
W/E16 High Containment Radiation / 9								Not Applicable		
BW/A01 Plant Runback / 1								Not Applicable		
BW/A02&A03 Loss of NNI-XY / 7								Not Applicable		
BW/A04 Turbine Trip / 4								Not Applicable		
BW/A05 Emergency Diesel Actuation / 6								Not Applicable		
BW/A07 Flooding / 8								Not Applicable		
BW/E03 Inadequate Subcooling Margin / 4								Not Applicable		

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)										Form ES-401-2
BW/E08; W/E03 LOCA Cooldown - Depress. / 4									Not Applicable			
BW/E09; CE/A13 ; W/E09&E10 Natural Circ. / 4	X								AK1.3 Knowledge of the operational implications of the following concepts as they apply to the (Natural Circulation Operations): Annunciators and conditions indicating signals, and remedial actions associated with the (Natural Circulation Operations).	3.1	27	
BW/E13&E14 EOP Rules and Enclosures									Not Applicable			
CE/A11 ; W/E08 RCS Overcooling - PTS / 4									Not Selected			
CE/A16 Excess RCS Leakage / 2									Not Selected			
CE/E09 Functional Recovery									Not Selected			
K/A Category Point Totals:		2	1	2	2	1	1	1	Group Point Total:		9	

PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)														Form ES-401-2	
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									K3.02 Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: S/G		3.5	28
004 Chemical and Volume Control					X							K5.30 Knowledge of the operational implications of the following concepts as they apply to the CVCS: Relationship between temperature and pressure in CVCS components during solid plant operation		3.8	29
005 Residual Heat Removal	X											K2.01 Knowledge of bus power supplies to the following: RHR pumps		3.0	30
006 Emergency Core Cooling												K4.11 Knowledge of ECCS design feature(s) and/or interlock(s) which provide for the following: Reset of SIS		3.9	31
				X				X				A2.11 Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Rupture of ECCS header		4.0	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										X	K1.05 Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: Sources of makeup water 2.2.12 Knowledge of surveillance procedures.		3.0	34
010 Pressurizer Pressure Control						X						K6.01 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: Pressure detection systems		2.7	36

PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)													Form ES-401-2
ES-401													
012 Reactor Protection										X	A4.03 Ability to manually operate and/or monitor in the control room: Channel blocks and bypasses	3.6	37
013 Engineered Safety Features Actuation											K3.01 Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: Fuel	4.4	38
			X								A3.01 Ability to monitor automatic operation of the ESFAS including: Input channels and logic	3.7	39
022 Containment Cooling											K4.04 Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: Cooling of control rod drive motors	2.8	40
025 Ice Condenser											Not Applicable		
026 Containment Spray	X										K1.01 Knowledge of the physical connections and/or cause effect relationships between the CSS and the following systems: ECCS	4.2	41
039 Main and Reheat Steam										X	A4.04 Ability to manually operate and/or monitor in the control room: Emergency feedwater pump turbines	3.8	42
059 Main Feedwater											K3.02 Knowledge of the effect that a loss or malfunction of the MFW will have on the following: AFW system	3.6	43
			X								A2.11 Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure of feedwater control system	3.0	44
061 Auxiliary/Emergency Feedwater											K5.02 Knowledge of the operational implications of the following concepts as the apply to the AFW: Decay heat sources and magnitude	3.2	45
											A3.03 Ability to monitor automatic operation of the AFW, including: AFW S/G level control on automatic start	3.9	46

PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)														Form ES-401-2	
ES-401															
062 AC Electrical Distribution	X								X				K2.01 Knowledge of bus power supplies to the following: Major system loads 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	3.0	47
063 DC Electrical Distribution						X							K4.02 Knowledge of DC electrical system design feature(s) and/or interlock(s) which provide for the following: Breaker interlocks, permissives, bypasses and cross-ties	2.9	49
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 A4.01 Ability to manually operate and/or monitor in the control room: Local and remote operation of the ED/G	2.7	50
073 Process Radiation Monitoring	X												K1.01 Knowledge of the physical connections and/or cause effect relationships between the PRM system and the following systems: Those systems served by PRMs	3.6	52
076 Service Water										X			A3.02 Ability to monitor automatic operation of the SWS, including: Emergency heat loads	3.7	53
078 Instrument Air												X	2.1.30 Ability to locate and operate components, including local controls.	4.4	54
103 Containment											X		A1.01 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: Containment pressure, temperature, and humidity	3.7	55
K/A Category Point Totals:	3	2	3	3	2	2	2	2	3	3	3	2	Group Point Total:	28	

PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO)													Form ES-401-2	
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												Not Selected		
002 Reactor Coolant											X	2.4.11 Knowledge of abnormal condition procedures.	4.0	56
011 Pressurizer Level Control	X											K2.01 Knowledge of bus power supplies to the following: Charging pumps	3.1	57
014 Rod Position Indication					X							K5.02 Knowledge of the operational implications of the following concepts as they apply to the RPIS: RPIS independent of demand position	2.8	58
015 Nuclear Instrumentation												Not Selected		
016 Non-nuclear Instrumentation		X										K3.02 Knowledge of the effect that a loss or malfunction of the NNIS will have on the following: PZR LCS	3.4	59
017 In-core Temperature Monitor												Not Selected		
027 Containment Iodine Removal												Not Selected		
028 Hydrogen Recombiner and Purge Control								X				A2.02 Malfunctions or operations on the HRPS; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations: LOCA condition and related concern over hydrogen	3.5	60
029 Containment Purge												Not Selected		
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	61

PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO)														Form ES-401-2	
ES-401															
034 Fuel Handling Equipment											X		A4.02 Ability to manually operate and/or monitor in the control room: Neutron levels	3.5	62
035 Steam Generator													Not Selected		
041 Steam Dump/Turbine Bypass Control												X	A3.02 Ability to monitor automatic operation of the SDS, including: RCS pressure, RCS temperature, and reactor power	3.3	63
045 Main Turbine Generator	X												K1.06 Knowledge of the physical connections and/or cause-effect relationships between the MT/G system and the following systems: RCS, during steam valve test	2.6	64
055 Condenser Air Removal													Not Selected		
056 Condensate													Not Selected		
068 Liquid Radwaste													Not Selected		
071 Waste Gas Disposal													Not Selected		
072 Area Radiation Monitoring													Not Selected		
075 Circulating Water													Not Selected		
079 Station Air													Not Selected		
086 Fire Protection										X			A1.05 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Fire Protection System operating the controls including: FPS lineups	2.9	65
K/A Category Point Totals:	1	1	1	1	1	1	0	1	1	1	1	1	Group Point Total:		10

PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (SRO)										Form ES-401-2
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1							Not Selected			
000008 Pressurizer Vapor Space Accident / 3					X		AA2.29 Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: The effects of bubble in reactor vessel	4.2	1	
000009 Small Break LOCA / 3							Not Selected			
000011 Large Break LOCA / 3							Not Selected			
000015/17 RCP Malfunctions / 4							Not Selected			
000022 Loss of Rx Coolant Makeup / 2							Not Selected			
000025 Loss of RHR System / 4							Not Selected			
000026 Loss of Component Cooling Water / 8							Not Selected			
000027 Pressurizer Pressure Control System Malfunction / 3							Not Selected			
000029 ATWS / 1						X	2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.6	2	
000038 Steam Gen. Tube Rupture / 3							Not Selected			
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4							Not Selected			
000054 (CE/E06) Loss of Main Feedwater / 4							Not Selected			

PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (SRO)										Form ES-401-2
ES-401										
000055 Station Blackout / 6						X		EA2.06 Ability to determine or interpret the following as they apply to a Station Blackout: Faults and lockouts that must be cleared prior to re-energizing buses	4.1	3
000056 Loss of Off-site Power / 6								Not Selected		
000057 Loss of Vital AC Inst. Bus / 6								Not Selected		
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 ability to operate and monitor plant systems	3.9	4
000062 Loss of Nuclear Svc Water / 4							X	2.1.32 Ability to explain and apply system limits and precautions.	4.0	5
000065 Loss of Instrument Air / 8								Not Selected		
W/E04 LOCA Outside Containment / 3								Not Applicable		
W/E11 Loss of Emergency Coolant Recirc. / 4								Not Applicable		
BW/E04: W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4								Not Applicable		
000077 Generator Voltage and Electric Grid Disturbances / 6							X	2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	4.2	6
K/A Category Totals:						3	3	Group Point Total:		6

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Form ES-401-2

W3-2012-10-RO Written Exam Outline

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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							Not Selected						
000003 Dropped Control Rod / 1							Not Selected						
000005 Inoperable/Stuck Control Rod / 1							Not Selected						
000024 Emergency Boration / 1							Not Selected						
000028 Pressurizer Level Malfunction / 2							Not Selected						
000032 Loss of Source Range NI / 7							Not Selected						
000033 Loss of Intermediate Range NI / 7							Not Selected						
000036 (BW/A08) Fuel Handling Accident / 8						X	2.4.41 Knowledge of the emergency action level thresholds and classifications.					4.6	7
000037 Steam Generator Tube Leak / 3							Not Selected						
000051 Loss of Condenser Vacuum / 4							Not Selected						
000059 Accidental Liquid RadWaste Rel. / 9							Not Selected						
000060 Accidental Gaseous Radwaste Rel. / 9							Not Selected						
000061 ARM System Alarms / 7							Not Selected						
000067 Plant Fire On-site / 8						X	2.1.28 Knowledge of the purpose and function of major system components and controls.					4.1	8
000068 (BW/A06) Control Room Evac. / 8							Not Selected						

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (SRO)					Form ES-401-2	
000069 (W/E14) Loss of CTMT Integrity / 5						Not Selected		
000074 (W/E06&E07) Inad. Core Cooling / 4					X	EA2.07 Ability to determine or interpret the following as they apply to a Inadequate Core Cooling: The difference between a LOCA and inadequate core cooling, from trends and indicators	4.1	9
000076 High Reactor Coolant Activity / 9						Not Selected		
W/E01 & E02 Rediagnosis & SI Termination / 3						Not Applicable		
W/E13 Steam Generator Over-pressure / 4						Not Applicable		
W/E15 Containment Flooding / 5						Not Applicable		
W/E16 High Containment Radiation / 9						Not Applicable		
BW/A01 Plant Runback / 1						Not Applicable		
BW/A02&A03 Loss of NNI-XY / 7						Not Applicable		
BW/A04 Turbine Trip / 4						Not Applicable		
BW/A05 Emergency Diesel Actuation / 6						Not Applicable		
BW/A07 Flooding / 8						Not Applicable		
BW/E03 Inadequate Subcooling Margin / 4						Not Applicable		
BW/E08; W/E03 LOCA Cooledown - Depress. / 4						Not Applicable		
BW/E09; CE/A13 ; W/E09&E10 Natural Circ. / 4						Not Selected		
BW/E13&E14 EOP Rules and Enclosures						Not Applicable		
CE/A11; W/E08 RCS Overcooling - PTS / 4						Not Selected		
CE/A16 Excess RCS Leakage / 2						Not Selected		

PWR Examination Outline Plant Systems - Tier 2/Group 1 (SRO)																	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	G	K/A Topic(s)				IR	#
003 Reactor Coolant Pump												Not Selected					
004 Chemical and Volume Control												Not Selected					
005 Residual Heat Removal												Not Selected					
006 Emergency Core Cooling							X					A2.02 Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of flow path				4.3	11
007 Pressurizer Relief/Quench Tank												Not Selected					
008 Component Cooling Water												Not Selected					
010 Pressurizer Pressure Control												Not Selected					
012 Reactor Protection												Not Selected					
013 Engineered Safety Features Actuation											X	2.2.22 Knowledge of limiting conditions for operations and safety limits.				4.7	12
022 Containment Cooling												Not Selected					
025 Ice Condenser												Not Applicable					
026 Containment Spray											X	2.1.20 Ability to interpret and execute procedure steps.				4.6	13
039 Main and Reheat Steam												Not Selected					

PWR Examination Outline Plant Systems - Tier 2/Group 1 (SRO)													Form ES-401-2	
ES-401														
059 Main Feedwater													Not Selected	
061 Auxiliary/Emergency Feedwater													Not Selected	
062 AC Electrical Distribution													Not Selected	
063 DC Electrical Distribution													Not Selected	
064 Emergency Diesel Generator										X			A2.06 Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Operating unloaded, lightly loaded, and highly loaded time limit	3.3 14
073 Process Radiation Monitoring													Not Selected	
076 Service Water													Not Selected	
078 Instrument Air													Not Selected	
103 Containment											X		A2.05 Ability to (a) predict the impacts of the following malfunctions or operations on the containment system and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Emergency containment entry	3.9 15
K/A Category Point Totals:													2	3
Group Point Total:													5	

PWR Examination Outline Plant Systems - Tier 2/Group 2 (SRO)														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	G	K/A Topic(s)	IR	#
001 Control Rod Drive												Not Selected		
002 Reactor Coolant												Not Selected		
011 Pressurizer Level Control												Not Selected		
014 Rod Position Indication												Not Selected		
015 Nuclear Instrumentation											X	2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	16
016 Non-nuclear Instrumentation												Not Selected		
017 In-core Temperature Monitor												Not Selected		
027 Containment Iodine Removal												Not Selected		
028 Hydrogen Recombiner and Purge Control												Not Selected		
029 Containment Purge												Not Selected		
033 Spent Fuel Pool Cooling							X					A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal spent fuel pool water level or loss of water level	3.5	17
034 Fuel Handling Equipment				X								K4.02 Knowledge of design feature(s) and/or interlock(s) which provide for the following: Fuel movement	3.3	18

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 2 (SRO)										Form ES-401-2			
035 Steam Generator												Not Selected			
041 Steam Dump/Turbine Bypass Control												Not Selected			
045 Main Turbine Generator												Not Selected			
055 Condenser Air Removal												Not Selected			
056 Condensate												Not Selected			
068 Liquid Radwaste												Not Selected			
071 Waste Gas Disposal												Not Selected			
072 Area Radiation Monitoring												Not Selected			
075 Circulating Water												Not Selected			
079 Station Air												Not Selected			
086 Fire Protection												Not Selected			
K/A Category Point Totals:					1				1			1	Group Point Total:		3

Facility: Waterford 3		Date of Exam: October 10, 2012				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements.	3.8	66		
	2.1.3	Knowledge of shift or short-term relief turnover practices.	3.7	67		
	2.1.44	Knowledge of RO duties in the control room during fuel handling, such as responding to alarms from the fuel handling area, communication with the fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.	3.9	68		
	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.			3.9	19
	2.1.39	Knowledge of conservative decision making practices.			4.3	20
Subtotal				3		2
2. Equipment Control	2.2.6	Knowledge of the process for making changes to procedures.	3.0	69		
	2.2.13	Knowledge of tagging and clearance procedures.	4.1	70		
	2.2.44	Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.2	71		
	2.2.7	Knowledge of the process for conducting special or infrequent tests.			3.6	21
	2.2.17	Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator.			3.8	22
Subtotal				3		2

Facility: Waterford 3			Date of Exam: October 10, 2012			
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	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.	3.4	73		
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.			3.8	23
	Subtotal			2		1
4. Emergency Procedures / Plan	2.4.5	Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.	3.7	74		
	2.4.14	Knowledge of general guidelines for EOP usage.	3.8	75		
	2.4.9	Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.			4.2	24
	2.4.28	Knowledge of procedures relating to a security event (non-safeguards information).			4.1	25
Subtotal			2		2	
Tier 3 Point Total				10		7

[illegible]

Facility: <u>Waterford 3</u>	Date of Examination: <u>10/01/2012</u>
Examination Level: RO ☒ SRO ☐	Operating Test Number: <u>1</u>

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A1 Conduct of Operations K/A Importance: 3.9	R,D,P	2.1.25, Ability to interpret reference materials, such as graphs, curves, tables, etc. Complete a Shutdown Margin with an immovable CEA in accordance with OP-903-090, Shutdown Margin, section 7.3, Shutdown Margin Verification - Untrippable CEA.
A2 Conduct of Operations K/A Importance: 4.3	R,N	2.1.23, Ability to perform specific system and integrated plant procedures during all modes of plant operation. Complete a calculation for determining the amount of pure water that may be added to the Refuel Cavity without dilution to below shutdown margin requirements in accordance with OP-010-006, Outage Operations, section 9.24, Refueling Cavity Boron Concentration.
A3 Equipment Control K/A Importance: 3.7	R,D	2.2.12, Knowledge of surveillance procedures. Determine Acceptability of Containment Temperature In accordance With OP-903-001, Technical Specification Surveillance Logs, Attachments 11.1 and 11.20.
A4 Radiation Control K/A Importance: 3.8	R,D	2.3.11, Ability to control radiation releases. Evaluate Meteorological conditions for gaseous release from the Gaseous Waste Management System in accordance with OP-007-003, Gaseous Waste Management
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: <u>Waterford 3</u>	Date of Examination: <u>10/01/2012</u>
Examination Level: RO ☐ SRO ☒	Operating Test Number: <u>1</u>

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A5 Conduct of Operations K/A Importance: 4.2	R,D,P	2.1.25, Ability to interpret reference materials, such as graphs, curves, tables, etc. Review and approve a completed Shutdown Margin with an immovable CEA in accordance with OP-903-090, Shutdown Margin, section 7.3, Shutdown Margin Verification - Untrippable CEA.
A6 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. Review a completed calculation for determining the amount of pure water that may be added to the Refuel Cavity without dilution to below shutdown margin requirements in accordance with OP-010-006, Outage Operations, section 9.24, Refueling Cavity Boron Concentration.
A7 Equipment Control K/A Importance: 4.1	R,D	2.2.12, Knowledge of surveillance procedures Review a completed Containment Pressure calculation in accordance With OP-903-001, Technical Specification Surveillance Logs, Attachment 11.15, Containment Pressure Calculation.
A8 Radiation Control K/A Importance: 3.7	R,D	2.3.4, Knowledge of radiation exposure limits under normal or emergency conditions. Authorize Emergency Exposure as the Emergency Director in accordance with EP-002-030, Emergency Radiation Exposure Guidelines and Controls.
A9 Emergency Plan K/A Importance: 4.4	R,D	2.4.44, Knowledge of emergency plan protective action recommendations. Determine protective action recommendations in accordance with EP-002-052, Protective Action Guidelines.

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: <u>Waterford 3</u>		Date of Examination: <u>10/01/2012</u>	
Exam Level RO ☒ SRO-I ☐ SRO-U ☐		Operating Test No.: <u>1</u>	
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	004 Chemical and Volume Control System Secure Emergency Boration in accordance with OP-901-103, Emergency Boration. A4.07, Boration/Dilution RO – 3.9, SRO – 3.7	L,N,S	1
S2	006 Emergency Core Cooling System, Establish simultaneous hot and cold leg injection in accordance with OP-902-002, Loss of Coolant Accident Recovery. A4.07, ECCS pumps and valves	D,L,P,S	2
S3	010 Pressurizer Pressure Control System; Restore Pressurizer Heater Control in accordance with OP-902-009, Appendix 25. A4.02, PZR Heaters RO - 3.6, SRO - 3.4	L,N,S	3
S4	005 Shutdown Cooling System; Place Shutdown Cooling Train A in Service Fault: After LPSI Pump A is running, SI-405A will fail closed, requiring the operator to take immediate operator actions IAW OP-901-131, Shutdown Cooling Malfunction, to secure LPSI Pump A. A4.01 Controls and indication for RHR pumps RO – 3.6, SRO – 3.4	A,D,L,S	4P
S5	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: Turbine fails to trip. A4.01 Main steam supply. Valves RO – 2.9, SRO – 2.8	A,M,S	4S
S6	022 Containment Cooling System; Perform OP-903-037, Containment Cooling Fans Operability Verification A4.01 CCS Fans RO – 3.6, SRO – 3.6	D,S	5
S7	062 AC Electrical Distribution System; Energize 4.16 KV Safety Bus from Offsite Power following a Station Blackout in accordance with OP-902-009, Attachment 12A, 6.9 KV and 4.16 KV Non-Safety Bus Restoration and Attachment 12B, Energize 4.16 KV Safety Bus from Offsite Power. (SITE PRIORITY - PRA) A4.01 All breakers (including available switchyard) RO - 3.3, SRO -3.1	L,M,S	6
S8	012 Reactor Protection System (RPS); Reset EFAS in accordance with OP-902-009 Attachment 5-C: EFAS Reset Procedure A4.04 Bistable, trips, reset and test switches RO – 3.3, SRO - 3.3	D,EN,S	7

In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	041 Steam Dump System and Turbine Bypass Control Operate Atmospheric Dump Valve A locally in accordance with OP-901-502, Control Room Evacuation. Fault: The local pneumatic control station will not function, requiring use of the local handwheel. A4.06 Atmospheric relief valve controllers RO – 2.9, SRO – 3.1	A,D,E,L	4S
P2	005 Residual Heat Removal System (Shutdown Cooling System) Placing Shutdown Cooling Purification in Service in accordance with OP-009-005 Section 6.6. K1.04 CVCS RO-2.9, SRO 3.1 G2.1.30 RO-4.4, SRO 4.0	D,L,R	4P
P3	062 A.C. Electrical Distribution Transfer SUPS 014AB from Alternate to Normal AC Power in accordance with OP-006-005, Inverters and Distribution. Fault: After alignment, voltage will not be indicated on SUPS 014 AB inverter. A3.04 Operation of inverter RO – 2.7, SRO – 2.9	A,D,P	6
@ 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	4
(C)ontrol room			0
(D)irect from bank		$\leq 9 / \leq 8 / \leq 4$	7
(E)mergency or abnormal in-plant		$\geq 1 / \geq 1 / \geq 1$	1
(EN)gineered safety feature		- / - / ≥ 1 (control room system)	1
(L)ow-Power / Shutdown		$\geq 1 / \geq 1 / \geq 1$	7
(N)ew or (M)odified from bank including 1(A)		$\geq 2 / \geq 2 / \geq 1$	4
(P)revious 2 exams		$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	2
(R)CA		$\geq 1 / \geq 1 / \geq 1$	1
(S)imulator			8

Facility: Waterford 3		Date of Examination: 10/01/2012	
Exam Level: RO ☐ SRO-I ☒ SRO-U ☐		Operating Test No.: 1	
Control Room Systems [@] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
	System / JPM Title	Type Code*	Safety Function
S1	004 Chemical and Volume Control System Secure Emergency Boration in accordance with OP-901-103, Emergency Boration. A4.07, Boration/Dilution RO – 3.9, SRO – 3.7	L,N,S	1
S2	006 Emergency Core Cooling System, Establish simultaneous hot and cold leg injection in accordance with OP-902-002, Loss of Coolant Accident Recovery. A4.07, ECCS pumps and valves	D,L,P,S	2
S3	010 Pressurizer Pressure Control System; Restore Pressurizer Heater Control in accordance with OP-902-009 Appendix 25. A4.02, PZR Heaters RO - 3.6, SRO - 3.4	L,N,S	3
S4	005 Shutdown Cooling System; Place Shutdown Cooling Train A in Service Fault: After LPSI Pump A is running, SI-405A will fail closed, requiring the operator to take immediate operator actions IAW OP-901-131, Shutdown Cooling Malfunction, to secure LPSI Pump A. A4.01 Controls and indication for RHR pumps RO – 3.6, SRO – 3.4	A,D,L,S	4P
S5	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: Turbine fails to trip. A4.01 Main steam supply. Valves RO – 2.9, SRO – 2.8	A,M,S	4S
S6	022 Containment Cooling System; Perform OP-903-037, Containment Cooling Fans Operability Verification A4.01 CCS Fans RO – 3.6, SRO – 3.6	D,S	5
S7	062 AC Electrical Distribution System; Energize 4.16 KV Safety Bus from Offsite Power following a Station Blackout in accordance with OP-902-009, Attachment 12-A: 6.9 KV and 4.16 KV Nonsafety Bus Restoration and Attachment 12-B: Energize 4.16 KV Safety Bus from Offsite Power. (SITE PRIORITY - PRA) A4.01 All breakers (including available switchyard) RO - 3.3, SRO -3.1	L,M,S	6
S8.			

In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	041 Steam Dump System and Turbine Bypass Control Operate Atmospheric Dump Valve A locally in accordance with OP-005-004, Main Steam. Fault: The local pneumatic control station will not function, requiring use of the local handwheel. A4.06 Atmospheric relief valve controllers RO – 2.9, SRO – 3.1	A,D,E,L	4S
P2	005 Residual Heat Removal System (Shutdown Cooling System) Placing Shutdown Cooling Purification in Service in accordance with OP-009-005 Section 6.6. K1.04 CVCS RO-2.9, SRO 3.1 G2.1.30 RO-4.4, SRO 4.0	D,L,R	4P
P3	062 A.C. Electrical Distribution Transfer SUPS 014AB from Alternate to Normal AC Power in accordance with OP-006-005, Inverters and Distribution. Fault: After alignment, voltage will not be indicated on SUPS 014 AB inverter. A3.04 Operation of inverter RO – 2.7, SRO – 2.9	A,D,P	6
[@] 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	4
(C)ontrol room			0
(D)irect from bank		≤ 9 / ≤ 8 / ≤ 4	6
(E)mergency or abnormal in-plant		≥ 1 / ≥ 1 / ≥ 1	1
(EN)gineered safety feature		- / - / ≥ 1 (control room system)	-
(L)ow-Power / Shutdown		≥ 1 / ≥ 1 / ≥ 1	7
(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	1
(S)imulator			7

Facility: <u>Waterford 3</u>		Date of Examination: <u>10/01/2012</u>	
Exam Level RO ☐ SRO-I ☐ SRO-U ☒		Operating Test No.: <u>1</u>	
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	004 Chemical and Volume Control System Secure Emergency Boration in accordance with OP-901-103, Emergency Boration. A4.07, Boration/Dilution RO – 3.9, SRO – 3.7	L,N,S	1
S2			
S3			
S4			
S5			
S6			
S7.			
S8.	012 Reactor Protection System (RPS); Reset EFAS in accordance with OP-902-009 Attachment 5-C: EFAS Reset Procedure A4.04 Bistable, trips, reset and test switches RO – 3.3, SRO - 3.3	D,EN,S	7

In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	041 Steam Dump System and Turbine Bypass Control Operate Atmospheric Dump Valve B locally in accordance with OP-901-502, Control Room Evacuation. Fault: The local pneumatic control station will not function, requiring use of the local handwheel. A4.06 Atmospheric relief valve controllers RO – 2.9, SRO – 3.1	A,D,E,L	4S
P2	005 Residual Heat Removal System (Shutdown Cooling System) Placing Shutdown Cooling Purification in Service in accordance with OP-009-005 Section 6.6. K1.04 CVCS RO-2.9, SRO 3.1 G2.1.30 RO-4.4, SRO 4.0	D,L,R	4P
P3	062 A.C. Electrical Distribution Transfer SUPS 014AB from Alternate to Normal AC Power in accordance with OP-006-005, Inverters and Distribution. Fault: After alignment, voltage will not be indicated on SUPS 014 AB inverter. A3.04 Operation of inverter RO – 2.7, SRO – 2.9	A,D,P	6
@ 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 / <u>SRO-U</u>	
(A)lternate path		4-6 / 4-6 / 2-3	2
(C)ontrol room			0
(D)irect from bank		$\leq 9 / \leq 8 / \leq 4$	4
(E)mergency or abnormal in-plant		$\geq 1 / \geq 1 / \geq 1$	1
(EN)gineered safety feature		- / - / ≥ 1 (control room system)	1
(L)ow-Power / Shutdown		$\geq 1 / \geq 1 / \geq 1$	3
(N)ew or (M)odified from bank including 1(A)		$\geq 2 / \geq 2 / \geq 1$	1
(P)revious 2 exams		$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	1
(R)CA		$\geq 1 / \geq 1 / \geq 1$	1
(S)imulator			2

Facility: Waterford 3 Scenario No.: 1 Op Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: Reactor power is 100%, EOC

Turnover:

Protected Train is B, AB Busses are aligned to Train B, HPSI Pump A is OOS, maintain 100%
power

Event No.	Malf. No.	Event Type*	Event Description
1	SG04G	I – BOP I – SRO TS – SRO	Steam Generator 1 Pressure Instrument, SG-IPT-1013C, fails low requiring Technical Specification entry and bypass of multiple Plant Protection System C trip bistables.
2	RC21A	I – All	Hot Leg 1 Temperature, RC-ITI-0111X, fails low affecting PZR level setpoint. OP-901-110, Pressurizer Level Control Malfunction.
3	RC08C	C – BOP C – SRO	Reactor Coolant Pump 2A Lower Seal fails. OP-901-130, Reactor Coolant Pump Malfunction.
4	H_H08	TS – SRO	Power Dependent Insertion Limit Alarm fails ON requiring Technical Specification actions.
5	FW35B	R – ATC N – BOP N – SRO	Feedwater Heater 5B tube leak from Condensate to heater shell causing isolation of the Low Pressure heater string. OP-901-221, Secondary System Transient and OP-901-212, Rapid Plant Power Reduction to 72% power.
6	RC09C	C – ATC C – SRO	Reactor Coolant Pump 2A Middle Seal fails, requiring a manual reactor trip, and securing of Reactor Coolant Pump 2A.
7	RC11A1	M – All	Pressurizer Code Safety, RC-317A, fails open. OP-902-002, Loss of Coolant Accident Recovery. All Reactor Coolant Pumps must be secured. (Critical Task 1)
8	SI02B	C – BOP C – SRO	High Pressure Safety Injection Pump B fails to AUTO start on the Safety Injection Actuation Signal requiring a manual start. (Critical Task 2)
9	RP09D	I-ATC I-BOP	RC-606, Control Bleedoff Containment Isolation and FP-601B, Fire Water B Containment Isolation fail to auto close.
* (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. High Pressure Safety Injection Pump A is out of service and danger tagged, due to high pump bearing vibration during its quarterly IST. Since it occurred just prior to shift turnover and the AB bus is aligned to Train B, High Pressure Safety Injection Pump AB has not yet been aligned for service. The Work Management Center is working in that direction.

After taking the shift, Steam Generator 1 Pressure Instrument, SG-IPT-1013C, fails low. The SRO should review and enter Technical Specifications 3.3.1 action 2 and 3.3.2 actions 13 and 19 and direct the BOP to bypass the Steam Generator 1 Pressure Lo, Steam Generator 1 ΔP , and Steam Generator 2 ΔP trip bistables in Plant Protection System Channel C within 1 hour, in accordance with OP-009-007, Plant Protection System. The SRO should review Technical Specifications 3.3.3.5 and 3.3.3.6 and OP-903-013, Monthly Channel Checks, and determine that Technical Specification entry for 3.3.3.5 and 3.3.3.6 is not required.

After Technical Specifications are addressed, Loop 1 T_{hot} instrument, RC-ITI-0111X, fails low. This affects the Reactor Regulating System Tave calculation and the Pressurizer Level Setpoint. The SRO should enter OP-901-110, Pressurizer Level Control Malfunction and implement Section E2, Pressurizer Level Setpoint Malfunction. The crew should take manual control of Pressurizer Level, select the non-faulted T_{hot} instrument (Loop 2) in both Reactor Regulating System cabinets, verify normal setpoint is restored and restore Pressurizer Level Control to Auto after returning Pressurizer Level to setpoint.

After the crew addresses the T_{hot} instrument failure, Reactor Coolant Pump 2A Lower Seal fails. The crew should enter OP-901-130, Reactor Coolant Pump Malfunction and implement Section E1, Seal Failure.

After the crew is in Section E1 of OP-901-130 AND the BOP has adjusted Component Cooling Water Temperature, Annunciator H-8 on Panel H, Power Dependent Insertion Limit, fails ON. The crew should determine that no Control Element Assemblies are below the Transient Insertion Limits and declare the alarm inoperable. The SRO should review Technical Specification 3.1.3.6 and determine that the surveillance interval for Technical Specification Surveillance 4.1.3.6 has changed from every 12 hours to every 4 hours with the alarm inoperable.

Once the SRO has addressed Technical Specifications, a tube leak occurs in Feedwater Heater 5B, causing Condensate flow to isolate through Low Pressure Feedwater Heaters 5B and 6B. The crew should enter OP-901-221, Secondary System Transient, and implement Section E1, Loss of Feedwater Preheating. This also requires a power reduction to < 72% power using OP-901-212, Rapid Plant Power Reduction.

After the reactivity manipulation is satisfied, Reactor Coolant Pump 2A Middle Seal fails. The crew should trip the reactor, implement OP-902-000, Standard Post Trip Actions AND secure Reactor Coolant Pump 2A.

After Reactor Coolant Pump 2A is secured, Pressurizer Code Safety, RC-317A, fails open. The crew should return to diagnostics and diagnose to OP-902-002, Loss of Coolant Accident Recovery. The crew should secure an additional Reactor Coolant Pump in the opposite loop (preferably 1A) when RCS Pressure lowers to < 1621 PSIA and secure all Reactor Coolant Pumps when Reactor Coolant System pressure no longer supports operation as indicated by pump vibration alarms or within 3 minutes of the Containment Spray Actuation (**CRITICAL TASK 1**).

Scenario Event Description

NRC Scenario 1

When Safety Injection occurs, either manually or automatically, High Pressure Safety Injection Pump B fails to Auto Start. The BOP should manually start High Pressure Safety Injection Pump B (**CRITICAL TASK 2**). RC-606, Controlled Bleedoff Containment Isolation and FP-601B, Fire Water B Containment Isolation fail to auto close on the Containment Isolation Actuation Signal. The ATC should close RC-606 and the BOP should close FP-601B.

The scenario can be terminated after the crew starts a cooldown or at the examiner's discretion.

CRITICAL TASKS**1. TRIP ANY RCP NOT SATISFYING RCP OPERATING LIMITS**

This task is satisfied by securing all RCPs when implementing procedural step 8 OP-902-002 or within 3 minutes of loss of Component Cooling Water flow whichever occurs first. This task becomes applicable after either running Reactor Coolant Pump Vibration alarms actuate OR Containment Spray is initiated. The vibration alarms indicate the possibility for additional Reactor Coolant System pressure boundary degradation through the Reactor Coolant Pumps. The time requirement of 3 minutes is based on the Reactor Coolant Pump operating limit of 3 minutes without CCW cooling.

2. ESTABLISH RCS INVENTORY CONTROL

This task is satisfied by starting High Pressure Safety Injection Pump B to establish Reactor Coolant System inventory control before exiting the step to verify Safety Injection Actuation Signal Actuation in OP-902-002 (Step 7). This task becomes applicable following the initiation of a Safety Injection Actuation Signal.

Scenario Quantitative Attributes

1. Total malfunctions (5–8)	9
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)	2

SCENARIO SETUP

- A. Reset Simulator to IC-191.
- B. Verify Scenario Malfunctions are loaded, as listed in the Scenario Timeline.
- C. Verify the following Remotes and Overrides:
 - 1. SIR29, HPSI PUMP A – RACKOUT
 - 2. SIR24, SI-203A_SI-208A HPSI PUMP A SUCT/DISCH ISOL VLVS - CLOSE
- D. Verify HPSI Pump A Control Switch (C/S) in OFF and place Danger Tag on C/S.
- E. Ensure Protected Train B sign is placed in SM office window.
- F. Verify EOOS is 8.7 Yellow
- G. Ensure the Log Printer Toggle Switch on the rear of the printer is in the UP position.
- H. Complete the simulator setup checklist.
- I. Start Insight, open file PlantParameters.tis.

SIMULATOR BOOTH INSTRUCTIONS

Event 1 Steam Generator Pressure Instrument, SG-IPT-1013C, Fails Low

1. On Lead Examiner's cue, initiate Event **Trigger 1**.
2. If Work Week Manager or PMI are 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 all S/G 1 Pressures read ~ 800 PSIA.

Event 2 Hot Leg 1 Temperature, RC-ITI-0111X, Fails Low

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

Event 3 RCP 2A Lower Seal Fails

1. On Lead Examiner's cue, initiate Event **Trigger 3**.
2. If the Duty Engineering or RCP Engineer is called inform the caller that you will monitor RCP 2A for further degradation.
3. If the Work Week Manager or PMM are called, inform the caller that a work package will be assembled for the next forced outage.

Event 4 Power Dependent Insertion Limit Alarm fails ON

1. On Lead Examiner's cue, initiate Event **Trigger 4**.
2. If Work Week Manager, Computer Technician, or PMI are called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 5 Feedwater Heater 5B Tube Leak, Rapid Plant Power Reduction

1. On Lead Examiner's cue, initiate Event **Trigger 5**.
2. If called to verify Low Pressure Heater levels, verify levels using the PMC and report levels to the Control Room.
3. If called to verify position of the Normal and Alternate Control Valves, verify valve positions using the PMC and report the position of the valves to the Control Room.
4. If requested to monitor Polisher Vessel D/P and remove as necessary, acknowledge the report.
5. If Work Week Manager or PMM are called, inform the caller that a work package will be assembled.
6. If Chemistry is called to sample the RCS for Dose Equivalent Iodine due to the down power, acknowledge and report that samples will be taken 2-6 hours from notification time and if asked tell the caller your name is Joe Chemist.

Event 6 RCP 2A Middle Seal Fails

1. After the reactivity manipulation is satisfied and on lead examiner's cue, initiate Event **Trigger 6**.
2. If the Duty Engineering or RCP Engineer is called inform the caller that you will monitor RCP 2A for further degradation.
3. If the Work Week Manager or PMM are called, inform the caller that a work package will be assembled.

Event 7-9 Pressurizer Code Safety, RC-317A, Fails Open, High Pressure Safety Injection Pump B Fails To AUTO Start/RC-606 and FP-601B Fail to Auto Close

NRC Scenario 1

1. After the crew secures RCP 2A and on Lead Examiner's cue, initiate Event **Trigger 7**.
2. If the Duty Plant Manager is called, inform the caller that you will make the necessary calls.
3. If Chemistry is called to perform samples acknowledge the request.
4. **At the end of the scenario, before resetting, end data collection and save the file as 2012 Scenario 1-(start-end time).tid.** Export to .csv file. Save the file into the folder for the appropriate crew

SCENARIO TIMELINE

EVENT	KEY	DESCRIPTION	TRIGGER	DELAY HH:MM:SS	RAMP HH:MM:SS	FINAL
EVENT DESCRIPTION						
1	SG04G	MS LINE IPT-1013C FAIL (0-100%) SG 1 PRESSURE INSTRUMENT SG-IPT-1013C FAILS LOW	1	00:00:00	00:00:00	0%
2	RC21A	RCS HOT LEG 1 CONTROL TT 111X FAILS (0-100%) HOT LEG 1 TEMPERATURE FAILS LOW	2	00:00:00	00:00:00	0%
3	RC08C	RCP 2A LOWER SEAL FAILURE (0-100%) RCP 2A LOWER SEAL FAILS	3	00:00:00	00:00:00	100%
4	H_H08	POWER DEPENDENT INSERTION LIMIT POWER DEPENDENT INSERTION LIMIT ALARM FAILS ON	4	00:00:00	00:00:00	FAIL ON
5	FW35B	LP FW HEATER 5B TUBE LEAK (100% = 10% OF TUBES) FW HTR 5B TUBE LEAK FROM CONDENSATE TO HEATER SHELL, RAPID DOWN POWER TO < 72% POWER	5	00:00:00	00:00:30	15%
6	RC09C	RCP 2A MIDDLE SEAL FAILURE (0-100%) RCP 2A MIDDLE SEAL FAILS	6	00:00:00	00:00:00	100%
7	RC11A1	CODE SAFETY RC-317A FAIL OPEN PRESSURIZER CODE SAFETY, RC-317A, FAILS OPEN,	7	00:00:00	00:00:00	ACTIVE
8	SI02B	HPSI PUMP B FAILS TO AUTO START HIGH PRESSURE SAFETY INJECTION PUMP B FAILS TO AUTO START	N/A	00:00:00	00:00:00	ACTIVE
9	RP09D	RELAY K202 FAILED, CIAS TRAINN B (CVC/RC/FP) RC-606, CONTROL BLEEDOFF CONTAINMENT ISOLATION AND FP-601B, FIRE WATER B CONTAINMENT ISOLATION FAIL TO AUTO CLOSE	NA	00:00:00	00:00:00	ACTIVE

REFERENCES

Event	Procedures
1	OP-009-007, Plant Protection System, Rev. 15 OP-903-013, Monthly Channel Checks, Rev. 16 Technical Specification 3.3.1 Technical Specification 3.3.2 Technical Specification 3.3.3.5 Technical Specification 3.3.3.6
2	OP-901-110, Pressurizer Level Control Malfunction, Rev. 6 OP-901-501, PMC or Core Operating Limits Supervisory System Malfunction, Rev. 12
3	OP-901-130, Reactor Coolant Pump Malfunction, Rev. 7
4	OP-500-008, Annunciator Response Procedure, Control Room Panel H, Att. 4.78, Rev. 26 OP-901-501, PMC or Core Operating Limits Supervisory System Malfunction, Rev. 12 Technical Specification 3/4.1.3.6
5	OP-901-221, Secondary System Transient, Rev. 0 OP-901-212, Rapid Plant Power Reduction, Rev. 4
6	OP-901-130, Reactor Coolant Pump Malfunction, Rev. 7 OP-902-000, Standard Post Trip Actions, Rev. 13 OP-902-009, Standard Appendices, Rev. 307, Appendix 1, Diagnostic Flow Chart
7	OP-902-002, Loss of Coolant Accident Recovery Procedure, Rev. 14 OP-902-009, Standard Appendices, Rev. 307, Appendix 2, Figures OP-902-009, Standard Appendices, Rev. 307, Appendix 1, Diagnostic Flow Chart
8	OP-902-000, Standard Post Trip Actions, Rev. 13 OI-038-000, Emergency Operating Procedures Operations Expectation/Guidance, Rev. 5
9	OP-902-000, Standard Post Trip Actions, Rev. 13 OI-038-000, Emergency Operating Procedures Operations Expectation/Guidance, Rev. 5

Facility: Waterford 3 Scenario No.: 2 Op Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: Reactor power is 60%, MOC

Turnover:

Protected Train is B, AB Bus is aligned to Train B, HPSI Pump A is OOS

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – ATC N – BOP N – SRO	Lower power to 50% in accordance with OP-010-005, Plant Shutdown.
2	CV30A2	C – ATC C – SRO	Letdown Flow Control Valve, CVC-113A, fails closed requiring entry into OP-901-112, Charging or Letdown Malfunction.
3	CC01A	C – BOP C – SRO TS – SRO	Component Cooling Water Pump A trips requiring entry into OP-901-510, Component Cooling Water System Malfunction.
4	NI01H	I – BOP I – SRO TS – SRO	Channel D Excore Nuclear Instrument Safety Channel, ENI-IJI-0001D, middle detector fails low.
5	MS13A	M – All	Main Steam line break outside Containment, SG 1, OP-902-004, Excess Steam Demand Recovery. (Critical Task 1 and 2)
6	RP08G	C-BOP C-SRO	Main Feedwater Isolation Valve Steam Generator 1, FW-184A fails to AUTO close on MSIS.
7	CC12E2	I-ATC I-SRO	Component Cooling Water Surge Tank Level Switch, CC-ILS-7013A, fails low, isolating Component Cooling Water to the Reactor Coolant Pumps, requiring the ATC to secure all running Reactor Coolant Pumps. (Critical Task 3)

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

Scenario Event Description

NRC Scenario 2

The crew assumes the shift at ~ 60% power with instructions to lower power to ~ 50% in accordance with OP-010-005, Plant Shutdown, and remove Main Feedwater Pump B from service. The plant is at 60% due to rising vibration on Main Feedwater Pump B at > 80% power. The System Engineer reports pump vibration monitoring indicates a possible impeller imbalance. High Pressure Safety Injection Pump A is out of service and danger tagged, due to high pump bearing vibration during its quarterly IST. Since it occurred just prior to shift turnover and the AB bus is aligned to Train B, High Pressure Safety Injection Pump AB has not yet been aligned for service. The Work Management Center is working in that direction.

After the reactivity manipulation is satisfied, the in-service letdown flow control valve, CVC-113A, fails closed. The SRO should enter OP-901-112, Charging or Letdown Malfunction and implement Section E2, Letdown Malfunction, and place the backup flow control valve, CVC-113B, in-service.

After the backup letdown flow control valve has been placed in service, Component Cooling Water Pump A trips on overcurrent. The SRO should enter OP-901-510, Component Cooling Water System Malfunction, and direct the start of Component Cooling Water Pump AB to replace Component Cooling Water Pump A. The SRO should enter Technical Specification 3.7.3, TRM 3.7.3, and cascading Technical Specifications per OP-100-014, Technical Specification and Technical Requirements Compliance.

After Component Cooling Water Pump AB is running and the SRO has reviewed Technical Specifications (or at examiner discretion), Channel D Safety Excore Nuclear Instrument Middle Detector fails low resulting in DNBR and LPD Trips on Plant Protection System Channel D and Startup Channel 1 energizes. The SRO should direct Startup Channel 1 be de-energized by placing the High Volts Selector switch in the Startup Channel 1 drawer to PRIMARY. The SRO should review Technical Specification 3.3.1 and Table 3.3-1 and determine that Action 2 should be entered for Functional Units of Linear Power, DNBR – Low, Local Power Density - High, and the Core Protection Calculator. The SRO should direct that at a minimum Linear Power, DNBR – Low, and Local Power Density – High trip bistables be bypassed in Channel D. Additionally the Logarithmic Power – High channel is also inoperable but the Technical Specification does not apply in MODE 1. However, the SRO may elect to place the Logarithmic Power – High Bistable in bypass as a conservative measure because this action would be applicable within 1 hour following a reactor trip or shutdown. The SRO should review OP-903-013, Monthly Channel Checks and Technical Specifications 3.3.3.5 and 3.3.3.6 and determine that Technical Specification 3.3.3.6, action 29 should be entered.

After the trip bistables in Plant Protection System Channel D are bypassed, a Main Steam line break outside Containment occurs on Main Steam Line 1, resulting in a reactor trip, Safety Injection Actuation Signal (SIAS), Containment Isolation Actuation Signal (CIAS) and Main Steam Isolation Signal (MSIS). FW-184A, Feedwater Isolation Valve A fails to close automatically on the MSIS requiring the BOP to manually close the valve. The SRO should diagnose to OP-902-004, Excess Steam Demand Recovery Procedure. The crew should take action to stabilize Reactor Coolant System temperature (**CRITICAL TASK 1**) and pressure (**CRITICAL TASK 2**) when Reactor Coolant System pressure AND Core Exit Thermocouple temperatures start to rise.

During the implementation of OP-902-004, CC-ILS-7013A, Component Cooling Water Surge Tank Level Switch fails low isolating Component Cooling Water to the Reactor Coolant Pumps. The ATC should secure all running Reactor Coolant Pumps within 3 minutes (**CRITICAL TASK 3**). The SRO may refer to OP-901-510, Component Cooling Water System Malfunction, Attachment 1, CCW Surge Tank Level Switch Failures to verify the failed instrument.

The scenario can be terminated after the crew secures all running Reactor Coolant Pumps or at the lead examiner's discretion.

CRITICAL TASKS**3. ESTABLISH REACTOR COOLANT SYSTEM TEMPERATURE CONTROL**

This task is satisfied by taking action to stabilize Reactor Coolant System temperature within the limits of the Reactor Coolant System Pressure/Temperature Limits curve using Atmospheric Dump Valve 2 and establishing EFW flow to Steam Generator 2. Action to address this task should prevent lifting a Pressurizer safety (2500 psia) or Steam Generator safety (1070 psig).

4. ESTABLISH REACTOR COOLANT SYSTEM PRESSURE CONTROL

This task is satisfied by taking action to stabilize RCS pressure within the limits of the Reactor Coolant System P/T curve and additionally maintain Reactor Coolant System pressure within 1500-1600 psid of the faulted steam generator. Action to address this task shall prevent lowering Subcooled Margin to < 28°F.

5. TRIP ANY REACTOR COOLANT PUMP NOT SATISFYING REACTOR COOLANT PUMP OPERATING LIMITS

This task is satisfied by securing all running Reactor Coolant Pumps within 3 minutes of loss of Component Cooling Water flow. This task becomes applicable after CC-ILS-7013A fails. The time requirement of 3 minutes is based on the Reactor Coolant Pump operating limit of 3 minutes without Component Cooling Water cooling.

Scenario Quantitative Attributes

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

SCENARIO SETUP

- J. Reset Simulator to IC-192.
- K. Verify Scenario Malfunctions are loaded, as listed in the Scenario Timeline.
- L. Verify the following Remotes and Overrides:
 - 1. SIR29, HPSI PUMP A – RACKOUT
 - 2. SIR24, SI-203A_SI-208A HPSI PUMP A SUCT/DISCH ISOL VLVS - CLOSE
- M. Verify HPSI Pump A Control Switch (C/S) is in OFF and place Danger Tag on C/S.
- N. Verify Startup Channel 1 High Volt Selector Switch is in ALTERNATE.
- O. Ensure Protected Train B sign is placed in SM office window.
- P. Verify EOOS is 8.7 Color Yellow with HPSI Pump A OOS.
- Q. Ensure gloves are available for using the simulator ladder.
- R. Complete the simulator setup checklist.
- S. Start Insight, select file PlantParameters.tis.

SIMULATOR BOOTH INSTRUCTIONS

Event 1 Power Reduction to 50%

4. If contacted to place Feedwater Pump B Local Governor Control in manual, insert Remote FWR88 to MANUAL.

Event 2 Letdown Flow Control Valve, CVC-113A, Fails Closed

3. On Lead Examiner's cue, initiate Event **Trigger 1**.
4. If Work Week Manager or PMM are called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
5. If contacted to place the alternate letdown flow control valve in service Run CAEP file **OP-901-112 Local Operator Actions\Placing Alternate LDFCV in Service.sch**.

Event 3 Component Cooling Water Pump A Trips

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

Event 4 Safety Channel D Excore Nuclear Instrument, ENI-IJI-0001D, Middle Detector Fails Low

7. On Lead Examiner's cue, initiate Event **Trigger 3**.
8. If Work Week Manager or PMI are called, inform the caller that a work package will be assembled.
9. If requested to verify Log Channel readings at LCP-43, report that Log Channel D is pegged low; all other channels are reading normally.

Event 5/6 Main Steam Line Break Outside Containment, SG 1/Main Feedwater Isolation Valve Fails to Auto Close

4. On Lead Examiner's cue, initiate Event **Trigger 4**.
5. If called as a Nuclear Auxiliary Operator to verify break location, inform the caller that a large amount of steam is issuing from the MSIV Area on the West Side of the RAB and it does not appear to be coming from a Secondary Safety or Atmospheric Dump Valve.
6. If Chemistry is called to perform samples acknowledge the request.

Event 7 Component Cooling Water Surge Tank Level Switch, CC-ILS-7013A, Fails Low

5. On Lead Examiner's cue, initiate Event **Trigger 5**.
6. **At the end of the scenario, before resetting, complete data collection by saving the file as 2012 Scenario 2-(start-end time).tid. Export to .csv file. Save the file into the folder for the appropriate crew.**

SCENARIO TIMELINE

EVENT	KEY	DESCRIPTION	TRIGGER	DELAY HH:MM:S	RAMP HH:MM:S	FINAL
EVENT DESCRIPTION						
1	N/A	N/A	N/A	N/A	N/A	N/A
DOWNPOWER FROM 60% TO 50%						
2	CV30A2	LTDN FLOW CONTROL VALVE CVC-113A FAILS CLOSED	1	00:00:00	00:00:00	ACTIV E
LETDOWN FLOW CONTROL VALVE, CVC-113A, FAILS CLOSED						
3	CC01A	CCW PUMP A TRIP	2	00:00:00	00:00:00	ACTIV E
COMPONENT COOLING WATER PUMP A TRIPS						
4	NI01H	MIDDLE DETECTOR (D2) SAFETY CHANNEL D FAIL (0-100%)	3	00:00:00	00:00:00	0
CHANNEL D EXCORE NUCLEAR INSTRUMENT SAFETY CHANNEL, ENI-IJI-0001D, MIDDLE DETECTOR FAILS LOW						
5	MS13A	MS A BREAK OUTSIDE CNTMT BEFORE MSIV (0-100%)	4	00:00:00	00:03:00	10
MAIN STEAM LINE BREAK OUTSIDE CONTAINMENT , SG 1						
6	RP08G	RELAY K305 FAILED, MSIS TRAIN A (MS/FW)	N/A	00:00:00	00:00:00	ACTIV E
MAIN FEEDWATER ISOLATION VALVE STEAM GENERATOR 1, FW-184A FAILS TO AUTO CLOSE ON MSIS						
7	CC12E2	CCW SURGE TNK LVL 7013AS FAILS LO	5	00:00:00	00:00:00	ACTIV E
COMPONENT COOLING WATER SURGE TANK LEVEL SWITCH, CC-ILS-7013A, FAILS LOW						

EVENT	KEY	DESCRIPTION	TRIGGER	DELAY HH:MM:S	RAMP HH:MM:S	FINAL
EVENT DESCRIPTION						

REFERENCES

Event	Procedures
1	OP-010-005, Plant Shutdown, Rev. 317 (Copy with applicable steps marked up through Step 9.1.16) OP-002-005, Chemical and Volume Control, Rev. 36, Section 6.7, Direct Boration OP-005-007, Main Turbine and Generator, Rev. 301, Section 6.2, Main Turbine and Generator Operation
2	OP-901-112, Charging or Letdown Malfunction, Rev. 4
3	OP-901-510, Component Cooling Water System Malfunction, Rev. 301 Technical Specification 3.7.3 Technical Requirement 3.7.3 OP-100-014, Technical Specification and Technical Requirement Compliance, Rev. 317
4	OP-009-007, Plant Protection System, Rev. 15 OP-903-013, Monthly Channel Checks, Rev. 16 Technical Specification 3.3.1 Technical Specification 3.3.3.5 Technical Specification 3.3.3.6
5	OP-901-103, Emergency Boration, Rev. 2 OP-902-000, Standard Post Trip Actions, Rev. 13 OP-902-004, Excess Steam Demand Recovery Procedure, Rev. 12 OP-902-009, Standard Appendices, Rev. 307, Appendix 1, Diagnostic Flow Chart, and Appendix 13, Stabilize RCS Temperature
6	OP-902-004, Excess Steam Demand Recovery Procedure, Rev. 12 OP-902-009, Standard Appendices, Rev. 307, Appendix 2, Figures
7	OP-901-510, Component Cooling Water System Malfunction, Rev. 301

Facility: Waterford Scenario No.: 3 Op Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: ~ 4% Reactor Power, MOC

Turnover:

Protected Train is B, AB Bus is aligned to Train B, Raise power to ~ 10% to roll the Main Turbine

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – ATC N – BOP N – SRO	Secure the Auxiliary Feedwater Pump and raise power to 10% to roll the Main Turbine in accordance with OP-010-003, Plant Startup and OP-010-004, Power Operations.
2	CH08E1	I – BOP I – SRO TS – SRO	Plant Protection System Channel D Containment Pressure (CIAS), CB-IPI-6701SMD, fails high requiring Technical Specification entry and bypass of channel trip bistables.
3	CV01B	C – ATC C – SRO TS – SRO	Charging Pump B trips on overcurrent requiring implementation of OP-901-112, Charging or Letdown Malfunction.
4	FW20A2	C – BOP C – SRO	Startup Feedwater Regulating Valve 1 fails closed requiring implementation of OP-901-201, Feedwater Control Malfunction
5	RC23A L_L10 L_M10	M – All	Large RCS Cold Leg break requiring implementation of OP-902-000, Standard Post Trip Actions and OP-902-002, Loss of Coolant Accident Recovery Procedure.
6	RP05A3 RP05B3 RP05C3 RP05D3	I – ATC I – SRO	Containment Spray fails to AUTO Actuate requiring manual actuation. (Critical Task 1 and 2)
7	MS11B	M – All	Main Steam Line 2 Break Inside Containment requiring entry into OP-902-008, Functional Recovery Procedure.
8	CS01A	C – BOP C – SRO	Containment Spray Pump A trips requiring action to close CS-125A.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario Event Description

NRC Scenario 3

The crew assumes the shift at ~ 4% power with instructions to raise power to 10% to roll the Main Turbine. All requirements have been met to change modes from MODE 2 to MODE 1. The Shift Manager has given permission to change modes. The SRO should direct raising power using Control Element Assemblies and/or dilution in accordance with OP-010-003, Plant Startup and OP-010-004, Power Operations.

After the reactivity manipulation has been satisfied, CB-IPI-6701SMD, Containment Pressure (CIAS) fails high. The SRO should review Technical Specifications 3.3.1 and 3.3.2. Per Table 3.3-1 under Containment Pressure – High (Functional Unit 6) the SRO should enter Technical Specification 3.3.1 action 2. Per Table 3.3-3 under Functional Units 1b (Safety Injection, Containment Pressure-High), 3b (Containment Isolation, Containment Pressure-High), and 4c (Main Steam Line Isolation, Containment Pressure High) the SRO should enter Tech 3.3.2 action 13. The SRO should direct the BOP to bypass the Containment Pressure High (RPS) and Containment Pressure High (ESF) trip bistables in PPS Channel D within 1 hour. The BOP should bypass the trip bistables in accordance with OP-009-007, Plant Protection System.

After the trip bistables have been placed in bypass, Charging Pump B trips on overcurrent. The SRO should implement OP-901-112, Charging or Letdown Malfunction, Section E1, Charging Malfunction. The SRO should direct the ATC to start a standby charging pump after verifying a suction path available or isolate Letdown using CVC-101, Letdown Stop Valve. If Letdown is isolated, Charging and Letdown will be re-initiated using Attachment 2 of OP-901-112. The SRO should review and enter Technical Specification 3.1.2.4 and Technical Requirement Manual 3.1.2.4. Technical Specification 3.1.2.4 may be exited after aligning Charging Pump AB to replace Charging Pump B. However, Technical Requirement Manual 3.1.2.4 should not be exited while Charging Pump B remains inoperable.

After Charging and Letdown are re-established, FW-166A, Startup Feedwater Regulating Valve 1 fails closed. The SRO should direct the BOP to match Feed and Steam Flows to SG 1 by manually throttling open FW-173A, Feedwater Regulating Valve 1. The SRO should implement OP-901-201, Steam Generator Level Control Malfunction, Attachment 1, General Actions.

After the BOP has control of SG 1 level, an RCS leak occurs on RCS Cold Leg 1A that progresses rapidly to a Large Break Loss of Coolant Accident. A Seismic Event Annunciator will come in at the time of the break. When Containment Pressure exceeds the Containment Spray (CSAS) setpoint, Containment Spray fails to actuate. The ATC should manually initiate Containment Spray (**CRITICAL TASK 1**) and secure any running Reactor Coolant Pumps (**CRITICAL TASK 2**). The SRO should implement OP-902-000, Standard Post Trip Actions and diagnose to OP-902-002, Loss of Coolant Accident Recovery Procedure.

After the crew diagnoses to OP-902-002, Main Steam Line 2 breaks inside Containment. Containment Spray Pump A will trip on overcurrent. The SRO should either go to OP-902-009 Appendix 1, Diagnostics Flowchart and diagnose to OP-902-008, Functional Recovery OR go directly to the procedure based on two events in progress per OP-100-017, Emergency Operating Procedures Implementation Guide. When the SRO performs prioritization Containment Isolation (CI-1) should be the highest priority. (**CRITICAL TASK 3**)

The scenario can be terminated after the CRS has performed prioritization of Safety Functions and implements the first success path or at the lead examiner's discretion.

CRITICAL TASKS**6. ESTABLISH CONTAINMENT TEMPERATURE AND PRESSURE CONTROL**

This task is satisfied by manually initiating Containment Spray Actuation Signal prior to exiting OP-902-000, Standard Post Trip Actions or Containment pressure exceeds 44 PSIG. This task becomes applicable after Containment Pressure rises above 17.7 PSIA. OP-902-000, Standard Post Trip Actions, directs this activity to satisfy the Containment Pressure and Temperature Control safety function.

7. TRIP ANY RCP NOT SATISFYING RCP OPERATING LIMITS

This task is satisfied by securing all RCPs within 3 minutes of loss of Component Cooling Water flow. This task becomes applicable after Containment Spray is initiated. The time requirement of 3 minutes is based on the Reactor Coolant Pump operating limit of 3 minutes without Component Cooling Water cooling.

8. ESTABLISH CONTAINMENT ISOLATION

This task is satisfied by prioritizing CI-1 as Priority 1 after performing Step 11 of OP-902-008, Functional Recovery. This task becomes applicable after the Main Steam Line Break occurs.

Scenario Quantitative Attributes

15. Total malfunctions (5–8)	7
16. Malfunctions after EOP entry (1–2)	3
17. Abnormal events (2–4)	2
18. Major transients (1–2)	2
19. EOPs entered/requiring substantive actions (1–2)	1
20. EOP contingencies requiring substantive actions (0–2)	1
21. Critical tasks (2–3)	3

SCENARIO SETUP

- T. Reset Simulator to IC-193.
- U. Verify Scenario Malfunctions are loaded, as listed in the Scenario Timeline.
- V. Ensure Protected Train B sign is placed in SM office window.
- W. Verify PMC is set to MODE 2.
- X. Verify EOOS is 10.0 Green
- Y. Complete the simulator setup checklist.
- Z. Start Insight, select file PlantParameters.tis.

SIMULATOR BOOTH INSTRUCTIONS

Event 1 Raise Power To 10% To Roll The Main Turbine

5. If requested to verify a charging pump is ready for a start acknowledge the request but do not report back that the charging pump is ready for a start until after event 3 is triggered.

Event 2 Containment Pressure PPS Channel D (CIAS) CB-IPI-6701SMD Fails High

6. On Lead Examiner's cue, initiate Event **Trigger 1**.
7. If Work Week Manager or PMI are called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 3 Charging Pump B Trips On Instantaneous Overcurrent

5. On Lead Examiner's cue, initiate Event **Trigger 2**.
6. If Work Week Manager or PME are called, inform the caller that a work package will be assembled.
7. If called as an NAO to investigate the trip at the breaker, report overcurrent flags on all 3 phases.
8. If called as an NAO to investigate the trip at the pump, report that the paint on the motor is discolored and there is a strong odor of burnt insulation, but no fire.

Event 4 Startup Feedwater Regulating Valve 1 Fails Closed

10. On Lead Examiner's cue, initiate Event **Trigger 3**.
11. If Work Week Manager or PMM are called, inform the caller that a work package will be assembled.

Event 5/6 Large RCS Cold Leg break), Containment Spray Fails to AUTO Actuate

7. On Lead Examiner's cue, initiate Event **Trigger 4**.
8. If the Duty Plant Manager is called, inform the caller that you will make the necessary calls.
9. If Chemistry is called to perform samples acknowledge the request.

Event 7/8 Main Steam Line 2 Break Inside Containment/Containment Spray Pump A Trips

7. On Lead Examiner's cue, initiate Event **Trigger 5**.
8. If the Duty Plant Manager is called, inform the caller that you will make the necessary calls.
9. If Chemistry is called to perform samples acknowledge the request.
10. If called as an NAO to investigate the trip at the breaker, report overcurrent flags on all 3 phases.
11. If called as an NAO to investigate the trip at the pump, report that the paint on the motor is discolored and there is a strong odor of burnt insulation, but no fire.
12. **At the end of the scenario, before resetting, complete data collection by saving the file as 2012 Scenario 3-(start-end time).tid. Export to .csv file. Save the file into the folder for the appropriate crew.**

SCENARIO TIMELINE

EVENT	KEY	DESCRIPTION	TRIGGER	DELAY HH:MM:S	RAMP HH:MM:S	FINAL
EVENT DESCRIPTION						
1	N/A	N/A	N/A	N/A	N/A	N/A
RAISE POWER TO 20% TO ROLL THE MAIN TURBINE						
2	CH08E1	CNTMT PRESS TRANSMITTER 6701 SMD FAILS HI	1	00:00:00	00:00:00	ACTIVE
CONTAINMENT PRESSURE PPS CHANNEL D (CIAS) CB-IPI-6701 SMD FAILS HIGH						
3	CV01B	CHARGING PUMP B TRIPPED	2	00:00:00	00:00:00	ACTIVE
CHARGING PUMP B TRIPS ON INSTANTANEOUS OVERCURRENT						
4	FW20A2	SU FW REG. VALVE A FAILS CLOSED	3	00:00:00	00:00:00	ACTIVE
STARTUP FEEDWATER REGULATING VALVE 1 FAILS CLOSED						
5	RC23A	RCS COLD LEG 1A RUPTURE	4	00:02:00	00:00:00	14%
LARGE RCS COLD LEG BREAK						
5	L_L10	SEISMIC RECORDERS IN OPERATION (Delete after 30 Seconds)	4	00:00:00	00:00:00	FAIL_O N
LARGE RCS COLD LEG BREAK						
5	L_M10	SEISMIC EVENT	4	00:00:00	00:00:00	FAIL_O N
LARGE RCS COLD LEG BREAK						
6	RP05A3	FAILS TO TRIP CH A HI-HI CONT. PRESS (CSAS)	N/A	00:00:00	00:00:00	ACTIVE
CONTAINMENT SPRAY FAILS TO AUTO ACTUATE						
6	RP05B3	FAILS TO TRIP CH B HI-HI CONT. PRESS (CSAS)	N/A	00:00:00	00:00:00	ACTIVE
CONTAINMENT SPRAY FAILS TO AUTO ACTUATE						
6	RP05C3	FAILS TO TRIP CH C HI-HI CONT. PRESS (CSAS)	N/A	00:00:00	00:00:00	ACTIVE
CONTAINMENT SPRAY FAILS TO AUTO ACTUATE						

EVENT	KEY	DESCRIPTION	TRIGGER	DELAY HH:MM:S	RAMP HH:MM:S	FINAL
EVENT DESCRIPTION						
6	RP05D3	FAILS TO TRIP CH D HI-HI CONT. PRESS (CSAS) CONTAINMENT SPRAY FAILS TO AUTO ACTUATE	N/A	00:00:00	00:00:00	ACTIVE
7	MS11B	MS LINE B BREAK INSIDE CNTMT (0-100% = 40 IN) MAIN STEAM LINE 2 BREAK INSIDE CONTAINMENT	5	00:00:00	00:00:00	10
8	CS01A	LOSS OF CONTAINMENT SPRAY PUMP A CONTAINMENT SPRAY PUMP A TRIPS	5	00:00:00	00:00:00	ACTIVE

REFERENCES

Event	Procedures
1	OP-010-003, Plant Startup, Rev. 324 (Copy marked up through Step 9.4.61) OP-010-004, Power Operations, Rev. 315 OP-002-005, Chemical and Volume Control, Rev. 37
2	OP-009-007, Plant Protection System, Rev. 15 OP-903-013, Monthly Channel Checks, Rev. 16 Technical Specification 3.3.1 Technical Specification 3.3.2
3	OP-901-112, Charging or Letdown Malfunction, Rev. 4 Technical Specification 3.1.2.4 Technical Requirement 3.1.2.4
4	OP-901-201, Steam Generator Level Control Malfunction, Rev. 5
5	OP-902-000, Standard Post Trip Actions, Rev. 13 OP-902-002, Loss of Coolant Accident Recovery Procedure, Rev. 14 OP-902-009, Standard Appendices, Rev. 307, Appendix 1, Diagnostic Flow Chart, and Appendix 2, Figures
6	OP-902-000, Standard Post Trip Actions, Rev. 13 OI-038-000, Emergency Operating Procedures Operations Expectation/Guidance, Rev. 5
7	OP-902-008, Functional Recovery Procedure, Rev. 18 OP-902-009, Standard Appendices, Rev. 307, Appendix 1, Diagnostic Flow Chart, and Appendix 2, Figures

Facility: Waterford 3 Scenario No.: 4 Op Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: ~ 100% Reactor Power, BOC

Turnover:

Protected Train is B, AB Bus is aligned to Train B, HPSI Pump A is OOS

Event No.	Malf. No.	Event Type*	Event Description
1	SG05B	I – BOP I – SRO	Steam Generator 2 Level Control Transmitter, SG-ILT-1106, fails low requiring implementation of OP-901-201, Steam Generator Level Control Malfunction.
2	RC15A1	I – ATC I – SRO TS – SRO	Pressurizer Level Control Channel Level Transmitter, RC-ILT-0110X, fails high requiring implementation of OP-901-110, Pressurizer Level Control Malfunction.
3	SG01B	TS – SRO	Steam Generator 2 develops a tube leak requiring implementation of OP-901-202, Steam Generator Tube Leakage.
4	N/A	R – ATC N – BOP N – SRO	Steam Generator 2 tube leakage requires implementation of OP-901-212, Rapid Plant Power Reduction.
5	IA03D IAR28	C – ATC C – SRO	Instrument Air Leak requiring implementation of OP-901-511, Instrument Air Malfunction and a manual reactor trip. After the reactor trip the leak is located and isolated.
6	SG01B	M – All	Primary to Secondary Leakage in Steam Generator 2 rises to greater than Charging Pump Capacity (Steam Generator Tube Rupture) (Critical Task 2 and 3)
7	ED02D EG08B	C – BOP C – SRO	A Startup Transformer B fault occurs, causing loss of power to the B3 bus which powers the only OPERABLE HPSI Pump. Emergency Diesel Generator B fails to AUTO start requiring operator action to re-energize the B3 bus. (Critical Task 1)
8	SI02B	C – BOP C – SRO	High Pressure Safety Injection Pump B fails to auto start requiring action to start the HPSI Pump. (Critical Task 1)

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

Scenario Event Description

NRC Scenario 4

The crew assumes the shift at 100% power with instructions to maintain 100% power. High Pressure Safety Injection Pump A is out of service and danger tagged, due to high pump bearing vibration during its quarterly IST. Since it occurred just prior to shift turnover and the AB bus is aligned to Train B, High Pressure Safety Injection Pump AB has not yet been aligned for service. The Work Management Center is working in that direction.

After taking the shift, Steam Generator 2 Level Control Transmitter, SG-ILT-1106 fails low. The SRO should direct the BOP to match feedwater and steam flow using Feedwater Regulating Valve 2, FW-173B and stabilize SG 2 level 50-70% Narrow Range. The SRO should enter OP-901-201, Steam Generator Level Control Malfunction and implement Attachment 1, General Actions.

After the crew has restored Steam Generator 2 to between 50 and 70% Narrow Range, Pressurizer Level Control Channel Level Transmitter, RC-ILT-0110X, fails high. The SRO should enter OP-901-110, Pressurizer Level Control Malfunction and implement Section E1. The crew should take manual control of the Pressurizer Level Controller and/or operate Charging Pumps to restore Pressurizer level, swap control to the Channel Y level channel, and return the Pressurizer Level Controller back to AUTO. The SRO should review Technical Specifications 3.3.3.5 and 3.3.3.6 and OP-903-013, Monthly Channel Checks. The SRO should determine that TS 3.3.3.6 requirements are met, but enter TS 3.3.3.5 Action a.

After Pressurizer Level Control is in AUTO, Steam Generator 2 develops a tube leak at ~ 11 gpm. The SRO should implement OP-901-202, Steam Generator Tube Leakage or High Activity. The SRO should determine that based on leak indications, Technical Specification 3.4.5.2 is not met for Primary-to-Secondary Leakage or Identified Leakage and enter TS 3.4.5.2 Action a. The SRO should also determine that the current leakage requires implementation of OP-901-212, Rapid Plant Power Reduction.

After the reactivity manipulation has been satisfied, an Instrument Air leak occurs. The SRO should implement OP-901-511, Instrument Air Malfunction. SA-125, Station Air to Instrument Air cross-connect valve, fails to open at set pressure and Instrument Air Header Pressure drops to less than 65 psig. The SRO should order a manual reactor trip and the crew should perform the actions of OP-902-000, Standard Post Trip Actions. If a leak location investigation is initiated, the leak will be found and isolated. If an operator is sent to SA-125 the operator will be able to open the valve by adjusting the local controller. Neither of these actions will be performed prior to reaching the reactor trip criteria of OP-901-511.

After the SRO has entered OP-902-007, Steam Generator Tube Rupture Recovery, Primary to Secondary leakage rises to greater than Charging Pump capacity. The SRO should order a manual actuation of Safety Injection and Containment Isolation. After Safety Injection is actuated, Startup Transformer B fails and Emergency Diesel Generator B fails to AUTO start. Additionally, when power is restored High Pressure Safety Injection Pump B fails to auto start. The BOP should perform a manual start of Emergency Diesel Generator B, verify that the Emergency Diesel Generator automatically loads, and manually start High Pressure Safety Injection Pump B (**CRITICAL TASK 1**). The crew should start a rapid cooldown of the Reactor Coolant System to less than 520°F T-hot. Since MS-319A is out of service due to the IA line rupture the BOP should select an alternate Steam Bypass Valve to perform the cooldown. The crew should also depressurize the Reactor Coolant System to prevent lifting secondary safety valves on Steam Generator 2 (**CRITICAL TASK 2**), and isolate Steam Generator 2 (**CRITICAL TASK 3**).

The scenario can be terminated after Steam Generator 2 is isolated or at the lead examiner's discretion.

CRITICAL TASKS**9. ESTABLISH RCS INVENTORY CONTROL**

This task applies upon loss of power to the B3 bus. This task is satisfied by the crew taking action to start and load Emergency Diesel Generator B and manually start High Pressure Safety Injection Pump B.

10. PREVENT OPENING MAIN STEAM SAFETY VALVES.

This task is satisfied by the crew taking action to maintain Steam Generator 2 pressure below the lowest secondary safety valve setpoint by taking action to reduce RCS pressure to < 1085 psia.

11. ISOLATE RUPTURED STEAM GENERATOR

This task is satisfied by isolating Steam Generator 2 in accordance with OP-902-007, Steam Generator Tube Rupture Recovery, Step 17 after RCS T_{HOT} is reduced below 520°F.

Scenario Quantitative Attributes

22. Total malfunctions (5–8)	7
23. Malfunctions after EOP entry (1–2)	2
24. Abnormal events (2–4)	4
25. Major transients (1–2)	1
26. EOPs entered/requiring substantive actions (1–2)	1
27. EOP contingencies requiring substantive actions (0–2)	0
28. Critical tasks (2–3)	3

SCENARIO SETUP

AA. Reset Simulator to IC-194.

BB. Verify Scenario Malfunctions are loaded, as listed in the Scenario Timeline.

CC. Verify the following Remotes and Overrides:

1. SIR29, HPSI PUMP A – RACKOUT
2. SIR24, SI-203A_SI-208A HPSI PUMP A SUCT/DISCH ISOL VLVS - CLOSE

DD. Verify HPSI Pump A Control Switch (C/S) in OFF and place Danger Tag on C/S.

EE. Ensure Event Trigger 6 is set up as below to initiate when Safety Injection is actuated:

1. ((RP_ESFASIAS == 1) I (RP_ESFBSIAS == 1))

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

GG. Verify EOOS is 8.7 Yellow.

HH. Complete the simulator setup checklist.

II. Start Insight, select file PlantParameters.tis.

SIMULATOR BOOTH INSTRUCTIONS

Event 1 Steam Generator 2 Level Control Transmitter, SG-ILT-1106, fails low

6. On Lead Examiner's cue, initiate Event **Trigger 1**.
7. If Work Week Manager or PMI are called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 2 Pressurizer Level Control Channel Level Transmitter, RC-ILT-0110X, Fails High

8. On Lead Examiner's cue, initiate Event **Trigger 2**.
9. If Work Week Manager or PMI are called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 3/4 Steam Generator 2 Tube Leak, OP-901-212, Rapid Plant Power Reduction

9. On Lead Examiner's cue, initiate Event **Trigger 3**.
10. If Chemistry is called to sample the Steam Generators for activity, acknowledge and wait 30 minutes and report leakage into Steam Generator 2 is ~ 11 GPM.
11. If called as DPM or Duty OPS Manager acknowledge the communication and tell contact person that you will make the additional communications per OI-035-000, Attachment 1.
12. If requested to verify BD-1162, position locally, report that BD-1162 is closed.
13. If requested as Programs & Components Engineering to monitor for loose parts in the Stay Cavity Area of Steam Generator, acknowledge the request and inform the caller that will monitor and evaluate data as necessary.
14. If Chemistry is called to sample the RCS for Dose Equivalent Iodine due to the down power, acknowledge and report that samples will be taken 2-6 hours from notification time and if asked tell the caller your name is Dustan Milam.
15. If called as DPM or Duty OPS Manager acknowledge the communication and in form the caller that you will make your required communications per OI-035-000, Attachment 1.
16. If notified as Load Dispatcher (Woodlands) acknowledge the communications and inform the caller that the grid will remain stable with available backup generation.
17. If requested to remove polisher vessels from service, inform the caller that you will monitor Polisher D/P and remove vessels as necessary.

Event 5 Instrument Air Leak

10. On Lead Examiner's cue, initiate Event **Trigger 4**.
11. If the Work Week Manager or PMM are called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
12. If the caller requests PMM assistance locating the leak inform the caller that 2 PMM persons will be provided to support leak location as soon as possible.
13. If requested to open the bypass valve around the SA to IA Cross-Connect Valve, wait until the reactor trip has occurred and set Remote IAR23 to OPEN and report that SA-127 is open.
14. If Operators are dispatched to locate the Instrument Air Leak, wait until after the reactor trip and report to the Control Room that the leak is on the Supply line to Steam Bypass Valve, MS-319A and can be isolated by closing IA-4916.
15. If directed to isolate the leak, set Remote IAR17 to CLOSED, LO-01A09A04DS1-1 is set to ON, DI-01A09S08-1 is set to OFF, and delete Malfunction IA03D. Report to the Control Room that the leak is isolated.

Event 6/7 Primary to Secondary Leakage in Steam Generator 2 Rises to Greater Than Charging Pump Capacity, Startup Transformer B Fault, Emergency Diesel Generator B and HPSI Pump B Fail To AUTO Start

13. On Lead Examiner's cue, initiate Event **Trigger 5**.
14. When Safety Injection is actuated, ensure Event **Trigger 6** goes active.
15. If the Duty Plant Manager or Duty OPS Manager is called, inform the caller that you will make the necessary calls in accordance with, OI-035-000.
16. If Chemistry is called to perform samples acknowledge the request.
17. **At the end of the scenario, before resetting, end data collection and save the file as 2012 Scenario4-(start-end time).tid. Export to .csv file. Save the file into the folder for the appropriate crew**

SCENARIO TIMELINE

EVENT	KEY	DESCRIPTION	TRIGGER	DELAY HH:MM:S	RAMP HH:MM:S	FINAL
EVENT DESCRIPTION						
1	SG05B	SG LEVEL ILT-1106 FAILS (0-100%)	1	00:00:00	00:01:00	0
STEAM GENERATOR 2 LEVEL CONTROL TRANSMITTER, SG-ILT-1106 FAILS LOW						
2	RC15A1	PZR CONTROL LT 0110X FAILS HI	2	00:00:00	00:00:00	ACTIV E
PRESSURIZER LEVEL CONTROL CHANNEL LEVEL TRANSMITTER, RC-ILT-0110X FAILS HIGH						
3/4	SG01B	SG2 TUBE LEAK (100% = 3200 GPM)	3	00:00:00	00:00:00	0.35
STEAM GENERATOR 1 TUBE LEAK, OP-901-212, RAPID PLANT POWER REDUCTION						
5	IA03D	RUPTURE AIRLINE TO STM BYPASS VLV MS-319A	4	00:00:00	00:00:00	100
INSTRUMENT AIR LEAK						
5	IAR28	SA-125 SETPOINT	N/A	00:00:00	00:00:00	0
INSTRUMENT AIR LEAK						
6	SG01B	SG2 TUBE LEAK (100% = 3200 GPM)	5	00:00:00	00:02:00	8
PRIMARY TO SECONDARY LEAKAGE IN STEAM GENERATOR 1 RISES TO GREATER THAN CHARGING PUMP CAPACITY						
7	ED02D	LOSS OF SUT B TRANSFORMER	6**	00:00:00	00:00:00	ACTIV E
SUT B FAULT, EDG B FAILS TO AUTO START						
** SEE SIMULATOR SETUP NOTES						
7	EG08B	FAILURE OF DG B TO AUTOSTART	N/A	00:00:00	00:00:00	ACTIV E
SUT B FAULT, EDG B FAILS TO AUTO START						
8	SI02B	HPSI PUMP B FAILS TO AUTO START	N/A	00:00:00	00:00:00	ACTIV E
HIGH PRESSURE SAFETY INJECTION PUMP B FAILS TO AUTO START						

REFERENCES

Event	Procedures*
1	OP-901-201, Steam Generator Level Control Malfunction, Rev. 5
2	OP-901-110, Pressurizer Level Control Malfunction, Rev. 6 OP-903-013, Monthly Channel Checks, Rev. 16 Tech Spec 3.3.3.5 Tech Spec 3.3.3.6
3	OP-901-202, Steam Generator Tube Leakage or High Activity, Rev. 9 Tech Spec 3.4.5.2
4	OP-901-212, Rapid Plant Power Reduction, Rev. 4
5	OP-901-511, Instrument Air Malfunction, Rev. 9 OP-902-000, Standard Post Trip Actions, Rev. 13
6	OP-902-000, Standard Post Trip Actions, Rev. 13 OP-902-009, Standard Appendices, Rev. 307, Appendix 1, Diagnostic Flow Chart and Appendix 2, Figures OP-902-007, Steam Generator Tube Rupture Recovery Procedure, Rev. 13
7	OP-902-000, Standard Post Trip Actions, Rev. 13 OI-038-000, Emergency Operating Procedure Operations Expectations/Guidance, Rev. 5