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W3F1-2010-0058

July 7, 2010

Mr. Elmo E. Collins, Jr.
U.S. Nuclear Regulatory Commission
Region IV
612 E. Lamar Blvd., Suite 400
Arlington, TX 76011-4125

Subject: Operator Examination Outline
Waterford Steam Electric Station, Unit 3 (Waterford 3)
Docket No. 50-382
License No. NPF-38

Dear Mr. Collins:

As requested in NRC Staff letter dated April 9, 2010, Entergy is hereby submitting the operating and written test outlines and supporting materials identified in NUREG-1021 for the upcoming October 2010 senior reactor operator licensing examination.

The examination materials enclosed contain confidential information that has been packaged in accordance with NUREG-1021. The enclosed examination materials shall be withheld from public disclosure until after administering of the examination is complete. The written examination is scheduled to be administered on October 13, 2010.

Also included is the completed form ES-201-3 from the March 2010 Walk Through Retake exam. This form is not confidential information.

There are no new commitments contained in this submittal.

If you have any questions pertaining to the contents of the enclosure, please contact John Signorelli at (504) 739-6032. For any questions or concerns pertaining to regulatory compliance, please contact William Steelman, Acting Manager Licensing at 504.739.6685.

Sincerely,

A handwritten signature in cursive script that reads "Mark Schaible".

Mark Schaible
Manager, Training & Development

MS/JDW/JVS

Enclosure

Facility:	WATERFORD 3	Date of Examination:	October 4, 2010
Examination Level:	SRO	Operating Test Number:	NRC
Administrative Topic (see Note)	Type Code*	Describe activity to be performed	
A1 Conduct of Operations K/A Importance: 4.4	S, N	2.1.23, Ability to perform specific system and integrated plant procedures during all modes of plant operation. Review and approve completed OP-903-117, Emergency Diesel Generator Fuel Oil Transfer Pump Operability Check, Attachment 10.1, Fuel Oil Transfer Pump A IST Data.	
A2 Conduct of Operations K/A Importance: 3.0	S, M	2.1.20, Ability to interpret and execute procedure steps. Review COLSS constant calculation in accordance with OP-004-005, Core Operating Limits Supervisory System Operation	
A3 Equipment Control K/A Importance: 4.7	S, N	2.2.40, Ability to apply Technical Specifications for a system. Evaluate Safety Injection System voiding in accordance with OP-903-026, Emergency Core Cooling System Valve Lineup Verification.	
A4 Radiation Control K/A Importance: 3.8	S, D, P	2.3.6, Ability to approve release permits. Review and approve a liquid release permit in accordance with OP-007-001, Boron Management.	
A5 Emergency Plan K/A Importance: 4.6	S, M	2.4.41, Knowledge of the emergency action level thresholds and classifications. Determine appropriate Emergency Plan action level in accordance with EP-001-001, Recognition and Classification of Emergency Conditions.	
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.			
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected)			

Facility:	WATERFORD 3	Date of Examination:	October 4, 2010
Exam Level	SRO – Instant	Operating Test No.:	NRC
Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
System / JPM Title		Type Code*	Safety Function
S1	001 Control Rod Drive; ATC Operator Immediate Operator Actions on 2 Dropped CEAs from OP-901-102, CEA or CEDMCS Malfunction Fault: The first and second reactor trip options do not function, requires performance of the final reactor trip contingency from EOP OP-902-000, Standard Post Trip Actions. A2.13 ATWS RO – 4.4, SRO – 4.6	A, D, P, S	1
S2	004 Chemical and Volume Control System; Perform actions associated with a faulted Pressurizer level setpoint in accordance with OP-901-110, Pressurizer Level Control Malfunction. A2.22 Mismatch of Letdown and Charging flows RO – 3.2, SRO – 3.1	A, M, S	2
S3	006 Emergency Core Cooling System; Reduce RCS pressure and use High Pressure Safety Injection Pumps to restore Pressurizer level in accordance with OP-901-112, Charging or Letdown Malfunction. A1.18 PZR level and pressure RO – 4.0, SRO – 4.3	N, S	3
S4	005 Shutdown Cooling System; Place Shutdown Cooling Train B in Service Fault: After LPSI Pump B is running, SI-405 B will fail closed, requiring the operator to take immediate operator actions IAW OP-903-130, Shutdown Cooling Malfunction, to secure LPSI Pump B. A4.01 Controls and indication for RHR pumps RO – 3.6, SRO – 3.4	A, D, L, P, S	4 - P
S5	062 A.C. Electrical Distribution, Synchronize the Main Generator to the grid in accordance with OP-010-004, Plant Startup. Fault: Auto Synchronization will fail to function, requiring manual synchronizing of the Generator Output Breakers. A4.07 Synchronizing and paralleling of different AC supplies RO – 3.1, SRO – 3.1	A, N, S	6
S6	012 Reactor Protection System Reset CSAS in accordance with OP-902-009, Standard Appendices, Section 5 – E A4.04 Bistable, trips, reset and test switches RO – 3.3, SRO – 3.3	D, EN, L, P, S	7
S7.	068 Liquid Radwaste System; Discharge WCT A to the Circulating Water System in accordance with OP-007-004, Liquid Waste Management System Fault: Upon initiation of flow, controller fails in raise, exceeding maximum flow allowed, requiring the operator to manually close the isolation valves. A4.03 Stoppage of release if limits exceeded RO – 3.9, SRO – 3.8	A, M, S	9

In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
P1 061 Emergency Feedwater System; Reset overspeed device on Emergency Feedwater Pump AB in accordance with OP-902-005, Station Blackout Recovery. A2.04 Pump failure or improper operation RO – 3.4, SRO – 3.8	D, E, L, R	4 – S
P2 033 Spent Fuel Pool Cooling System; Place the Spent Fuel Pool on purification in accordance with OP-002-006, Fuel Pool Cooling and Purification K4.02 Maintenance of Spent Fuel Pool cleanliness RO – 2.5, SRO – 2.7	D, R	8
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, M	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	6
(C)ontrol room		
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4	5
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	1
(EN)gineered safety feature	- / - / ≥1 (control room system)	1
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1	3
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	5
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	3
(R)CA	≥ 1 / ≥ 1 / ≥ 1	2
(S)imulator		

Facility:	WATERFORD 3	Date of Examination:	October 4, 2010
Exam Level	SRO – Upgrade	Operating Test No.:	NRC
Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
System / JPM Title		Type Code*	Safety Function
S1			
S2 004 Chemical and Volume Control System; Perform actions associated with a faulted Pressurizer level setpoint in accordance with OP-901-110, Pressurizer Level Control Malfunction. A2.22 Mismatch of Letdown and Charging flows RO – 3.2, SRO – 3.1		A, M, S	2
S3			
S4			
S5			
S6 012 Reactor Protection System Reset CSAS in accordance with OP-902-009, Standard Appendices, Section 5 – E A4.04 Bistable, trips, reset and test switches RO – 3.3, SRO – 3.3		D, EN, L, P, S	7
S7. 068 Liquid Radwaste System; Discharge WCT A to the Circulating Water System in accordance with OP-007-004, Liquid Waste Management System Fault: Upon initiation of flow, controller fails in raise, exceeding maximum flow allowed, requiring the operator to manually close the isolation valves. A4.03 Stoppage of release if limits exceeded RO – 3.9, SRO – 3.8		A, M, S	9

In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
P1 061 Emergency Feedwater System; Reset overspeed device on Emergency Feedwater Pump AB in accordance with OP-902-005, Station Blackout Recovery. A2.04 Pump failure or improper operation RO – 3.4, SRO – 3.8	D, E, L, R	4 – S
P2		
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, M	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	3
(C)ontrol room		
(D)irect from bank	$\leq 9 / \leq 8 / \leq 4$	2
(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)	$\geq 2 / \geq 2 / \geq 1$	3
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	1
(R)CA	$\geq 1 / \geq 1 / \geq 1$	1
(S)imulator		

Facility:	WATERFORD 3	Scenario No.: 1	Op Test No.: NRC
Examiners:	_____	Operators:	_____
	_____		_____
	_____		_____
Initial Conditions:	<ul style="list-style-type: none"> 100%, MOC, AB buses aligned to Train B Protected Train is B Emergency Diesel Generator A is out of service. 		
Turnover:	<ul style="list-style-type: none"> Maintain 100 % power 		

Event No.	Malfunction No.	Event Type*	Event Description
1	H_105	I – ATC I – SRO	Remove Reactor Power Cutback from service in accordance with OP-004-015.
2	RC22B2	TS – SRO I – SRO	Pressurizer pressure instrument RC-IPI-0102 B fails low.
3	SG01B CV02C	TS – SRO C – SRO C – ATC	Steam Generator 2 tube leakage Charging Pump AB fails to auto start
4	N/A	R- ATC N-BOP N-SRO	Rapid Plant Power Reduction due to Steam Generator tube leakage.
5	SG01B	M-All	Steam Generator Tube Rupture Steam Generator 2
6	SI02A	C – BOP C - SRO	High Pressure Safety Injection Pump A fails to auto-start on Safety Injection
7	6	RP08C	C – ATC C – SRO
8	7	MS11B	M – All
8		C – BOP C – SRO	Isolate Steam Generator #1 when T _{HOT} < 520 °F
9		C – ATC C – SRO	Reduce RCS pressure using Pressurizer Auxiliary Spray while maintaining sub-cooled margin.

* (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.

After assuming the shift, annunciator H1005, Reactor Power Cutback Single Channel Trouble, alarms. The crew will be contacted by I&C maintenance after reviewing the annunciator response procedure describing a failure of Reactor Power Cutback, requiring Reactor Power Cutback be removed from service in accordance with OP-004-015, Reactor Power Cutback. This manipulation is performed by the ATC operator at CP-2 and CP-7.

After Reactor Power Cutback is removed from service, Pressurizer pressure instrument RC-IPI-0102 B fails low. The ATC operator will receive the annunciators for this failure. The CRS should evaluate Tech Specs and enter Tech Spec 3.3.1 and 3.3.2 and determine that Plant Protection System bistable 6 for low Pressurizer pressure must be bypassed within 1 hour on Channel B.

After the CRS evaluates Tech Specs but before bistable 6 is bypassed, a Steam Generator tube leak develops in Steam Generator 2. Charging Pump AB will be aligned as the first backup Charging Pump and it will fail to auto start on the lowering Pressurizer level. The ATC operator should make this diagnoses and start Charging Pump AB. The CRS should enter OP-901-202, Steam Generator Tube Leakage or High Activity. The size of the leak will require entering OP-901-212, Rapid Plant Power Reduction. For the power reduction, the ATC will perform Direct Boration to the RCS as well as Pressurizer boron equalization and ASI control with CEAs. The BOP will manipulate the controls to reduce Main Turbine load. The CRS should enter Tech Spec 3.4.5.2 for Steam Generator 2 leakage. The CRS may consider declaring Charging Pump AB inoperable due to it's failure to auto start, but no Tech Spec entry is required.

Once the crew has commenced the power reduction and lowered power to ~ 90%, or at the lead examiner's cue, the Steam Generator tube leak will degrade to a rupture. The CRS should direct the ATC to perform a manual Reactor trip, initiate Safety Injection and Containment Isolation. High Pressure Safety Injection Pump A will fail to start on the Safety Injection signal, requiring the BOP operator to start HPSI Pump A. Containment Isolation valve CVC-401 will fail to close on the CIAS, requiring the ATC operator to close the valve.

After the crew completes OP-902-000, Standard Post Trip Actions and the CRS diagnoses into OP-902-007, Steam Generator Tube Rupture Recovery, the CRS should direct a rapid RCS cooldown to less than 520 °F T_{HOT}. After this direction is given, a Main Steam Line break will develop on Steam Generator 2 inside Containment. The CRS should exit OP-902-007 and enter OP-902-008, Functional Recovery Procedure. Prioritization in OP-902-008 should result in Containment Isolation being priority 1. The crew should address Containment Isolation by using the steps in the Heat Removal section to isolate Steam Generator 2.

The scenario can be terminated after Steam Generator 2 is isolated, or at the lead examiners discretion.

Scenario Event Description

NRC Scenario 1

Critical Tasks

1. Trip any RCP not satisfying RCP operating limits.

This task is satisfied by securing all RCPs within 3 minutes of loss of CCW flow. The required task becomes applicable after Containment Spray has been actuated. The time requirement of 3 minutes is based on the RCP operating limit of 3 minutes without CCW cooling.

2. Prevent Opening the Main Steam Safety Valves.

Depends on break size.

This task is satisfied by the crew taking action to maintain Steam Generator #2 pressure below the safety valve setpoint by taking action to reduce RCS pressure to < 945 psia.

3. Isolate Steam Generator #2.

This task is satisfied by the crew taking action to isolate Steam Generator #2 after the RCS T_{HOT} temperature is < 520 °F.

Scenario Quantitative Attributes

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

Scenario Notes:

- A. Reset Simulator to IC-191.
- B. Verify the following Scenario Malfunctions are loaded:
 - 1. rc22b2 for Pressurizer level instrument RC-ILI-0102 B
 - 2. sg01B for Steam Generator #2 tube leak
 - 3. cv02c for Charging Pump AB
 - 4. si02a for High Pressure Safety Injection Pump A
 - 5. rp08c for CVC-401
 - 6. ms11b for Steam Generator #2 steam line break
 - 7. eg10a for EDG A overspeed device
- C. Verify the following remotes
 - 1. egr26 for EDG A local alarm acknowledgement
 - 2. egr27 for EDG B local alarm acknowledgement
- D. Verify the following overrides
 - 1. di-08a05s14-1 for blocking FP-601 A set to trigger 9
 - 2. di-08a05s19-1 for blocking IA-909 set to trigger 9
 - 3. di-04a04s10-1 for blocking CVC-109 set to trigger 9
- E. Verify the following under Event Triggers:
 - 1. zdirpciastrp(4).eq.0 is set on trigger 9
- F. Verify the following Control Board Conditions:
 - 1. Danger tag placed on EDG A control switch
 - 2. Danger tag placed on EDG A Output Breaker
- G. Verify EDG A output breaker is racked out and place danger tags on EDG A and its output breaker.
- H. Ensure Protected Train B sign is placed in SM office window.
- I. Verify EOOS is 8.5 Yellow
- J. Complete the simulator setup checklist.

Simulator Booth Instructions

Event 1 Reactor Power Cutback Failure

1. On Lead Examiner's cue, initiate Event Trigger 1.
2. After the annunciator response procedure is referenced, call the CRS as the on shift I&C technician. Report that during planned data collection, the Reactor Power Cutback channel A has locked up and will not respond.
3. If Work Week Manager is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 2 Pressurizer Pressure Instrument RC-IPI-0102 B Fails Low

1. On Lead Examiner's cue, initiate Event Trigger 2.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
3. If sent to LCP-43, report all RCS pressure indications are reading normal.

Event 3 Steam Generator #2 Tube Leak / Charging Pump AB Fails to Start / Rapid Plant Power Reduction

1. On Lead Examiner's cue, initiate Event Trigger 3.
2. If Chemistry or HP is called, acknowledge S/G tube leak and need to carry out the actions of UNT-005-032, Steam Generator Primary to Secondary Leakage.
3. If called as TGB watch to monitor Condensate System Polisher pressure, acknowledge and remove Polisher Vessel from service if necessary.
4. If called as the RCA Watch to check Charging Pump AB, report that it looks normal locally.

Event 4 Steam Generator #2 Tube Rupture

1. On Lead Examiner's cue, initiate change the severity of malfunction SG01B to 10% and ramp it in over a 2 minute period.
2. If called as RAB watch to check the Emergency Diesel Generators, initiate Trigger 10, after EDG A & B Trouble alarms clear, report they are running satisfactorily.

Event 5 Steam Generator #2 Steam Line Break

1. After the crew has entered OP-902-007 and commenced the rapid cooldown and on the Lead Examiner's cue, initiate Event Trigger 7.

Event 6 High Pressure Safety Injection Pump A fails to start

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

NRC Scenario 1

Scenario Timeline:

Event	Malfunction	Severity	Ramp HH:MM:SS	Delay	Trigger
1	H_105	N/A	N/A	N/A	1
	Remove Reactor Power Cutback from service				
2	RC22B2	N/A	N/A	N/A	2
	Pressurizer pressure instrument RC-IPI-0102 B fails low				
3	SG01B	0.4 %	00:5:00	NA	3
	Steam Generator #2 Tube Leak				
4	CV02C	N/A	N/A	N/A	N/A
	Charging Pump AB fails to auto start				
5	SG01B	10 %	00:01:00	N/A	N/A
	Steam Generator #2 Tube Rupture				
6	SI02A	N/A	N/A	N/A	N/A
	HPSI Pump A fails to start on SIAS				
7	RP08C	N/A	N/A	N/A	N/A
	CVC-401 fails to close on CIAS				
7	MS11B	10 %	00:05:00	N/A	7
	Main Steam Line Break S/G 2				

REFERENCES:

Event	Procedures
1	OP-004-015, Reactor Power Cutback System
2	OP-009-007, Plant Protection System Tech Spec 3.3.1 and 3.3.2
3	OP-901-202, Steam Generator Tube Leakage or High Activity Tech Spec 3.4.5.2
4	OP-901-212, Rapid Plant Power Reduction Tech Spec 3.1.3.6 Regulating and Group P CEA Insertion Limits
5	OP-902-000, Standard Post Trip Actions OP-902-007, Steam Generator Tube Rupture Recovery OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart
7	OP-902-008, Safety Function Recovery Procedure OP-902-009, Standard Appendices, Appendix 13, Stabilize RCS Temperature

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

Event No.	Malf. No.	Event Type*	Event Description
1	CV01B	TS – SRO C – ATC C – SRO	Charging Pump B trips
2	N/A	TS – SRO	Dry Cooling Tower Fan 8A reported with no oil in sight glass.
3	D_P06	R – ATC N – BOP N – SRO	In service Isophase Bus Fan trips, standby fan will not start. Normal plant power reduction to < 16,560 amps.
4	RC04C RD24 A,B,E,F	M – All I – ATC I – SRO	RCP 2A Shaft Shear with automatic trip initiated but correct alignment of trip breakers do not open. Manual reactor trip.
5	RD11A-74 RD11A-68	C-ATC C - SRO	2 CEAs stick out on trip requiring Emergency Boration
6	ED01 A, B, C, D	M-All	Loss of Off Site Power
7	EG08B	C- BOP C - SRO	EDG B fails to auto-start

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

The crew assumes the shift at 100% power with instructions to maintain 100% power. Emergency Diesel Generator A is out of service due to a cracked lube oil strainer. Tech Spec 3.8.1.1 b and d have been entered. The turnover will include that the site is under a Severe Thunderstorm Warning and a Tornado Watch. All of the necessary actions of OP-901-521, Severe Weather and Flooding, have been accomplished.

After taking the shift, Charging Pump B will trip on motor overload. The crew should start Charging Pump AB or A and enter OP-901-112, Charging or Letdown Malfunction. The CRS should enter Tech Spec 3.1.2.4 and TRM 3.1.2.4. Additionally, the crew will no longer be in compliance with Tech Spec 3.8.1.1 d, requiring action within 2 hours. The CRS should direct the ATC to align Charging Pump AB to replace Charging Pump B and exit Tech Spec 3.1.2.4, comply with Tech Spec 3.8.1.1.b, and remain in TRM 3.1.2.4.

After the ATC aligns Charging Pump AB or at the lead examiners direction, the Outside Watch will call and report that during his rounds in the Dry Cooling Tower Area, he has discovered Dry Cooling Tower Fan 8A has a cracked oil housing and no oil is visible in the sight glass. The CRS should declare Dry Cooling Tower Fan 8A inoperable and enter Tech Spec 3.7.4 action d, which, due to the tornado watch, requires a shutdown if not restored in 1 hour.

After the CRS identifies the correct Tech Spec, the in service Isophase Bus Fan trips. The Turbine Building Watch will report that the standby Isophase Bus Fan will not start. The crew should enter OP-901-211, Generator Malfunction. The crew should determine the need to commence a normal plant shutdown in accordance with OP-010-005, Plant Shutdown, to lower Main Generator amps to less than 16,560 amps. The ATC will perform Pressurizer boron equalization, direct Boration to the RCS, as well as ASI control with CEAs. The BOP will manipulate the Main Turbine controls to reduce load.

Once the crew has commenced the power reduction and lowered power to ~ 90%, or at the lead examiner's discretion, Reactor Coolant Pump 2A will have a sheared shaft failure. The Plant Protection System will actuate, but 4 Reactor Trip Breakers will fail to open automatically. The crew should manually trip the reactor using the Diverse Reactor Trip System. After the reactor trip, 2 CEAs will fail to insert. The ATC should commence Emergency Boration in accordance with OP-901-103. The crew will carry out the immediate operator actions of OP-902-000, Standard Post Trip Actions.

During the review of Standard Post Trip Actions, a Loss of Off Site Power will occur. EDG B will fail to automatically start and have to be started manually by the BOP operator. The CRS should enter OP-902-003, Loss of Off Site Power/Loss of Forced Circulation Recovery. Once in OP-902-003, the CRS should direct the performance of OP-902-009, Standard Appendices, Appendix 20, Operation of DCT Sump Pumps. The scenario can be terminated after the CRS orders the performance of OP-902-009 Appendix 20 or at the lead examiners discretion.

Scenario Event Description

NRC Scenario 2

Critical Tasks

1. Manually trip the Reactor.

This task is satisfied by manually tripping the reactor within 1 minute of the failure of the automatic trip. The required task becomes applicable after the annunciators are received associated with the RCP 2A sheared shaft.

2. Establish reactivity control.

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

3. Energize at least one vital electrical AC bus.

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

Scenario Quantitative Attributes

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

Scenario Notes:

- A. Reset Simulator to IC-192.
- B. Verify the following Scenario Malfunctions:
 - 1. cv01b for Charging Pump B trip
 - 2. rc04c for RCP 2A sheared shaft
 - 3. rd24a for Reactor Trip Circuit Breaker 1 fail to open
 - 4. rd24b for Reactor Trip Circuit Breaker 2 fail to open
 - 5. rd24e for Reactor Trip Circuit Breaker 5 fail to open
 - 6. rd24f for Reactor Trip Circuit Breaker 6 fail to open
 - 7. rd11a74 for CEA 74 stuck
 - 8. rd11a68 for CEA 68 stuck
 - 9. ed01a for Off Site Feeder Breaker 7172 trip
 - 10. ed01b for Off Site Feeder Breaker 7176 trip
 - 11. ed01c for Off Site Feeder Breaker 7182 trip
 - 12. ed01d for Off Site Feeder Breaker 7186 trip
 - 13. eg10a for EDG A overspeed device
 - 14. eg08b for EDG B fail to auto start
- C. Verify the following Annunciators
 - 1. d_p06 for Isophase Fan trip
 - 2. b_e07 for Dry Cooling Tower 1 level high
 - 3. b_e08 for Dry Cooling Tower 2 level high
- D. Verify the following Control Board Conditions:
 - 1. Danger tag placed on EDG A control switch
 - 2. Danger tag placed on EDG A Output Breaker
- E. Verify EDG A output breaker is racked out and place danger tags on EDG A and its output breaker.
- F. Ensure Protected Train B sign is placed in SM office window.
- G. Verify EOOS is 8.5 Yellow
- H. Complete the simulator setup checklist.

Simulator Booth Instructions

Event 1 Charging Pump A Trips

1. On Lead Examiner's cue, initiate Event Trigger 1.
2. If called, the RCA should report a scent of burnt electrical components at Charging Pump B.
3. If Work Week Manager is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 2 Dry Cooling Tower Fan 8A Failure

1. On Lead Examiner's cue, call 4100 and report indication of a cracked oil housing on DCT Fan 8A and that there is no oil visible in the sight glass.
2. If Work Week Manager is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 3 Isophase Bus Fan Trip / Normal Plant Power Reduction

1. On Lead Examiner's cue, initiate Event Trigger 3.
2. When called, have the TGB Watch report that Isophase Bus Supply Fan A has tripped and Supply Fan B did not start. If directed to start Supply Fan B, report that it will not start.
3. If directed to check the breakers (GEN-EBKR-212A-3M and 212B-3M), Breaker A is tripped. There are no visible problems with breaker B.
4. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 4 Reactor Coolant Pump 2A Sheared Shaft / Trip Failure

1. On Lead Examiner's cue, initiate Event Trigger 4.
2. If the Work Week Manager or Duty Plant Manager is called, inform the caller that they will make the necessary calls.

Event 5 CEA 74 and 68 Fail to Insert / Emergency Boration

1. No calls for this malfunction should occur.

NRC Scenario 2

Event 6 Loss of Off Site Power

1. After the crew has commenced Standard Post Tip Actions and on the Lead Examiner's cue, initiate Event Trigger 6.
2. If called as OSW watch report that a steady rain has been falling all shift.
3. If called to come to the Control Room to get a copy of OP-902-009, Appendix 20 for aligning the DCT Sump Pumps, report that you have a copy at the 314 Bus.

Event 8 Emergency Diesel Generator B fails to start

1. If called as RAB watch to check EDG B, initiate Trigger 9, and when the EDG B Trouble alarm is clear, report that it is running satisfactorily.

NRC Scenario 2

Scenario Timeline:

Event	Malfunction	Severity	Ramp HH:MM:SS	Delay	Trigger
	EPR09	A	1.5	N/A	N/A
	Precipitation at 1.5 inches per hour				
	EGR29	A	N/A	NA	N/A
	EDG A output breaker racked out				
	EG10	A	N/A	NA	N/A
	EDG A overspeed device pulled				
1	CV01	B	N/A	N/A	1
	Charging Pump B trip				
2	N/A	N/A	N/A	N/A	N/A
	Dry Cooling Tower Fan 8A failure				
3	D_P06	N/A	N/A	N/A	3
	Isophase Bus Fan failure				
4	RC04	C	N/A	N/A	4
	RCP 2A Sheared Shaft				
4	RD24	A, B, E, F	N/A	N/A	N/A
	Reactor Trip Breakers 1, 2, 5, & 6 fail to open				
5	RD11A	74	N/A	N/A	N/A
	CEA 74 stuck out after reactor trip				
5	RD11A	68	N/A	N/A	N/A
	CEA 68 stuck out after trip				
6	ED01	A, B, C, D	N/A	N/A	6
	Loss of Off Site Power				
7	EG08	B	N/A	N/A	N/A
	EDG B Fail to Auto-start				
	B_E07	N/A	N/A	00:02:30	6
	B_E08			00:04:00	
	Dry Cooling Tower 1 & 2 high level alarm				

REFERENCES:

Event	Procedures
1	OP-901-112, Charging or Letdown Malfunction Tech Spec 3.1.2.4, 3.8.1.1 TRM 3.1.2.4
2	Tech Spec 3.7.4
3	OP-901-211, Generator Malfunction OP-010-005, Plant Shutdown
4	OP-902-000, Standard Post Trip Actions OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart
5	OP-901-103, Emergency Boration
6	OP-902-003, Loss of Off Site Power/Loss of Forced Flow OP-902-009, Standard Appendices, Appendix 20, Operation of Dry Cooling Tower Sump Pumps

Facility:	WATERFORD 3	Scenario No.: 3	Op Test No.: NRC
Examiners:	_____	Operators:	_____
	_____		_____
	_____		_____
Initial Conditions:			
	<ul style="list-style-type: none"> Mode 3 with 2 Charging Pumps in operation 		
	<ul style="list-style-type: none"> Protected Train is B 		
	<ul style="list-style-type: none"> AB Bus is aligned to Train B 		
Turnover:			
	<ul style="list-style-type: none"> Dilute to Critical Boron Concentration 		

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – ATC N – SRO	Dilute to critical boron concentration
2	CV35A CVR101	C – ATC C – BOP C – SRO	During dilution, PMU counter fails to secure flow OP-901-104, Inadvertent Positive Reactivity Addition
3	CB08B1	TS – SRO	Containment pressure instrument CB-IPI-6702-SMC C fails high.
4	CC02A	TS – SRO	Auxiliary Component Cooling Water Pump A trip
5	RX14A	I – ATC I - SRO	Pressurizer Pressure RC-IPR-0100 X fails high, Main Spray Valves open
6	RC23A	M – ALL	Small break loss of coolant accident
7	RP05 A3, B3, C3, D3	I – ATC I – SRO	Containment Spray fails to actuate
8	SI-16D SI-16H	C – BOP C - SRO	SI-228A and SI-228 B fail to open on Safety Injection

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

Scenario Event Description

NRC Scenario 3

The crew assumes the shift with the reactor shutdown and in Mode 3 following a forced outage. The turnover will include instructions to perform RCS dilution to critical boron concentration.

The reactivity plan will include instructions to dilute in multiple 200 gallon batches. During the dilution, the Primary Water counter will fail to secure dilution. The ATC should attempt to secure Primary Water Flow by operating PMU-144 and CVC-510. Neither of these actions will secure flow. The CRS should enter OP-901-104, Inadvertent Positive Reactivity Addition, and secure Primary Makeup Pump A.

After these actions are completed, Containment pressure instrument CB-IPI-6702-SMC Channel C input to Containment Spray Actuation fails high. The CRS should enter Tech Spec 3.3.2 and direct bypassing high Containment Pressure – Hi Hi bistable on Channel C.

After these actions are completed, Auxiliary Component Cooling Water Pump B will trip. The crew should verify Component Cooling Water temperature is being controlled by Dry Cooling Tower Fans. The SRO should declare ACCW Pump A inoperable and enter a 72 hour action for Tech Spec 3.7.4 as well as cascading Tech Specs. The SRO should address the need to accomplish surveillance OP-903-066, Electrical Breaker Alignment Checks, within 1 hour to comply with Tech Spec 3.8.1.1.b. They must also address the need to accomplish the requirements of Tech Spec 3.8.1.1.d within 2 hours.

After the Tech Specs are evaluated, Pressurizer pressure instrument RC-IPR-0100 X fails high. This causes both Main Spray valves to open. The SRO should enter OP-901-120, Pressurizer Pressure Malfunction. The ATC will align the non-faulted Pressurizer pressure channel.

After the Pressurizer Pressure Control Channel Y is selected, a small break LOCA event will occur. Containment Spray Actuation will fail requiring manual actuation. All Reactor Coolant Pumps will be required to be secured after the CSAS. 2 High Pressure Flow Control Valves, 1 on Train A and 1 on Train B, for RCS loop 2B will fail to open, requiring the BOP to open these valves.

After the crew has completed OP-902-000, Standard Post Trip Actions, the CRS should diagnose into OP-902-002, Loss of Coolant Accident Recovery. The scenario can be terminated after the crew has commenced an RCS cooldown using Atmospheric Dump Valves.

NRC Scenario 3

Critical Tasks

1. Establish Containment temperature and pressure control

This task is satisfied by manually actuating Containment Spray prior to exiting OP-902-000, Standard Post Trip Actions, or before completing the Safety Function Status Review in OP-902-002, Loss of Coolant Accident Recovery, if OP-902-00 is not used.

2. Trip any RCP not satisfying RCP operating limits.

This task is satisfied by securing all RCPs within 3 minutes of loss of CCW flow. The required task becomes applicable after Containment Spray has been actuated. The time requirement of 3 minutes is based on the RCP operating limit of 3 minutes without CCW cooling.

2. Manually establish minimum design Safety Injection flow

This task is satisfied by opening SI-228 A or SI-228 B prior to reporting Safety Injection flow meets the requirements of the Safety Injection flow curves.

Scenario Quantitative Attributes

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

Scenario Notes:

A. Reset Simulator to IC-193.

1. Use keys 165 – 168 for S/G high level bypass setup.

B. Verify the following Scenario Malfunctions:

1. cv35a for the PMU Dilution counter
2. rx14-A for Pressurizer pressure instrument RC-IPT-0100 X
3. cb08b1 for Containment Pressure instrument CB-IPI-6702-SMC
4. cc02a for Auxiliary Component Cooling Water Pump A
5. rc23a for RCS break
6. rp05a3, b3, c3, d3 for Containment Spray failure
7. SI16d and h for SI-228 A and SI-228 B

C. Verify the following Remotes:

1. cvr101 set at 2% for PMU-140
2. anr04h for EDG A local alarm acknowledgement.
3. anr04i for EDG B local alarm acknowledgement.

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

E. Verify EOOS is 10.0 Green

F. Complete the simulator setup checklist.

Simulator Booth Instructions

Event 1 Dilute to critical boron concentration

1. No communications should occur for this evolution.

Event 2 PMU flow malfunction

1. After first dilution batch is complete and during second batch, initiate Event Trigger 2.
2. If called to operate valves listed in OP-901-104, acknowledge communication and report that you will work on valve list.

Event 3 Containment pressure instrument CB-IPi-6702 SMC fails high

1. After OP-901-104 has been entered and PMU Pump A is secured, or on Lead Examiner's cue, initiate Event Trigger 3.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 4 Auxiliary Component Cooling Water Pump A trip

1. After Tech Specs have been identified and on the Lead Examiner's cue, initiate Event Trigger 4.
2. If called as the watchstander and sent to ACCW Pump A, report that the pump looks normal locally.
3. If called as the watchstander and sent to ACCW Pump A breaker, report that the breaker indicates open and that there are various breaker parts on the floor of the cubicle.
4. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 5 Pressurizer pressure instrument RC-IPR-0100 X fails high

1. After Tech Specs for Event 4 are addressed, or on Lead Examiner's cue, initiate Event Trigger 5.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 6 Loss of Coolant Accident

1. After the actions in OP-901-120 are complete and on the Lead Examiner's cue, initiate Event Trigger 6.
2. If called as RAB watch to check EDG A & B, initiate Trigger 10, and when the EDG A & B Trouble alarms are clear, report that they are running satisfactorily.

Event 7 Containment Spray fails to actuate

1. No communications should occur for this malfunction.

Event 8 SI-228 A and SI-228 B fail to open on SIAS

1. No communications should occur for this malfunction.

NRC Scenario 3

Scenario Timeline:

Event	Malfunction	Severity	Ramp HH:MM:SS	Delay	Trigger
1	N/A	N/A	N/A	N/A	N/A
	Dilute to critical boron concentration				
2	CV35	A	N/A	N/A	2
	PMU counter fails to secure dilution				
2	CVR101	2%	N/A	N/A	2
	PMU – 140 throttled open				
3	CH08	B1	N/A	N/A	3
	Containment Pressure Instrument CB-IPI-6702-SMC fails high				
4	CC02	A	N/A	N/A	4
	Auxiliary Component Cooling Water Pump A trips				
5	RX14	A	100%	N/A	5
	Pressurizer pressure instrument RC-IPR-0100 X fails high				
6	RC23	A	0.05%	5:00	6
	Small Break LOCA				
7	RP05	A3, B3, C3, D3	N/A	N/A	N/A
	Containment Spray fails to actuate				
8	SI16	D H	N/A	N/A	N/A
	SI-228 A and SI-228 B fail to open				

REFERENCES:

Event	Procedures
1	OP-010-003, Plant Startup OP-002-005, Chemical and Volume Control
2	OP-901-104, Inadvertent Positive Reactivity Addition
3	OP-009-007, Plant Protection System Tech Spec 3.3.2
4	Tech Spec 3.7.4
5	OP-901-120, Pressurizer Pressure Control Malfunction Tech Spec 3.2.8
6	OP-902-000, Standard Post Trip Actions OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart OP-902-002, Loss of Coolant Accident Recovery
7	OP-902-000, Standard Post Trip Actions OI-038-000, Emergency Operating Procedures Operations Expectations / Guidance
8	OP-902-000, Standard Post Trip Actions OI-038-000, Emergency Operating Procedures Operations Expectations / Guidance

Facility:	WATERFORD 3	Scenario No.:	4	Op Test No.:	NRC Spare
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions:					
<ul style="list-style-type: none"> • 50% Power, MOC, AB Busses aligned to Train B • Main Feedwater Pump A & B are running • Emergency Diesel Generator A is out of service 					
Turnover:					
<ul style="list-style-type: none"> • Recommence power ascension to 100%. 					

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – ATC N – BOP N – SRO	Commence power ascension
2	CV12A2	I – ATC I – SRO TS – SRO	VCT Level Instrument CVC-ILT-0227 fails low, aligns Charging Pump suction to the RWSP
3	FW51A	TS – SRO	CSP Level instrument EFW-ILI-9013 A fails low
4	SG05C	I – BOP I – SRO	Steam Generator #1 level instrument, SG ILR 1111, fails high.
5	RC05B	C – ATC C – SRO	RCP 1B oil system/bearing malfunction
6	RC24A	M – All	LOCA
6	ED01 A,B,C,D	M – All	Loss of off site power. EDG B starts and loads Safety Bus 3B
7	CV02B	C – ATC C – SRO	Charging Pump B fails to start on SIAS.
8	SI01B	C – BOP C – SRO	High Pressure Safety Injection Pump B trips. Align High Pressure Safety Injection Pump AB

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

Scenario Event Description

NRC Scenario 4

The crew assumes the shift at 50% power with instructions to raise power to 100%. The turnover will include that the previous crew placed Main Feedwater Pump B in service.

After power ascension has commenced, Volume Control Tank level instrument CVC-ILT-227 fails low. This will shift the Charging Pump suction to the Refueling Water Storage Pool. The CRS will direct securing Charging Pump A, the running Charging Pump, and enter OP-901-113, Volume Control Tank Makeup Control Malfunction. The CRS should declare any Charging Pump placed in Off inoperable and enter Tech Spec 3.1.2.4 (Tech Spec entry is not required for Charging Pump AB). The crew will also have to secure power ascension.

After the crew has addressed the VCT level instrument failure and associated Tech Specs, Condensate Storage Pool level instrument EFW-ILI-9013 A will fail low. The CRS should address Tech Specs and enter 3.3.3.5 and 3.3.3.6.

After Tech Specs have been addressed, Steam Generator #1 level instrument SG-ILR-1111 will fail high. This will set Steam Generator #1 controllers to manual. The CRS should enter OP-901-201, Steam Generator Level Control Malfunction. The Steam Generator #1 controls will not go to their Reactor Trip Override position later since they are in manual.

After the CRS has completed the flow chart in OP-901-201, Reactor Coolant Pump 1B will indicate an oil system and bearing failure. The crew should enter OP-901-130, Reactor Coolant Pump Malfunction. The CRS should direct the ATC to start Lift Oil for RCP 1B and direct the BOP operator to lower CCW System temperature. The bearing will continue to degrade during these actions.

After the desired actions of OP-901-130 have been completed, a loss of coolant accident will occur. After the BOP operator places the Steam Generator #1 controls to their Reactor Trip Override positions (when he has stated he is finished his standard post trip actions), a loss of off site power will occur. Charging Pump B will fail to auto start on the SIAS, requiring the ATC to start it.

After the crew has entered OP-902-002, Loss of Coolant Accident Recovery, High Pressure Safety Injection Pump B will trip. Since there will be no power to Train A safety Bus with EDG A out of service, the crew will be required to align High Pressure Safety Injection Pump AB.

The scenario can be terminated after High Pressure Safety Injection Pump AB is running, or at the lead examiners discretion.

Scenario Event Description

NRC Scenario 4

Critical Tasks

1. Trip any RCP not satisfying RCP operating limits.

This task is satisfied by securing all RCPs within 3 minutes of loss of CCW flow. The required task becomes applicable after Containment Spray has been actuated. The time requirement of 3 minutes is based on the RCP operating limit of 3 minutes without CCW cooling.

2. Manually establish minimum design Safety Injection flow

This task is satisfied by swapping AB Safety Busses and aligning High Pressure Safety Injection Pump AB.

Scenario Quantitative Attributes

1. Total malfunctions (5–8)	6
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)	1
7. Critical tasks (2–3)	2

Scenario Notes:

- A. Reset Simulator to IC-94.
- B. Verify the following Scenario Malfunctions:
 - 1. cv12a2 for VCT level instrument CVC-ILT-0227
 - 2. fw51a for CSP level instrument EFW-ILI-9013 A
 - 3. sg05c for Steam Generator #1 level SG-ILR-1111
 - 4. rc05b for RCP 1B failure
 - 5. rc24a for LOCA
 - 6. ed01 a, b, c, d for Loss of Offsite Power
 - 7. cv02b for Charging Pump B failure to auto start
 - 8. si01b for High Pressure Safety Injection Pump B
- C. Verify the following Remotes:
 - 1. anr04h for EDG A local alarm acknowledgement.
 - 2. anr04i for EDG B local alarm acknowledgement.
- D. Verify the following overrides
- E. Ensure Protected Train B sign is placed in SM office window.
- F. Verify EOOS is 8.5 Yellow
- G. Complete the simulator setup checklist.

Simulator Booth Instructions

Event 1 Power Ascension

1. If called as the TGB watch regarding Condensate Polisher System manipulations during power ascension, acknowledge communication. Make CDP adjustments as necessary during power ascension.

Event 2 VCT level instrument fails low

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

Event 3 CSP Level instrument fails low

1. On Lead Examiner's cue, initiate Event Trigger 3.
2. If Work Week Manager or PMM is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
3. If called as the RAB watch to check LCP-43, wait 5 minutes and report CSP Train A, EFW-ILI-9013 A1 indication reading 0%.

Event 4 SG-ILT-1111 fails high

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

Event 5 RCP 1B oil/bearing failure

1. On the Lead Examiner's cue, initiate Event Trigger 5.
2. If Work Week Manager or Engineering is called, inform the caller that support will be sent to the Control Room.

Event 6 LOCA with LOOP

1. On the Lead Examiner's cue, initiate Event Trigger 6
2. Initiate Event Trigger 9 for the LOOP after the BOP has completed manually establishing RTO on train A.
3. If called as RAB watch to check the Emergency Diesel Generators, initiate Trigger 10, after EDG A & B Trouble alarms clear, report they are running satisfactorily.

Event 7 Charging Pump B fails to start on SIAS

1. No calls should occur with this event.

Event 8 High Pressure Safety Injection Pump B trip

1. On the Lead Examiner's cue, initiate Event Trigger 8
2. When called to perform the manual operation in the field for High Pressure Safety Injection Pump AB, report that you have a copy of Appendix 26 and you are standing by.

NRC Scenario 4

Scenario Timeline:

Event	Malfunction		Severity	Ramp HH:MM:SS	Delay	Trigger
2	CV12	A	N/A	N/A	N/A	2
	VCT level instrument CVC-ILT-0227 fails low					
3	FW51	A	0%	N/A	N/A	3
	CSP level instrument EFW-ILI-9013 A fails low					
4	SG05	C	100%	00:20	N/A	4
	Steam Generator #1 level instrument SG-ILR-1111 fails high					
5	RC05	B	N/A	N/A	N/A	5
	RCP 1B oil/bearing failure					
6	RC24	A	0.2%	3:00	N/A	6
	LOCA					
6	ED01	A, B, C, D	N/A	N/A	N/A	9
	Loss of Offsite Power					
7	CV02	B	N/A	N/A	N/A	N/A
	Charging Pump B fails to start on SIAS					
8	SI01	B	N/A	N/A	N/A	8
	High Pressure Safety Injection Pump B trips					

REFERENCES:

Event	Procedures
1	OP-010-004, Power Operations OP-002-005, Chemical and Volume Control
2	OP-901-113, Volume Control Tank Makeup Control Malfunction Tech Spec 3.1.2.4 TRM 3.2.1.4
3	OP-903-013, Monthly Channel Checks Tech Spec 3.3.3.5 and 3.3.3.6
4	OP-901-201, Steam Generator Level Control Malfunction
5	OP-901-130, Reactor Coolant Pump Malfunction
6	OP-902-000, Standard Post Trip Actions OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart OP-902-002, Loss of Coolant Accident Recovery
7	OI-038-000, Emergency Operating Procedures Operations Expectations / Guidance
8	OP-902-009, Standard Appendices, Appendix 26, Aligning the Standby HPSI Pump

Facility: Waterford 3		Date of Exam: October 4, 2010		Operating Test No.		NRC												
A P P L I C A N T	E V E N T T Y P E	Scenarios												T O T A L	M I N I M U M (*)			
		1			2			3			Spare							
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION							
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P					
															R	I	U	
SRO-I 1 Name	RX							1							1	1	1	0
	NOR	4					3								1	1	1	1
	I/C	1,3,6, 8,9					7		2,5,7						8	4	4	2
	MAJ	5,7					4,6		6						2	2	2	1
	TS	2,3													2	0	2	2
SRO-I 2 Name	RX		4												1	1	1	0
	NOR					3									1	1	1	1
	I/C		1,3,6, 9			1,4,5, 7				2,8					8	4	4	2
	MAJ		5,7			4,6				6					4	2	2	1
	TS					1,2									2	0	2	2
SRO-I 3 Name	RX					3									1	1	1	0
	NOR			4				1							1	1	1	1
	I/C			2,8		1,4,5		2,5,7, 8							7	4	4	2
	MAJ			5,7		4,6		6							3	2	2	1
	TS							3,4							2	0	2	2
SRO-I 4 Name	RX		4												1	1	1	0
	NOR					3									1	1	1	1
	I/C		1,3,6, 9			1,4,5, 7									8	4	4	2
	MAJ		5,7			4,6									3	2	2	1
	TS					1,2									2	0	2	2
SRO-U Name	RX					3									0	1	1	0
	NOR	4													1	1	1	1
	I/C	1,3,6, 8,9				1,4,5									5	4	4	2
	MAJ	5,7				4,6									1	2	2	1
	TS	2,3													2	0	2	2
Spare	RX											1						
	NOR											1		1				
	I/C											2,4,5, 7,8	2,4,5, 7	4,8				
	MAJ											6	6	6				
	TS											2,3						

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.
3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

Facility: Waterford 3													Date of Exam: October 13, 2010					
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	2	1	4				3	4			4	18	3	3	6		
	2	1	2	1				2	2			1	9	3	1	4		
	Tier Totals	3	3	5				5	6			5	27	6	4	10		
2. Plant Systems	1	3	2	3	3	2	2	3	2	3	2	3	28	3	2	5		
	2	2	0	1	1	0	0	0	2	1	1	2	10	0	2	3		
	Tier Totals	5	2	4	4	2	2	3	4	4	3	5	38	5	3	8		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7
					3		2		2		3			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.

ES-401		PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1							RO		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 (CE/E02) Reactor Trip - Recovery / 1					X		EA2.2	Adherence to appropriate procedures and operation within the limitations in the Facility's license and amendments.	3.0	39		
000008 Pressurizer Vapor Space Accident / 3	X						AK1.01	Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident: Thermodynamics and flow characteristics of open or leaking valves	3.2	40		
000009 Small Break LOCA / 3			X				EK3.12	Knowledge of the reasons for the following responses as they apply to the small break LOCA: Letdown isolation	3.4	41		
000011 Large Break LOCA / 3												
000015/17 RCP Malfunctions / 4					X		AA2.10	Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): When to secure RCPs on loss of cooling or seal injection	3.7	42		
000022 Loss of Rx Coolant Makeup / 2				X			AA1.01	Ability to operate and / or monitor the following as they apply to the Loss of Reactor Coolant Makeup: CVCS letdown and charging	3.4	43		
000025 Loss of RHR System / 4						X	2.2.38	Knowledge of conditions and limitations in the facility license.	3.6	44		
000026 Loss of Component Cooling Water / 8					X		AA2.01	Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: Location of a leak in the CCW system	2.9	45		
000027 Pressurizer Pressure Control System Malfunction / 3			X				AK3.03	Knowledge of the reasons for the following responses as they apply to the Pressurizer Pressure Control Malfunctions: Actions contained in EOP for PZR PCS malfunction	3.7	46		
000029 ATWS / 1						X	2.4.11	Knowledge of abnormal condition procedures.	4.0	47		

Tier 1 / Group 1 Reactor Operator (cont.)

000038 Steam Gen. Tube Rupture / 3	X						EK1.02	Knowledge of the operational implications of the following concepts as they apply to the SGTR: Leak rate vs. pressure drop	3.2	48
000040 (CE/E05) Steam Line Rupture - Excessive Steam Demand / 4		X					EK2.2	Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.7	49
000054 (CE/E06) Loss of Main Feedwater / 4						X	2.1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	50
000055 Station Blackout / 6				X			EA1.06	Ability to operate and monitor the following as they apply to a Station Blackout: Restoration of power with one ED/G	4.1	51
000056 Loss of Off-site Power / 6				X			AA1.37	Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: Instrument air	3.4	52
000057 Loss of Vital AC Inst. Bus / 6					X		AA2.05	Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: S/G pressure and level meters	3.5	53
000058 Loss of DC Power / 6			X				AK3.02	Knowledge of the reasons for the following responses as they apply to the Loss of DC Power: Actions contained in EOP for loss of dc power	4.0	54
000062 Loss of Nuclear Svc Water / 4						X	2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	4.0	55
000065 Loss of Instrument Air / 8			X				AK3.04	Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: Cross-over to backup air supplies	3.0	56
000077 Generator Voltage and Electric Grid Disturbances / 6										
K/A Category Totals:	2	1	4	3	4	4	Group Point Total:			18

ES-401		PWR Examination Outline						Form ES-401-2		
		Emergency and Abnormal Plant Evolutions - Tier 1/Group 2						RO		
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#
000001 Continuous Rod Withdrawal / 1		X					AK2.08	Knowledge of the interrelations between the Continuous Rod Withdrawal and the following: Individual rod display lights and indications	3.1	57
000003 Dropped Control Rod / 1										
000005 Inoperable/Stuck Control Rod / 1										
000024 Emergency Boration / 1										
000028 Pressurizer Level Malfunction / 2										
000032 Loss of Source Range NI / 7										
000033 Loss of Intermediate Range NI / 7										
000036 Fuel Handling Accident / 8				X			AA1.02	Ability to operate and / or monitor the following as they apply to the Fuel Handling Incidents: ARM system	3.1	58
000037 Steam Generator Tube Leak / 3	X						AK1.01	Knowledge of the operational implications of the following concepts as they apply to Steam Generator Tube Leak: Use of steam tables	2.9	59
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	60
000059 Accidental Liquid RadWaste Rel. / 9										
000060 Accidental Gaseous Radwaste Rel. / 9								Knowledge of the interrelations between the Accidental Gaseous Radwaste release and the following: ARM system, including the normal radiation-level indications and the operability status		
000061 ARM System Alarms / 7										

Tier 1 / Group 2 Reactor Operator (cont.)

000067 Plant Fire On-site / 8											
000068 Control Room Evac. / 8											
000069 (W/E14) Loss of CTMT Integrity / 5				X			AA1.01	Ability to operate and / or monitor the following as they apply to the Loss of Containment Integrity: Isolation valves, dampers, and electropneumatic devices	3.5	63	
000074 Inad. Core Cooling / 4			X				EK3.04	Knowledge of the reasons for the following responses as they apply to the Inadequate Core Cooling: Tripping RCPs	3.9	62	
000076 High Reactor Coolant Activity / 9						X	2.1.14	Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc.	3.1	64	
CE/A13 Natural Circ. / 4											
CE/A11 RCS Overcooling - PTS / 4											
CE/A16 Excess RCS Leakage / 2					X		AA2.01	Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	2.7	65	
CE/E09 Functional Recovery		X					EK2.1	Knowledge of the interrelations between the Functional Recovery and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.6	61	
K/A Category Point Totals:	1	2	1	2	2	1	Group Point Total:			9	

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1											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									K3.01	Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: RCS	3.7	1
003 Reactor Coolant Pump						X							K5.04	Knowledge of the operational implications of the following concepts as they apply to the RCPS: Effects of RCP shutdown on secondary parameters, such as steam pressure, steam flow, and feed flow	3.2	2
004 Chemical and Volume Control										X			A3.14	Ability to monitor automatic operation of the CVCS, including: Letdown and charging flows	3.4	3
005 Residual Heat Removal		X											K1.06	Knowledge of the physical connections and/or cause effect relationships between the RHRS and the following systems: ECCS	3.5	4
006 Emergency Core Cooling			X										K2.04	Knowledge of bus power supplies to the following: ESFAS-operated valves	3.6	5
007 Pressurizer Relief/Quench Tank									X				A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the P S; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Stuck-open PORV or code safety	3.9	6
008 Component Cooling Water					X								K4.09	Knowledge of CCWS design feature(s) and/or interlock(s) which provide for the following: The "standby" feature for the CCW pumps;	2.7	7
008 Component Cooling Water										X			A3.04	Ability to monitor automatic operation of the CCWS, including: Requirements on and for the CCWS for different conditions of the power plant	2.9	8

Tier 2 / Group 1 Reactor Operator (cont.)

010 Pressurizer Pressure Control						X				A1.06	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PZR PCS controls including: RCS heatup and cooldown effect on pressure	3.1	9
010 Pressurizer Pressure Control									X	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	10
012 Reactor Protection						X				A1.01	Ability to predict and/or monitor Changes in parameters (to prevent exceeding design limits) associated with operating the RPS controls including: Trip setpoint adjustment	2.9	11
013 Engineered Safety Features Actuation	X									K1.12	Knowledge of the physical connections and/or cause effect relationships between the ESFAS and the following systems: ED/G	4.1	12
013 Engineered Safety Features Actuation					X					K6.01	Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: Sensors and detectors	2.7	13
022 Containment Cooling									X	A4.03	Ability to manually operate and/or monitor in the control room: Dampers in the CCS	3.2	14
026 Containment Spray			X							K3.02	Knowledge of the effect that a loss or malfunction of the CSS will have on the following: Recirculation spray system	4.2	15
039 Main and Reheat Steam	X									K1.08	Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: MFW	2.7	16
039 Main and Reheat Steam							X			A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Malfunctioning steam dump	3.4	17
059 Main Feedwater				X						K4.05	Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: Control of speed of MFW pump turbine	2.5	18
061 Auxiliary/Emergency Feedwater						X				K6.02	Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: Pumps	2.6	19

Tier 2 / Group 1 Reactor Operator (cont.)

061 Auxiliary/Emergency Feedwater												X	2.1.28	Knowledge of the purpose and function of major system components and controls.	4.1	20
062 AC Electrical Distribution												X	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.	2.6	21
063 DC Electrical Distribution		X											K2.01	Knowledge of bus power supplies to the following: Major DC loads	2.9	22
064 Emergency Diesel Generator										X			A3.07	Ability to monitor automatic operation of the ED/G system, including: Load sequencing	3.6	23
064 Emergency Diesel Generator											X		A4.01	Ability to manually operate and/or monitor in the control room: Local and remote operation of the EDG	4.0	27
073 Process Radiation Monitoring					X								K5.03	Knowledge of the operational implications as they apply to concepts as they apply to the PRM system: Relationship between radiation intensity and exposure limits	2.9	24
076 Service Water								X					A1.02	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: Reactor and turbine building closed cooling water temperatures	2.6	25
078 Instrument Air			X										K3.02	Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Systems having pneumatic valves and controls	3.4	26
103 Containment				X									K4.01	Knowledge of containment system design feature(s) and/or interlock(s) which provide for the following: Vacuum breaker protection	3.0	28
K/A Category Point Totals:	3	2	3	3	2	2	3	2	3	2	3			Group Point Total:		28

ES-401		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	X											K1.05 Knowledge of the physical connections and/or cause effect relationships between the CRDS and the following systems: NIS and RPS	4.5	29
002 Reactor Coolant														
011 Pressurizer Level Control								X				A2.04 Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of one, two or three charging pumps	3.5	37
014 Rod Position Indication														
015 Nuclear Instrumentation														
016 Non-nuclear Instrumentation				X								K4.03 Knowledge of NNIS design feature(s) and/or interlock(s) which provide for the following: Input to control systems	2.8	30
017 In-core Temperature Monitor									X			A3.01 Ability to monitor automatic operation of the ITM system including: Indications of normal, natural, and interrupted circulation of RCS	3.6	31
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control								X				A2.03 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: The hydrogen air concentration in excess of limit flame propagation or detonation with resulting equipment damage in containment	3.4	32
029 Containment Purge											X	2.4.30 Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	2.7	33

Tier 2 / Group 2 Reactor Operator (cont.)

033 Spent Fuel Pool Cooling																						
034 Fuel Handling Equipment																						
035 Steam Generator			X									K3.01	Knowledge of the effect that a loss or malfunction of the S/GS will have on the following: RCS	4.4	34							
041 Steam Dump/Turbine Bypass Control											X	2.4.2	Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.5	35							
045 Main Turbine Generator																						
055 Condenser Air Removal	X											K1.06	Knowledge of the physical connections and/or cause effect relationships between the CARS and the following PRM system	2.6	36							
056 Condensate																						
068 Liquid Radwaste																						
071 Waste Gas Disposal																						
072 Area Radiation Monitoring																						
075 Circulating Water																						
079 Station Air																						
086 Fire Protection											X	A4.05	Ability to manually operate and/or monitor in the control room: Deluge valves	3.0	38							
K/A Category Point Totals:	2	0	1	1	0	0	0	2	1	1	2	Group Point Total:			10							

ES-401		PWR Examination Outline						Form ES-401-2			
		Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						SRO			
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)		IR	#	
000007 (CE/E02) Reactor Trip - Stabilization - Recovery / 1											
000008 Pressurizer Vapor Space Accident / 3											
000009 Small Break LOCA / 3											
000011 Large Break LOCA / 3											
000015/17 RCP Malfunctions / 4											
000022 Loss of Rx Coolant Makeup / 2					X		AA2.03	Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: Failures of flow control valve or controller	3.6	9	
000025 Loss of RHR System / 4											
000026 Loss of Component Cooling Water / 8						X	2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm	4.3	10	
000027 Pressurizer Pressure Control System Malfunction / 3											
000029 ATWS / 1						X	2.4.4	Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.7	11	
000038 Steam Gen. Tube Rupture / 3											
CE/E05 Steam Line Rupture - Excessive Heat Transfer / 4											

Tier 1 / Group 1 Senior Reactor Operator (cont.)

000054 (CE/E06) Loss of Main Feedwater / 4					X		AA2.02	Adherence to appropriate procedures and operation within the limitations in the Facility's license and amendments.	4.2	12
000055 Station Blackout / 6						X	2.1.20	Ability to interpret and execute procedure steps.	4.6	13
000056 Loss of Off-site Power / 6										
000057 Loss of Vital AC Inst. Bus / 6					X		AA2.04	Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: ESF system panel alarm annunciators and channel status indicators	4.0	14
000058 Loss of DC Power / 6										
000062 Loss of Nuclear Svc Water / 4										
000065 Loss of Instrument Air / 8										
000077 Generator Voltage and Electric Grid Disturbances / 6										
K/A Category Totals:	0	0	0	0	3	3	Group Point Total:			6

ES-401		PWR Examination Outline						Form ES-401-2	
		Emergency and Abnormal Plant Evolutions - Tier 1/Group 2						SRO	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1					X		AA2.03 Ability to determine and interpret the following as they apply to the Dropped Control Rod: Dropped rod, using in-core/ex-core instrumentation, in-core or loop temperature measurements	3.8	15
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2					X		AA2.06 Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Letdown flow indicator	2.8	16
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7									
000036 (BW/A08) Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									

Tier 1 / Group 2 Senior Reactor Operator (cont.)

000067 Plant Fire On-site / 8						X	AA2.12	Ability to determine and interpret the following as they apply to the Plant Fire on Site: Location of vital equipment within fire zone	3.9	17
000068 Control Room Evac. / 8						X	2.4.30	Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	4.1	18
000069 Loss of CTMT Integrity / 5										
000074 Inad. Core Cooling / 4										
000076 High Reactor Coolant Activity / 9										
CE/A13 Natural Circ. / 4										
CE/A11 RCS Overcooling - PTS / 4										
CE/A16 Excess RCS Leakage / 2										
CE/E09 Functional Recovery										
K/A Category Point Totals:	0	0	0	0	3	1	Group Point Total:			4

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 1												SRO		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																	
004 Chemical and Volume Control								X				A2.10	Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Inadvertent boration/dilution			4.2	1
005 Residual Heat Removal											X	2.2.37	Ability to determine operability and/or availability of safety related equipment.			4.6	2
006 Emergency Core Cooling																	
007 Pressurizer Relief/Quench Tank																	
008 Component Cooling Water											X	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	3
010 Pressurizer Pressure Control																	
012 Reactor Protection																	
013 Engineered Safety Features Actuation																	
022 Containment Cooling																	

Tier 2 / Group 1 Senior Reactor Operator (cont.)

026 Containment Spray																			
039 Main and Reheat Steam																			
059 Main Feedwater																			
061 Auxiliary/Emergency Feedwater																			
062 AC Electrical Distribution																			
063 DC Electrical Distribution																			
064 Emergency Diesel Generator									X			A2.11	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: Conditions (minimum load) required for unloading an ED/G	2.9	4				
073 Process Radiation Monitoring																			
076 Service Water									X			A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of SWS	3.7	5				
078 Instrument Air																			
103 Containment																			
K/A Category Point Totals:	0	0	0	0	0	0	0	0	3	0	0	2	Group Point Total:						5

ES-401		PWR Examination Outline Plant Systems - Tier 2/Group 2										SRO		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															
002 Reactor Coolant															
011 Pressurizer Level Control															
014 Rod Position Indication															
015 Nuclear Instrumentation								X				A2.04	Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Effects on axial flux density of control rod alignment and sequencing, xenon production and decay, and boron vs. control rod reactivity changes	3.8	6
016 Non-nuclear Instrumentation															
017 In-core Temperature Monitor															
027 Containment Iodine Removal															
028 Hydrogen Recombiner and Purge Control															
029 Containment Purge															
033 Spent Fuel Pool Cooling											X	2.4.22	Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.	4.4	7

Tier 1 / Group 2 Senior Reactor Operator (cont.)

034 Fuel Handling Equipment																			
035 Steam Generator																			
041 Steam Dump/Turbine Bypass Control																			
045 Main Turbine Generator																			
055 Condenser Air Removal																			
056 Condensate																			
068 Liquid Radwaste																			
071 Waste Gas Disposal									X				A2.08	Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Meteorological changes				2.8	8
072 Area Radiation Monitoring																			
075 Circulating Water																			
079 Station Air																			
086 Fire Protection																			
K/A Category Point Totals:	0	0	0	0	0	0	0	0	2	0	0	1	Group Point Total:						3

Facility: Waterford 3		Date of Exam: October 13, 2010				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.40	Knowledge of refueling administrative requirements.	2.8	66		
	2.1.19	Ability to use plant computers to evaluate system or component status.	3.9	67		
	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management.	4.3	68		
	2.1.13	Knowledge of facility requirements for controlling vital/controlled access.			3.2	19
	2.1.37	Knowledge of procedures, guidelines, or limitations associated with reactivity management.			4.6	20
				3		2
2. Equipment Control	2.2.38	Knowledge of conditions and limitations in the facility license.	3.6	69		
	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings.	3.5	70		
	2.2.14	Knowledge of the process for controlling equipment configuration or status.			4.3	21
	2.2.39	Knowledge of less than or equal to one hour Technical Specification action statements for systems.			4.5	22
				2		2
3. Radiation Control	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	71		
	2.3.12	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.2	72		
	2.3.6	Ability to approve release permits.			3.8	23
						2

4. Emergency Procedures / Plan	2.4.50	Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.2	73		
	2.4.30	Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.	2.7	74		
	2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	4.0	75		
	2.4.18	Knowledge of the specific bases for EOPs.			4.0	24
	2.4.41	Knowledge of the emergency action level thresholds and classifications.			4.6	25
				3		2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1 / 1 2 / 1 RO	A4.01	There is excessive coverage of Instrument Air in the exam. Topics drawn include 000056, 000065, and 000078 twice. This was all in the RO portion of the exam. 000056 (question #52), 000065 (question #56), and the first 000078(question #26) were left as selected. The second 000078 (question #27), K/A A4.01, was randomly selected as another system in Tier 2, Group 1. The new system selected was 064 Emergency Diesel Generator. Left the K/A as the original A4.01 (still question #27).
1 / 1 RO	AA2.06	There is an overlap issue between 015/17 RCP (question #42) and 000026 (question #45) related to CCW. 015/17 RCP (question #42) was left as selected and 000026 (question #45) was re-drawn to K/A AA2.01.
1 / 2 RO	AK3.04	Waterford has no actions on fire situations in the EOPs. There is already 1 other fire question in RO and 1 in SRO. Replaced system 000067 Plant Fire on Site (question #62). Reselected system 000074, Inadequate Core Cooling and kept original K/A AK3.04 (still question #62).
1 / 2 2 / 1 2 / 2 RO		There is excessive coverage of radiation monitors in the exam. Topics drawn include: 000036, Fuel handling Accident Question 58 Left as selected. 000060, Accidental Gas Radwaste Release Question 61 Reselected CE/E09, Functional Recovery, and used the same K/A. 000073, Process Rad Monitoring Question 24 Left as selected. 000055, Condenser Air Removal Question 36 Left as selected. 068, Liquid Rad Waste Question 37 Reselected 011, Pressurizer level Control, and used the same K/A. This was all in the RO portion of the exam. These moves also removed potential overlap between the written exam and operating exam.
1 / 1 SRO	AA2.06	Addressed overlap between RO test, 015/017 (question #42) and 026 (question #45) in the RO test and 026 (question #10) in the SRO test. Reselected K/A 2.4.45 for 026, SRO question #10.
2 / 1 RO	K3.02	Addressed overlap between RO question #1 and #2. Both were against system 003, Reactor Coolant Pump. Question #1 was K/A K3.02 and question #2 was K5.04. Both were testing the same concept for the same components. Reselected new K/A for question #1. The new K/A is K3.01.

Waterford 3 Written Exam Outline Sample Methodology

Waterford used the sampling process described in ES-401, Attachment 1, Example Systematic Methodology.

The random selection process used sequentially numbered “poker chip” tokens, which were identical in weight and size but varied in color only. The WHITE tokens were labeled K1 through K6, the GREEN tokens were labeled A1 through A4, the BLUE tokens were labeled G1 through G4, and the RED tokens were labeled 1 through 50.

The Emergency and Abnormal Plant Evolutions and Plant Systems items that were not sampled were the items that were specifically designated for a plant design other than Combustion Engineering (Babcock & Wilcox and Westinghouse). Additionally, systems 025, Ice Condenser, and 027, Containment Iodine Removal, were not sampled, since Waterford does not have these 2 systems.

After K/A stems were randomly drawn, K/A statement were evaluated for their importance rating. Statements with importance ratings of less than 2.5 were evaluated for plant specific importance or PRA importance. There were no instances where a K/A statement with an importance rating of less than 2.5 warranted inclusion in the sample population.