

Exelon Nuclear

2016 ILT NRC Exam Scenario

Scenario Number:

NRC Scenario 1

Revision Number: 00

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Appendix D

Scenario Outline

Form ES-D-1

Facility: Quad Cities Scenario No.: **2016 NRC Scenario 1** Op-Test No.: ILT 14-1
 Examiners: _____ Operators: _____

Initial Conditions:

The plant is operating at 75% power.
 RCIC steam line is isolated.

Turnover: Return RCIC to the standby lineup.

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	Re-pressurize the RCIC Steam Lines
2	SW07B	BOP C	The 1B RBCCW Pump degrades (QCOP 3700-02)
3	FW06B	ATC I	Feedwater Flow Transmitter Failure
4	PC04G	SRO	Drywell-Torus Vacuum Breaker fails open TS
5	RR01A	ATC R	1A Recirc Pump Trip / Emergency Power Reductions (QCOA 0202-04) TS
6	RR11A	CREW M	LOCA- Recirc Loop A Discharge Pipe Break TAF-Blowdown (QGA 100/200/500-1)
7	ED03B/ED04B	ATC C	Loss of Reactor Feed Pumps
8	DG04A	BOP C	U-1 EDG fails to auto start
9	HP01/RC01	CREW C	HPCI Startup and Trip / RCIC Trip

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

ES-301-4 Quantitative attributes:

Total Malfunctions (5-8): 8
 Malfunction(s) after EOP (1-2): **E7, 8, & 9**
 Abnormal Events (2-4): **E2, 3, 4, & 5**
 Major Transient(s) /E-Plan entry (1-2): **E6**
 EOPs (1-2): **QGA 100 & 200**
 EOP Contingencies (0-2): **QGA 100/500-1**
 Critical Tasks (2-3): **3**

ES-301-5 Quantitative attributes:

BOP Normal: **E1**
 ATC Reactivity (1 per set): **E5**
 BOP I/C (4 per set): **E2 & 8**
 ATC I/C (4 per set): **E3 & 7**
 SRO-I I/C (4 per set inc 2 as ATC):
E2, 3, 5, 7, 8, 9
 SRO Tech Spec (2 per set): **E4 & 5**
 ALL Major Transients (2 per set) **E6**

SUMMARY:

- Initial Conditions:
 - The plant is operating at 75% power to support load following per Generation Dispatch.
 - RCIC has been returned to service and is to be placed in its normal standby lineup.
- Event 1: The BOP performs QCOP 1300 step F.3 to return RCIC to its standby lineup.
- Event 2: The Unit 1 EO on rounds calls the Control Room and reports the 1B RBCCW pump motor is running hot and very noisy. The BOP reports RBCCW discharge pressure lowering and directs the EO to lineup the ½C RBCCW pump to Unit 1 per QCOP 3700-02. The ½C RBCCW pump is started and the 1B RBCCW pump is secured.
- Event 3: The 1B RFP flow transmitter fails downscale causing a minor level transient. The ATC swaps to 1-element control stabilizing RPV water level. Instrument Maintenance will investigate and report the RFP must be secured to replace the transmitter. The SRO will direct the BOP to start up the 1C RFP and secure the 1B RFP in preparation for a clearance order to repair the transmitter.
- Event 4: The BOP acknowledges and reports annunciators 901-3 C-13 and 901-3 G-11. A short time later, the control room receives a call that a new engineer on a system walkdown inadvertently bumped a test pushbutton on the 2251-24 panel. An EO is dispatched and reports the 1601-33B Drywell to Torus Vacuum Breaker indicates open. Attempts by the EO to close the vacuum breaker are unsuccessful. The Unit Supervisor enters TS 3.6.1.1 Condition A, Primary Containment inoperable, TS 3.6.1.8 Condition C, one Vacuum breaker not closed, and TS 3.6.2.5 Condition A, Drywell to Torus differential pressure ≤ 1.0 psid.
- Event 5: The 1A Recirc Pump will trip causing the crew to enter QCOA 0202-04. The crew will insert CRAM rods to stay within MELLLA and outside of Instability Region II. The Unit Supervisor will enter TS 3.4.1 Condition C, Single Loop operation outside of the LCO requirements.
- Event 6: 1A Recirc Pump Discharge Pipe break. The crew will take actions for rising Drywell pressure in accordance with QCOA 0201-01. A manual scram will be inserted on high Drywell pressure. The crew will take actions in accordance with QGA 100 and QGA 200. With the loss of high pressure injection systems, RPV level will lower to -142" (TAF). The crew will enter QGA 500-1 and execute a blowdown. RPV level will be restored with Low Pressure ECCS systems.
- Event 7: Shortly after the scram, the T-12 reserve feed beaker to Bus 11 will fail to close, leaving Bus 11 de-energized. Simultaneously, Bus 12 will trip on an overcurrent resulting in a loss of all Reactor Feed pumps.
- Event 8: The Unit 1 EDG will fail to auto start on 2.5 psig Drywell pressure. The BOP will manually start the EDG.
- Event 9: The crew will attempt to start RCIC for RPV level control, however, the Trip Throttle valve will trip and not reset. HPCI will initially inject and restore RPV water level but will trip after several minutes. The crew will be unable to re-establish HPCI injection and RPV level will lower to TAF.
- Approximate Run Time: 1.5 Hours

CRITICAL TASKS:

Critical Task #1: When Torus pressure exceeds 5 psig, INITIATE drywell sprays while in the safe region of the drywell spray initiation limit (DSIL). (BWROG PC-5.1 INIT DW SPRAY)

Critical Task #2: Given the plant with the inability to maintain level above -59 inches, INHIBIT ADS, to prevent an uncontrolled depressurization IAW QGA 100. (Important PSA task / Inhibiting ADS terminates 5 of top 200 Core Damage Sequences)

Critical task #3: Given the plant with an inability to maintain RPV water level above -142 inches with an injection source lined-up and running, initiate an emergency depressurization before RPV water level drops to -190 inches in accordance with QGA 100 and QGA 500-1. (Important PRA Operator Action - emergency depressurization terminates 19 of top 100 Core Damage Sequences)

EXERCISE PERFORMANCE OBJECTIVES

SR-1300-P05	(Freq: LIC=I) Given a reactor plant being started up, warmup the RCIC lines and align the system for standby in accordance with QCOP 1300-01.
SR-3700-K26	(Freq: LIC=B) EVALUATE given key RBCCW parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s): c. Low RBCCW pressure
SR-0600-K26	(Freq: LIC=B) EVALUATE given key Feedwater Level Control System parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s): a. Feedflow sensor fails high/low
SR-1601-K20	Given various plant conditions, EVALUATE the following Containment Systems indications/ responses and DETERMINE if the indication/ response is expected and normal. b. Drywell/torus differential pressure c. Torus to Drywell vacuum breaker position
SR-0202-P04	Given an operating reactor plant with a loss of one recirculation pump, take actions to determine the cause, stabilize plant parameters, and to exit the Instability Region in accordance with QCOA0202-04.
SR-0203-P07	(Freq: LIC=B) Given a reactor plant in a QGA condition, inhibit ADS in accordance with QGA 100 or QGA 101. (Important PSA task / Inhibiting ADS terminates 5 of top 200 Core Damage Sequences)
SR-0001-P01	(Freq: LIC=A) Given the plant with a loss of normal feedwater resulting in the inability to restore RPV water level above 0 inches, inject with Alternate Injection Systems (QGA Detail E) to attempt to hold RPV water level above -142 inches in accordance with QGA 100. (SOER 86-1 r8)
SR-0001-P02	(Freq: LIC=A) Given the plant with an inability to maintain RPV water level above -142 inches with an injection source lined-up and running, initiate an emergency depressurization before RPV water level drops to -190 inches in accordance with QGA 100 and QGA 500-1. (Important PRA Operator Action - emergency depressurization terminates 19 of top 100 Core Damage Sequences)

EXERCISE PERFORMANCE OBJECTIVES

SR-0001-P03	(Freq: LIC=A) Given a shutdown reactor plant with an emergency depressurization in progress due to an inability to maintain RPV water level above -142 inches, attempt to control RPV level above -142 inches using available injection systems or establish/maintain adequate core cooling using alternate methods in accordance with QGA 500-1 and QGA 100.
SR-0001-P26	(Freq: LIC=B) Given a reactor plant with rising drywell temperature due to a LOCA or steam leak and RHR is not needed for core cooling, verify parameters are in the safe region of the Drywell Spray Initiation Limit (QGA Figure K), verify tripped or trip recirc pumps and drywell coolers, and attempt to initiate drywell sprays before drywell temperature reaches 280 degrees in accordance with QGA 200.
SR-0001-P45	(Freq: LIC=A) Given a reactor plant in a QGA condition, verify the proper actuation of containment isolations and ECCS and emergency DG starts in accordance with QGA 100 or QGA 101.

Simulator Setup:

1. Reset to IC-20 (75% power).
2. Go to **RUN**.
3. Verify the following RWM Sequence is loaded: **4PHESD (or current shut down sequence)**

(The following commands to be utilized for this scenario are contained in the CAEP file:
2016 NRC Scenario 1.cae)

4. Insert Commands for setup:
 - **trgset 1 "pcpdwg.gt.1.5"** (sets trigger 1 true when Drywell pressure is greater than 1.5 psig)
 - **trg 1 "dmf pc04g"** (Drywell-Torus Vacuum Breaker failure deleted on trigger 1)
 - **trgset 2 "tcvsv3.le.0.1"** (sets trigger true when main turbine stop valve #3 is closed)
 - **trg 2 "imf ed03b"** (trips Bus 12 on overcurrent)
 - **trgset 3 "rcntb.gt.0.5"** (sets trigger 3 true when the RCIC turbine speed is > 50%)
 - **trg 3 "imf rc01"** (trips the RCIC turbine Trip Throttle Valve)
 - **imf ed04b** (prevents Bus 11 to automatically transfer upon loss of normal power source)
 - **imf dg04a** (prevents an auto start for the Unit 1 EDG)
5. Verify the following commands for scenario performance:
 - **imf sw07b 30 3:** (degrade the 1B RBCCW pump 30% over 3 minutes)
 - **imf fw06b 0 40** (fails the 1B RFP flow transmitter downscale over 40 seconds)
 - **imf pc04g 20** (fails the 1-1601-33B Drywell-Torus Vacuum Breaker 20% open)
 - **mmf pc04g 100** (modifies D/T Vacuum Breaker position to 100% open)
 - **mmf pc04g 20** (modifies D/T Vacuum Breaker position to 20% open)
 - **imf rr01a** (trips the 1A Recirc pump)
 - **imf rr11a .1 5:** (Inserts a .1% break over 5 minutes in the 1A Recirc Pump discharge piping)
 - **bat sv** (silences 901-3 G-11 and C-13 alarms)
 - **imf hp01** (trips the HPCI turbine)
 - **mmf rr11a .5** (modifies 1A Recirc piping break to .5%)
6. Install "Protected System" placards and/or rings on the following equipment:
 - HPCI
 - T-12
7. Provide a "Load Drop" REMA.
8. Provide a marked up copy of QCOP 1300-01, RCIC System Preparation for Standby Operation.
9. Place the Zinc Injection placard on 1A RFP.

LIST OF POTENTIAL PROCEDURES**Annunciator Procedures**

- 901(2)-3, A-9, HPCI TURBINE TRIPPED, Rev. 5
- 901(2)-3, A-16, PRICNMT HIGH PRESSURE, Rev. 15
- 901(2)-3, C-13, TORUS VACUUM BKR VALVES OPEN DIV I, Rev. 12
- 901(2)-3, G-11, TORUS VACUUM BKR VALVES OPEN DIV II Rev. 10
- 901(2)-3, G-15, REACTOR VESSEL LOW LOW LEVEL, Rev. 17
- 901(2)-4 B-2, RECIRC DRIVE A TRIP, Rev. 10
- 901(2)-5 E-8, RX VESSEL HIGH LEVEL, Rev. 9
- 901(2)-5 F-8, RX VESSEL LOW LEVEL, Rev. 10
- 901(2)-8 F-3, 4KV BUS OVRCUR TRIP, Rev. 6

QCOP 0300-16, Addition of Water to Reactor Vessel Using CRD Hydraulic System, Rev. 8

QOP 3200-04, Reactor Feed Pump Changeover, Rev. 50

QCOP 3700-02, RBCCW System Startup and Operation, Rev. 29

QCGP 2-3, Reactor Scram, Rev. 84

QCGP 3-1, Reactor Power Operations, Rev. 79

QCOA 0201-01, Increasing Drywell Pressure, Rev. 27

QCOA 0202-04, Reactor Recirc Pump Trip—Single Pump, Rev. 45

QGA 100, RPV Control, Rev. 10

QGA 200, Primary Containment Control, Rev. 10

QGA 500-1, RPV Blowdown, Rev. 14

CREW TURNOVER**1.) Plant Conditions:**

- a.) Unit 1 is currently at 75% Power due to a load drop last shift for load following.
- b.) Unit 2 is at 100% Power.
- c.) Technical Specification limitations:
 - Day 3/14, TS 3.5.3 Condition A, RCIC inoperable.
- d.) On Line Risk is YELLOW.
- e.) Fire Risk is Blue. Risk Management Actions (RMA) in place.
- f.) Protected Equipment:
 - (1) RBCCW
 - (2) Fuel Pool Cooling
 - (3) Transformer 12
 - (4) HPCI
 - (5) HPCI Room Cooler
 - (6) U-1 EDG Cooling Water Pump

2.) Significant problems/abnormalities:

- a.) RCIC was returned to service last shift as repairs to the steam line drain pot level switch have been completed.

3.) Evolutions/maintenance for the oncoming shift:

- a) Perform QCOP 1300-01 step F.3, RCIC System Preparation For Standby Operation and re-pressurize the RCIC steam line.
- b.) Continue holding load per QCGP 3-1.

Quad Cities 2016 NRC Scenario No.1		Event No. 1	Page 1 of 2
Event Description: Re-pressurize the RCIC Steam Lines.			
Time	Position	Applicant's Actions or Behavior	
	SRO	Directs and supervises QCOP 1300-01, step F.3.	
	BOP	Verifies RCIC Barometric Condenser Condensate and Vacuum Pump control switches are in AUTO.	
	BOP	Depresses INITIATION SIGNAL SEAL-IN AND RESET pushbutton.	
	BOP	Verifies MO 1-1301-61, STM TO TURB VLV is closed.	
	BOP	Depresses the STM LINE BRK TRIP RESET pushbutton.	
	BOP	Depresses TURB RESET pushbutton.	
	BOP	Verifies AO 1-1301-12 and AO 1-1301-13, COND PMP ISO VLVs are closed.	
	BOP	Verifies TURB SPEED TEST switch is in NORMAL.	
	BOP	Verifies TURB SPEED TEST PWR switch is in OFF.	
	BOP	Verifies AO 1-1301-34 and AO 1-1301-35, STM LINE DRAIN ISOL VLVs are open.	
	BOP	Verifies AO 1-1301-32, COND DRN VLV is closed.	
	BOP	Contacts EO to verify RCIC room is cleared of personnel OR makes a plant announcement to evacuate the RCIC room.	
	BOP	Opens MO 1-1301-17, STM SPLY ISOL VLV.	
	BOP	Warms RCIC steam line:	
		<ul style="list-style-type: none"> Slowly cracks open MO 1-1301-16, STM SPLY ISOL VLV. Monitors PI 1-1340-6, TURB INLT PRESS, for increase in pressure. Verifies annunciator 901-4 F-16, RCIC TURBINE INLET STM DRN HIGH LEVEL, is NOT in alarm. When RCIC steam line pressure stops increasing AND 901-4 F-16 is cleared, fully opens MO 1-1301-16. 	
	BOP	Verifies GOVERNOR VLV is open.	
	BOP	Verifies TRIP THROTTLE VLV is open.	

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Event Description: Re-pressurize the RCIC Steam Lines		
Time	Position	Applicant's Actions or Behavior
	BOP	Verifies RCIC FLOW CONTROLLER is in AUTO.
	BOP	Verifies RCIC FLOW CONTROLLER flow rate is set as 400 gpm
	BOP	Verifies all RCIC annunciators on the 901-4 panel are cleared.
	ATC	Monitors reactor power, pressure, and water level.
End of Event 1		

Quad Cities		2016 NRC Scenario No. 2	Event No. 2	Page 1 of 2
Event Description: 1B RBCCW pump degrades.				
Time	Position	Applicant's Actions or Behavior		
SIM OP: Degrade the 1 B RBCCW pump 30% ramped over 3 minutes using malfunction SW07B: imf sw07b 30 3:				
Key Parameter Response: Degrading RBCCW Discharge Header pressure as indicated on PI 1-3740-4 at the 912-1 panel. Expected Annunciator(s): None				
SIM OP ROLE PLAY: As the U-1 EO on rounds, call in and report: "The 1B RBCCW pump is sounding very noisy, the motor is hot to touch and the discharge pressure is 40 psig."				
	BOP	Reports RBCCW Discharge Header pressure on PI 1-3740-4 at the 912-1 panel is low in the green band.		
	SRO	Directs BOP to place the 1/2C RBCCW Pump into operation.		
	BOP	Directs the EO to lineup the 1/2C RBCCW Pump to Unit 1 per QCOP 3700-02 step F.4.		
SIM OP ROLE PLAY: As the EO, wait 3 minutes, then call in and report: "The 1/2C RBCCW pump is lined up to Unit 1 per the Hard Card, QCOP 3700-02 Attachment B."				
	BOP	Starts the 1/2C RBCCW Pump, then secures the 1B RBCCW Pump.		
	BOP	Directs the EO to close the 1-3799-59, 1B RBCCW PMP DSCH VLV and the 1-3799-61, 1B RBCCW PMP SUCT VLV per QCOP 3700-02 Attachment A, step 2.		
SIM OP ROLE PLAY: As the EO, wait 3 minutes, then report back: "The 1B RBCCW Pump suction and discharge valves are closed. QCOP 3700-02 Attachment A, step 2 is complete."				

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Event Description: 1B RBCCW pump degrades

Time	Position	Applicant's Actions or Behavior
	BOP	Reports 1/2C RBCCW pump is running, the 1B RBCCW pump is secured, and RBCCW Discharge Header pressure is approx. 53 psig.
	ATC	Monitors Recirc pump seal cooling water temperatures at TR 1-262-19A/B., PUMP TEMPERATURE, point 2.
	ATC	Monitors Drywell pressure and temperature.

End of Event 2

Quad Cities 2016 NRC Scenario No.1 Event No. 3 Page 1 of 3		
Event Description: 1B RFP Feedwater Flow Transmitter Fails Downscale		
Time	Position	Applicant's Actions or Behavior
SIM OP: Fail the 1B RFP flow transmitter downscale ramped over 40 seconds using malfunction FW06B: imf fw06b 0 40		
Key Parameter Response: RPV water level transient Expected Annunciator(s): 901-5 E-8 Automatic Actions: None		
	ATC	Reports 901-5 E-8, RX VESSEL HIGH LEVEL, alarm and refers to annunciator procedure.
	ATC	Reports the 1B Reactor Feed Pump flow transmitter is failing downscale.
	ATC	Transfers to 1-element control by selecting "SINGLE" on the 1-640-18, Rx Level Master Controller.
	ATC	Reports RPV water level is stable and controlled at 30 inches.
	SRO	Determines Core Thermal Power calculation is low due to failed feed flow transmitter and contacts a QNE.
	SRO	Contacts Instrument Maintenance to investigate the 1B FW Flow Transmitter.
SIM OP ROLE PLAY: If dispatched, as the IM Supervisor, wait 2 minutes, then report the following: "The 1B RFP will have to be shutdown to replace the flow transmitter."		
SIM OP ROLE PLAY: If contacted, as the SOS, state: "Generation Dispatch will be requesting a load increase to full power in the next 24 hours. Proceed with the 1B RFP shutdown so that repairs can be started this shift."		
SIM OP ROLE PLAY: If contacted, as the QNE, state: "A substitute value for the 1B RFP flow will need to be entered in the Heat Balance if it is not secured. I can do this remotely if the pump is to remain on line."		
LEAD EVALUATOR NOTE: IF desired, the scenario may continue to Event 4 when RPV level is stable and DFWLC is in Single Element.		
	SRO	Directs BOP to start the 1C RFP from Bus 12 and secure the 1B RFP per QOP 3200-04.

Quad Cities 2016 NRC Scenario No.1 Event No. 3 Page 2 of 3		
Event Description: 1B RFP Feedwater Flow Transmitter Fails Downscale		
Time	Position	Applicant's Actions or Behavior
	BOP	Dispatches an EO to the 1A Condensate/Condensate Booster Pump and the 1C Reactor Feed Pump for pre-start checks.
SIM OP ROLE PLAY: As the EO dispatched to the 1A Cond/Cond Booster Pump, wait 2 minutes, then call back and report: “Steps F.3.a.(1) thru (14) and F.4.a. are complete. The 1A Cond/Cond Booster Pump is lined up and ready for a start.”		
	BOP	Places the COND PMP SELECTOR switch to OFF.
	BOP	Starts the 1A Cond/Cond Booster Pump and verifies: <ul style="list-style-type: none"> • Condensate pump discharge press: 140 psig • Condensate Booster pump suction press: 80 psig • Condensate Booster pump discharge press: 220 psig • RFP suction press: 200 psig
	BOP	Verifies on the 1B RFP Aux Oil Pump: <ul style="list-style-type: none"> • Control switch has a red target. • Yellow AUTO TRIP light is lit.
	BOP	Places the RFP SELECTOR switch to OFF.
SIM OP ROLE PLAY: As the EO dispatched to the 1C RFP, report the following when contacted: “Steps F.14.(a.) thru (m.) is complete. The 1C RFP is lined up and ready for a start.”		
	BOP	Closes MO 1-3201C, 1C RFP DISCH VLV.
	BOP	Opens AO 1-3201C, 1C RFP RECIRC VLV.
	BOP	Starts the 1C RFP from Bus 12.
	BOP	Verifies the 1C RFP Auxiliary Oil Pump trips.
	BOP	Opens MO 1-3201C, RFP DISCH VLV.
	BOP	When RFP flow stabilizes, places AO 1-3201C, RFP RECIRC VLV to AUTO.

Quad Cities 2016 NRC Scenario No.1 Event No. 3 Page 3 of 3		
Event Description: 1B RFP Feedwater Flow Transmitter Fails Downscale		
Time	Position	Applicant's Actions or Behavior
	BOP	Verifies AO 1-3201C closes.
SIM OP ROLE PLAY: When contacted for steps F.24.a,b,d,e, and f., as the EO, wait 2 minutes and report: “RFP bearing oil temp is 120°F, speed changer oil press is 8 psig, oil flow from bearing is visible, no seal leaks, and the RFP seals have been vented.”		
	BOP	Opens AO 1-3201B, RFP RECIRC VLV.
	BOP	Closes MO 1-3201B, RFP DISCH VLV.
	BOP	Stops the 1B RFP.
	BOP	Opens MO 1-3201B, RFP DISCH VLV and places AO 1-3201B control switch to AUTO.
	BOP	Verifies AO 1-3201B closes.
	BOP	Verifies Feed and Condensate parameters are normal.
	BOP	Places the RFP SELECTOR SWITCH to STANDBY for the 1B RFP.
	BOP	Verifies the 1B RFP Auxiliary Oil Pump is running.
SIM OP ROLE PLAY: When contacted, to verify RFP warming line valves are open, (step F.29a.), as EO, wait 30 sec., then report: “The 1-3299-40, and 1-3299-116 downstream and upstream warming line valves for the 1A and 1B RFPs are open.”		
	BOP	Stops the 1A Cond/Cond Booster Pump.
	BOP	Places the COND PP SELECTOR switch to STANDBY for the 1A Cond/Cond Booster Pump.
	BOP	Verifies correct number of Condensate Demins are in operation.
	BOP	Checks Flow Control Line to verify thermal limits are NOT exceeded.
End of Event 3		

Quad Cities	2016 NRC Scenario No. 1	Event No. 4	Page 1 of 2
Event Description: Drywell-Torus Vacuum Breaker Fails Open			
Time	Position	Applicant's Actions or Behavior	
SIM OP: Fail the 1-1601-33B Drywell Torus Vacuum Breaker 20% open using malfunction PC04G: imf pc04g 20			
Key Parameter Response: Drywell and Torus pressure equalize. Expected Annunciator(s): 901-3 C-13, 901-3 G-11 Automatic Actions: None			
	BOP	Reports "Division I and Division II Torus Vacuum Breaker Open" annunciators are In alarm.	
	BOP	Determines the 1-1601-33B Drywell to Torus Vacuum Breaker is open from the SER.	
	BOP	Refers to QCAN 901-3 C-13 and QCAN 901-3 G-11.	
	BOP	Reports Drywell and Torus pressures starting to equalize.	
	BOP	Dispatches an EO to the 2251-24 panel to verify open and/or dual indication for the 1-1601-33B vacuum breaker	
SIM OP ROLE PLAY: As a System Engineer on a plant walkdown, 1 minute after the alarm, call into the control and report that you " inadvertently bumped a pushbutton on the 2251-24 panel. "			
SIM OP ROLE PLAY: As EO, wait 1 minute after dispatch then call in from the 2251-24 panel and report: " The 1-1601-33B Drywell-Torus Vacuum breaker shows dual indication on both Division I and Division II. "			
	BOP	Obtains Unit Supervisor concurrence, then directs the EO to cycle the 1-1601-33B Vacuum breaker by depressing the test pushbutton.	
SIM OP ROLE PLAY: If directed by the BOP, cycle the 1-1601-33B by inserting the following commands: mmf pc04g 100 wait 3 seconds then insert mmf pc04g 20 As the EO, report back that: "Position indication went to "OPEN" then back to "INTERMEDIATE."			

Quad Cities 2016 NRC Scenario No.1 Event No. 4 Page 2 of 2		
Event Description: Drywell-Torus Vacuum Breaker Fails Open		
Time	Position	Applicant's Actions or Behavior
	BOP	Contacts Instrument Maintenance to investigate.
	BOP	Reports Drywell to Torus differential pressure is < 1.0 psid.
	SRO	Enters the following Technical Specification LCOs: TS 3.6.1.1, Condition A, Primary Containment inoperable. (1 hour) TS 3.6.1.8, Condition C, One Suppression Chamber-to-Drywell Vacuum Breaker not closed. (4 hours) TS 3.6.2.5 Condition A, Drywell to Suppression Chamber differential pressure not within limit. (24 hours)
	ATC	Continuously monitors RPV power, pressure, and water level.
End of Event 4		

Quad Cities	2016 NRC Scenario No. 1	Event No. 5	Page 1 of 2
Event Description: 1A Recirc Pump Trip			
Time	Position	Applicant's Actions or Behavior	
SIM OP: Trip the 1A Recirc Pump using malfunction RR01A: imf rr01a			
Key Parameter Response: RWL initially oscillates between 36 and 26 inches, Rx power drops to approx. 54%, Rx. pressure lowers to approx. 960 psig. Expected Annunciator(s): 901-4 A-1, 901-4 A-3, 901-4 A-5, 901-4 B-2, 901-5 E-8, 901-5 F-8 Automatic Actions: None			
	ATC	Reports the 1A Recirc Pump has tripped and refers to annunciator procedures.	
	SRO	Sets scram criteria at: Trip of 2 nd Recirc pump OR Indication of core instabilities.	
	SRO	Directs action of QCOA 0202-04, Reactor Recirc Pump Trip—Single Pump.	
	ATC	Monitors for oscillations in SRM period or LPRM/APRM levels.	
	ATC	Places the RWM in Power Reduction Mode and depresses Array Mode to latch all CRAM rods.	
	ATC	Inserts CRAM rods as needed to lower FCL and to avoid /exit Instability Regions I and II.	
	ATC/BOP	Verifies speed on operating Recirc Pump is < 78% and maintains pump motor current < 770 amps as indicated on 1-202-730B, PMP CUR.	
	ATC/BOP	Closes MO 1-202-5A, PMP DISCH VLV, then re-opens it after 5 minutes.	
	ATC/BOP	Verifies operating loop flow is < 49 Mlb/hr.	
	ATC/BOP	Monitor for 50°F differential temperature between Recirc Loops.	
	BOP	Monitors RPV bottom head temperature.	
	ATC/BOP	Dispatch EO to Bus 11 and 1A ASD to investigate.	
SIM OP ROLE PLAY: If dispatched, as EO, wait 3 minutes then report from Bus 11: “The breaker has tripped on overcurrent. I’ve contacted EM’s to assist.”			

Quad Cities 2016 NRC Scenario No. 1 Event No. 5 Page 2 of 2		
Event Description: 1A Recirc Pump Trip		
Time	Position	Applicant's Actions or Behavior
	SRO	Notifies QNE and Generation Dispatch of tripped Recirc Pump.
	BOP	Contacts Chemistry department and informs them of load drop of > 30%.
	SRO	Enters TS 3.4.1 Condition C and contacts Instrument Maintenance to apply APRM/RBM set point changes for single loop operation. TS
SIM OP ROLE PLAY: If contacted, as the QNE, after being briefed on the 1A Recirc Pump trip inform the caller that you: "Will implement the Single Loop Thermal Limits in Powerplex and review the control rod pattern for any adjustments that may be necessary."		
SIM OP ROLE PLAY: If contacted, as Chemistry Technician state that you : "Will start taking reactor coolant samples and analyzing for I-131 equivalent."		
SIM OP ROLE PLAY: If contacted, as Generation Dispatch, acknowledge the down power due to the Recirc Pump trip.		
SIM OP ROLE PLAY: If contacted, as Instrument Maintenance Supervisor, when contacted to apply APRM/RBM single loop set points state that: "You will brief a crew on QCIPM 0756-06 and have them report to the control room to adjust the APRM/RBM set points."		
End of Event 5		

Quad Cities 2016 NRC Scenario No. 1 Event No. 6/7/8/9 Page 1 of 5		
Event Description: LOCA—Recirc Loop A Discharge Pipe Break		
Time	Position	Applicant's Actions or Behavior
SIM OP: Insert a .1% break in the A Recirc Loop Discharge piping ramped over 5 minutes using malfunction RR11A: imf rr11a .1 5:		
Key Parameter Response: Drywell and Torus pressure/temperature rises, RPV water level lowers when injection sources are lost, RPV pressure lowers Expected Annunciator(s): 901-3 A-16, 901-3 G-15, 901-4 A-17, 901-4 B-17, 901-5 D-11, 901-5 B-10/B-15 Automatic Actions: Rx. scram, ECCS auto starts, ECCS load shedding		
	BOP	Acknowledges 901-3 A-16, PRI CMNT HIGH PRESSURE, alarm and reports rising Drywell pressure.
	SRO	Enters and directs actions of QCOA 0201-01. Sets scram criteria on high Drywell pressure.
	BOP	Attempts to locate and isolate leak. Checks Recirc pump seals, RBCCW alarms, PIC1-1640-11, CONTAINMENT PRESS for normal operation.
SIM OP NOTE: Verify trigger 1 goes true when Drywell pressure reaches 1.5 psig. If not, set it true with the following command: trg! 1		
	BOP	Starts all available Drywell cooling.
	BOP	Notifies Radiation Protection of elevated Containment pressure and evacuates the Reactor Building.
	SRO	Directs a manual reactor scram.
	ATC	Depresses both RX SCRAM CH A and CH B Pushbuttons. Places the Reactor Mode Switch to SHUTDOWN.
	ATC	Reports all rods in, RPV water level < 0 inches and recovering, RPV pressure < 1060 psig and controlled with Main Turbine Bypass Valves.
	SRO	Enters QGA 100 on low RPV water level. Re-enters QGA 100 and enters QGA 200 on high Drywell pressure.
	ATC	Carries out QCGP 2-3, Reactor Scram, actions.
	ATC/BOP	Verify auto actions for 0 in. RPV water level (Group III) and 2.5 psig Drywell pressure (Group II).

Quad Cities		2016 NRC Scenario No. 1	Event No. 6/7/8/9	Page 2 of 5
Event Description: LOCA—Recirc Loop A Discharge Pipe Break				
Time	Position	Applicant's Actions or Behavior		
	ATC/BOP	Reports Bus 11 and Bus 12 are NOT energized from Transformer 12. (Event 7)		
	ATC/BOP	Acknowledges 901-8 F-3, 4KV BUS OVRCUR TRIP, alarm and dispatches an EO to Busses 11 and 12 to investigate. (Event 7)		
SIM OP ROLE PLAY: If dispatched, wait 5 minutes, then as the EO report: “Bus 12 has an overcurrent target up and the Reserve Feed Breaker T-12 to Bus 11 did not close. I’ve contacted Electrical Maintenance to assist.”				
	BOP	Reports the U-1 EDG did NOT auto start, then manually starts the U-1 EDG by placing the control switch to START and verifies the following: <ul style="list-style-type: none">• U-1 EDG Cooling Water Pump starts• Voltage 3952 to 4368• Frequency 58.8 to 61.2 Hz. (Event 8)		
	SRO	Directs RPV water level band of 0 to +48 inches using Preferred Systems: HPCI/RCIC/SSMP.		
	ATC/BOP	Reports the RCIC Trip Throttle Valve has tripped and dispatches an EO to investigate. (Event 9)		
SIM OP ROLE PLAY: Wait 5 minutes then report back as the EO from the RCIC Room: “The RCIC Trip Throttle Valve linkage is damaged and cannot be reset.”				
	ATC/BOP	Starts HPCI and/or SSMP for injection and controls RPV water level within 0 to +48 in. band.		
	SRO	Directs an RPV cooldown at < 100°F/hr using main turbine bypass valves.		
	SRO	Directs actions of QGA 200, Primary Containment Control.		
	SRO	Directs BOP to spray the Torus when Torus pressure exceeds 2.5 psig.		
	BOP	Starts Torus sprays and monitors containment response.		
	BOP	Reports Torus pressure 5 psig and rising. Verifies Torus level below 17 ft.		

Quad Cities	2016 NRC Scenario No. 1	Event No. 6/7/8/9	Page 3 of 5
Event Description: LOCA—Recirc Loop A Discharge Pipe Break			
Time	Position	Applicant's Actions or Behavior	
	SRO	Checks the DSIL curve and verifies both Recirc pumps are tripped and Drywell Coolers are secured.	
CT1	SRO	Directs BOP to initiate Drywell Sprays.	
CT1	BOP	Starts Drywell Sprays and reports containment temperature and pressure are lowering.	
	BOP	Secures Drywell or Torus sprays before the respective volume reaches 0 psig.	
	SRO	Directs BOP to initiate Torus Cooling and monitor Torus temperature.	
	BOP	Starts Torus Cooling on one or both loops and monitors Torus temperature.	
	BOP	Reports containment Hydrogen level at 0%.	
SIM OP NOTE: When RPV water level is stabilized and Drywell sprays have been initiated, then trip the HPCI turbine using malfunction HP01 and modify the 1A Recirc Discharge Pipe break to .5%: imf hp01 mmf rr11a .5			
	BOP	Reports HPCI turbine has tripped and dispatches an EO to the HPCI room. (Event 9)	
SIM OP ROLE PLAY: If dispatched to the HPCI room, wait 5 minutes, then as the EO call back and report : “The HPCI turbine is not running, the Stop valve is closed, and the Emergency Oil pump is running. I'll call Mechanical and Electrical Maintenance for assistance.”			
	BOP	Reports RPV water level lowering.	
	SRO	Directs second CRD pump started for injection per QCOP 0300-16.	
SIM OP ROLE PLAY: If dispatched to valve in the 2 nd set of CRD suction filters, wait 2 minutes, then as EO report: “The 2nd set of CRD filters are valved in.”			
	BOP	Starts second CRD pump.	
	BOP	Reports RPV water level 0 inches and lowering.	
	SRO	Directs Alternate Systems for injection.	

Quad Cities		2016 NRC Scenario No.1	Event No. 6/7/8/9	Page 4 of 5
Event Description: LOCA—Recirc Loop A Discharge Pipe Break				
Time	Position	Applicant's Actions or Behavior		
	SRO	Directs ATC to inject with SBLC system.		
	ATC	Starts both SBLC pumps and reports system injection.		
CT2	SRO	Directs BOP to inhibit ADS.		
CT2	BOP	Inhibits ADS.		
	BOP	Reports RPV water level at -59 in. and lowering.		
	BOP/ATC	Reports Group I isolation on RPV low-low level.		
	SRO	Transitions to Alternate Level Control Leg of QGA 100 and verifies at least 2 Injection Subsystems (Detail F) are available.		
	BOP	Reports all Low Pressure ECCS Subsystems and Safe Shutdown Makeup Pump are available.		
	BOP	Bypasses 2/3 Core Height interlock after receiving permission from the Unit Supervisor.		
	BOP	Reports RPV water level at -142 inches.		
	SRO	Verifies all Injection Subsystems are lined up with pumps running.		
	SRO	Transitions to QGA 500-1 before RPV water level drops to -190 inches.		
	SRO	Verifies all rods are in.		
	SRO	Verifies Drywell pressure < 2.5 psig.		
	SRO	Directs BOP to maximize injection to the RPV.		
	BOP	Secures Containment Sprays and Torus Cooling.		
	SRO	Verifies Torus level is above 5 ft.		
CT3	SRO	Directs all 5 ADS Valves opened and switches left in Manual.		
CT3	BOP	Opens all 5 ADS Valves and leaves switches in the MAN position.		
	BOP	Confirms and reports all 5 ADS valves are open by acoustic monitor indication on the 901-21 panel.		
	BOP	Monitors RPV pressure and reports at 325 psig.		

Quad Cities	2016 NRC Scenario No.1	Event No. 6/7/8/9	Page 5 of 5
Event Description: LOCA—Recirc Loop A Discharge Pipe Break			
	BOP	Verifies all ECCS Subsystems inject at RPV pressure < 325 psig.	
	ATC	Monitors and reports RPV water level rising.	
	ATC	Reports RPV water level above -142 in. (TAF) and rising.	
	SRO	Directs BOP/ATC to establish RPV water level band of 0 to +48 in.	
	SRO	Directs BOP to secure/operate ECCS systems as necessary to restore and maintain RPV water level in band.	
	ATC/BOP	Report RPV water level above 0 inches and controlling in 0 to 48 in. band.	
SIMOP NOTE: When Blowdown has been performed and RPV water level restored in band, with concurrence of the Lead Examiner, place the simulator in FREEZE .			
End of Scenario.			

Exelon Nuclear

2016 ILT NRC Exam Scenario

Scenario Number:

NRC Scenario 2Revision Number: 00Date: 10/12/15Developed By: Raymond J. Venci/S/ 01/28/16

Instructor

Date

Validated By: Duane Haas /S/ 01/29/16

SME or Instructor

Date

Reviewed By: Jason Swain/S/ 02/04/16

Operations Representative

Date

Approved By: Raymond J. Venci/S/ 02/05/16

Training Department

Date

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Appendix D

Scenario Outline

Form ES-D-1

Facility: Quad Cities Scenario No.: **2016 NRC Scenario 2** Op-Test No.: ILT 14-1
 Examiners: _____ Operators: _____

Initial Conditions:

The plant is operating at 50% power. Power was lowered due to Load Following for Grid Stability. Work on the Nelson-345KV Junction is completed. The Unit is returning to full power. 1B Service Water Pump and 1A Stator Cooling Water pump are out of service for repair.

Turnover:

Reverse Main condenser flow and raise power to 100% per ReMA instructions.

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	Reverse Main Condenser flow
2	None	ATC R	Raise power after Load Following
3	RD02R2255	ATC C	Recoverable Stuck Rod / Raise CRD Drive Pressure (QCOA 0300-02)
4	NM10A	ATC I	RBM Channel 7 fails high TS
5	RM05B	SRO	"B" Drywell Rad Monitor Upscale Failure TS
6	dihs15401 close	BOP C	SJAE suction valves fail shut. BOP recovers them by QOA 901-7 A-14 actions.
7	TU02A	BOP C	Main Turbine high vibration (Leading to Turbine Trip)
8	RD 13A (Hydraulic ATWS)	Crew M	ATWS. No rod motion. The Crew will take actions per QGA 101 to control reactor power, level and pressure.
9	RP10A(B)	ATC C	The Group III (RWCU) fails to actuate. The ATC will manually isolate RWCU.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

ES-301-4 Quantitative attributes:

Total Malfunctions (5-8): **6**

Malfunction(s) after EOP (1-2): **E9**

Abnormal Events (2-4): **E3, 4, 6, & 7**

Major Transient(s) /E-Plan entry (1-2): **E8**

EOPs (1-2): **QGA 100 and 101**

EOP Contingencies (0-2): **1**

Critical Tasks (2-3): **4**

ES-301-5 Quantitative attributes:

BOP Normal: **E1**

ATC Reactivity (1 per set): **E2**

BOP I/C (4 per set): **E6 & 7**

ATC I/C (4 per set): **E3, 4 & 9**

SRO-I I/C (4 per set inc 2 as ATC):

E3, 4, 6, 7, 9

SRO Tech Spec (2 per set): **E4 & 5**

ALL Major Transients (2 per set) **E8**

SUMMARY:

- Initial conditions:
 - The plant is operating at 58% power. Power was lowered due to Load Following for Grid Stability. There was work done on the Nelson-345KV Junction. All work was completed. The Unit is returning to full power. 1B Service Water Pump and 1A Stator Cooling Water pump are out of service for repair.
- Event 1: When Engineering is ready, the BOP operator reverses Main Condenser Flow.
- Event 2: Raise power with control rods and recirculation flow to 100% power.
- Event 3: Recoverable Stuck Rod / Raise CRD Drive Pressure. The ATC and SRO respond per QCOA 0300-02. The control rod is freed after raising drive water pressure per the procedure.
- Event 4: RBM Channel 7 fails high. The ATC and SRO Respond per QCAN 901-5 A-7 to bypass the faulty RBM after the SRO references Technical Specification 3.3.2.1 Condition G.
- Event 5: "B" Drywell Rad Monitor Upscale Failure (TS). The BOP and SRO respond per QCAN 901-56 A-1 and Technical Specifications 3.3.3.1 Condition A and 3.3.6.1 Condition A.
- Event 6: The on-line SJAE suction valves fail shut due to an intermittent failure. The failure is revealed by annunciator 901-7 A-14 and valve position indication. The BOP will be able to recover the SJAEs by carrying out the QCAN actions and re-opening the valves to maintain Main Condenser vacuum.
- Event 7: The BOP responds to Main Turbine high vibration per QCAN 901-7 D-2 and QCOS 5600-01. The BOP has several actions to complete in an attempt to mitigate the effects of the high vibrations. The vibrations will continue to raise until the crew scrams the reactor and trips the Main Turbine.
- Event 8: When the ATC inserts a manual scram no control rods will insert. The crew will recognize they are in a hydraulic ATWS and enter QGA 100, "RPV Control" and then they will rapidly transition to QGA 101 "RPV Control (ATWS)". The crew will attempt to insert control rods per QCOP 0300-28, but they will have little success beyond driving individual driving rods. The SRO will enter the Level/Power Control section of QGA 101 and lower reactor level to control reactor power.
- Event 9: After entry into QGA 101, the Group III (RWCU) will fail to actuate when SBLC is started. The ATC will manually isolate RWCU.
- Approximate Run Time: 1.5 Hours

CRITICAL TASKS:

Critical task #1: With a reactor scram required and the reactor not shutdown, TAKE ACTION TO REDUCE POWER by injecting boron (prior to exceeding 110°F torus temperature) and/or inserting control rods, to prevent exceeding primary containment design limits. (BWROG RPV-6.1 ATWS PWR/LVL S/D REACTOR)

Critical task #2: With a reactor scram required and the reactor not shutdown, and conditions for ADS blowdown are met, INHIBIT ADS to prevent an uncontrolled RPV depressurization, to prevent causing a significant power excursion. (BWR RPV-6.2 ATWS PWR/LVL INHIBIT ADS)

Critical task #3: During an ATWS with conditions met to perform power/level control, TERMINATE AND PREVENT INJECTION, with the exception of boron, CRD and RCIC into the RPV until conditions are met to re-establish injection. (BWROG RPV-6.3 PWR/LVL TERM/PREVENT)

Critical task #4: When conditions are met to re-establish injection, use available injection systems to MAINTAIN RPV water level above the Minimum Steam Cooling RPV Water Level (-190"). (BWROG RPV-6.4 ATWS PWR/LVL RESTORE RPV LVL)

EXERCISE PERFORMANCE OBJECTIVES

Objective	Objective Description
SR-0001-P11	Given a reactor plant with an ATWS, take action to reduce heat input into the containment in accordance with QGA 101. (SOER 83-8 r11) (ATWS is a key event in 1 of the 100 most probable PRA Core Damage Sequences)
SR-0001-P13	Given a reactor plant with an ATWS and conditions are met to re-establish RPV injection during power/level control, use Preferred ATWS Systems (QGA Detail G) to attempt to maintain RPV water level between -190 inches and the level to where it was lowered in accordance with QGA 101.
SR-0001-P45	Given a reactor plant in a QGA condition, verify the proper actuation of containment isolations and ECCS and emergency DG starts in accordance with QGA 100 or QGA 101.
SR-0002-P03	Given a reactor plant at power with a reactor scram, place the plant into a stable condition in accordance with QCGP 2-3.
SR-0002-P04	Given a reactor plant at power, perform a power change discernible on neutron monitors using control rods in accordance with QCOP 0280-01, QCGP 3-1 and QCGP 4-1.
SR-0203-P07	Given a reactor plant in a QGA condition, inhibit ADS in accordance with QGA 100 or QGA 101. (Important PSA task / Inhibiting ADS terminates 5 of top 200 Core Damage Sequences)
SR-0300-P05	Given a reactor plant during a startup with a stuck control rod, restore the ability to drive the control rod or declare the rod inoperable in accordance with QCOA 0300-02.
SR-0302-K26	EVALUATE given key Control Rod Drive parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s): c. Stuck Rod
SR-0700-P10	Given an operating reactor plant with control rod moves occurring to adjust FCL, operate and monitor the RBM in accordance with QCOP 0700-05.
SR-1100-P02	Given a reactor plant with an ATWS, inject boron prior to exceeding 110 degrees torus water temperature OR if core instability is observed in accordance with QGA 101 and QCOP 1100-02. (Important PRA Operator Action - starting SBLC terminates 1 of the top 100 most probable Core Damage Sequences and has a RAW of 17.3)
SR-1603-K32	Given Primary Containment Isolation (PCI) System operability status OR key parameter indications, various plant conditions and a copy of Tech Specs, DETERMINE Tech Spec compliance and required actions, if any.
SR-3300-P09	Given a reactor plant at power with a loss of condenser vacuum, take action to attempt to locate and correct the cause for lowering vacuum in accordance with QOA 3300-02 and/or QOA 5450-05. (PRA Initiating Event %TC - Loss of Vacuum accounts for 4.2% of total CDF and initiates 4 of the top 100 Core Damage Sequences)

EXERCISE PERFORMANCE OBJECTIVES

Objective	Objective Description
SR-4400-P02	Given an operating reactor plant, reverse main condenser circ water flow in accordance with QCOP 4400-09.
SR-5600-K20	Given a Main Turbine and Auxiliary Systems operating mode and various plant conditions, EVALUATE the following Main Turbine and Auxiliary Systems indications/responses and DETERMINE if the indication/ response is expected and normal. d. Turbine eccentricity, vibrations and bearing metal temperatures

Simulator setup:

1. Reset to IC-19 (Approximately 50% power).
2. Go to **RUN**.
3. Verify the following RWM Sequence is loaded: 4PHESU
 - a. Mark up the Control Rod Move Sheet to reflect rod step 30 two rods withdrawn to target out
5. Verify the North SJAE suction valves are open

(Commands to be utilized during this scenario are contained in the CAEP file:
2016 NRC Scenario 2.cae)

5. Insert Commands for setup:

imf rd02r2255 00 stick control rod 38-31 at position 00
trgset 1 'rdpdrivedelta.ge.340' Set trigger 1 true when CRD pressure exceeds 340psid
trg 1 'dmf rd02r2255' Delete stuck rod on trigger 1

Group III Failures

imf rp10A Group III failure

imf rp10B Group III failure

6. Verify the following commands for scenario performance:

SJAE suction valve closure

trgset 14 'zloil15402asjae(1).and.zloil15401asjae(1)' triggers for SJAE closure

trg 14 'dor dihs15401' Delete override on SJAE Control Switch

ior dihs15401 close Close SJAE suction with override

Malfunctions

imf nm10a 100 RBM 7 Fails Upscale

imf rm05a 100 5: A Drywell Rad Monitor Upscale Failure, with a five minute ramp

imf rd13a 100 Hydraulic ATWS

imf rd13b 100 Hydraulic ATWS

imf tu02d 50 15: Main Turbine High Vibrations

imf tu02c 30 15: Main Turbine High Vibrations

imf tu02e 30 15: Main Turbine High Vibrations

In plant support activities

irf rd04r closed Close the CRD 25 Valve

irf qg09r 1 Bypass isolations per QCOP 0250-02

irf qg08r 1 Bypass all reactor scrams

irf qg14r 1 Pull the ARI fuses in the 2201-70A and 2201-70B panels in Aux Electric Room

7. Take the following equipment OOS (hang OOS Card):
 - 1A SCW Pump
 - Protect the 1B SCW pump with Protected Equipment ring
 - 1B SW Pump
8. Complete the following Control Panel setup items:
 - Verify Main Condenser Circ Water Flow is South (**North** SJAE suction open)
 - Verify the LOCA TRIP ENABLED label above the 1C Circ Water Pump.
 - Display the Power/Flow Map on Monitor 3.
 - Clear all SBO Panel alarms.
9. Provide a current revision of the following procedures, signed off as specified:
 - QCOP 4400-09 (no steps signed off)
 - QCGP 3-1 marked off through step F.3.d.
10. Provide scenario 2 REMA
 - Withdraw rods to 95% FCL
 - Raise core flow to 98 Mlbm/hr
 - Withdraw rods to 100% FCL
11. Perform the applicable steps of TQ-QC-201-0113 "Simulator Exam Security Actions Checklist".
12. Ensure (1) orange ring is available to provide equipment status.
13. Ensure 2 EST's are available to provide equipment status.

LIST OF POTENTIAL PROCEDURES**Annunciator Procedures**

- 901(2)-5 A-7, RBM HIGH OR INOP, Rev. 5
- 901(2)-5 C-3, ROD OUT BLOCK, Rev. 11
- 901(2)-5 C-6 APRM DOWNSCALE, Rev. 5
- 900-56 A-1 DRYWELL HIGH RAD CONC, Rev. 11
- 900-7 A-14, AIR EJECTOR NORTH SUCTION VALVES CLOSED, Rev. 10
- 901(2)-7 D-2 UNIT 1 TURBINE GENERATOR BEARING HIGH VIBRATION, Rev. 6

QCGP 1-1, Normal Unit 1 Startup, Rev. 104

QCGP 2-3, Reactor Scram, Rev. 84

QCGP 4-1, Control Rod Movements And Control Rod Sequence, Rev. 46

QCOA0300-02, Inability to Drive A Control Rod: Control Rod Stuck, Rev. 21

QCOA0700-03, Loss of Neutron Flux Indication. Rev. 9

QCOA5600-01, Main Turbine High Vibration, Rev. 16

QCOP 1000-30, Post-Accident RHR Operation, Rev. 31

QCOP 300-28, Alternate Control Rod Insertion Rev. 31

QCOP 4400-09, Circulating Water System Flow Reversal, Rev. 28

QCOP1100-02, Injection of Standby Liquid Control, Rev. 12

QCOS 1600-06, ECCS AND Primary Containment Isolation Trip Instruments Outage Report, Rev. 21

QGA 100, RPV Control, Rev. 10

QGA 101, RPV Control (ATWS), Rev. 14

QOP 0700-05, Rod Block Monitor, Rev. 16

CREW TURNOVER**Plant Conditions:**

- a.) Unit 1 is at 50% power.
Power was lowered due to Load Following for Grid Stability. There was work done on the Nelson-345KV Junction. All work was completed. The Unit is returning to full power.
- b.) Unit 2 is at 100% power.
- c.) Technical Specification limitations:
 - (1) Unit 1: None
 - (2) Unit 2: None
- d.) On Line Risk is GREEN.
- e.) Fire Risk is BLUE.
No Risk Management Actions (RMA) in place. Evolution less than 48 hours duration.

2.) Significant problems/abnormalities:

- a.) 1A Stator Cooling Water pump is OOS for replacement. 1B Stator Cooling Water pump is protected.
- b.) 1B SW pump is OOS for packing replacement. The expected duration is less than 48 hours.

3.) Evolutions/maintenance for the oncoming shift:

- a.) Engineering is doing an evaluation on Circ Water and wants to monitor some parameters during Condenser Flow Reversal. When they report that they are ready, reverse Main Condenser Flow per QCOP 4400-09. Backpressure is not expected to exceed 6" Hg. All involved personnel have been briefed on the evolution. Replacement fuse is in the Main Control Room.
- b.) Raise reactor power to 100% with rods and recirc.
 - i. Withdraw rods to 95% FCL
 - ii. Raise core flow to 98 Mlbm/hr
 - iii. Withdraw rods to 100% FCL

Quad Cities Scenario No.: 2 Event No.: 1 Page 1 of 1		
Event Description: Reverse Main Condenser Flow from South to North		
Time	Position	Applicant's Actions or Behavior
SIMOP ROLE PLAY: Contact the Unit Supervisor as the EO standing by with Engineering (phone 2300): "Engineering is ready to monitor Circ Water, Condenser Flow Reversal may proceed."		
	SRO	Directs Main Condenser flow reversal per QCOP 4400-09.
SIMOP ROLE PLAY: As necessary, provide the appropriate acknowledgements as the Equipment Operator stationed at MCC 16-3 or Engineering personnel.		
	BOP	Establish communications with the Equipment Operator stationed at MCC 16-3.
	BOP	(Continuous) Monitors Condenser Backpressure and Condensate Temperatures.
	BOP	Verifies OFFGAS FLOW TO MAIN CHIMNEY on FR-1-5440-7 (901-54 panel) is >15 scfm.
	BOP	Verifies Annunciator 901-7 C-1, "COND FLOW REV VLVS ON LOCAL CONT," is NOT in alarm.
	BOP	Opens South SJAE Suction valves using the Test switch on the 901-7 panel by placing the switch to the "SOU" position.
	BOP	Places the Circulating Water Flow Selector switch to the "NORTH" position when the South SJAE valves are fully open.
	BOP	Verifies the following: <ul style="list-style-type: none"> · SJAE Suction valves change over · Condenser differential pressure has reversed and vacuum is stable
	ATC	Monitors reactor and RPV parameters.
End of Event 1		

Quad Cities Scenario No.: 2 Event No.: 2		Page 1 of 1
Event Description: Raise Reactor power with control rods		
Time	Position	Applicant's Actions or Behavior
SIMOP ROLE PLAY: If the crew does not promptly begin the task, call the control room as the Shift Manager and prompt them to begin.		
LEAD EVALUATOR ROLE PLAY: If the crew decides to verify they are within the thermal limits, role play as the QNE and state: "Thermal limits have been verified." Role Play as the Qualified Verifier (QV) as necessary. If the crew requests a Reactivity SRO, state: "No one is available to perform this function."		
	SRO	Directly supervises control rod moves and reactor recirculation adjustments. Directs the RO to begin to raise power to 100%..
	ATC	(CONTINUOUS) Monitors reactor parameters.
	ATC	Selects an in-sequence control rod.
	ATC	On the RWM verifies proper rod is selected, it's current position and bounds.
	ATC	Communicates to the QV. "Ready to Withdraw Rod P-8 from position 00 to position 48 using continuous withdrawal."
	QV/BOP	Replies: "Rod P-8 is selected. Understand withdrawing Rod P-8 from position 00 to position 48 using continuous withdrawal."
	ATC	Replies: "That is correct".
	ATC	Verifies control rod and moves it to the desired position.
	ATC/BOP	Place keeps rod moves in the rod movement book.
	ATC	Repeats above steps as necessary for the next control rods
	BOP	Monitors balance of plant parameters.
End of Event 2		

Quad Cities	Scenario No.: 2	Event No.: 3	Page 1 of 1
Event Description: Recoverable Stuck Rod / Raise CRD Drive Pressure			
Time	Position	Applicant's Actions or Behavior	
EVALUATOR NOTE: Control Rod F-14 will not move from position with normal drive water pressure; CRD Drive Pressure indication is on 901-5, 1-340-4. Expected Annunciator(s): None Automatic Actions: None			
	ATC	Reports CR F-14 will not move.	
	SRO	Directs RO to perform the actions of QCOA 0300-02.	
	ATC	Verifies no Rod Block exists.	
	ATC	Verifies no RWM select block exists.	
	ATC	Verifies the proper control rod is selected.	
	ATC	Raises CRD drive water pressure in 50 psig increments by throttling closed on the 1-302-8 valve.	
SIMOP NOTE: When CRD drive water pressure is greater than 340 psid, verify Event Trigger 1 goes true to delete malfunction dmf rd02255 .			
	ATC	Attempts to withdraw Control Rod F-14 and identifies normal control rod movement.	
	ATC	Continues normal control rod withdrawal.	
	ATC	Restores drive water pressure to normal.	
	QV/BOP	Provides peer check as required.	
	BOP	Monitors balance of plant parameters.	
LEAD EVALUATOR NOTE: If the crew does not continue to raise power, prompt the crew. This is necessary for moving to the next event.			
End of Event 3			

Quad Cities	Scenario No.: 2	Event No.: 4	Page 1 of 1
Event Description: RBM Channel 7 fails high			
Time	Position	Applicant's Actions or Behavior	
SIMOP NOTE: While rod P-10, is being withdrawn, initiate the RBM Upscale malfunction. (Malfunction expert command: imf nm10a 100)			
Key Parameter Response: Rod Out Permissive light is OFF; RBM CH 7 indicates upscale Expected Annunciator(s): 901-05 A-7 RBM HIGH OR INOP 901-05 C-3 ROD OUT BLOCK Automatic Actions: Rod Block			
	ATC	Responds to unexpected annunciators and informs the Unit Supervisor.	
	ATC	Determines RBM channel 7 is UPSCALE.	
	ATC	Verifies that a ROD BLOCK is in effect.	
	BOP	May verify RBM 7 is upscale at the 901-37 panel meter.	
	ATC	Verifies the correct rod was being withdrawn.	
	ATC	May depress the PUSH SETUP button.	
	ATC	May attempt to re-null the RBM by selecting an edge rod and then re-selecting the desired rod.	
	SRO	Contacts Instrument Maintenance to investigate the upscale failure of RBM 7.	
SIMOP ROLE PLAY: As Instrument Maintenance, inform the Unit Supervisor you will: "Start a work package to troubleshoot and replace components as needed. It will take approx. 2 hours to complete the package and 1 shift to complete the work."			
	SRO	Directs RBM 7 bypassed per QOP 0700-05.	
	ATC	Bypasses RBM 7 by placing the RBM BYPASS joystick to the CH 7 position and logs the time.	
	SRO	Enters TS 3.3.2.1 Control Rod Block Instrumentation, Condition A for one rod block monitor inoperable.	
EVALUATOR NOTE: The crew may return to Event 3 to continue the reactivity manipulation.			
End of Event 4			

Quad Cities	Scenario No.: 2	Event No.: 5	Page 1 of 1
Event Description: Drywell Rad Monitor Failure			
Time	Position	Applicant's Actions or Behavior	
SIMOP NOTE: When directed by the Lead examiner, start the Drywell Rad Monitor Failure event (expert command: imf rm05a 100 5:)			
Key Parameter Response: 1-2419A Drywell Radiation Monitor indicating full upscale Expected Annunciators: 901-5 A-8, GROUP 2 ISOL CH TRIP 901-55 A-1, DRYWELL HIGH HIGH RAD CONC Automatic Action: ½ Group 2 Isolation			
	BOP	Acknowledges annunciator 901-55 A-1, DRYWELL HIGH HIGH RAD CONC and reports the 1-2419A Drywell radiation monitor is indicating full upscale.	
	ATC	Acknowledges annunciator 901-5 A-8, GROUP 2 ISOL CH TRIP and refers to annunciator procedure.	
	SRO	Confirms the 1-2419B Drywell radiation monitor is indicating normally (approximately 3-4 R/hr).	
EVALUATOR ROLE PLAY: If the BOP goes to confirm the PCI Relays have dropped out: CUE the following on Panel 901-15 <ul style="list-style-type: none"> • Relay 595-104A dropped out • Relay 595-104C dropped out 			
	BOP	Informs RP of the failed Drywell radiation monitor.	
SIMOP ROLE PLAY: As RP, inform the Control Room that you will: “Implement compensatory actions for the Drywell Radiation Monitor.” As IMD, if informed of the failed DW radiation monitor, state you will: “Start a work package.”			
	SRO	Enters the following Technical Specifications for an inoperable Drywell Radiation monitor: <ul style="list-style-type: none"> • PCI 3.3.6.1, Condition A, Place the Channel in Trip Within 24 Hours • PAM 3.3.3.1, Condition A, Restore Required Channel to Operable Status Within 30 Days 	
End of Event 5			

Quad Cities Scenario No.: 2 Event No.: 6 Page 1 of 1		
Event Description: SJAE Suction Valve Closure		
Time	Position	Applicant's Actions or Behavior
SIMOP NOTE: When directed by the Lead Examiner, insert override to cause the SJAE suction valves to shut with the following command (The command is on page 3 of the CAEP file): ior dihs15401 close		
Key Parameter Response: SJAE suction valves close Expected Annunciator(s): 901-7 B-14, AIR EJECTOR SOUTH SUCTION VALVES CLOSED Automatic Actions: None		
	BOP	Announces Air Ejector suction valve alarm 901-7 B-14
	SRO	Directs BOP to perform actions of QCAN 901-7 B-14
	SRO	Sets scram criteria for high condenser backpressure
	BOP	Verifies SJAE valves closed
	BOP	Verifies Circ Water Flow from South
	BOP	Attempts to open SJAE suction valves by placing SJAE SUCT VLV C/S on Panel 901-7 to OPEN.
	BOP	Reports SJAE suction valves are open
End of Event 6		

Quad Cities	Scenario No.: 2	Event No.: 7	Page 1 of 1
Event Description: Main Turbine High Vibration			
Time	Position	Applicant's Actions or Behavior	
SIMOP NOTE: When directed by the Lead Examiner, insert malfunctions to cause high Main Turbine vibrations on 3 bearings and the SDV hydraulic locks: imf rd13a 100 imf rd13b 100 imf tu02d 50 15: imf tu02c 30 15: imf tu02e 30 15:			
Key Parameter Response: Main Turbine vibrations began to rise Expected Annunciator(s): 901-7 D-2, UNIT 1 TURBINE GENERATOR BEARING HIGH VIBRATION Automatic Actions: None			
	BOP	May notice Main Turbine vibrations rising	
	BOP	Announces alarm 901-7 D-2 and reports bearing 4 is at 7 mils	
	SRO	Directs BOP to perform actions of QCAN 901-7 D-2.	
	SRO	Sets scram criteria for high Main Turbine vibrations of 10 mils	
	BOP	Verifies high vibration is valid by observing bearings 3 and 5 also have high vibrations	
	BOP	Refers to QCOA 5600-01	
	BOP	Reports when bearing 4 reaches 10 mils	
	ATC	Inserts manual scram	
	BOP	Trips the Main Turbine	
Lead Evaluator Note: ATWS actions are contained in Events 8 and 9.			
End of Event 7			

Quad Cities Scenario No.: 2 Event No.: 8 Page 1 of 3		
Event Description: ATWS		
Time	Position	Applicant's Actions or Behavior
SIMOP NOTE: Be prepared to verify the Group III isolation failed.		
	ATC	Reports control rods did <u>NOT</u> insert
	SRO	Enters QGA 100, transitions to QGA 101
	ATC	Places the Mode Switch in SHUTDOWN
	ATC	Arms and depresses ARI
	SRO	Directs BOP to inhibit ADS
CT2	BOP	Inhibits ADS
	SRO	Directs BOP to place both Core Spray pumps in PTL
	BOP	Places both Core Spray pumps in PTL
	SRO	Directs actions for Power Leg of QGA 101
	SRO	Directs control rod insertion per QCOP 0300-28
	ATC	May dispatch EO to close the 1-301-25, U-1 CRD CHARGING WTR SV if control rods cannot be inserted
SIMOP ROLE PLAY: If requested as EO, close the 1-301-25 valve using: irf rd04r close		
CT1	ATC	Inserts control rods spiraling outward from center of core
	SRO	Directs actions of QGA 101 Level Control Leg
	SRO	Directs verification of auto actions and isolations for 0 inches RPV water level
	BOP	Verifies auto actions and isolations for 0 inches RPV water level
	SRO	Directs isolations bypassed per QCOP 0250-02
SIM OP ROLE PLAY: If requested, bypass isolations per QCOP 0250-02: irf qg09r 1 Wait 1 minute and report completion		

Quad Cities	Scenario No.: 2	Event No.: 8	Page 2 of 3
Event Description: ATWS			
Time	Position	Applicant's Actions or Behavior	
	BOP	Contacts EO to bypass RPV low water level MSIV and high offgas radiation isolations per QCOP 0250-02	
	ATC	Directs operator to bypass all reactor scrams per QCOP 0300-28	
SIMOP ROLE PLAY: If requested, wait approx. 2 minutes and bypass all reactor scrams using the following command, then report back: irf qg08r 1			
	ATC	(If RPV Water Level drops below -59 inches) Dispatches EO to de-energize ARI by removing fuses in 2201-70A and 2201-70B panels per QCOP 0300-28	
SIMOP ROLE PLAY: If requested as EO, wait 2 minutes, then pull the ARI fuses in the 2201-70A and 2201-70B panels in Aux Electric Room using the command below and report back: irf qg14r 1			
	ATC	Directs personnel to individually scram control rods from the 901-16 panel	
SIMOP ROLE PLAY: Attempt to individually scram 4 control rods (one from each bank), then contact the ATC operator and report: "Control rods will NOT insert from the 901-16 panel."			
LEAD EVALUATOR NOTE: The ATC will inject SBLC as part of the "Immediate Operator Actions" following the failure of the manual scram. The SRO will also back up this action by directing actions per QGA 101.			
CT1	SRO	Directs SBLC Injection prior to exceeding 110°F Torus Water Temperature	
CT1	ATC	Initiates SBLC Injection as directed (See Event 9)	
	SRO	Verifies reactor power >5% and RPV water level > -35"	
CT3	SRO	Directs all injection except Boron, CRD, and RCIC terminated and RPV water level lowered to at least -35". (Terminate and prevent from 901-3 and 901-5)	
CT3	BOP	Performs Terminate and Prevent Injection from Panel 901-3	
	BOP	Places HPCI in Trip-Latch	

Quad Cities Scenario No.: 2 Event No.: 8 Page 3 of 3		
Event Description: ATWS		
Time	Position	Applicant's Actions or Behavior
	BOP	Verifies RHR Discharge Pressure < Reactor Pressure or places RHR Pumps in Pull-To-Lock
CT3	ATC	Performs Terminate and Prevent Injection from Panel 901-5 <ul style="list-style-type: none"> Places A and B Feed Reg Valve Controllers in MANUAL and reduces output to 0 (zero) Places the Low Flow Feed Reg Valve Controller in MANUAL and reduces output to 0 (zero)
	ATC	Closes A and B Feed Reg Valve Isolations, MO-1-3206-A/B.
	ATC/BOP	Reports level when Rx power < 5%, RPV water level at TAF or ADS valves are closed with DW pressure < 2.5 psig.
CT4	SRO	Directs RPV water level maintained between –190" and the level to which it was lowered
CT4	ATC/BOP	(CONTINUOUS) Maintains level in the directed band with Preferred Injection systems
End of Event 8		

Quad Cities	Scenario No.: 2	Event No.: 9	Page 1 of 1
Event Description: Group III (RWCU) Isolation Failure			
Time	Position	Applicant's Actions or Behavior	
	ATC	Reports SBLC tank level and selects a SBLC pump for injection by placing the control switch to SYS 1 <u>or</u> SYS 2	
	ATC	Verifies and reports the following:	
	ATC	Squib A/B light is off	
	ATC	Flow Light is on	
	ATC	RWCU System failed to isolate	
CT1	ATC	Manually isolates the RWCU system by closing the MO 1-1201-2 and MO 1-1201-5. (May also close the 1-1201-80, but it is not required.)	
	ATC	SBLC Tank level lowering	
	ATC	Pump discharge pressure slightly high than reactor pressure	
	ATC	Annunciator 901-5 H-6 SBLC Squib valve circuit failure is on	
	ATC	Neutron flux is decreasing	
	ATC	Monitors SBLC Tank level for 16% decrease (in approximately 21 minutes)	
	BOP	Performs other operator actions of QGA 101	
End of Event 9			
SIMOP: When available injection systems are maintaining RPV water level above the Minimum Steam Cooling RPV Water Level (-190"). and/or at the discretion of the Lead Examiner, place the simulator in FREEZE .			

(Final)

Exelon Nuclear

2016 ILT NRC Exam Scenario

Scenario Number:

NRC Scenario 3Revision Number: 00Date: 12/18/15

Developed By: Raymond J. Venci/S/ 01/28/16
Instructor Date

Validated By: Duane Haas /S/ 01/29/16
SME or Instructor Date

Reviewed By: Jason Swain/S/ 02/04/16
Operations Representative Date

Approved By: Raymond J. Venci/S/ 02/05/16
Training Department Date

Appendix D

Scenario Outline

Form ES-D-1

Facility: Quad Cities Scenario No.: **2016 NRC Scenario 3** Op-Test No.: ILT 14-1
 Examiners: _____ Operators: _____

Initial Conditions:

The plant is operating at 100% power. Maintaining full power. 1B Service Water Pump and 1A Stator Cooling Water pump are out of service for repair.

Turnover:

Swap running EHC pumps for upcoming maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	Swap running EHC pumps per QCOP 5650-01 Step F.4
2	SW02A (degraded)	BOP C	1A Service Water pump degrades resulting in swapping to standby pump per QCAN 912-1 B-3.
3	None (cued)	BOP C	1C RFP bearing failure requiring shutdown of the 1C RFP
4	None	ATC R	Emergency power reduction, per QCGP 3-1 step F.1, to secure 1C RFP
5	NM08A	ATC I	APRM channel 1 fails "As Is" during Emergency Power reduction TS
6	zdihs11300rm(1)	BOP C	RCIC spurious start and subsequent manual trip from MCR TS
7	HP12 HP13 CR01 CR02	CREW M	Fuel failure and HPCI steam line break. Crew enters QGA 300 and transitions to QGA 500-1 when two areas exceed Max Safe radiation levels.
8	NM03A-D NM07A-H	ATC I	SRMs and IRMs fail to automatically insert. The ATC will manually insert them per QCGP 2-3 and QCOP 0700-01 guidance
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			
ES-301-4 Quantitative attributes: _____ Total Malfunctions (5-8): 6 Malfunction(s) after EOP (1-2): E8 Abnormal Events (2-4): E2, 3, 5, & 6 Major Transient(s) /E-Plan entry (1-2): E7 EOPs (1-2): QGA 100, 300, and 500-1 EOP Contingencies (0-2): 1 Critical Tasks (2-3): 2		ES-301-5 Quantitative attributes: _____ BOP Normal: E1 ATC Reactivity (1 per set): E4 BOP I/C (4 per set): E2, 3, & 6 ATC I/C (4 per set): E5 & 8 SRO-I I/C (4 per set inc 2 as ATC): E2,3,5,6,8 SRO Tech Spec (2 per set): E5 & 6 ALL Major Transients (2 per set) E7	

SUMMARY:

- Initial conditions:
 - Unit 1 is at 100% power holding load
 - 1B Service Water Pump and 1A Stator Cooling Water pump are out of service for repair.
- Event 1: The BOP swaps running EHC pumps per QCOP 5650-01 step F.4 from 1A EHC running to 1B EHC pump.
- Event 2: 1A Service Water pump degrades resulting in swapping to a standby pump per QCAN 912-1 B-3.
- Event 3: EO on Rounds reports the 1C RFP is very noisy and appears to have a rapidly degrading outboard pump bearing. The EO and FS are concerned the 1C RFP will fail catastrophically. The BOP will shutdown the 1C RFP per QCOP 3200-05
- Event 4: Emergency power reduction to secure 1C RFP. The ATC will make an Emergency Power Reduction per QCGP 3-1 Step F.1. The ATC will lower power with recirc and rods to ≤ 2511 MWth (~85%).
- Event 5: APRM channel 1 fails "As Is" during Emergency Power reduction. The ATC will determine APRM channel 1 has failed at ~ 100 power. The SRO will review TS and determine one APRM inoperable is a Tracking Only LCO. The ATC will bypass APRM 1 when directed by the SRO per QCOP 0700-04 Step F.3
- Event 6: RCIC will spuriously start. The BOP will verify no initiation signal exists and the BOP will trip RCIC per QCOP 1300-05 Step F. The SRO will determine RCIC is inoperable and enter the TS LCO.
- Event 7: A fuel failure leads to scram on high off gas radiation. When the reactor scrams, the fuel failure will worsen and HPCI will develop a steam leak. The combination of the fuel failure and steam leak will cause the crew to enter QGA 300, Secondary Containment Control and subsequently QGA 500-1, RPV Blowdown.
- Event 8: After the scram the SRMs and IRMs will fail to automatically insert. The failure will be revealed when the ATC carries out the actions of QCGP 2-3 Attachment 1. The ATC will manually insert them per QCGP 2-3, QCOP 0700-01, and QCOP 0700-02 guidance.
- Approximate Run Time: 1.5 Hours

CRITICAL TASKS:

Critical Task #1: The Crew will take action to isolate the RPV and reduce the release of radioactivity by manually closing the MSIV's, Main Steam drains and/or verifying the Offgas System is isolated as required.

Critical task #2: Given an operating reactor plant with a primary system discharging into the reactor building and the discharge cannot be isolated, INITIATE an emergency depressurization when two or more areas exceed the maximum safe operating levels of the same parameter (radiation, temperature, or water level).

EXERCISE PERFORMANCE OBJECTIVES

Objective	Objective Description
SR-0001-P42	Given a reactor plant with a primary system discharging into the reactor building and the discharge cannot be isolated, verify/initiate an emergency depressurization when two or more areas exceed the maximum safe operating levels of the same parameter (radiation, temperature, or water levels) in accordance with QGA 300 and QGA 500-1.
SR-0001-P45	Given a reactor plant in a QGA condition, verify the proper actuation of containment isolations and ECCS and emergency DG starts in accordance with QGA 100 or QGA 101.
SR-0002-P03	Given a reactor plant at power with a reactor scram, place the plant into a stable condition in accordance with QCGP 2-3.
SR-0002-P04	Given a reactor plant at power, perform a power change discernible on neutron monitors using control rods in accordance with QCOP 0280-01, QCGP 3-1 and QCGP 4-1.
SR-0202-P34	Given U1 reactor plant in operation with the reactor recirc system in dual loop operation, take actions to perform a manual speed runback from the 901-4 panel using the 10% manual runback pushbutton IAW QCOP 0202-03
SR-0700-P01	Given a reactor plant during a reactor startup or shutdown, operate the SRM and IRM subsystems in accordance with QCGP 1-1 or QCGP 2-1 and QCOP 0700-01 and QCOP 0700-02.
SR-0700-P07	Given an operating reactor plant with an APRM failure, take actions to bypass the failed APRM and meet TS requirements in accordance with QCOP 0700-04 and QCAP 0230-19. (SOER 90-3 r1)
SR-1300-K26	EVALUATE given key RCIC System parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s): <ul style="list-style-type: none"> a. Inadvertent auto start b. Failure to auto start c. Backleakage past discharge check
SR-1700-P03	Given a reactor plant at power and a fuel clad failure or high activity in off-gas, take action to reduce the release in accordance with QCOA 1700-05 or QCOA 1700-04.
SR-3200-P02	Given a reactor plant during a startup, start the first reactor feed pump in accordance with QOP 3200-02.

EXERCISE PERFORMANCE OBJECTIVES

Objective	Objective Description
SR-3900-P02	Given a reactor plant at power when a loss of service water occurs, take action to scram and control RPV parameters in accordance with QCOA 3900-01, 3700-01 and 3800-03. (PRA Initiating Event %TSW, Loss of Service Water, accounts for 20.3% of total CDF and initiates 14 of the top 100 Core Damage Sequences) (Loss of SW / SW ruptures accounts for 43.6% of total CDF and initiates 32 of the top 100 Core Damage Sequences including the top 4)
SR-5650-K21	<p>Given a Main Turbine Control - EHC Hydraulic System operating mode and various plant conditions, PREDICT how Main Turbine/EHC systems and plant parameters will respond to manipulation of the following Main Turbine Control - EHC Hydraulic System local/remote controls:</p> <ul style="list-style-type: none">a. EHC pump control switchesb. EHC pump test start pushbuttonc. EHC filter pump control switchd. Main turbine supervisory trip cutout switche. Hydraulic Fluid Conditioning Skid controlsf. EHC heater/fan controls

Simulator setup:

1. Reset to IC-21 (Approximately 100% power).
2. Go to **RUN**
3. Verify 1A EHC pump is on
4. Verify the following RWMSequence is loaded: 4PHESD
 - a. Mark up the Control Rod Move Sheet to reflect all rods withdrawn up to Step 17.
5. Ensure an FAS alarm message sheet is contained in the Lead Examiner's book.

(Commands to be utilized during this scenario are contained in the CAEP file:
2016 NRC Scenario 3.cae)

6. Insert Commands for setup:
 Set up for SRM IRM manual insertion following the scram using the batch files.

Ensure the path to the thumb drive matches the CAEP. For instance, if the thumb drive shows up in "D" drive the path is as shown. However, if the thumb drive shows up in the "E" drive, the correct syntax is bat e:\srirm and the CAEP must be modified. The same goes for the batch file that removes the SRM and IRM malfunctions. This is necessary to comply with NRC Examination Security.

bat d:\srirm Prevents the SRMs and IRMs from driving into the core
trgset 5 'zdihs10700din' Sets a trigger to allow the SRMs and IRMs to drive into the core manually
trg 5 'bat d:\delsrirm' Allows the SRMs and IRMs to drive into the core manually
trgset 9 'rcntb.gt.0.5' Remove RCIC initiation signal
trg 9 'dor dihs11300rmi' Remove RCIC initiation signal
imf nm08a 80 Fail APRM 1 As Is
imf sw01B Prevent 1B SW pump from starting
imf hp12a 45 Bind the HPCI steam isolation valves
imf hp12b 45 Bind the HPCI steam isolation valves
trgset 1 'tcvsv3.le.0.1' Trigger 1 goes true when TCV 3 goes closed
imf hp13(1 5:00)35 15: HPCI steam leak with five minute time delay and a 15 minute ramp
imf cr02(1) 2 30: Gross Fuel Failure at 2% Severity, 30 minute ramp, on trigger 1
imf og04 Fail Offgas Isolation
 Set up complete

Commands to execute during the scenario

imf sw02a 100 7:00 Degrade 1A SW pump to 100% over 7 minutes
irf fp01r off Secure 1A Fire Diesel
irf fp01r auto 1A Fire Diesel to standby
ior dihs11300rmi init Spurious initiation of RCIC
imf cr01 100 10: Fuel failure
imf fw01C If directed Contingency to trip 1C RFP
irf sw10r run Start the U1 DGCWP, if needed
bat fireout Acknowledge the fire alarms
imf rm0115 60 15: If needed, Torus Area ARM to >Max Safe in 15 minutes

7. Take the following equipment OOS (hang INFO Card):
 - 1B SW Pump
 - 1A SCW Pump
 - Protect the 1B SCW pump with Protected Equipment ring
8. Complete the following Control Panel setup items:
 - Verify the LOCA TRIP ENABLED labels are above the 1A and 1C Circ Water Pumps.
 - Display the Power/Flow Map on Monitor 3.
 - Clear all SBO Panel alarms.
9. Provide a current revision of the following procedures, signed off as specified:
 - QCOP 5650-01 (no steps signed off)
 - QCGP 3-1 , marked up to the point of holding load at 100% power
10. Provide scenario 3 REMA for Holding Load.
11. Perform the applicable steps of TQ-QC-201-0113 "Simulator Exam Security Actions Checklist"
12. Ensure (1) orange ring is available to provide equipment status.
13. Ensure 2 EST's are available to provide equipment status.

LIST OF POTENTIAL PROCEDURES

Annunciator Procedures

- 901(2)-3 A-1 RX BLDG HI RADIATION, Rev. 6
- 901(2)-3 C-2 OFFGAS HIGH HIGH RADIATION, Rev. 9
- 901(2)-3 D-2 OFFGAS HI RADIATION, Rev. 16
- 901(2)-3 F-12 HPCI PUMP AREA HI TEMP, Rev. 7
- 900-3 H-2 AREA HI TEMP STEAM LEAK DETECTION, Rev. 9
- 901(2)-4 D-16, RCIC SYSTEM INITIATED, Rev. 9
- 901(2)-5 A-6, APRM UPSCALE/HIGH, Rev. 8
- 901(2)-5 C-3, ROD OUT BLOCK, Rev. 11
- 901(2)-5 H-1, OPRM TROUBLE/INOP, Rev. 3
- 900-55/56 A-1, DRYWELL HIGH RAD CONC, Rev. 11
- 912-1 B-3 SERVICE WATER SYSTEM LOW PRESSURE, Rev. 6

QCGP 2-3, Reactor Scram, Rev. 84

QCGP 3-1, Reactor Power Operations, Rev. 79

QCGP 4-1, Control Rod Movements and Control Rod Sequence, Rev. 46

QCOA 0201-05, Primary system Leaks Outside Primary Containment, Rev. 11

QCOA 0700-03, Loss of Neutron Flux Indication, Rev. 9

QCOA 1300-02 RCIC Automatic Initiation, Rev. 17

QCOA 1700-04, Abnormal Offgas Radiation, Rev. 20

QCOA 1700-05, Abnormal Main Steam Line Radiation, Rev. 19

QCOA 1800-01, Area High Radiation, Rev. 7

QCOP 0700-01, Source Range Monitor (SRM) Operation, Rev. 16

QCOP 0700-02, Intermediate Range Monitor (IRM) Operation, Rev. 20

QCOP 1000-30, Post-Accident RHR Operation, Rev. 31

QCOP 3200-05, Reactor Feedpump Shutdown, Rev. 37

QCOP 5650-01, Unit 1 EHC System Operation, Rev. 32

QGA 100, RPV Control, Rev. 10

QGA 200, Primary Containment Control, Rev. 10

QGA 300, Secondary Containment Control, Rev. 13

QGA 500-1, RPV Blowdown, Rev. 14

CREW TURNOVER**1. Plant Conditions:**

- a.) Unit 1 is at 100% power holding load
- b.) Unit 2 is at 100% power.
- c.) Technical Specification limitations:
 - (1) Unit 1: None
 - (2) Unit 2: None
- d.) d.) On Line Risk is GREEN.
- e.) Fire Risk is BLUE.
No Risk Management Actions (RMA) in place. Evolution less than 48 hours duration.

2.) Significant problems/abnormalities:

- a.) 1A Stator Cooling Water pump is OOS for replacement. 1B Stator Cooling Water pump is protected.
- b.) 1B SW pump is OOS for packing replacement. The expected duration is less than 48 hours.

3.) Evolutions/maintenance for the oncoming shift:

- a.) Swap EHC pumps for maintenance on the 1A EHC pump

Quad Cities		Scenario No.: 3	Event No.: 1	Page 1 of 1
Event Description: Swap EHC pumps from 1A in operation to 1B in operation				
Time	Position	Applicant's Actions or Behavior		
	SRO	Directs EHC pump swap per QCOP 5650-01 Step F.4		
SIMOP ROLE PLAY: As the Equipment Operator stationed at Unit 1 EHC skid ,when asked about the status of the 1B EHC pump before it is started, report: "The 1B EHC pump pre-start checks are complete. All personnel are clear."				
	BOP	Starts standby 1B EHC OIL PMP		
	BOP	Stops off going 1A EHC OILPMP		
	BOP	Verifies EHC pump discharge pressure is between 1500 and 1700 psig as indicated on PI 1-5650-12, EHC OIL PRESS		
SIMOP ROLE PLAY: As the Equipment Operator stationed at Unit 1 EHC skid ,when asked about the status of the 1B EHC pump after it is started, report: "The 1B EHC pump discharge pressure is 1580 psig, no leaks, and it sounds normal."				
	ATC	(CONTINUOUS) Monitors reactor and RPV parameters.		
End of Event 1				

Quad Cities	Scenario No.: 3	Event No.: 2	Page 1 of 2
Event Description: Degraded Service Water (SW) Pressure resulting in starting a standby SW pump			
Time	Position	Applicant's Actions or Behavior	
<p>SIMOP NOTE: When directed by the Lead Evaluator, degrade the 1A SW pump 100% ramped over 7 minutes using malfunction SW02:</p> <p>imf sw02a 100 7:00</p> <p>There is a seven minute ramp to ensure the examinees have time to start a standby pump and preclude taking actions for a total loss of SW. Consideration could be given to starting this malfunction quickly after the EHC pump swap to prevent scenario dead time.</p>			
<p>Key Parameter Response: Service Water header pressure lowers as indicated on PI ½-3940-18, SW PMP SPLY PRESS on the 912-1 panel. Low pressure annunciator received at 80 psig.</p> <p>Expected Annunciator(s): 912-1 B-3, SERVICE WATER LOW PRESSURE</p> <p>Automatic Actions: None</p>			
	ATC	(CONTINUOUS) Monitors reactor parameters.	
	BOP	Reports annunciator 912-1 B-3, SERVICE WATER LOW PRESSURE	
	SRO	Directs BOP to restore SW pressure	
	BOP	Confirms SW pressure ≤ 80 psig on PI ½-3940-18, SW PMP SPLY PRESS	
	BOP	Verifies MO ½-3906, FIRE PROT SW SPLY VLV shut	
<p>Evaluator Note: The BOP may elect to start the ½ SW pump (from either Unit) or the 2A SW pump to restore SW pressure.</p>			
	BOP	Starts standby SW pump	
	BOP	Confirms SW pressure returns to normal band on PI ½-3940-18, SW PMP SPLY PRESS	
<p>SIMOP ROLE PLAY: As the Equipment Operator sent to the SW pumps, wait 2 minutes and report as appropriate:</p> <p>“The 1A SW pump is vibrating and it is noisy.”</p> <p>“The (which ever pump they started) is operating normally.”</p> <p>“(When the 1A SW pump is secured) The 1A SW pump is no longer running.”</p>			
Event 2 continued			

Quad Cities		Scenario No.: 3	Event No.: 2	Page 2 of 2
Event Description: Degraded Service Water (SW) Pressure resulting in starting a standby SW pump				
Time	Position	Applicant's Actions or Behavior		
	BOP	Secures 1A SW pump		
<p>SIMOP ROLE PLAY: IF the ½ A Fire Diesel starts, THEN:</p> <ul style="list-style-type: none"> As U2ANSO acknowledge the FAS Trouble alarm using batch file "fireout" (bat fireout) <p>LEAD EVALUATOR ROLE PLAY: When the FAS Trouble alarm is acknowledged, give the FAS printout to the BOP.</p>				
<p>SIMOP ROLE PLAY: IF dispatched to shutdown the ½ A Fire Diesel, THEN wait 30 minutes (minimum Fire Diesel run time) and insert remote function fp01r off (irf fp01r off) and then return it to AUTO using fp01r (irf fp01r auto)</p>				
End of Event 2				

Quad Cities		Scenario No.: 3	Event No.: 3	Page 1 of 2
Event Description: 1C RFP bearing degradation requiring the pump to come off line.				
Time	Position	Applicant's Actions or Behavior		
SIMOP NOTE: When directed by the lead evaluator, call in as the Unit 1 EO and report: "The outboard pump bearing on the 1C RFP is making a lot of noise. I am concerned the pump will fail catastrophically. The FS is here also and concurs."				
Key Parameter Response: None Expected Annunciator(s): None Automatic Actions: None				
Evaluator Note: An Emergency Power Reduction will occur before the 1C RFP is secured. The Emergency Power Reduction is Event 4 in the scenario guide.				
	SRO	Directs securing 1C RFP per QCOP 3200-05		
	BOP	Places RFP SELECTOR switch to OFF.		
	BOP	Verifies Auxiliary Oil Pump control switch for RFP to be shut down: (1) Has a red target. (2) Yellow AUTO TRIP light is lit. .		
	BOP/ATC	Verifies Reactor water level is stable		
	BOP	Places control switch for RFP to be shut down to STOP		
	BOP	Verifies Auxiliary Oil Pump starts as RFP coasts down.		
	BOP/ATC	Verifies Reactor water level remains stable.		
	BOP	Verifies RFP current on running pump is < 1115 amps.		
	BOP	Verifies RFP discharge header pressure has stabilized.		
Evaluator Note: Securing a Condensate Pump is not integral to rest of the scenario. The following actions have no affect on the rest of the scenario and may be skipped if desired.				
	BOP	Verifies RFP suction pressure is > 250 psig.		
	BOP	Places control switch for COND PMP to be shut down to STOP.		
Event 3 continued				

Quad Cities		Scenario No.: 3	Event No.: 3	Page 2 of 2
Event Description: 1C RFP bearing degradation requiring the pump to come off line.				
Time	Position	Applicant's Actions or Behavior		
	BOP	IF a Condensate/Condensate Booster pump is to be placed in standby, THEN, selects that pump for standby using COND PMP SELECTOR switch		
End of Event 3				

Quad Cities		Scenario No.: 3	Event No.: 4	Page 1 of 1
Event Description: Emergency Power Reduction				
Time	Position	Applicant's Actions or Behavior		
	SRO	Directs Emergency Power Reduction to ≤ 2511 MWth (~85%) per QCGP 3-1		
	ATC	Reduces Recirc flow by depressing the MANUAL RUNBACK pushbutton (PB) as desired, up to a maximum of three times within a 5 second period. -OR- Lowering flow using the Master/Individual Controllers.		
	ATC	Verifies the MANUAL Pushbutton is lit at both LOOP A and B SPEED CONTROLLER.		
	ATC	Verifies the Speed Demand at both LOOP A and B SPEED CONTROLLERS decreases 10% for each time the MANUAL RUNBACK Pushbutton is depressed.		
	ATC	Verifies the Recirc Pump Speed at both LOOP A and B SPEED CONTROLLERS decrease at approximately 2.5% per second		
	ATC	Drives CRAM rods -OR- In-sequence rods to lower FCL AND/OR avoid/exit ICA Region I/II as indicated in QCOA 0400-02		
	ATC	(CRAM RODS) Selects POWER REDUCTION from any menu on the RWM.		
	ATC	(CRAM RODS) Depresses ARRAY MODE to latch all CRAM Rods		
	ATC	(CRAM RODS) Selects the first CRAM Rod in sequence.		
	SRO	Refers to Power to Flow Map to determine target power level		
	ATC	(CRAM RODS) Continuously inserts CRAM Rod(s) in sequence to position 00 as needed to lower FCL AND/OR avoid/exit ICA Region I/II as indicated in QCOA 0400-02		
EVALUATOR NOTE: The crew may return to Event 3 to continue securing Feed and Condensate pumps.				
End of Event 4				

Quad Cities		Scenario No.: 3	Event No.: 5	Page 1 of 1
Event Description: APRM 1 Failure				
Time	Position	Applicant's Actions or Behavior		
SIMOP NOTE: Verify APRM 1 displays a constant 100% power.				
Key Parameter Response: APRM 1 reads 100% power following the Emergency Power Reduction				
Expected Annunciator(s):				
901-5 A-6, APRM UPSCALE/HIGH				
901-5 C-3, ROD OUT BLOCK				
901-5 H-1, OPRM TROUBLE/INOP				
Automatic Action: Rod Withdrawal block				
	ATC	Verifies rod out block and other annunciators		
	ATC	Reports APRM 1 is reading ~ 100%		
	SRO	Refers to QCOA 0700-03.		
	SRO	Determines APRM 1 is INOP		
SIMOP ROLE PLAY: If contacted, as IMD and/or other support personnel, report: "I will come to the Control Room in a few minutes to take a look at the APRM."				
	SRO	Refer to TS and TRM.		
	SRO	Verifies minimum number of operable channels is met per T S 3.3.1.1 for RPS trip functions and TRM Section 3.3.a for Rod Block functions.		
	SRO	Directs bypassing APRM 1 per QCOP 0700-04		
	ATC	Positions APRM BYPASS joystick to bypass APRM Channel 1		
	ATC	Verifies white BYPASS light comes ON for that APRM		
End of Event 5				

Quad Cities		Scenario No.: 3	Event No.: 6	Page 1 of 1
Event Description: RCIC Spurious start				
Time	Position	Applicant's Actions or Behavior		
SIMOP NOTE: When directed by the Lead Evaluator cause a spurious start of RCIC by overriding the initiation pushbutton: ior dihs11300rmi init				
Key Parameter Response: RCIC valves reposition and the Flow controller ramps up to a steady 400 gpm. Expected Annunciator(s): 901-4 D-16, RCIC SYSTEM INITIATED Automatic Action: RCIC starts up and injects.				
	BOP	Reports annunciator 901-1 D-16 and refers to QCAN		
	BOP	Verifies AUTOMATIC ACTIONS occur..		
	BOP	Performs QCOA 1300-02 Immediate Operator Actions: Trip RCIC turbine by performing one or more of the following, listed in preferred order: a. Depress the Remote RCIC Turb Trip pushbutton. b. Lower flow controller setpoint to zero. c. Isolate steam supply: (1) Close MO 1-1301-17, STM SPLY ISOL VLV. (2) Close MO 1-1301-16, STM SPLY ISOL VLV.		
	ATC	Monitors FCL, LPRMs and APRMs for reactivity addition and refers to QCOA 0400-01.		
	SRO	Determines applicable Technical Specifications: · TS 3.5.3, RCIC System, Condition A		
SIMOP ROLE PLAY: If requested as IMD (other Maintenance), state: "I will be up shortly to discuss the RCIC issues."				
End of Event 6				

Quad Cities		Scenario No.: 3	Event No.: 7-8	Page 1 of 6
Event Description: Fuel failure and HPCI steam line break. Crew enters QGA 300 and transitions to QGA 500-1 when two areas exceed Max Safe radiation levels.				
Time	Position	Applicant's Actions or Behavior		
SIMOP NOTE: When directed by the Lead Evaluator, cause a Fuel failure by inserting malfunction CR01: imf cr01 100 10:				
Key Parameter Response: Rising Rad levels for Offgas, MSL, Drywell, Reactor & Turb Bldg Expected Annunciator(s): (in » 1.5 min) 901-3 D-2 OFFGAS HI RADIATION (in » 4 min) 901-55/56 A-1, DRYWELL HIGH RAD CONC (in » 5 min) 901-5 A-8 & D-8, GROUP 2 & CONTROL ROOM VENT ISOLATED (in » 14 min) 901-3 C-2, OFFGAS HIGH HIGH RADIATION Automatic Actions: Group 2 Isol, CR Vent Isol, Offgas Isolation 15-Min timer Starts				
	BOP	Responds to Annunciator OFF GAS HI RADIATION		
	SRO	Enters and directs actions of QCOA 1700-04 and QCOA 1700-05		
	SRO	Directs reactor power be held constant		
	BOP	Reports Off Gas radiation levels are steadily rising as indicated on the A & B SJAЕ Rad monitors (901-10) and Recorder (901-02)		
	BOP	Monitors Main Steam Line Radiation monitors and reports to US		
	BOP	Monitors Area Radiation Monitors at the 901-11 panel and reports to US		
	SRO/BOP	Evacuates any areas of high radiation and refers to QCOA 1800-01 as needed		
	SRO/BOP	Notifies Chemistry and the QNE of abnormal Off Gas activity		
	SRO/BOP	Directs Chemistry to draw Reactor Coolant and Recombiner outlet samples within 4 hours		
	SRO/BOP	Checks for indications of high coolant conductivity		
	SRO/BOP	Checks Chimney Gas Monitors for trends		
SIMOP ROLE PLAY: Acknowledge directives as necessary if notified as Rad Protection and Chemistry personnel.				
	SRO/BOP	Notifies Rad Protection to perform surveys		
	SRO/BOP	Notifies Chemistry to monitor CAMS		
	BOP	Responds to Annunciator DRYWELL HIGH RAD CONC and notifies the Unit Supervisor		
	SRO/BOP	(Continuous) Monitor Drywell Radiation Levels		
	BOP	Confirms rising rad levels on RIS 1-2419 A& B at Panel 901-55 & 56		
Event 7-8 continued				

Quad Cities	Scenario No.: 3	Event No.: 7-8	Page 2 of 6
Event Description: Fuel failure and HPCI steam line break. Crew enters QGA 300 and transitions to QGA 500-1 when two areas exceed Max Safe radiation levels.			
Time	Position	Applicant's Actions or Behavior	
	BOP	Monitors Containment H ₂ and O ₂ levels per QCOP 2400-01	
	SRO/BOP	Notifies Radiation Protection	
	ATC	Responds to Annunciator GROUP 2 ISOL CH TRIP and CONTROL ROOM VENT ISOLATED and informs the Unit Supervisor	
	SRO	May direct verification of Group 2 and CR Vent isolation	
	ATC/BOP	As directed, verifies the Group 2 and CR Vent isolations	
	BOP	Responds to Annunciator OFF GAS HIGH HIGH RADIATION	
	BOP	Verifies Offgas 15-Minute Timer has started (at 901-10)	
	SRO	When Offgas activity cannot be reduced < the Offgas HI HI Rad Alarm, directs actions to shutdown the reactor and isolate the release	
	ATC	Manually scrams the reactor (See Page 3 of this event)	
CT 1	SRO	Directs closing of AO 1-5406 Offgas Discharge to Stack	
CT 1	BOP	Closes AO 1-5406	
	BOP	As directed, verifies that AO 1-5408A and AO 1-5408B close	
CT 1	BOP	Manually initiates a Group 1 Isolation / Closes MSIVs and MSIV Drain valves	
	SRO	Directs actions QCGP 2-3	
	ATC	Places RX MODE switch to SHUTDOWN position	
	ATC	Verifies the SDV vent and drain valves are closed	
	ATC	Verifies that all Control Rods have fully inserted	
	ATC	Makes scram report including entry into QGA 100 on RPV Water Level < 0 inches	
	ATC	Attempts to maintain RPV level 0 to +48" with preferred injection systems: <ul style="list-style-type: none">• Verifies DFWLC in Single Element• May isolate Feed Water Reg Valve(s)• May place Low Flow Feed Reg Valve in Service• May secure unnecessary Feed and Condensate Pumps	
Event 7-8 continued			

Quad Cities		Scenario No.: 3	Event No.: 7-8	Page 3 of 6
Event Description: Fuel failure and HPCI steam line break. Crew enters QGA 300 and transitions to QGA 500-1 when two areas exceed Max Safe radiation levels.				
Time	Position	Applicant's Actions or Behavior		
	ATC	(CONTINUOUS) Monitors RPV water level and pressure		
EVALUATOR NOTE: The SRMs and IRMs will not automatically insert. This is Event 8. SIM OP NOTE: Pay close attention to when the ATC depresses the DRIVE IN pushbutton for the SRM/IRM. This can be done by visual observation via camera, or by monitoring the event triggers. When Event Trigger 5 goes TRUE (turns RED) the button has been depressed. When the button is depressed run batch file d:\delsrmirm from the CAEP. (Expert: bat d:\delsrmirm)				
	ATC	Manually inserts SRMs AND IRMs by depressing the SRM/IRM DETECTOR POSITION display switch and then the DRIVE IN switch.		
	ATC	Verifies both Recirc Pumps running at minimum speed in Manual		
	ATC	Reports when all rods are fully inserted		
	SRO	Enters and directs actions of QGA 100		
	SRO	Directs ATC/BOP to verify 0" isolations and auto-starts		
	ATC/BOP	Stabilize RPV Pressure < 1060 psig with Relief Valves		
	ATC/BOP	Verifies Group 2 and 3 Isolations, RB vent isolation and SGBT start		
	ATC	Verifies Main Turbine trips, all SV's, CV's, ISV's, IV's and extraction steam check valves close		
	ATC	Verifies Main Generator Output Breakers tripped after 30 seconds and places control switches in PTL		
	ATC	Verifies Main Generator Field and Exciter Field Breakers		
	ATC	Verifies all 4 KV buses powered from T-12		
	ATC	Verifies both Recirc Pumps running at minimum speed in Manual		
	ATC	Starts the Control Room AFU Booster Fan within 40 minutes		
	ATC	Dispatches EO to reset the Generator 86 Relays		
SIMOP NOTE: When the Main Turbine trips, verify trigger 1 goes true inserting the HPCI steam leak and gross fuel failure using malfunction CR02: imf hp13(1) 100 30: (100% Severity on a 30 minute ramp) imf cr02(1) 2 30: (Gross Fuel Failure at 2% Severity, 30 minute ramp)				
Event 7-8 continued				

Quad Cities		Scenario No.: 3	Event No.: 7-8	Page 4 of 6
Event Description: Fuel failure and HPCI steam line break. Crew enters QGA 300 and transitions to QGA 500-1 when two areas exceed Max Safe radiation levels.				
Time	Position	Applicant's Actions or Behavior		
<p>Key Parameter Response: Increasing Radiation levels and Temperature in the HPCI Room</p> <p>Expected Annunciator(s):</p> <p>901-3 A-1, RX BLDG HI RADIATION (in approximately 1.5 minutes)</p> <p>901-3 H-2, AREA HI TEMP STM LEAK DETECT (in approximately 2.5 minutes)</p> <p>Automatic Actions: None (Malfunctions for HPCI Steam Supply Valve binding)</p>				
	BOP	Responds to annunciators and informs the Unit Supervisor		
	BOP	Responds to a Annunciator RX BLDG HI RADIATION and informs the Unit Supervisor		
	SRO	Enters and directs applicable actions of QGA 300		
	BOP	Monitors Area Radiation levels from the 901-2 and 901-10 panels and reports QGA 300 Entry Conditions		
<p>EVALUATOR NOTE:</p> <p>The HPCI Room ARM exceeds its Max Safe Value approximately 4 minutes after the turbine trip.</p> <p>The Torus Area ARM will also be approaching its Max Normal (Alarm) value.</p>				
<p>SIMOP NOTE: If the fire alarm sounds, silence the alarm with the command: bat fireout</p> <p>Cue the Evaluator to role play as the Unit 2 Operator and inform the BOP that the alarm is from the Unit 1 HPCI room, (high temperature).</p>				
	BOP	Reports HPCI Room Radiation levels are > Max Normal and increasing		
	BOP/ATC	Monitors Reactor Bldg Temperatures at Panel 901-21 (TR 1-1290)		
<p>SIMOP ROLE PLAY: When requested to investigate breakers for HPCI 4 & 5, wait 2 minutes and as EO report: "The thermals are tripped."</p> <p>If asked to reset them, reply: "They will NOT reset"</p>				
	BOP/ATC	Recognizes and reports when the HPCI Room exceeds its Max Safe value of 155°F		
	BOP	Reports HPCI Room Radiation levels are > Max Safe value of 3000 mr		
	SRO	Re-enters and directs applicable actions of QGA 100		
	BOP	Attempts to isolate HPCI Steam Lines		
Event 7-8 continued				

Quad Cities		Scenario No.: 3	Event No.: 7-8	Page 5 of 6
Event Description: Fuel failure and HPCI steam line break. Crew enters QGA 300 and transitions to QGA 500-1 when two areas exceed Max Safe radiation levels.				
Time	Position	Applicant's Actions or Behavior		
	BOP	Directs EO to investigate breakers for HPCI 4 & 5 valves		
	BOP	Directs EO with Rad Prot. support to investigate source of leak		
SIMOP ROLE-PLAY: As EO, report: "The HPCI room is filled with steam and entry is impossible. "				
	ATC/BOP	Dispatches EO to start the U-1 EDG cooling water pump and monitor RB Basement water levels		
SIMOP ROLE PLAY: If dispatched as EO, wait 2 minutes and start the Unit 1 EDG CWP: mrf sw10r run				
	SRO/BOP	Announces evacuation of Unit 1 Reactor Bldg. over plant page		
SIMOP NOTE: Verify the Torus Area ARM exceeds its Max Safe Value (3000 mr/hr) approximately 11 minutes after the Mode Switch is taken to Shutdown. If necessary, use the following malfunction to ramp the ARM: rm0115 60 15:				
Key Parameter Response: Increasing Radiation levels in the Torus Area on ARM 15				
Expected Annunciator(s): 901-3 A-1, RX BLDG HI RADIATION (Re-Alarming)				
Automatic Actions: None				
	BOP	Monitors Reactor Bldg ARMs on Panel 901-11		
	BOP	Recognizes and reports that ARM 15 TORUS AREA is trending higher		
	BOP	Recognizes and reports when the second area, the Torus Area, has exceeded its Max Safe Radiation level (3000 MR)		
	SRO	When 2 areas (HPCI Room and Torus Area) exceed Max Safe radiation levels, enter and direct QGA 500-1		
	SRO	Verifies all rods in		
Event 7-8 continued				

Quad Cities		Scenario No.: 3	Event No.: 7-8	Page 6 of 6
Event Description: Fuel failure and HPCI steam line break. Crew enters QGA 300 and transitions to QGA 500-1 when two areas exceed Max Safe radiation levels.				
Time	Position	Applicant's Actions or Behavior		
	BOP	Reports Drywell pressure < 2.5 psig and Torus level above 5 ft.		
CT 2	SRO	Orders all 5 ADS valves opened and leave switches in Manual		
CT2	BOP	Opens all 5 ADS valves and leaves all switches in the "MAN" position		
	BOP	Verifies ADS valve positions at the 901-21 panel		
	ATC/BOP	Starts cooldown to cold shutdown per QCOP 1000-05		
	ATC	Monitors and controls RPV water level		
SIMOP NOTE: When the RPV is depressurized per QGA 500-1 guidance, the ATC has driven in the SRMs and IRMs, and/or at the discretion of the Lead Examiner, place the simulator in FREEZE .				

FINAL

Exelon Nuclear

2016 NRC Exam Scenario

Scenario Number:

NRC Scenario 4

Revision Number: 00

Date: 11/02/2015

Developed By: Raymond J. Venci/S/ 01/28/16

Instructor

Date

Validated By: Duane Haas /S/ 01/29/16

SME or Instructor

Date

Reviewed By: Jason Swain/S/ 02/04/16

Operations Representative

Date

Approved By: Raymond J. Venci/S/ 02/05/16

Training Department

Date

Appendix D

Scenario Outline

Form ES-D-1

Facility: Quad Cities Scenario No.: **2016 NRC Scenario 4** Op-Test No. ILT 14-1
 Examiners: _____ Operators: _____

Initial Conditions:

The plant is currently at 75% power and holding load per Generation Dispatch.

Turnover: Perform the Core Spray Monthly surveillance for the 1B Core Spray pump, and QCOS 1600-04, Weekly Primary Containment Oxygen Concentration from the 901-56 panel.

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	Perform Core Spray Monthly Surveillance (1B Core Spray pump)
2	DIHS124AS6B	BOP C	Failure of 1B CAM to start for surveillance. TS
3	FW17C DIHS13302	ATC C	1C Condensate Pump trip w/failure of standby pump to auto-start.
4	None	SRO	SSMP Room Cooler inoperable. TS
5	DIHS156041A LOHS156041A	BOP C	1A Gland Exhauster trip.
6	MC08	ATC R	Loss of Main Condenser vacuum / Emergency Power Reduction
7	RP02 RP03	ATC C	Electric ATWS (ARI inserts control rods) QGA 101.
8	MS04B	CREW M	Main Steam Line break inside the Drywell. QGA 100 and QGA 200.
9	DIHS11001S17B RH19AR	CREW C	Failure of Drywell Sprays (S-17B and RHR 23A valve). Blowdown QGA 500-1

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

ES-301-4 Quantitative attributes:
 Total Malfunctions (5-8): **7**
 Malfunction(s) after EOP (1-2): **E8 & 9**
 Abnormal Events (2-4): **E2, 3, 5, 6**
 Major Transient(s) /E-Plan entry (1-2): **E8**
 EOPs (1-2): **QGA 100, 200**
 EOP Contingencies (0-2): **QGA 500-1**
 Critical Tasks (2-3): **2**

ES-301-5 Quantitative attributes:
 BOP Normal: **E1**
 ATC Reactivity (1 per set): **E6**
 BOP I/C (4 per set): **E2 & 5**
 ATC I/C (4 per set): **E3 & 7**
 SRO-I I/C (4 per set inc 2 as ATC): **E2,3,5,7**
 SRO Tech Spec (2 per set): **E2 & 4**
 ALL Major Transients (2 per set) **E8**

SUMMARY:

- Initial Conditions:
 - The plant is operating at 75%.
- Event 1: The BOP performs QCOS 1400-04, Core Spray Pump Operability Test for the 1B Core Spray Pump.
- Event 2: The BOP is directed to perform QCOS 1600-04, Weekly Primary Containment Oxygen Test, however, the 1B CAM (901-56 panel) will fail to start. The SRO will enter TLCO 3.3.b. Condition A, for one inoperable channel (Table 3.3.b-1 function 5&6).
- Event 3: The 1C Condensate/Condensate Booster Pump will trip due to a motor short causing an overcurrent condition sensed at the breaker. The standby pump (1A) will fail to autostart requiring a manual start by the ATC operator. EO's will be dispatched to the breaker and running pumps. The EO will report an overcurrent target up at Bus 14 cubicle 8 and EM's will be notified to investigate.
- Event 4: The BOP will dispatch an EO to the SSMP Room in response to the 912-8 A-8, "Safe Shutdown System Trouble" alarm. The EO will report that the "Compressor Trip" light is lit on the Room Cooler. The EO will attempt a reset as directed by the BOP, however, it will be unsuccessful. The SRO will declare the SSMP inoperable due to an inoperable room cooler and enter TS 3.7.9 and a 14 Day Safe Shutdown Analysis Administrative Technical Requirement, (SSA ATR) for both Units.
- Event 5: The running Gland Seal Exhauster will trip. The BOP will start the standby Exhauster and adjust Gland Exhaust pressure.
- Event 6: An air leak will result in lowering Main Condenser vacuum. The crew performs QOA 3300-02 and Emergency Power Reduction. All efforts to mitigate the loss of Main Condenser vacuum will be unsuccessful and a manual scram will be inserted as backpressure approaches 7.5 in Hg.
- Event 7: Control rods do not insert due to an Electric ATWS. The SRO will transition to QGA 101 and manual initiation of the ARI system will insert all control rods. The SRO will exit QGA 101 and re-enter QGA 100.
- Event 8: A leak in the B Main Steam Line inside the Drywell will develop resulting in a QGA 200 entry. The crew will attempt to spray the Drywell, however, Div I DW sprays are not available because the RHR 23A valve breaker will trip and not reset. Div II DW sprays will also not be available due to an S17 switch problem. The crew will enter QGA 500-1, RPV Blowdown in order to avoid exceeding the Pressure Suppression Pressure (PSP) limit.

Approximate Run Time: 1.5 Hours

CRITICAL TASKS:

Critical Task #1: With a reactor scram required and the reactor not shutdown, TAKE ACTION TO REDUCE POWER by injecting boron (prior to exceeding 110°F Torus temperature) and/or inserting control rods, to prevent exceeding primary containment design limits. (BWROG RPV-6.1 ATWS PWR/LVL S/D REACTOR)

Critical Task #2: When DW temperature CANNOT be maintained <280 F OR Torus pressure CANNOT be maintained LESS THAN the Pressure Suppression Limit (PSP), INITATE an Emergency Depressurization.

SR-1400-K20	(Freq: LIC=B) Given a system operating mode and various plant conditions, EVALUATE the following system indications and DETERMINE if the indications are expected and normal: a. Core Spray (1) Pump run/trip status (2) Valve position (3) Pump suction and discharge pressures
SR-2400-K32	(Freq: LIC=B) Given CAM operability status OR key parameter indications, various plant conditions and a copy of Tech Specs, DETERMINE Tech Spec compliance and required actions, if any.
SR-2400-K21	SR-2400-K21 (Freq: LIC=B) Given a CAM operating mode and various plant conditions, PREDICT how CAM / plant parameters will respond to manipulation of the following CAM local/remote controls: b. H2-O2 Mon Inlet Valve Selector Switch c. CAM Power Control Switch
SR-3200-K22	(Freq: LIC=B) Given a Condensate/Feedwater System operating mode and various plant conditions, PREDICT how key Condensate/Feedwater System/ plant parameters will respond to the following Condensate/Feedwater System component or controller failures: a. Condensate/condensate booster pump trip
SR-2900-K32	(Freq: LIC=B) Given SSMP System operability status OR key parameter indications, various plant conditions and a copy of Tech Specs, DETERMINE Tech Spec compliance and required actions, if any.
SR-5600-K22	(Freq: LIC=B) Given a Main Turbine and Auxiliary Systems operating mode and various plant conditions, PREDICT how system/plant parameters will respond to the following Main Turbine and Auxiliary Systems component or controller failures: f. Gland Steam Exhauster trip
SR-3300-P09	(Freq: LIC=B) Given a reactor plant at power with a loss of condenser vacuum, take action to attempt to locate and correct the cause for lowering vacuum in accordance with QOA 3300-02 and/or QOA 5450-05. (PRA Initiating Event %TC - Loss of Vacuum accounts for 7.65% of total CDF and initiates 4 of the top 100 Core Damage Sequences)
SR-0002-P03	(Freq: LIC=A) Given a reactor plant at power with a reactor scram, place the plant into a stable condition in accordance with QCGP 2-3.
SR-1000-P02	(Freq: LIC=A) Given a reactor plant in an accident condition (QGA), operate torus sprays in accordance with QCOP 1000-30 and appropriate QGA. (Important PRA Operator Action - starting containment sprays has a RAW value of 82.5)

SR-0001-P11	(Freq: LIC=B) Given a reactor plant with an ATWS, take action to reduce heat input into the containment in accordance with QGA 101. (SOER 83-8 r11) (ATWS is a key event in 1 of the 100 most probable PRA Core Damage Sequences)
SR-0001-P26	(Freq: LIC=B) Given a reactor plant with rising drywell temperature due to a LOCA or steam leak and RHR is not needed for core cooling, verify parameters are in the safe region of the Drywell Spray Initiation Limit (QGA Figure K), verify tripped or trip recirc pumps and drywell coolers, and attempt to initiate drywell sprays before drywell temperature reaches 338 degrees in accordance with QGA 200.
SR-0001-P23	(Freq: LIC=A) Given a reactor plant with rising containment pressure and temperature due to a LOCA or steam leak, initiate an emergency depressurization when torus pressure cannot be maintained below the Pressure Suppression Pressure (QGA Figure L) or when drywell temperature cannot be restored and held below 338 degrees in accordance with QGA 200 and QGA 500-1. (Important PRA Operator Action - emergency depressurization terminates 19 of top 100 Core Damage Sequences)
SR-0001-P45	(Freq: LIC=A) Given a reactor plant in a QGA condition, verify the proper actuation of containment isolations and ECCS and emergency DG starts in accordance with QGA 100 or QGA 101.

Simulator Setup:

1. Reset to IC-20 (Approximately 75% power).
2. Go to **RUN**.
3. Verify the following RWM Sequence is loaded:4 **PHESD (or current shut down sequence)**
4. Verify the 1A CAM (901-55) is selected to Torus and the 1B CAM (901-56) is selected to Drywell.

(The following commands to be utilized for this scenario are contained in the CAEP file:
2016 NRC Scenario 4.cae)

5. Insert Commands for setup:
 - **ior dihs11001s17b off** (override the B Loop S-17 switch to OFF)
 - **ior dihs124as6b off** (override the 1B CAM power switch to OFF on the 901-56 panel)
 - **ior dihs13302 p2a_off** (override the Condensate Pump Selector Switch to OFF)
 - **ior lohs13302a4 on** (override the 1A Condensate Pump Standby light ON)
 - **trgset 1 “zdihs13302a(5)”** (Set trigger 1 true when the 1A Condensate Pump control switch is taken to Start)
 - **trgset 2 “zdihs13302a(5)”** (Set trigger 2 true when the 1A Condensate Pump control switch is taken to Start)
 - **trg 2 “dor dihs13302”** (Delete the override on the Condensate Pump Selector Switch when trigger 1 goes true)
 - **trg 1 “dor lohs13302a4”** (Delete the override on the 1A Condensate Pump Standby light when trigger 1 goes true)
 - **ior dihs156041a (3) trip** (On trigger 3, override the 1A Gland Exhauster handswitch to TRIP)
 - **ior lohs156041a4 (3) on** (On trigger 3, override the 1A Gland Exhauster Amber Trip light ON)
 - **imf ser0986(3) on** (On trigger 3, set annunciator 912-7 E-12 in alarm)
 - **trgset 5 “zdihs1100123a(2)”** (Set trigger 5 true when the RHR 23A valve control switch is taken to OPEN)
 - **trg 5 “irf rh19ar open”** (On trigger 5, open the breaker for the RHR 23A valve)
 - **imf rp03a** (Manual Scram Circuit Failure Channel A)
 - **imf rp03b** (Manual Scram Circuit Failure Channel B)
 - **imf rp02a** (Auto Scram Circuit Failure Channel A1)
 - **imf rp02b** (Auto Scram Circuit Failure Channel B1)
 - **imf rp02c** (Auto Scram Circuit Failure Channel A2)
 - **imf rp02d** (Auto Scram Circuit Failure Channel B2)
6. Verify the following commands for scenario performance:
 - **irf pc11r ackn** (reset alarms at 901-64A panel in Cable Spreading Room for A CAM)
 - **imf fw17c** (trip the 1C Condensate/Condensate Booster Pump)
 - **imf ano9128a8 on** (override alarm 912-8 A-8, Safe Shutdown System Trouble, on)
 - **trg! 3** (trip the 1A Gland Seal Steam Exhauster using trigger 3)
 - **imf mc08 100 25:** (Set Main Condenser air in-leakage to 100% ramped over 25 minutes)

- **irf cu13r 0 :30** (Close the 1A RWCUDemin FCV 1-1279-15A ramped over 30 seconds)
 - **irf cu9r out** (Isolate the 1A RWCUDemin)
 - **irf cu14r 0 :30** (Close the 1B RWCUDemin FCV 1-1279-15B ramped over 30 seconds)
 - **irf cu10r out** (Isolate the 1B RWCUDemin)
 - **imf ms04b 0.5 10:** (B Main Steam Line break in Drywell at 0.5% severity over 10 min)
7. Take the following components Out of Service:
- None
8. Provide a current revision of the following procedures, signed off as specified:
- Provide a copy of QCOS 1400 -04 marked up as a partial surveillance to test the 1B Core Spray Pump and a stopwatch.
 - Provide a SDTC for the 1B Core Spray Pump inoperable.
 - Provide a copy of QCOS 1600-04 with both the Weekly Containment O₂ Concentration and the Monthly Channel Check required. Marked up to start at step H.2.
 - Provide a BLANK copy of QCOS 1600-04 to the Lead Examiner.
9. Provide a Load Drop REMA signed off to be at 75% power.
10. Perform the applicable "Post Simulator Exam Security Actions" of TQ-QC-201-0113 "Simulator Exam Security Actions Checklist.

LIST OF POTENTIAL PROCEDURES**Annunciator Procedures**

- 901(2)-3 A-4, CORE SPRAY PUMP RUNNING, Rev. 4
- 901(2)-3 A-14, TORUS HIGH/LOW LEVEL, Rev. 9
- 901(2)-3 A-16, PRIMARY CNMT HIGH PRESSURE, Rev. 16
- 901(2)-3 D-2, OFF GAS HI RADIATION, Rev. 15
- 901(2)-5 D-11, PRIMARY CNMT HIGH PRESS, Rev. 12
- 901(2)-5 D-10/15, RPS CHANNEL A/ B REACTOR SCRAM, Rev. 6
- 901(2)-5 A-10/15, RPS CHANNEL A/B MANUAL SCRAM, Rev. 6
- 901(2)-5 F-5, CONDENSER VACUUM LO, Rev. 8
- 901(2)-6 A-6, COND PUMP DISCHARGE LOW PRESSURE, Rev. 9
- 901(2)-6 F-5, CONDENSATE BOOSTER PUMP AUTO TRIP, Rev. 10
- 900-7 E-12, GLAND STM EXH MOTOR TRIP, Rev. 3
- 901(2)-7 H-3, CONDENSER LO VACUUM 24 IN. HG, Rev. 9
- 912-8 A-8, SAFE SHUTDOWN SYSTEM TROUBLE, Rev. 5
- 900-54 C-7, NORMAL PROCESS FLOW HI/LO, Rev. 3
- 900-55 B-5, H/2 & O/2 MON SYSTEM CMN FAIL, Rev. 4

QCGP 2-3, REACTOR SCRAM, Rev. 84

QCGP 3-1, REACTOR POWER OPERATIONS, Rev. 79

QGA 100, RPV CONTROL, Rev. 10

QGA 200, PRIMARY CONTAINMENT CONTROL, Rev. 10

QGA 500-1, RPV BLOWDOWN, Rev. 14

QCOA 0201-01, INCREASING DRYWELL PRESSURE, Rev. 27

QCOA 3300-01, LOSS OF CONDENSATE PUMP, Rev. 22

QOA 3300-02, LOSS OF CONDENSER VACUUM, Rev. 40

QCOP 1000-30, POST-ACCIDENT RHR OPERATION, Rev. 31

QCOP 2900-01, SAFE SHUTDOWN MAKEUP PUMP SYSTEM PREPARATION FOR
STANDBY OPERATION, Rev. 36

QOP 5600-01, GLAND STEAM SYSTEM, Rev. 22

QCOP 5750-19, DRYWELL COOLER OPERATION, Rev. 10

QCOS 1400-04, CORE SPRAY PUMP OPERABILITY TEST, Rev. 16

QCOS 1600-04, WEEKLY PRIMARY CONTAINMENT OXYGEN CONCENTRATION,
Rev. 31

QCAP 0200-10, EMERGENCY OPERATING PROCEDURE (QGA) EXECUTION
STANDARDS, Rev. 49

QCAP 1500-02, ADMINISTRATIVE TECHNICAL REQUIREMENTS FOR NON-
FUNCTIONAL SAFE SHUTDOWN EQUIPMENT, Rev. 32

CREW TURNOVER**1.) Plant Conditions:**

- a.) Unit 1 is at 75% Power, holding load for Generation Dispatch.
- b.) Unit 2 is at 100% Power.
- c.) Technical Specification limitations:
 - (1) Unit 1: None
 - (2) Unit 2: None
- d.) On Line Risk is GREEN.
- e.) Fire Risk is GREEN.
- f.) Protected Equipment:
 - (1) RBCCW
 - (2) Fuel Pool Cooling

2.) Significant problems/abnormalities:

None

3.) Evolutions/maintenance for the oncoming shift:

- a.) Perform QCOS 1400-04, Core Spray Pump Operability Test for the 1B Core Spray Pump. An EO is briefed and on station in the Core Spray room.
- b.) After the Core Spray monthly is complete, then perform QCOS 1600-04, Weekly Primary Containment Oxygen Test using the 1B CAM (901-56 panel) system. The critical due date for this surveillance is today.

Quad Cities 2016 NRC Scenario No. 4 Event No. 1 Page 1 of 1		
Event Description: Perform QCOS 1400-04 for the 1B Core Spray Pump		
Time	Position	Applicant's Actions or Behavior
	SRO	Directs the BOP to perform QCOS 1400-04, Core Spray Pump Operability Test for the 1B Core Spray Pump.
	BOP	Starts the 1B Core Spray Pump and verifies the MO 1-1402-38B, CS Min Flow valve opens.
	BOP	Notifies the SRO of entry time for B Core Spray loop inoperability.
	BOP/ATC	Enters a Short Duration Time Clock for 1B Core Spray Pump inoperable. (TS LCO 3.5.1 Condition B)
	BOP	Throttles open MO 1-1402-4B, CS BYP AND TEST VLV to establish flow rate of ≥ 4500 gpm at ≥ 216 psig.
	BOP	Contacts the EO at the pump to report pump suction pressure on PI 1-1402-40B.
SIMOP ROLE PLAY: When contacted, as EO report: "The 1B Core Spray pump suction pressure is 4 psig as indicated on PI 1-1402-40B."		
	BOP	Verifies pump suction pressure is ≥ 3 psig and records pump discharge pressure and flow rate.
	BOP	Closes and times MO 1-1402-4B.
	BOP	Verifies MO 1-1402-38B opens as system flow decreases.
	BOP	Stops the 1B Core Spray Pump.
	BOP	Closes MO 1-1402-38B valve.
	BOP	IF over-pressure condition exists in discharge line piping, THEN: <ul style="list-style-type: none"> Crack open MO 1-1402-4B to slowly pressure Close MO 1-1402-4B when pressure reaches 90 psig as indicated on PI 1-1450-1B, CS HEADER
	BOP	Notifies the SRO to exit the LCO for B Core Spray loop inoperable.
	BOP	Performs standby lineup verification for B loop Core Spray valves.
	BOP	Signs off surveillance as satisfactory and returns it to the SRO for approval signature.
	ATC	Continuously monitors RPV power, pressure, and water level.
End of Event 1		

Quad Cities		2016 NRC Scenario No. 4	Event No. 2	Page 1 of 1
Event Description: Failure of 1B CAM (901-56 panel) to start for surveillance.				
Time	Position	Applicant's Actions or Behavior		
	SRO	Directs BOP to perform QCOS 1600-04, Weekly Primary Containment Oxygen Concentration.		
	BOP	Records position of the H2 % O2 MON INLET VLV SELECT switch for each CAM.		
	BOP	Momentarily places the 1B CAM PWR CONT switch to ON at the 901-56 panel and reports the B CAM did NOT start and the sample valves did NOT open.		
	SRO/BOP	Contacts Instrument Maintenance and requests assistance.		
SIM OP ROLE PLAY: If contacted, as IM Supervisor, acknowledge the report and then state that you: “Will prepare a troubleshooting package, brief the Techs and then report to the control room.”				
	SRO	Enters TLCO 3.3.b, Post Accident Monitoring (PAM) Instrumentation, Condition A, for one required channel inoperable. (Table T3.3.b-1 Function 5 & 6). TS		
LEAD EVALUATOR ROLE PLAY: IF necessary, as the Shift Manager direct completion of QCOS 1600-04 using the 1A DW CAM. (Provide the blank copy of QCOS 1600-04 upon request.)				
	BOP	Momentarily places the 1A CAM PWR CONT switch to ON at the 901-55 panel and acknowledges alarms.		
	BOP	Places the H2 & O2 MON INLT SELECT switch for the A Train to the DW position and verifies the sample valves swap from Torus to Drywell.		
	BOP	Dispatches an EO to the Cable Spreading Room to locally reset the 901-55 B-5 alarm.		
SIM OP ROLE PLAY: If dispatched to the 901-64A/B panels in the Cable Spreading Room, as EO reset the alarms for the A CAM (901-55 panel) using the following command: irf pc11r ackn				
	ATC	Continuously monitors RPV power, pressure, and water level.		
End of Event 2				

Quad Cities 2016 NRC Scenario No. 4 Event No. 3 Page 1 of 2		
Event Description: 1C Condensate/Condensate Booster Pump trip with failure of Standby Pump to auto-start.		
Time	Position	Applicant's Actions or Behavior
SIMOP: At the Lead Evaluator's direction, trip the 1C Condensate/Condensate Booster Pump using malfunction FW17C: imf fw17c		
Key Parameter Response: 1C Condensate/Condensate Booster Pump trips with failure of Standby Pump to auto-start. Expected Annunciator(s): 901-6 A-6, COND PUMP DISCHARGE LOW PRESSURE 901-6 F-5, CONDENSATE BOOSTER PUMP AUTO TRIP Automatic Actions: None (Standby Pump auto-start is defeated)		
	ATC	Reports 1C Condensate/Condensate Booster Pump has tripped and the Standby Pump has failed to autostart.
	ATC	Manually starts the 1A Condensate/Condensate Booster Pump.
	ATC	Reports RPV water level is +30 inches and stable.
	BOP	Refers to QCAN 901-6 F-6 and verifies: PI 1-3340-48, COND PMP DISCH HDR PRESS, indicates > 104 psig. 1-3240-73, RFP SUCT HDR PRESS, indicates > 145 psig.
	US	Directs actions of QCOA 3300-01, Loss of Condensate Pump.
	BOP	Notifies Generation Dispatch of plant status.
SIM OP ROLE PLAY: If contacted, as Generation Dispatch, acknowledge the report of the tripped pump.		
	BOP	May place the COND PMP SELECTOR switch to the OFF position.
	ATC/BOP	Verifies proper operation of the Feed Water Reg Valves.
	BOP	Verifies Bus 14 current and voltage are in normal range.
	BOP	Dispatches EO to Bus 14 to check for any red targets on the breaker compartment or the Bus Auxiliary compartment.
Event 3 Continued		

Quad Cities	2016 NRC Scenario No. 4	Event No. 3	Page 2 of 2
Event Description: 1C Condensate/Condensate Booster Pump trip with failure of Standby Pump to auto-start.			
Time	Position	Applicant's Actions or Behavior	
	BOP	Dispatches EO to check operation of running Condensate/Condensate Booster Pumps and to perform step D.12 of QCOA 3300-01: <ul style="list-style-type: none">• Secure Hydrogen injection on the 1C Cond/Cond Booster Pump• Valve in Hydrogen injection on the 1A Cond/Cond Booster Pump	
SIM OP ROLE PLAY: As the EO dispatched to Bus 14, wait 1 minute, then report: "There is an overcurrent target up on Bus 14 cubicle 8, for the 1C Cond/Cond Booster Pump. No other targets are up on any of the compartments."			
SIM OP ROLE PLAY: As the EO dispatched to the Condensate Pumps, wait 2 minutes, then report: "The 1A, 1B, and 1D Condensate Pumps are operating normally. Step D.12 of QCOA 3300-01 is complete. Hydrogen injection is valved into the 1A Condensate pump and secured on the 1C Condensate pump."			
End of Event 3			

Quad Cities 2016 NRC Scenario No. 4 Event No. 4		Page 1 of 1
Event Description: SSMP Room Cooler inoperable.		
Time	Position	Applicant's Actions or Behavior
SIMOP ROLE PLAY: When directed by the Lead Examiner, actuate annunciator 912-8 A-8 using the following command: imf ano9128a8 on		
Key Parameter Response: None. Expected Annunciator(s): 912-8 A-8, SAFE SHUTDOWN SYSTEM TROUBLE Automatic Actions: None.		
	BOP	Reports annunciator 912-8 A-8, Safe Shutdown System Trouble is in alarm and refers to annunciator procedure.
	BOP	Dispatches an EO to the Safe Shutdown Makeup Pump Room to investigate.
SIM OP ROLE PLAY: As the EO, wait 1 minute, then report back that: "The COMPRESSOR TRIP INDICATING LIGHT is lit on the side of the SSMP Room Cooler."		
	BOP	Reports condition to the SRO and directs the EO to attempt a reset per QCOP 2900-01 step F.17.
SIM OP ROLE PLAY: As the EO, wait 4 minutes, then call back and report that you have: "Performed QCOP 2900-01 step F.17 and the COMPRESSOR TRIP INDICATING LIGHT will NOT reset. The light is still lit and the compressor is NOT running."		
	BOP	Reports to the SRO that the SSMP Room Cooler compressor is tripped and will not reset.
	BOP	Contacts Mechanical Maintenance for assistance.
	ATC	Continuously monitors RPV power, pressure, and water level.
	SRO	Declares SSMP inoperable due to an inoperable Room Cooler. Enters the following administrative actions for Units 1 and 2: TS 3.7.9, Condition A, SSMP inoperable. 14 Day ATR, SSMP unavailable.
SIM OP ROLE PLAY: If contacted, as Maintenance Supervisor, state that you will: "Prepare a troubleshooting package and dispatch a crew to investigate the SSMP Room Cooler Compressor."		
End of Event 4		

Quad Cities	2016 NRC Scenario No. 4	Event No. 5	Page 1 of 2
Event Description: 1A Gland Steam Exhauster Trip			
Time	Position	Applicant's Actions or Behavior	
<p>SIMOP : When directed by the Lead Examiner and the BOP is in position to receive credit for the malfunction, trip the 1A Gland Exhauster by manually initiating trigger 3</p> <p>trg! 3</p> <p>Verify the following commands go active:</p> <p>imf ser0986 (3) on</p> <p>ior dihs156041a (3) trip</p> <p>ior lohs156041a4 (3) on</p>			
<p>Key Parameter Response: 1A Exhauster Amber Trip light on and Red Running light off: Lowering Vacuum on Gland Seal Exhaust Vacuum indication, 1-5140-70</p> <p>Expected Annunciator(s): 901-7 E-12, GLAND STM EXH MOTOR TRIP</p> <p>Automatic Actions: MO 1-5400-E1, A CNDSR EXH ISOL VLV E1 closes when the GSE Motor breaker trips.</p>			
	BOP	Acknowledges annunciator 901-7 E-12, and reports the 1A Gland Steam Exhauster has tripped.	
	SRO	Directs BOP to perform the actions of QCAN 901-7 E-12.	
	BOP	Starts the 1B Gland Steam Exhauster.	
	BOP	Throttles open MO 1-5405B, B CNDSR EXH DISCH VLV D-2.	
	BOP	On the tripped Gland Steam Exhauster, throttles closed MO 1-5405A, A CNDSR EXH DISCH VLV D-1.	
	BOP	On the tripped Gland Steam Exhauster, verifies MO 1-5400-E1, A CNDSR EXH ISOL VLV E1 automatically closes.	
	BOP	Refers to QOP 5600-01, step F.2	
	BOP	Verifies NO valid level alarms on Gland Condenser Hotwell or Shell.	
	ATC	Continuously monitors RPV power, pressure, and RPV water level.	
Event 5 Continued			

Quad Cities 2016 NRC Scenario No. 4 Event No. 5			Page 2 of 2
Event Description: 1A Gland Steam Exhauster Trip			
Time	Position	Applicant's Actions or Behavior	
	BOP	Throttles the MO 1-5405B to obtain 10 inches to 15 inches of vacuum as indicated on the 1-5140-70, GLAND SEAL EXH VACU.	
	BOP	Verifies GLAND SEAL SPLY PRESS is between 2.5 and 5.0 psig.	
	BOP	Dispatches an EO to MCC 15-1 to investigate the tripped breaker.	
SIM OP ROLE PLAY: As the EO, wait 2 minutes after being dispatched to MCC 15-1 and call back to report: "The breaker for the Gland Steam Exhauster Motor at MCC 15-1 cubicle B2 is tripped. There is no obvious problem at the breaker and you have contacted EMD to investigate."			
End of Event 5			

Quad Cities		2016 NRC Scenario No. 4	Event No. 6	Page 1 of 2
Event Description: Loss of Main Condenser vacuum (Emergency Power Reduction)				
Time	Position	Applicant's Actions or Behavior		
SIM OP: When directed by the Lead Examiner, initiate a 100% loss of Main Condenser vacuum ramped over 25 minutes using malfunction MC08: imf mc08 100 25:				
Key Parameter Response: Main Condenser backpressure rising on PR 1-5640-79; Generator MW(e) lowering, Off gas flow to Main Chimney rising on FI 1-5440-7. Expected Annunciator(s): 901-3 D-2, OFF GAS HI RADIATION 901-7 H-3, CONDENSER LO VACUUM 24 IN HG 901-5 F-5, CONDENSER VACUUM LO 901-54 C-7, NORMAL PROCESS FLOW HI/LO Automatic Actions: Reactor Scram and Turbine trip				
	BOP	Acknowledges 901-3 D-2 alarm and refers to the QCAN.		
	SRO	Directs that reactor power be held constant until the cause of the high radiation is determined.		
	BOP	Monitors SJAE and Main Steam Line radiation levels.		
	ATC/BOP	Report Off Gas Flow as indicated on FI 1-5440-7, OFF GAS FLOW TO MN CHIMNEY, is rising.		
	ATC/BOP	Report Main Condenser backpressure rising.		
	SRO	Enters and directs actions of QOA 3300-02, Loss of Condenser Vacuum.		
	SRO	Directs an Emergency Power Reduction to control Condenser backpressure < 6 in. Hg.		
	ATC	Reduces Recirc Pump speed(s) using the Master/Individual Controllers <u>OR</u> the Manual Runback pushbuttons.		
	ATC	Inserts CRAM rods to maintain FCL within the MELLLA boundary.		
	BOP	Dispatches EO's to verify Condenser vacuum breaker water seal is intact and loop seal are full.		
	SRO	Sets scram criteria at 7.5 in Hg.		
	BOP	Verifies Off-Gas and SJAE suction valves are open.		
	BOP	Verifies Circulating Water System is operating normally.		
	BOP	Verifies Main Condenser Hotwell level is normal.		
Event 6 Continued				

Quad Cities 2016 NRC Scenario No. 4 Event No. 6			Page 2 of 2
Event Description: Loss of Main Condenser vacuum (Emergency Power Reduction)			
Time	Position	Applicant's Actions or Behavior	
	BOP	Acknowledges and reports annunciator 901-7 H-3, CONDENSER LO VACUUM 24 IN. HG, is in alarm.	
	BOP	Notifies Chemistry that Condenser vacuum has been lost and to align Unit 1 Reactor Building Sample Panel drains per CY-QC-110-608.	
	SRO	Directs ATC to insert a manual reactor scram on loss of Main Condenser vacuum.	
	ATC	Inserts a manual reactor scram by depressing both RX SCRAM pushbuttons <u>AND</u> placing the RX MODE SELECT switch to SHUTDOWN.	
End of Event 6			

Quad Cities 2016 NRC Scenario No. 4 Event No. 7			Page 1 of 3
Event Description: Electric ATWS (Manual ARI inserts rods)			
Time	Position	Applicant's Actions or Behavior	
<p>Key Parameter Response: No control rod movement when manual scram is inserted. All 8 RPS SCRAM SOLENOID GROUP indicating lights on 901-5 panel remain lit.</p> <p>Expected Annunciator(s): 901-5 C-5, ATWS CHANNEL A OR B MANUAL PB ARMED (when ARI system is initiated) 901-5 A-1, SCRAM VALVE AIR SUPPLY LOW PRESSURE (when ARI system is initiated) 901-5 A-10/15, CHANNEL A/B MANUAL SCRAM</p> <p>Automatic Actions: None</p>			
	ATC	Reports control rods did NOT insert	
	SRO	Enters QGA 100, RPV Control and transitions to QGA 101 on failure to scram when above 5% power.	
CT1	ATC	Arms and depresses ARI pushbuttons.	
	ATC	Runs both Recirc Pump speeds to minimum (32%).	
	ATC	Reports ALL control rods are inserted.	
EVALUATOR NOTE: The bulleted actions below are NOT required, but may be performed prior to exiting QGA 101.			
	ATC	<ul style="list-style-type: none"> Injects SBLC by placing the SBLC PUMP SELECT to either SYS 1 or SYS 2. (if control rod motion has not been observed yet) 	
	SRO	<ul style="list-style-type: none"> Directs BOP to inhibit ADS. 	
	BOP	<ul style="list-style-type: none"> Inhibits ADS by placing AUTO BLOWDOWN INHIBIT switch to INHIBIT. 	
	SRO	<ul style="list-style-type: none"> Directs Core Spray Pumps placed in P-T-L. 	
	BOP	<ul style="list-style-type: none"> Places both Core Spray Pump control switches in P-T-L. 	
	SRO	<ul style="list-style-type: none"> Directs ATC to terminate Boron injection. 	
	ATC	<ul style="list-style-type: none"> Places SBLC switch to OFF. (if system was injecting) 	
	SRO	<ul style="list-style-type: none"> Directs BOP to return AUTO BLOWDOWN INHIBIT switch to the NORMAL position and take Core Spray pump control switches out of P-T-L. 	
	BOP	<ul style="list-style-type: none"> Places AUTO BLOWDOWN INHIBIT switch to the NORMAL and takes both Core Spray pump control switches out of P-T-L. 	
	SRO	Exits QGA 101 and re-enters QGA 100.	
	SRO	Directs ATC to enter and perform actions per QCGP 2-3, Reactor Scram.	
Event 7 continued			

Quad Cities		2016 NRC Scenario No. 4	Event No. 7	Page 2 of 3
Event Description: Electric ATWS (Manual ARI inserts rods)				
Time	Position	Applicant's Actions or Behavior		
	ATC	Performs post scram actions per QCGP 2-3, Attachment A.		
	SRO	Directs ATC/BOP to verify auto actions/isolations for 0 inches RPV water level.		
	ATC/BOP	Report all Group II and Group III isolations are verified		
	SRO	Directs ATC to control RPV water level in a band of 0 to +48 in. with the Condensate and Feedwater system.		
	ATC	Controls RPV water level in 0 to +48 in. band using the Condensate/Feed System.		
	BOP	Starts up RWCU system in reject mode per QCOP 1200-07 Attach. A (Hard Card)		
		<ul style="list-style-type: none">Verifies RBCCW system is in operation at the 912-1 panel.Resets Group III isolation with the ISOL VLV RESET switch at the 901-5 panel.Opens MO 1-1201-2, PMP SUCT VLV.Opens MO 1-1201-5, RECIRC PMP SUCT ISOL VLV.Cracks open MO 1-1201-80, RETURN ISOL VLV.Starts 1A/B RWCU pump throttling open MO 1-1201-80 valve as necessary to clear alarm 901-4 H-12, RWCU SYSTEM PUMPS LOW FLOW.Throttles MO 1-1201-80 to establish pump discharge pressure 100 to 200 psig > Reactor pressure.Opens MO 1-1201-78, CU REJECT TO CONDENSER SV.Throttles open FCV 1-1239, U-1 CU REJECT FCV by adjusting FC 1-1290-31, REJECT FLOW CONTROLLER.Removes Filter Demins from operation per QCOP 1200-03.		
	BOP	Dispatches EO to the RWCU Demin Panel 2201-61.		
Event 7 continued				

Quad Cities 2016 NRC Scenario No. 4 Event No. 7		Page 3 of 3
Event Description: Electric ATWS (Manual ARI inserts rods)		
Time	Position	Applicant's Actions or Behavior
<p>SIM OP ROLE PLAY: If dispatched as EO to isolate the RWCU Demins, wait 2 minutes, then call back and remove the 1A and 1B Demins respectively, using the commands below. Note: (the BOP will throttle open MO 1-1201-133, DEMIN BYPASS VLV as each one is taken off line.)</p> <p>irf cu13r 0 :30 irf cu09r out</p> <p>irf cu14r 0 :30 irf cu10r out</p>		
	SRO	Directs the BOP to initiate an RPV cooldown using ADS valves at < 100°F/hr.
	ATC/BOP	Initiate an RPV cooldown using ADS valves.
EVALUATOR NOTE: IF the Crew initiates Torus Cooling, see page 24 for the steps.		
End of Event 7		

Quad Cities 2016 NRC Scenario No. 4 Event No. 8-9			Page 1 of 5
Event Description: Main Steam Line break inside the Drywell / Blowdown			
Time	Position	Applicant's Actions or Behavior	
SIM OP: When the plant is stabilized and at the direction of the Lead Examiner, insert a .5% break in the B Main Steam Line ramped over 10 minutes using malfunction MS04B: imf ms04b .5 10:			
Key Parameter Response: Drywell /Torus pressure and temperature rising Expected Annunciator(s): (Not a complete list) 901-3 A-16 PRIMARY CONTAINMENT HIGH PRESSURE 901-5 D-11 PRIMARY CNMT HIGH PRESS Automatic Actions: Group 2 Isolation, CR and RB Vents isolate, SBGTS starts, ECCS systems initiate, EDGs start, LOCA Load Shed, LPCI Loop Select			
	BOP	Acknowledges and reports annunciator 901-3 A-16, PRI CNMT HIGH PRESSURE, is in alarm.	
	BOP	Monitors and reports rising Drywell pressure.	
	SRO	Directs BOP to take actions per QCOA 0201-01.	
	BOP	Makes an announcement to evacuate the Reactor Building.	
	BOP	Notifies Radiation Protection of elevated drywell pressure and directs them to control access to the Reactor Building.	
	ATC/BOP	Investigate cause of increasing Drywell pressure.	
	BOP	Reports Drywell pressure at 2.5 psig and rising.	
	SRO	Enters QGA 100 and 200 on 2.5 psig Drywell pressure.	
	SRO	Directs ATC/BOP to verify auto actions for 2.5 psig Drywell pressure.	
	SRO	Verifies HPCI is not needed for core cooling and directs ATC/BOP to trip-latch HPCI.	
	ATC/BOP	Places HPCI turbine Trip pushbutton in trip-latch.	
	ATC/BOP	Verify isolations and actuations per QCAP 0200-10 Attach. O.	
	SRO	Directs BOP to restart RBCCW and Drywell Coolers.	
	BOP	Restarts RBCCW and Drywell Coolers per QCOP 5750-19, Hard Card.	
Event 8-9 continued			

Quad Cities		2016 NRC Scenario No. 4	Event No. 8-9	Page 2 of 5
Event Description: Main Steam line break inside Drywell / Blowdown				
Time	Position	Applicant's Actions or Behavior		
	SRO	Directs BOP to initiate and maximize <u>Torus Cooling</u> .		
	BOP	Maintains the following during Post-Accident RHR Operation: <ul style="list-style-type: none">· RHR Service Water Pressure 15-20 psig > RHR Pressure· RHR Service Water flow <3600 gpm/pump· RHR Discharge Pressure 100-200 psig		
	BOP	Prepares RHR for Operation.		
		Verifies RHR Pumps running.		
		Places LOOP A/B CONTAINMENT COOLING PERMISSIVE Switch 17 to ON.		
		Places LOOP A/B RHR SW START PERMISSIVE Switch 19 to MANUAL OVERRIDE.		
	BOP	Starts an RHR Service Water pump on both loops.		
		Opens MO 1-1001-5A/B to approximately 40%.		
		Starts A/C RHR SW Pumps.		
		Throttles MO 1-1001-5A/B as necessary.		
		Closes MO 1-1001-16A/B valves.		
	BOP	Starts 2 nd RHR Service Water pump on both loops.		
		Opens MO 1-1001-5A/B to achieve approximately 140 psig RHR Service Water pressure.		
		Starts B/D RHR SW Pumps.		
		Throttles MO 1-1001-5A/B as necessary to maintain flow <7200 gpm and discharge pressure <350 psig.		
Event 8-9 continued				

Quad Cities		2016 NRC Scenario No. 4	Event No. 8-9	Page 3 of 5
Event Description: Main Steam line break inside Drywell / Blowdown				
Time	Position	Applicant's Actions or Behavior		
	BOP	Opens MO 1-1001-34A.		
	BOP	Throttles open MO-1-1001-36A and maintains RHR discharge pressure in a 100-250 psig band.		
	BOP	Attempts to open MO 1-1001-34B and reports the valve will NOT open. Determines a possible problem with the S-17B switch (RHR Loop B CONTAINMENT Clg permissive) and contacts EM for assistance.		
SIM OP ROLE PLAY: If directed as EMD or IMD to troubleshoot LOOP B CONTAINMENT COOLING PERMISSIVE Switch 17, inform the operator you will locate your supervisor, start a troubleshooting package, and then report to the control room (No EMD or IMD personnel will enter the simulator).				
	SRO	Verifies Torus level <27 ft.		
	SRO	Before Torus Pressure reaches 5 psig, directs BOP to start Torus Sprays.		
	BOP	As directed, initiates Torus Sprays on A Loop.		
		Opens MO 1-1001-34A.		
		Opens MO 1-1001-37A and reports Torus Sprays initiated.		
	BOP	Throttles MO 1-1001-36A as necessary to maintain RHR Discharge Pressure.		
	SRO	Directs BOP to secure Torus Sprays before Torus Pressure drops to 0 psig.		
	BOP	Reports Torus pressure >5 psig.		
	SRO	Verifies Torus level <17 ft.		
	SRO	Verifies containment parameters (DW temperature and pressure) are within the DW Spray Initiation Limit Curve.		
	SRO	Verifies Recirc pumps are tripped and directs Drywell coolers tripped if restarted.		
	BOP	Trips drywell coolers. (if required)		
Event 8-9 Continued				

Quad Cities 2016 NRC Scenario No. 4			Event No. 8-9	Page 4 of 5
Event Description: Main Steam line break inside Drywell / Blowdown				
Time	Position	Applicant's Actions or Behavior		
	SRO	Directs BOP to initiate DW Sprays.		
	BOP	Reports the RHR 23A valve breaker tripped and dispatches an EO to MCC 18-1B.		
SIM OP ROLE PLAY: As EO dispatched to investigate the RHR 23A valve breaker, wait 4 minutes, then report back: "The RHR 23A valve breaker is tripped and will not reset."				
	BOP	Dispatches EOs to manually open the RHR 23A valve.		
SIMOP ROLE PLAY: If asked for status of opening the DW spray valves state that you are: "Having trouble moving the handwheel and have requested assistance from Mechanical Maintenance."				
	SRO	May direct actions to start all available drywell cooling.		
	ATC/BOP	Restarts DW coolers if directed.		
CT2	SRO	Enters and directs actions of QGA 500-1 to blowdown the vessel when it is determined Drywell temperature cannot be restored below 280°F or Torus pressure cannot be maintained within PSP limits.		
	ATC/BOP	Prevents injection from Core Spray and LPCI not needed for Core Cooling by diverting LPCI flow to Torus cooling and/or placing pumps in PTL.		
	SRO	Verifies Torus level > 5 feet.		
CT2	BOP	Opens all 5 ADS valves and leaves switches in MAN.		
	BOP	Verifies all ADS valves open by acoustic monitor indication on the 901-21 panel.		
Event 8-9 continued				

Quad Cities 2016 NRC Scenario No. 4 Event No. 8-9			Page 5 of 5
Event Description: Main Steam line break inside Drywell / Blowdown			
Time	Position	Applicant's Actions or Behavior	
	ATC	Verifies or trips RFPs due to level exceeding +48 inches from swell.	
	ATC/BOP	Monitors RPV water level instruments for indications of saturation.	
SIM OP NOTE: When RPV pressure is at or below 100 psig, RPV water level is stabilized, and at the direction of the Lead Evaluator, freeze the Simulator.			
End of Scenario			