Exelon Nuclear

2020 ILT NRC Exam Scenario

Scenario Number:

NRC Scenario 1

Revision Number: 00

Date: 08/30/2019

Developed by: _____ _____
Instructor Date

Validated by: _____ _____
SME or Instructor Date

Reviewed by: _____ _____
Operations Representative Date

Facility: Quad Cities Scenario: **2020 NRC Scenario 1** Op-Test No.: ILT 18-1
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions:
The plant is operating at 100% power, holding load.

Turnover: Reverse Main Condenser flow per QCOP 4400-09.

Critical Tasks:

1. With a primary system discharging into Secondary Containment, isolate Reactor Building ventilation. Time of manual isolation not to exceed 30 minutes from discovery of unisolable HPCI steam leak (EAL entry condition).

2. Perform an RPV Blowdown when two areas are above max safe radiation levels. QGA 500-1 entry not to exceed 15 minutes after two or more areas of the same parameter are above max safe.

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	Reverse Main Condenser flow
2	AOPI1514012 AOAI1564025 SER0783 LOIL15650PANP	BOP C	1A EHC pump degrades and standby pump fails to auto-start.
3	RR01A	ATC R / TS	1A Recirc pump trip / Emergency Power Reduction
4	NM08A	ATC C	APRM 1 fails to track (stuck at 100%)
5	DIFC1064018I2	ATC C	DFWLC Master Controller failure
6	HP10	BOP C / TS	HPCI spurious initiation
7	HP13 CR01	CREW M	HPCI Steam Line break & Fuel failure RPV Blowdown (2 areas above max safe rad levels)
8	HV01	CREW C	Reactor Building Vents fail to isolate

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

ES-301-4 Quantitative attributes:	ES-301-5 Quantitative attributes:
Total Malfunctions (5-8): **8** Malfunction(s) after EOP (1-2): **1** Abnormal Events (2-4): **E2, 3, 4, 5, 6** Major Transient(s) /E-Plan entry (1-2): **1** EOPs (1-2): **QGA 100 / 300** EOP Contingencies (0-2): **QGA 500-1** Critical Tasks (2-3): **2**	BOP Normal: **E1** ATC Reactivity (1 per set): **E4** BOP I/C (4 per set): **E2, 6** ATC I/C (4 per set): **E4, 5** SRO-I I/C (4 per set inc 2 as ATC): **E2, 4, 5, 6** SRO Tech Spec (2 per set): **E3, 6** ALL Major Transients (2 per set): **E7**

SUMMARY:

- Initial Conditions:
    - The plant is operating at 100% power, holding load.
    - QCOP 4400-09, Circulating Water System Flow Reversal, is the first activity scheduled for the shift.
- Event 1: The BOP performs QCOP 4400-09, Circulating Water System Flow Reversal.
- Event 2: The 1A EHC pump will degrade as evidenced by a low pump current, the “Normal Pressure” light extinguishes, and an “EHC Fluid Low Pressure” alarm on the 901-7 panel. The standby pump will have failed to autostart. The operator will manually start the 1B EHC pump and secure the 1A EHC pump.
- Event 3: The 1A Recirc pump trips. The crew will enter and take actions per QCOA 0202-04. The crew will perform an emergency power reduction with control rods to avoid/exit ICA Region II. A reduction in the operating Recirc pump speed will also be required to get motor current and pump speed within limits. After the plant is stabilized, the SRO will enter TS 3.4.1 for Single Loop Operation.
- Event 4: The ATC will report APRM 1 still indicating 100% power. The SRO will review TS 3.3.1.1 and TRM 3.3.a. for APRM requirements and determine that no LCO/TLCO entries are required. The crew will bypass APRM 1.
- Event 5: The DFLC Master Controller setpoint drifts downscale causing RPV water level to lower. The ATC operator will terminate the transient by placing both Individual FRV Controllers in manual. The ATC will adjust both Feedwater Regulating valve position to maintain the LFFRV between 40% and 60% open.
- Event 6: A spurious HPCI initiation will occur. The operator will attempt to secure HPCI injection by actuating the trip-latch REMOTE HPCI TURB TRIP pushbutton. When this proves to be unsuccessful, the operator will lower the flow controller setpoint to zero to prevent injection and dispatch an EO to locally trip HPCI. The SRO will enter TS 3.5.1 (ECCS-Operating) HPCI System inoperable.
- Event 7: HPCI Steam Line break and Fuel Failure. A break in the HPCI steam supply line in the HPCI room causes room high temperature and radiation alarms. Both HPCI Steam Isolation valve breakers will trip when given either a manual or automatic close signal. Fuel Failure results from the Recirc pump trip and manual reactor scram. HPCI and Torus radiation levels exceeding max safe values results in an RPV blowdown.
- Event 8: Reactor Building Vents fail to isolate on the Group II signal. The operators will manually isolate the vents and verify the SBGTS is operating to maintain secondary containment integrity.
- Approximate Run Time: 1.5 Hours

CRITICAL TASKS:

Critical Task #1: The crew will recognize a failure of the reactor building vents to isolate and manually isolate them using the control switch on the 912-1.
Time of manual isolation not to exceed 30 minutes from discovery of unisolable HPCI steam leak (EAL entry condition).

Critical Task #2: 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 of the same parameter (radiation, temperature, or water levels) are above max safe IAW QGA 300 and QGA 500-1.
QGA 500-1 entry not to exceed 15 minutes after two or more areas of the same parameter are above max safe.

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EXERCISE PERFORMANCE OBJECTIVES

SR-0202-P04	(Freq: LIC=A) Given an operating reactor plant with a loss of one reactor recirculation pump, take actions to determine the cause, stabilize the plant parameters and to exit the instability region in accordance with QCOA 0202-04.
SR-0700-P07	(Freq: LIC=B) 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-2300-P07	(Freq: LIC=I) Given an operating plant with an inadvertent HPCI initiation, determine that the initiation is invalid and trip the HPCI turbine in accordance with QCOA 2300-01 and QCOP 2300-04.
SR-4400-P02	(Freq: LIC=I) Given an operating reactor plant, reverse main condenser circ water flow in accordance with QCOP 4400-09.
SR-1700-P03	(Freq: LIC=B) 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. (SOER 90-2 r2)
SR-0001-P40	(Freq: LIC=A) Given a reactor plant with a reactor building area radiation alarm, temperature alarm, differential pressure at or above 0 inches, or area water level above 1 inch, attempt to isolate all discharges into an area except systems needed for fire fighting or other QGA actions in accordance with QCOA 0201-5 and QGA 300.
SR-0001-P41	(Freq: LIC=A) Given an operating reactor plant with a primary system discharging into the reactor building, verify manual scram, enter/re-enter QGA 100 before any area exceeds the maximum safe operating temperature/radiation/water level in accordance with QGA 300. (BWROG SC-1.1)
SR-0001-P42	(Freq: LIC=A) 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. (BWROG SC-1.2)
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.

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Simulator Setup:

1. Reset to IC-21 (100% power) and Go to **RUN.**
2. Verify the following RWM Sequence is loaded: **6PHESD (or current shut down sequence)**
3. Delete SRM 24 override and return bypass switch to normal.
4. Place INFO cards as follows: None.

5. Insert Commands for setup:
   - **imf NM08A 80** (Fail APRM 1 to 100% power)
   - **imf HV01** (Reactor Building Ventilation fails to auto isolate)
   - **imf HP12A 50** (Bind the HPCI Isolation Valve MO 1-2301-4 50% open)
   - **imf HP12B 50** (Bind the HPCI Isolation Valve MO 1-2301-5 50% open)
   - **ior DIHS12303RTT default** (Fail the HPCI Remote Turbine Trip pushbutton)

6. Verify the following commands for scenario performance**:**
   - **ior AOPI1514012 1300 4: 1550** (Override EHC Pressure gauge on 901-7 panel to 1300 psig over 4 minutes)
   - **ior AOAI1564025 22 3: 29** (Override the 1A EHC Pump Current gauge to 22 amps ramped over 3 minutes)
   - **ior ser0783 on 3:30** (Override annunciator 901-7 A-6 on with a 3.5 minute delay)
   - **ior LOIL15650PANP off 3:20** (Override the 1A EHC Pump Normal Pressure Light off on a 3.33 minute delay)
   - **zdihs1564022(1).eq.true** (Set variable true when 1A EHC pump c/s is taken to PTL)
   - **zdihs1564022(3).eq.true** (Set variable true when 1A EHC pump c/s is taken to STOP – triggers command below)
   - **dor AOAI1564025** (Delete override on 1A EHC pump current meter)
   - **zdihs1564034(4).eq.true** (Set variable true when 1B EHC pump c/s is taken to START – triggers next two commands)
   - **dor AOPI1514012** (Delete override on EHC Pressure gauge)
   - **dor ser0783** (Delete override on 901-7 A-6 alarm)
   - **imf RR01A** (Trip the 1A Recirc pump)
   - **ior DIFC1064018I1 off** (Override DFLC Master Controller RAISE pushbutton off)
   - **DIFC1064018I2 lower** (Override DFLC Master Controller LOWER pushbutton on)
   - **dor DIFC1064018I2 (8 sec. delay)** (Delete LOWER pushbutton override after 8 sec.)
   - **imf HP10** (Inadvertent HPCI Initiation)
   - **bat fireout** (acknowledge FAS alarms)
   - **irf HP17R trip** (Trip HPCI with the HPCI Local Turbine Trip Lever)
   - **imf HP13 100 6:** (HPCI steam line rupture in the HPCI room at 100% severity ramped over 6 minutes)
   - **imf CR01 100 10:** (Insert Fuel failure at 100% severity ramped over 10 minutes)
   - **irf SW10R run** (Local start of the U1 DGCWP)

Simulator setup continued:

7. Install “Protected System” placards and/or rings on the following equipment:
   - RBCCW pumps
   - Fuel Pool Cooling Water pumps

8. Provide the following:
   - “Holding Load and Load Following” REMA
   - Marked up copy of QCOP 4400-09
   - One replacement fuse (FNA6) as required by QCOP 4400-09, step C.3.
   - FAS alarm message to Lead Evaluator

9. Place the Zinc Injection placard on 1A RFP.

10. Verify CIRCULATING WATER FLOW SELECTOR switch is selected to South.

LIST OF POTENTIAL PROCEDURES

Annunciator Procedures

- 901(2)-3, A-1, REACTOR BUILDING AREA RADIATION MONITOR CHANNEL HIGH RADIATION, Rev. 8
- 901(2)-3, A-2, MAIN STEAM LINE HIGH RADIATION, Rev.12
- 901(2)-3, A-9, HPCI TURBINE TRIP/LOW GOVERNOR HYDRAULIC OIL PRESSURE, Rev. 6
- 901(2)-3, A-14, TORUS HIGH/LOW LEVEL, Rev. 9
- 901(2)-3, D-1, TURBINE BUILDING AREA RADIATION MONITOR CHANNEL HIGH, Rev. 7
- 901(2)-3, D-2, HIGH RADIATION AT SJAE OUTLET, Rev. 16
- 901(2)-3, D-12, HPCI PUMP LOW FLOW, Rev. 7
- 901(2)-3, D-13, ELECT RELIEF VALVES 3A 3B OPEN, Rev. 7
- 901(2)-3, E-14, ACOUSTIC MON SAFETY RLF VALVES OPEN, Rev. 7
- QOA 900-3, H-2, AREA HIGH TEMP STEAM LEAK DETECTION, Rev. 9
- 901(2)-5, F-8, RX VESSEL LOW LEVEL, Rev.11
- 901(2)-4, B-2, RECIRCULATION ADJUSTIBLE SPEED DRIVE A TRIP, Rev. 11
- 901(2)-7, A-6, EHC FLUID SYSTEM LOW PRESSURE, Rev. 5
- QOA 900-56, A-1, DRYWELL HIGH RAD CONC, Rev. 11
- QOA 912-5, C-1, RX BLDG 1 LOW DP, Rev. 8

QCOP 4400-09, Circulating Water System Flow Reversal, Rev. 30

QCOP 0700-04, Average Power Range Monitoring System Operation, Rev. 18

QCOA 0201-05, Primary System Leaks (Slow Leaks) Outside Primary Containment, Rev. 11

QCOA 0201-09, Reactor Low Water Level, Rev. 27

QCOA 0202-04, Reactor Recirc Pump Trip – Single Pump, Rev. 47

QCOA 0400-02, Core Instabilities, Rev. 27

QCOA 2300-01, HPCI Automatic Initiation, Rev. 24

QCOA 1700-04, Abnormal Off Gas Radiation, Rev. 23

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

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

QCOA 0201-01, Increasing Drywell Pressure, Rev. 30

QCOS 0202-09, Recirculation Single Loop Operation Outage Report, Rev. 18

QCGP 2-3, Reactor Scram, Rev. 92

QCGP 3-1, Reactor Power Operations, Rev. 87

QGA 100, RPV Control, Rev. 12

QGA 300, Secondary Containment Control, Rev. 13

QGA 500-1, RPV Blowdown, Rev. 16

CREW TURNOVER

1.) Plant Conditions:

a.) Unit 1 is currently at 100% Power

b.) Unit 2 is at 100% Power.

c.) Technical Specification limitations:

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:

a.) None.

3.) Evolutions/maintenance for the oncoming shift:

a) Perform QCOP 4400-09, Circulating Water System Flow Reversal. An operator has been briefed and is stationed at MCC 16-3.

b.) Continue holding load per QCGP 3-1.

Quad Cities 2020 NRC Scenario No.1 Event No. 1 Page 1 of 1 Event Description: Perform QCOP 4400-09, Circulating Water System Flow Reversal.		
Time	**Position**	**Applicant's Actions or Behavior**
	SRO	Directs BOP to complete QCOP 4400-09, Circulating Water System Flow Reversal.
	BOP	Contacts EO at MCC 16-3 to establish communications.
SIM OP ROLE PLAY: As the EO at MCC 16-3, if called state: **"I'm in position and have located the Circ Water Reversing Valve breakers."**		
EVALUATOR NOTE: At rated power, Holdup Pipe flow rate is ~ 20 scfm. Therefore, step F.1 should be N/A.		
	BOP	Verifies annunciator 901-7 C-1, "COND FLOW REV VLVS ON LOCAL CONT" is NOT in alarm.
	BOP	Monitors Main Condenser backpressure on PR 1-5640-79 at the 901-7 panel.
	BOP	Places and holds SJAE SUCT VLV TEST switch to the SOU position and verifies the South SJAE Suction valves will open.
	BOP	When the South SJAE Suction valves indicate full open, places CIRCULATING WATER FLOW SELECTOR switch to the opposite (NORTH) position.
	BOP	Verifies the first four valves reverse within 45 seconds and the second four valves reverse within the subsequent 45 seconds.
	BOP	Verifies the following: • SJAE suction valves change over (South valves open). • Condenser seal trough fill valves change over. • Condenser differential pressure has reversed and vacuum is stable.
	ATC	Monitors reactor power, pressure, and water level.
End of Event 1		

Quad Cities 2020 NRC Scenario No.1 Event No. 2 Page 1 of 2 Event Description: 1A EHC Pump degrades with failure of standby pump to autostart		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP NOTE: As directed by the Lead Evaluator, insert block commands for 1A EHC pump degradation: **ior AOPI1514012 1300 4: 1550** **ior AOAI1564025 22 3: 29** **ior ser0783 on 3:30** **ior LOIL15650PANP off 3:20**		
Key Parameter Response: EHC oil pressure lowers to 1300 psig, pump current to 22 amps, and 1A EHC Pump Normal Pressure Light extinguishes. Expected Annunciator(s): 901-7 A-6 Automatic Actions: Standby pump autostarts		
	BOP	Reports and acknowledges annunciator 901-7 A-6, "EHC FLUID LOW PRESSURE" alarm.
	SRO	Directs BOP to take actions per QCAN 901-7 A-6.
	BOP	Monitors EHC System pressure at PI 1-5650-12, and reports: o Oil pressure is at 1300 psig and holding. o 1A EHC Pump Normal Pressure Light is out. o Pump current is low in band. o The standby pump did NOT autostart
	SRO	May set scram criteria of 1100 psig EHC System Oil pressure.
	BOP	Starts the 1B EHC pump and monitors system parameters
	BOP	Dispatches EO to the 1A EHC pump.
SIM OP ROLE PLAY: If dispatched to the 1A EHC pump, wait 2 minutes, then call back and report: **"The 1A EHC pump is running but the motor sounds noisy and is hot".**		
Event 2 continued		

Quad Cities 2020 NRC Scenario No.1 Event No. 2 Page 2 of 2 Event Description: 1A EHC Pump degrades with failure of standby pump to autostart		
Time	**Position**	**Applicant's Actions or Behavior**
	BOP	Secures the 1A EHC Pump and reports: o Oil pressure is 1550 psig o 1B EHC Pump Normal Pressure Light is lit. o Pump current is 30 amps. (mid band)
SIM OP NOTE: When the 1B EHC pump c/s is taken to START, verify the overrides for the EHC Oil pressure as indicated on PI 1-5650-12 and for the 901-7 A-6 alarm are deleted. **dor AOPI1514012** **dor ser0783** When the 1A EHC pump c/s is taken to PTL or NAT, verify the override on the 1A EHC pump current is deleted. **dor AOAI1564025**		
	SRO	Contacts Electrical and Mechanical Maintenance to start work packages on the 1A EHC pump
	ATC	Monitors reactor power, pressure, and water level.
End of Event 2		

Quad Cities 2020 NRC Scenario No.1 Event No. 3 Page 1 of 2

Event Description: 1A Reactor Recirc Pump Trip / Emergency Power Reduction

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: At the direction of the Lead Evaluator, insert block command to trip the 1A Reactor Recirc Pump: **imf RR01A**		
Key Parameter Response: Reactor power ~ 70%, Reactor pressure ~ 975 psig, momentary RPV water level transient Expected Annunciator(s): 901-4 A-1, 901-4 A-3, 901-4 B-2, 901-5 E-7, 901-5 E-8 Automatic Actions: None		
	BOP	Acknowledges alarms and reports the 1A Recirc Pump has tripped.
	ATC	Reports reactor power and pressure lowering. RPV water level high but stabilizing with DFWLC.
	SRO	Directs actions of QCOA 0202-04.
	SRO	Sets scram criteria of loss of 2nd Recirc pump or core instabilities observed.
	ATC	Verifies Total Core Flow < 55 Mlb/hr and FCL > 59.4%. Refers to QCOA 0400-02 as time permits.
	ATC	1) Selects POWER REDUCTION on the RWM 2) Depresses ARRAY MODE to latch all CRAM RODS 3) Continuously inserts CRAM rods per CRAM Rod Move Sheet as needed to lower FCL to avoid/exit ICA Region I/II.
	BOP	Reduces speed on the 1B Recirc pump to < 78% and maintain pump motor current < 770 amps as indicated on 1-0202-730B, PMP CUR.
	BOP	Verify closed MO 1-0202-5A, PMP DISCH VLV, on tripped pump.
	BOP	After 5 minutes has elapsed, re-opens MO 1-0202-5A, PMP DISCH VLV.
	BOP	Within 2 hours, reduces core flow to < 50 Mlb/hr and core thermal power to ≤ 50% RTP.
Event 3 continued		

Quad Cities 2020 NRC Scenario No.1 Event No. 3 Page 2 of 2

Event Description: 1A Reactor Recirc Pump Trip / Emergency Power Reduction

Time	Position	Applicant's Actions or Behavior
	ATC	If further power reduction is required with control rods, then when all CRAM Rods are fully inserted: 1) RETURN TO PRIMARY on the RWM 2) Exit POWER REDUCTION mode 3) Continuously insert control rods to Target-In beginning at last step of Control Rod sequence.
	BOP	Reduces operating loop flow to < 49 Mlb/hr as time permits.
	BOP	Monitors Recirc loop & Reactor Vessel Bottom Head temperatures.
TS	SRO	Enters TS LCO 3.4.1 Condition C, 24 hours to meet LCO requirements for single recirculation loop operation. o Contacts the QNE to implement single loop operation limits for APLHGR, MCPR, and LHGR in PowerPlex. o Contacts Instrument Maintenance to adjust APRM Flow Biased Scram and Rod Block setpoints for single loop operation.
	SRO	Refers to QCOS 0202-09, Recirculation Single Loop Operation Outage Report.
SIM OP ROLE PLAY: If dispatched to the Recirc pump breaker, as the EO report: "**The breaker has tripped on overcurrent, I'll contact the EM shop for assistance in additional troubleshooting."**		
SIM OP ROLE PLAY: If contacted, as the QNE, state: **"I'll verify the single loop operation thermal limits in the COLR and make the adjustments in PowerPlex."**		
SIM OP ROLE PLAY: As Instrument Maintenance Supervision, state: **"I'll prepare a package for APRM scram and rod block adjustments with the QNE and report to the control room."**		
End of Event 3		

Quad Cities 2020 NRC Scenario No.1 Event No. 4 Page 1 of 1 Event Description: APRM 1 not responding to power change.		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: APRM 1 indicates ~100%, APRMs 2 thru 6 indicate ~ 68%, after Recirc pump trip Expected Annunciator(s): None. Automatic Actions: ½ SCRAM on RPS Channel A		
	ATC	Reports ½ SCRAM on RPS Channel A due to APRM Hi-Hi.
	ATC	Reports APRM 1 is not tracking reactor power. APRM 1 is still indicating 100% power.
	SRO	Contacts and directs Instrument Maintenance to investigate / troubleshoot APRM 1 failure.
SIM OP ROLE PLAY: As the Instrument Maintenance Supervisor, state: **"I'll prepare a troubleshooting package and report to the control room. We will need to bypass the APRM to do the testing."**		
	SRO	Determines APRM requirements are still met per TS Table 3.3.1.1-1 and TRM section 3.3.a. Directs ATC to bypass APRM 1 per QCOP 0700-04.
LEAD EVALUATOR ROLE PLAY: QCOP 0700-04 step F.3.a., requires an SRO verification that the minimum number of operable channels per TS 3.3.1.1 and TRM 3.3.a, will still be met if APRM 1 is bypassed. As the WEC SRO or SM concur with the SRO's decision.		
	ATC	Positions APRM BYPASS joystick to "CH1" and verifies white BYPASS light for APRM 1, on the 901-5 panel, is lit.
	BOP	Verifies APRM 1 is bypassed.
	SRO	Directs ATC to reset ½ SCRAM on RPS A.
	ATC	Resets ½ SCRAM and verifies all four RPS Channel A SCRAM SOLENOID GROUP indicating lights are lit.
	ATC	Fills out and places Equipment Status Tag on the APRM BYPASS joystick.
End of Event 4		

Quad Cities 2020 NRC Scenario No.1 Event No. 5 Page 1 of 1 Event Description: DFLC Master Controller Downscale Failure		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP NOTE: At the direction of the Lead Evaluator, insert block commands to lower the DFLC Master Controller setpoint to approx. 22 inches. **DIFC1064018I1 off** **DIFC1064018I2 lower** **dor DIFC1064018I2 (8 sec. delay)**		
Key Parameter Response: RPV water level ↓, APRM power ↓ Expected Annunciator(s): 901-5 F-8 Automatic Actions: None		
	ATC	Acknowledges 901-5 F-8, RX VESSEL LOW LEVEL, alarm and reports RPV water level at 26 inches and lowering.
	SRO	Sets scram criteria at RPV water level +11 inches and lowering.
	ATC	Reports DFLC Master Controller setpoint lowering and both Main Feedwater Reg Valves closing.
	SRO	Directs ATC to take manual control of Main Feedwater Reg Valves.
	ATC	Places both Main Feedwater Reg valves in manual and refers to QCOA 0201-09 and QCAN 901(2)-5 F-8.
	ATC	Reports RPV water level has stabilized at ~ +22 inches.
	SRO	Directs ATC to restore RPV water level to +30 inches and maintain manual control.
	ATC	Raises RPV water level to +30 inches by slowly opening FRVs 1-642A and/or 1-642B and reports RPV water level stable and in manual control.
	SRO	Contacts Instrument Maintenance to investigate the 1-640-18, RX LVL Master CNTRL.
SIM OP ROLE PLAY: As the IM Supervisor, state: **"I will contact the System Engineer for assistance in developing a troubleshooting plan and review it with the Shift Manager"**		
End of Event 5		

Quad Cities 2020 NRC Scenario No.1 Event No. 6 Page 1 of 2 Event Description: HPCI spurious initiation		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP NOTE: At the direction of the Lead Evaluator, insert block command to initiate HPCI: **imf HP10**		
Key Parameter Response: RPV water level ↑, APRM power increases ~ 10% Expected Annunciator(s): 901-3 A-14, 901-3 D-12, 901-5 E-8, Automatic Actions: DFWLC compensates for HPCI injection.		
	BOP	Reports HPCI system is lining up for injection.
	SRO	Directs BOP to trip-latch HPCI.
	BOP	Depresses REMOTE HPCI TURB TRIP pushbutton and actuates the trip-latch.
	BOP	Reports HPCI turbine did NOT trip and lowers the Flow controller setpoint to zero.
EVALUATOR NOTE: The operator may also attempt to close the HPCI Steam Isolation Valves. The valves will bind at 50% closure and trip the breakers. Role plays for personnel dispatched are given on the next event.		
	ATC	Reports RPV water level has stabilized at 30 inches and controlled by DFWLC.
	ATC	Monitors APRMs and reports a small power spike, (if injection occurred).
	SRO	Directs ATC to refer to QCOA 0400-02 and monitor for core instabilities.
	SRO	Directs BOP to enter QCOA 2300-01.
	BOP	Dispatches an EO to locally trip the HPCI turbine.
Event 6 Continued		

Quad Cities 2020 NRC Scenario No.1 Event No. 6 Page 2 of 2 Event Description: HPCI spurious initiation		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP ROLE PLAY: If dispatched., as the EO wait 2 minutes, then insert the command to trip HPCI locally: **irf HP17R trip** Call back and report: **"The HPCI turbine is tripped and the STOP VALVE has been verified closed."**		
	BOP	Places MO 1-2301-14, MIN FLOW BYP VLV in PTL to prevent draining the CCSTs to the Torus.
TS	SRO	Declares the HPCI turbine inoperable and enters TS LCO 3.5.1 Condition G. Immediately verifies RCIC system is operable and starts 14 day time clock.
	SRO	Contacts Electrical Maintenance to investigate the HPCI spurious initiation.
SIM OP ROLE PLAY: As the Electrical Maintenance Supervisor, state: **"We'll get a troubleshooting package and start with the Initiation logic relays in the Aux Electric Room. We will contact the control room prior to opening any cabinets."**		
LEAD EVALUATOR NOTE: If the crew attempted to close the HPCI Steam Isolation valves, these additional Tech Specs would apply for inoperable PCI valves. TS LCO 3.6.1.3, Condition A and B. PCIVs inoperable. (One hour to isolate the affected penetration flow path) TS LCO 3.3.3.1, Condition A and C. PAM instrumentation for PCIV position inoperable. (7 days to restore one required channel to operable status)		
End of Event 6		

Quad Cities 2020 NRC Scenario No.1 Event No. 7/8 Page 1 of 4 Event Description: HPCI Steam Line Break / Fuel Failure		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP NOTE: At the direction of the Lead Evaluator, insert the block command for a HPCI Steam Line and Fuel Failure: **imf HP13 100 6:** **imf CR01 100 10:**		
Key Parameter Response: Rx Bldg d/p ↓, Rx Bldg radiation levels ↑ Expected Annunciator(s): 901-3 A-1, 901-3 H-2, 901-5 A-8, 912-5 C-1, 901-56 A-1 Automatic Actions: Group II and Group IV isolations		
	BOP	Acknowledges and reports the following annunciators: • 901-3 A-1, RX BLDG HI RADIATION • 901-3 H-2, AREA HI TEMP STEAM LEAK DETECTION • 912-5 C-1, RX BLDG 1 LOW DP
	BOP	Announces evacuation of Reactor Building over the plant PA system.
	BOP	Refers to QCAN, notifies Radiation Protection of conditions and requests access control.
	SRO	Directs BOP to enter QCOA 1800-01.
	SRO	Enters and directs actions of QGA 300. (Area radiation above alarm setpoint and re-enters on Area temperature above alarm setpoint)
	BOP	Reports the following: • ARM 16 (HPCI Cubicle) reading >100 mr/hr and rising. • HPCI room temperature 140ºF and rising.
	BOP	Reports isolation valves MO 1-2301-4 and MO 1-2301-5 have lost indication.
	ATC	Dispatches EO to start U1 Diesel Generator Cooling Water Pump
SIM OP ROLE PLAY: If dispatched to start the U1DGCWP, wait 2 minutes, insert remote function: **irf SW10R run** Then call back and report, **"The Unit 1 DGCWP has been started and is running."**		
Event 7/8 Continued		

Quad Cities 2020 NRC Scenario No.1 Event No. 7/8 Page 2 of 4

Event Description: HPCI Steam Line Break / Fuel Failure

Time	Position	Applicant's Actions or Behavior
SIM OP / Lead Evaluator ROLE PLAY: When requested, acknowledge the FAS alarms and give alarm message provided to the BOP. **bat fireout**		
	ATC	Dispatches EO to monitor Reactor Building basement area water levels
SIM OP ROLE PLAY: As the EO dispatched to the reactor building basement, wait 3 minutes, then call back and report: **"There is a large steam leak in the HPCI room. Entry into the room to isolate the leak is not possible."**		
	BOP	Dispatches EOs to MCC 19-1 and MCC 1A to reset MO 1-2301-4 and MO 1-2301-5, STM ISOL VLV breakers.
SIM OP ROLE PLAY: As the EO dispatched to reset the HPCI Isolation valve breakers, wait 5 minutes, then call back and report: **"The HPCI 4 and 5 valve breakers will NOT reset. Electrical Maintenance has been called to assist."**		
	SRO	Directs ATC to insert a manual reactor scram and enter QCGP 2-3.
	ATC	Inserts a manual reactor scram and enters QCGP 2-3.
	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 and directs actions of QGA 100.
	SRO	Directs BOP/ATC to verify auto actions for 0 inches RPV water level.
	SRO	Directs ATC to maintain RPV water level between 0 in. and 48 in. using Condensate and Feedwater system.
CT1	BOP	Reports Reactor Building Vents failed to isolate and manually closes both units RX BLDG ISOL DAMPERS by placing control switches 1(2)-5741-196A and 1(2)-5741-250A to CLOSE at the 912-1 panel.
	BOP	BOP acknowledges 901-56 A-1, DRYWELL HIGH RAD CONC alarm. Reports Drywell radiation 20 mr/hr and rising.
Event 7/8 Continued		

Quad Cities	2020 NRC Scenario No.1	Event No. 7/8	Page 3 of 4

Event Description: HPCI Steam Line Break / Fuel Failure

Time	Position	Applicant's Actions or Behavior
	BOP	Monitors area radiation and temperatures at the 901-11 and 901-21 panels respectively.
	SRO	Directs BOP/ATC to dispatch EO with Mechanical Maintenance and RP Tech to close the MO 1-2301-5 valve.
SIM OP ROLE PLAY: If contacted, as EO to close the HPCI 5 valve, state: **"I'll get MMs and an RP Tech to assist. I will contact the crew at the breaker before attempting to operate the handwheel."**		
	SRO	Directs BOP to refer to QCOA 0201-05.
	ATC/BOP	Reports 901-3 D-2, OFF GAS HI RADIATION, alarm and refers to annunciator procedure.
	SRO	Directs BOP to isolate the Off Gas System and close the MSIVs per QCOA 1700-04.
	BOP	Places the control switch for AO 1-5406 to the CLOSE position and verifies the following valves close: • AO 1-5406, OG DISCH TO STACK • AO 1-5408A, OFFGAS FILT DRN • AO 1-5408B, HOLDUP PIPE DRN
	BOP	Closes all MSIVs
	BOP	Closes all MSIV Drain Valves.
	SRO	May direct the ATC to start a reactor cooldown at < 100 ºF/hr using ADS valves.
	ATC	Opens ADS valve and starts a reactor cooldown.
	SRO	Directs BOP to start Torus Cooling.
	BOP	Starts Torus Cooling on one or both loops and monitors Torus temperature.
Event 7/8 Continued		

Quad Cities	2020 NRC Scenario No.1	Event No. 7/8	Page 4 of 4
Event Description: HPCI Steam Line Break / Fuel Failure			

Time	Position	Applicant's Actions or Behavior
	BOP	Reports ARM 16 (HPCI Cubicle) reading >3000 mr/hr and ARM 15 (Torus Area) > 1000 mr/hr and rising.
	BOP	Reports HPCI room temperature > 150ºF (max safe)
	BOP	Reports HPCI room and Torus area radiation levels are both > 3000 mr/hr.
	SRO	Enters and directs actions of QGA 500-1, (2 areas above max safe radiation levels).
	SRO	Verifies all rods in to at least position 04.
	BOP	Verifies Drywell pressure < 2.5 psig.
	BOP	Verifies Torus level is above 5 ft.
CT2	SRO	Directs BOP to open all 5 ADS valves and leave switches in MAN position.
CT2	BOP	Opens all 5 ADS valves and leaves switches in MAN.
	BOP	Confirms all ADS valves are open by the acoustic monitor indications on the 901-21 panel.
	ATC/BOP	Monitor RPV depressurization to < 100 psig.
SIM OP NOTE: When Blowdown has been performed and with concurrence of the Lead Examiner, place the simulator in **FREEZE.**		
End of Scenario		

END OF SCENARIO

Exelon Nuclear

2020 ILT NRC Exam Scenario

Scenario Number:

NRC Scenario 2

Revision Number: 00

Date: 09/08/2019

Developed by: _____ _____
Instructor Date

Validated by: _____ _____
SME or Instructor Date

Reviewed by: _____ _____
Operations Representative Date

Facility: Quad Cities Scenario: **2020 NRC Scenario** 2 Op-Test No.: ILT 18-1
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions:
The plant is at 40% power with a startup in progress per QCGP 1-1.

Turnover: Start the second Reactor Feed Pump per QCGP 1-1, step F.9.zz.

Critical Tasks:

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

2. 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/LVL TERM/PREVENT)

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	Start the 2nd Reactor Feed Pump
2	None	ATC R	Raise Reactor Power per QCGP 1-1
3	RD01R4631	ATC C / TS	Uncoupled Control Rod with full insertion
4	SER1123 LOAM102034B4C05 LOAM102034B4C03 LOAM102034B4C01	SRO TS	3D ERV Acoustic Monitor failure
5	SER1487 DIHS15707A	ATC C	RFP Vent Fan trip
6	MC01C	BOP C	1C Circulation Water Pump trip
7	SW07A	BOP C	RBCCW pump degradation / swap RBCCW pumps
8	MC08	CREW M	Loss of Main Condenser vacuum / SCRAM
9	RD13A RD13B	CREW C	Full Core Hydraulic ATWS

* (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): **1** Abnormal Events (2-4): **E3, 5, 6, 7** Major Transient(s) /E-Plan entry (1-2): **8** EOPs (1-2): **QGA 100** EOP Contingencies (0-2): **QGA 101** Critical Tasks (2-3): **2**	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, 5** SRO-I I/C (4 per set inc 2 as ATC): **E3, 5, 6, 7, 9** SRO Tech Spec (2 per set): **E3, 4** ALL Major Transients (2 per set) **E8**

SUMMARY:

- Initial Conditions:
  - The plant is currently at 40% power with a startup in progress following a weekend maintenance outage. The 2nd Reactor Feed pump is to be started, then continue to raise reactor power per QCGP 1-1 and the ReMA.
  - The EOs have verified the valve lineup and performed pre-start checks per QOP 3200-03 for the 1B Condensate/Condensate Booster pump and 1A Reactor Feed pump. The EOs have been briefed and are stationed in the field.
- Event 1: Start the 2nd Reactor Feed pump. The BOP contacts the EO and announces the start of the 1B Condensate/Condensate Booster pump. The EO will perform the post start checks after which the 1A RFP will be started. Post start checks will be satisfactory and relayed to the BOP.
- Event 2/3: Raise reactor power/uncoupled control rod. The ATC will withdraw control rods per the ReMA to raise FCL. The third control rod withdrawn to position 48 will uncouple during the coupling check. Attempts to recouple the rod per QCOA 0300-03 are unsuccessful. The control rod is fully inserted and disarmed. The SRO will enter TS 3.1.3 Condition C.
- Event 4: 3D ERV Acoustic Monitor Failure. The BOP will respond to annunciator 901-3 E-14, "Acoustic Mon Safety RLF Valves Open", by checking acoustic monitor indications on the 901-21 panel. On the D relief valve module, the OPEN and MEMORY lights are lit, but the digital reading is below the threshold. With no change in TCV position, MWe output, and the absence of the 901-3 E-13 and 901-3 E-16 alarms, the SRO declares the acoustic monitor inoperable and enters TLCO 3.3.b., Condition A.
- Event 5: Reactor Feed Pump Vent Fan trip. The 1A RFP Vent Fan break trips and the 1B RFP Vent fails to autostart. Annunciator 901-6 F-8 alarms and RFP exhaust air temperature lowers. The ATC manually starts the 1B RFP Vent Fan and dispatches an EO to MCC 18-3 to investigate.
- Event 6: 1C Circ Water Pump trip. The 1C Circ Water pump breaker trips on instantaneous overcurrent resulting in a small increase in Main Condenser backpressure. The BOP will be directed to start the 1B Circ Water pump.
- Event 7: 1A RBCCW pump degradation. The 1A RBCCW pump degrades resulting in a low system pressure. The EO will report the pump running hot and noisy. The EO will be directed to line up the ½ RBCCW pump to Unit 1. The ½ RBCCW pump is started, restoring system pressure, and the 1A RBCCW pump secured.
- Event 8: Loss of Main Condenser vacuum / SCRAM. Main Condenser backpressure increases due to a tear of the Main Condenser boot. The crew will reduce power with control rods and Recirc flow. The SRO will direct a manual scram when efforts to stabilize backpressure are unsuccessful.

- Event 9: Hydraulic ATWS. A hydraulic lock on the North and South Scram Discharge Volumes prevents control rod insertion. The SRO directs actions of QGA 101. The ATC will take actions to shutdown the reactor by injecting SBLC and individually inserting control rods. The BOP will control RPV pressure in band. RPV water level will be controlled in a lowered band until the Hot Shutdown weight of Boron is injected. The scenario ends when RPV level is restored to a band of 0 to 48 in. and RPV pressure is stable in band.

- Approximate Run Time: 1.5 Hours

CRITICAL TASKS:

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

Critical Task #2: 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/LVL TERM/PREVENT)

EXERCISE PERFORMANCE OBJECTIVES

SR-0203-P01	(Freq: LIC=B) Given a reactor plant with an ATWS and a loss of the main condenser as a heat sink, stabilize RPV pressure below 1060 psig using ADS valves in accordance with QGA 101 and QCOP 0203-01.
SR-0203-P07	(Freq: LIC=B) Given a reactor plant in a QGA condition, inhibit ADS in accordance with QGA 100 or QGA 101.
SR-0300-P07	(Freq: LIC=B) Given a reactor plant in an ATWS condition (QGA), perform the NSO actions to insert control rods in accordance with QCOP 0300-28.
SR-1000-P01	(Freq: LIC=A) (ILT-MP) Given a reactor plant either operating or shutdown, start the RHRSW system and RHR system in torus cooling in accordance with QCOP 1000-04 and QCOP 1000-9 or QCOP 1000-30. (Important PRA Operator Action – starting torus cooling in conjunction with other actions has a maximum RAW of 2.18E+4) (recovery of torus cooling after failure terminates 20 of top 100 core damage sequences)
SR-1100-P02	(Freq: LIC=A) (ILT-MP) 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 has a RAW of 4.4)
SR-3200-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 5.20% of total CDF and initiates 2 of the top 100 Core Damage Sequences)
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 2 of top 100 most probable PRA Core Damage Sequences)
SR-0001-P12	(Freq; LIC=A) Given a reactor plant with an ATWS and conditions are met to intentionally lower RPV water level (power/level control), terminate and prevent all RPV injection except for boron, CRD, and RCIC in accordance with QGA 101. (SOER 83-8 r11)
SR-0001-P14	(Freq: LIC=B) Given a reactor plant with an ATWS with RPV water level lowered and being maintained between MSCRWL (Minimum Steam Cooling Reactor Water Level) and the level to where it was lowered and SBLC tank level has dropped by 16 percent, raise RPV injection rate to attempt to restore RPV water level to between +0 and +48 inches; stop injection if power starts and continues to rise in accordance with QGA 101, (SOER 83-8 r11).
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.
SR-0002-P04	(Freq: LIC=B) (ILT-MP) Given a reactor plant at power, perform a power change discernible on neutron monitors using control rods in accordance with QCGP 3-1 and QCGP 4-1. (SOER 84-2 r7a)
SR-0002-P08	(Freq: LIC=I) Given a reactor plant at power and an authorized activated ReMA form, perform the evolution in accordance with the ReMA form and OP-AB-300-1003.

:

Simulator Setup:

1. Reset to IC-18 (40% power).
2. Go to **RUN.**
3. Verify the following RWM Sequence is loaded: **6PESU2**
4. **Secure** the 1B Circ Water pump, place LOCA tag on 1C Circ Water pump.
5. **Verify** the 1A RFP Vent Fan is running.
6. 1B Condensate/Condensate Booster Pump and 1A RFP selected for **STANDBY**.

7. Insert Scenario Setup Commands:
   - **imf RD01R 4631** (Uncouples control rod M-8 when withdrawn to position 48 and a coupling check is performed)
   - **imf ser1533 off** (Override annunciator 901-6 E-8 off)

   Override the ADS valve tailpipe temperatures for 3A thru 3E as follows:
   ior AOTR1026020l thru M 207, 200, 202, 204, 202
   dor AOTR10260201l thru M (Delete overrides triggered off of the Mode Switch to S/D)
   zdihs10590300(1) (Mode Switch to S/D)

8. Verify the following commands for scenario performance**:**

   Event 4: Simulate a failure of the D Relief Valve Acoustic Monitor (3 commands):
   - **imf SER1123 on** (Override annunciator 901-3 E-14 ON)
   - **ior LOAM102034B4C05 on** (Override OPEN light on for "D" relief valve acoustic monitor)
   - **ior LOAM102034B4C03 on** (Override MEMORY light on for "D" ERV acoustic monitor)
   - **ior LOAM102034B4C01 off** (Override CLOSED light off for "D" ERV acoustic monitor)

   Event 5: Simulate a trip of the 1A RFP Vent Fan w/ failure of 1B RFP Vent Fan to autostart (2 commands):
   - **ior DIHS15707A ptl** (Override the 1A RFP Vent Fan c/s in PTL)
   - **imf ser1487 on** (Override annunciator 901-6 F-8 ON)

   When the 1B RFP Vent Fan c/s is taken to START (3 commands):
   - **imf fw24a** (Insert an overcurrent trip on the 1A RFP Vent Fan beaker)
   - **dor DIHS15707A** (Delete override on 1A RFP Vent Fan c/s, delay 1 sec)
   - **dmf ser1487 (**Delete override on annunciator 901-6 F-8, delay 1 sec)

   Event 6: Circulating Water pump trip:
   - **imf mc01c** (Trip the 1C Circ Water pump)

   Event 7: RBCCW pump degrades:
   imf sw07a 50 2: (Degrade 1A RBCCW pump 50% over 2 minutes)

Simulator Setup:

Event 8/9: Hydraulic ATWS and Main Condenser Vacuum Leak:

- **imf rd13a 100** (100% Hydraulic lock on North Scram Discharge Volume)
- **imf rd13b 100** (100% Hydraulic lock on South Scram Discharge Volume)
- **imf mc08 20 5:** (Insert Main Condenser Air In-Leakage at 20% severity over 5 min.)

Field Actions:

- **irf RD04R close/open** (Close/Open 1-0301-25 valve as directed)
- **irf RD06R4631R inop** (Control Rod M-8 inoperable)
- **irf QG08R activate** (Bypass all RPS Auto Scrams)
- **irf QG09R activate** (Bypass Lo-Lo Level MSIV isolation)
- **irf QG14R activate** (Pull the ARI fuses)

9. Prepare a copy of QOP 3200-03 as follows:
   - Sign off steps – C.1, F.2, F.2.b., F.3.a., F.12.(except n.),
   - N/A the following steps – F.1, F.2.a., F.2.c., F.2.d. thru F.2.h., F.3.a.(1), F.4., F.5., F.12.n. F.12.o.(1)., F.13 thru F.17.
   - Flag step F.6 and F.18.

10. Prepare a copy of QCGP 1-1, pages 105 thru 117 only.
    - Sign off steps – F.8.n., F.8.p.(1), F.8.q.(1) & (3), F.8.r, F.9.a. thru F.9.y, and F.9.cc.
    - N/A the following steps – F.8., F.8.p., F.8.q.(2).

11. Install “Protected System” placards and/or rings on the following equipment:
    - RBCCW pumps
    - Fuel Pool Cooling Water pumps

12. Provide the following paperwork:
    - Turnover Sheet
    - Startup ReMA
    - Marked up copy of QCGP1-1 and QOP 3200-03.

13. Place the Zinc Injection placard on 1B RFP.

14. Place LOCA Load Shed placards on the 1A and 1C Circulating Water Pumps.

LIST OF POTENTIAL PROCEDURES

Annunciator Procedures:

- 901(2)-3 E-14, ACOUSTIC MON SAFETY RLF VALVES OPEN, Rev. 7
- 901(2)-4 G-3, RECIRC PUMP A SEAL CLG WTR LOW FLOW, Rev. 10
- 901(2)-4 G-7, RECIRC PUMP B SEAL CLG WTR LOW FLOW, Rev. 7
- 901(2)-3 G-15, REACTOR VESSEL LOW LOW LEVEL, Rev. 18
- 901(2)-5 A-2, ROD OVTRVL, Rev. 6
- 901(2)-5 A-3, ROD DRIFT, Rev. 8
- 901(2)-5 F-6, CONDENSER VACUUM LO, Rev. 8
- 901(2)-5 F-8, RX VESSEL LOW LEVEL, Rev. 11
- 901(2)-7 A-15, CIRC WTR PUMP AUTO TRIP, Rev. 12
- 901(2)-7 H-3, CONDENSER LO VACUUM 24 IN HG, Rev. 9
- 912-1 D-1, RX BUILDING COOLING WATER LOW PRESSURE, Rev. 1
- QOA 900-6 F-8, RFP VENT FAN AUTO TRIP, Rev. 7
- QOA 900-54 C-7, NORMAL PROCESS FLOW HI/LO, Rev. 5

QOP 3200-03, Start Up of the Second and Third Reactor Feed Pumps, Rev. 51

QCOP 0300-28, Alternate Control Rod Insertion, Rev. 33

QCOP 1000-30, Post-Accident RHR Operation, Rev. 32

QCOP 1100-02, Injection of Standby Liquid Control, Rev. 13

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

QCGP 1-1, Normal Unit 1 Startup, Rev. 116

QCGP 3-1, Reactor Power Operations, Rev. 87

QCGP 4-1, Control Rod Movements and Control Rod Sequence, Rev. 49

QOA 3300-02, Loss of Condenser Vacuum, Rev. 40

QCOA 0300-03, Uncoupled Control Rod, Rev. 17

QCOA 4400-04, Reactor Operation with Only One Circulating Water Pump Available, Rev. 25

QGA 100, RPV Control, Rev. 12

QGA 101, RPV Control (ATWS), Rev. 16

CREW TURNOVER

1.) Plant Conditions:

a.) Unit 1 is at 40% Power with a startup in progress. Rod step 23 is fully withdrawn. FCL is at 60% with feed flow at 4.3 Mlb/hr.

b.) Unit 2 is at 100% Power.

c.) Technical Specification limitations:

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:

a.) None.

3.) Evolutions/maintenance for the oncoming shift:

BOP Task:

a) Start the 2nd Reactor Feed Pump per QCGP 1-1 step F.9.zz. Valve line ups and pre-start checks for the 1B Condensate/Condensate Booster pump and the 1A Reactor Feed pump are complete per QOP 3200-03. The EOs have been briefed and are stationed with field copies of QOP 3200-03, at the Condensate Pit and the Reactor Feed Pump room.

ATC Task:

b.) After the 2nd Reactor Feed pump is started, withdraw control rods and raise the FCL to 75%. Verify feedwater flow is > 4.5 Mlb/hr, then place the 1B Feed Reg Valve online. The QNE is in the Control Room.

Quad Cities 2020 NRC Scenario No.2 Event No. 1 Page 1 of 2 Event Description: Start the 2nd Reactor Feed Pump		
Time	**Position**	**Applicant's Actions or Behavior**
	SRO	Directs BOP to start the 2nd Reactor Feed Pump per QOP 3200-03.
	BOP	Establishes communications with the EO in the Condensate Pit and announces the Condensate/Condensate Booster pump start.
SIM OP ROLE PLAY: As the EO at the Condensate Pit, state: **"QOP 3200-03, step F.2 is complete. The 1B Condensate Pump is ready for a start. The area is cleared of all personnel."**		
	BOP	Places the COND PMP SELECTOR switch to OFF.
	BOP	Starts the 1B Condensate/Condensate Booster Pump.
	BOP	Places the COND PMP SELECTOR switch to PUMP 1D.
	BOP	Verifies the following pressures are greater than the listed minimum values: o Condensate pump discharge --- 140 psig o Condensate Booster pump suction --- 80 psig o Condensate Booster pump discharge --- 220 psig o RFP suction --- 200 psig
	BOP	Directs EO to lock open the 1-2799-31B valve.
SIM OP ROLE PLAY: As the EO, repeat back the task, wait 1 minute, then state: **"Post start checks on the 1B Condensate/Condensate Booster Pump are sat, and the 1-2799-31B valve is locked open."**		
	BOP	Establishes communications with the EO at the Reactor Feed Pump room.
SIM OP ROLE PLAY: As the EO in the RFP room, state: **"QOP 3200-03, step F.12. is complete. The 1A RFP is ready for a start, all personnel are cleared from the room."**		
	BOP	Places the RFP SELECTOR switch to OFF
	BOP	Closes MO 1-3201A, 1A RFP DISCH VLV.
	BOP	Opens AO 1-3201A, 1A RFP RECIRC VLV.
Event 1 Continued		

Quad Cities 2020 NRC Scenario No.2 Event No. 1 Page 2 of 2

Event Description: Start the 2nd Reactor Feed Pump

Time	Position	Applicant's Actions or Behavior
	BOP	Announces start of 1A RFP over the plant PA system.
	BOP	Starts the 1A Reactor Feed Pump.
	BOP	Verifies the Auxiliary Oil Pump AUTO-TRIP light comes on.
	BOP	Opens MO 1-3201A, RFP DISCH VLV.
	BOP	Returns c/s for AO 1-3201A, RFP RECIRC VLV to the AUTO position.
	BOP	Verifies AO 1-3201A, RFP RECIRC VLV closes.
	BOP	If necessary, adjusts AO 1-3401, COND RECIRC FCV TO CNDSR to maintain Condensate/Condensate Booster Pump amps > 160.
	BOP	Directs EO to perform QOP 3200-03, steps F.25. and F.27.b.
SIM OP ROLE PLAY: As the EO at the RFP, state: **"I understand perform QOP 3200-03, step F.25 and F.27.b and contact the control room when complete."** Wait 5 minutes, then call back and inform the BOP that QOP 3200-03, steps F.25 and F.27.b. have been completed.		
	BOP	Selects the 1C RFP for STANDBY with the RFP SELECTOR switch and verifies: o 1C Reactor Feed Pump STANBY light is lit. o 1C RFP Auxiliary Oil Pump is operating.
	ATC	Monitors reactor power, pressure, and water level.
End of Event 1		

Quad Cities 2020 NRC Scenario No.2 Event No. 2 Page 1 of 1 Event Description: Raise Reactor Power per QCGP 1-1		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: APRM power ↑, FCL ↑ Expected Annunciator(s): None Automatic Actions: None		
	SRO	Directs ATC to withdraw control rods to raise the FCL to 75% and assigns QV duties to the BOP.
	ATC	Verifies Rod Step 23 is fully withdrawn, by checking each control rod position on the RWM and the Full Core Display.
	ATC	Selects control rod H-12 and verifies selection using two separate indications. Verifies position and bounds on the RWM.
LEAD EVALUATOR NOTE: Per QCGP 4-1, a continuous insert signal will be applied and stall flows recorded for all control rods at 00 or being inserted to 00.		
	ATC	Communicates maneuver to the QV.
	ATC	Places RMCS switch to the ROD IN position and holds until stall flows stabilize, then releases.
	ATC	Records stall flow as indicated on FI 1-340-8, DRIVE WTR FLOW, on the Control Rod Move Sheet.
	ATC	Communicates rod movement from position 00 to 48 to QV.
	BOP	Verifies correct rod selected and movement.
	ATC	Simultaneously positions and holds ROD OUT NOTCH OVERRIDE switch in NOTCH OVERRIDE position AND the RMCS switch ROD OUT NOTCH position.
	ATC	Monitors control rod position and reactor power.
	ATC	Performs a coupling check when the control rod is at position 48 by attempting to withdraw it beyond position 48.
	ATC/BOP	Initial the applicable Move Sheet block.
EVALUATOR NOTE: The above process is repeated for control rod H-4.		
End of Event 2		

Quad Cities 2020 NRC Scenario No.1 Event No. 3 Page 1 of 3 Event Description: Uncoupled Control Rod		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Loss of Control Rod position indication by RMCS and RWM. Expected Annunciator(s): 901-5 A-2, 901-5 A-3 Automatic Actions: None		
	ATC	Selects control rod M-8, performs a stall flow check, then withdraws the control rod to position 48.
	ATC	Performs a coupling check and reports the following: o Loss of rod position indication on Full Core and 4-Rod Displays. o Loss of position indication on RWM. o Annunciator 901-5 A-2, ROD OVTRVL in alarm. o Annunciator 901-5 A-3, ROD DRIFT in alarm.
	SRO	Directs ATC to perform actions of QCOA 0300-03.
	ATC	Disables "BLOCKS TO FULL" on the RWM per QCOP 0207-01. OR Bypasses the RWM per QCOP 0207-02.
	ATC	Inserts control rod to position 46.
	ATC	Continuously withdraws control rod to position 48 and performs a coupling check.
	ATC	Acknowledges annunciators, checks the RWM, and reports control rod M-8 has NOT re-coupled.
LEAD EVALUATOR ROLE PLAY: As the QNE, give direction to the crew to make one additional attempt to re-couple the control rod as follows: • Insert the control rod to position 00 • Apply a continuous insert signal until stall flow has stabilized • Withdraw the control rod to position 48 and perform a coupling check		
	SRO	Directs ATC to insert control rod M-8 to position 00, obtain a stall flow, then withdraw to position 48 and perform a coupling check.
Event 3 Continued		

Quad Cities 2020 NRC Scenario No.1 Event No. 3 Page 2 of 3

Event Description: Uncoupled Control Rod

Time	Position	Applicant's Actions or Behavior
	ATC	Inserts control rod to M-8, applies a continuous insert signal until stall flow stabilizes, then withdraws to position 48 and performs a coupling check.
	ATC	Acknowledges annunciators, checks the RWM and reports control rod M-8 did NOT re-couple.
	SRO	Directs ATC to insert the control rod and take it out of service on the RWM.
LEAD EVALUATOR ROLE PLAY: As the QNE, concur/advise the crew to: **"Insert the control rod to position 48, then take the rod out-of-service as directed by the procedure."** Also inform the crew that you will: **"Revise the control rod sequence and confirm the CRDA analysis is still valid per NF-QC-721. Control rod movement can continue when this is completed."**		
	ATC	Enables the "Rod Out-of-Service' option on the RWM by: o Selects SECONDARY FUNCTIONS o Selects control rod M-8 on the Rod Select Matrix o Selects control rod M-8 on the RWM and verifies the control rod is enclosed in a blue box o Selects ROD OUT OF SERVICE option on the RWM and verifies "Rod M-8 placed out of service" message is displayed on the RWM screen. o Verifies a withdraw block ONLY is applied to the control rod o Selects RETURN TO PRIMARY to return to the Primary Menu
	ATC	Inserts control rod M-8 to position 00.
	ATC	Deselects and then reselects control rod M-8.
Event 3 Continued		

Quad Cities 2020 NRC Scenario No.1 Event No. 3 Page 3 of 3 Event Description: Uncoupled Control Rod		
Time	**Position**	**Applicant's Actions or Behavior**
	ATC	Verifies control rod M-8 is indicated in light blue and has both insert and withdraw blocks applied.
TS	SRO	Enters TS 3.1.3 Condition C and directs ATC/BOP to dispatch an EO to electrically disarm HCU 46-31.
	ATC/BOP	Dispatches an EO to disarm HCU 46-31 per QCOP 0300-07.
SIM OP ROLE PLAY: As the EO dispatched to electrically disarm HCU 46-31, wait 5 minutes, insert / release command: **irf RD06R4631R inop** Then call back and report: **"HCU 46-31 has been electrically disarmed per QCOP 0300-07."**		
SIM OP NOTE: The 100% Hydraulic lock of the Scram Discharge Volumes may now be inserted with the following 2 commands: **imf RD13A 100** **imf RD13B 100**		
End of Event 3		

Quad Cities 2020 NRC Scenario No.2 Event No. 4 Page 1 of 2 Event Description: 3D ERV Acoustic Monitor Failure		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP NOTE: When directed, insert/release the following 3 commands to simulate an acoustic monitor failure: • **imf SER1123 on** • **ior LOAM102034B4C05 on** • **ior LOAM102034B4C03 on** • **ior LOAM102034B4C01 off**		
Key Parameter Response: 3D Relief Valve Acoustic Monitor OPEN and MEMORY lights lit. Input signal reads 0.0. No change in TCV position. Expected Annunciator(s): 901-3 E-14 Automatic Actions: None		
	BOP	Reports annunciator 901-3 E-14, ACOUSTIC MON SAFETY RLF VALVES OPEN, in alarm and refers to annunciator procedure.
	BOP	Checks 901-21 panel to determine which acoustic monitor is in alarm and reports the following for the 3D ERV: o OPEN light is lit o MEMORY light is lit o CLOSED light is lit o Input signal reads 0.0
	BOP	Reports tailpipe temperatures for all relief valves ranging from 184ºF to 190ºF.
	BOP	Reports CLOSED lights are lit for all five relief valves on the 901-3 panel.
	ATC	Reports no change in MW(e) or Turbine Control Valve position.
	SRO	Contacts Instrument Maintenance to investigate 3D Relief Valve Acoustic Monitor.
Event 4 Continued		

Quad Cities 2020 NRC Scenario No.2 Event No. 4 Page 2 of 2 Event Description: 3D ERV Acoustic Monitor Failure		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP ROLE PLAY: If contacted, as the Instrument Maintenance Supervisor, state: **"I will review the Manufacturers Manual, prepare a work package, and report to the control room to do diagnostic testing."**		
TS	SRO	Declares the 3D Relief Valve Acoustic Monitor inoperable and enters TLCO 3.3.b Condition A, 30 days to restore channel to operable status. (Table 3.3.b-1 Function 2)
LEAD EVALUATOR NOTE: If the SRO determines the 3D Relief Valve is inoperable, then the following Technical Specifications should be entered: TS 3.5.1 Condition H, One ADS valve inoperable. (14 days to restore valve to operable status) TS 3.4.3 Condition A, One Relief Valve inoperable. (14 days to restore valve to operable status)		
End of Event 4		

Quad Cities	2020 NRC Scenario No.1	Event No. 5	Page 1 of 1
Event Description: 1B Reactor Feed Pump Vent Fan Trip			
Time	**Position**	**Applicant's Actions or Behavior**	
SIM OP NOTE: At the Lead Evaluators direction, insert/release the following 2 commands to simulate a trip of 1B RFP Vent Fan breaker: **ior DIHS15707A ptl** **imf ser1487 on**			
Key Parameter Response: 1-3240-87, RFP AIR EXH TEMP ↓ Expected Annunciator(s): 901-6 F-8 Automatic Actions: Autostart of the standby RFP Vent Fan			
	ATC	Reports 1B RFP Vent Fan trip and failure of the 1A RFP Vent Fan to autostart.	
	SRO	Directs start of 1A RFP Vent Fan.	
	ATC	Starts the 1A RFP Vent Fan.	
SIM OP NOTE: Verify the following 3 commands are inserted/released when the 1A RFP Vent Fan control switch is taken to START: **imf fw24a** **dor DIHS15707A** **dmf ser1487**			
	ATC	Dispatches EO to MCC 19-2 to investigate.	
SIM OP ROLE PLAY: As the EO dispatched to MCC 19-2, wait 2 minutes, then report: **"The breaker is tripped and will not reset. I'll contact Electrical Maintenance for assistance."**			
	BOP	Monitors balance of plant systems.	
End of Event 5			

Quad Cities	2020 NRC Scenario No.2	Event No. 6	Page 1 of 1
Event Description:	1C Circulating Water Pump Trip		

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: At the direction of the Lead Evaluator, trip the 1C Circulating Water Pump by inserting/releasing the following command: **imf MC01C**		
Key Parameter Response: Main Condenser backpressure ↑ Expected Annunciator(s): 901-7 A-15 Automatic Actions: None		
	BOP	Acknowledges annunciator, reports trip of 1C Circ Water Pump and refers to annunciator procedure.
	BOP	Dispatches EO to Bus 14 to investigate.
SIM OP ROLE PLAY: As the EO dispatched to Bus 14, wait 2 minutes and report: **"The 1C Circ Water Pump has tripped on overcurrent."**		
	BOP	Reports Main Condenser backpressure slowly rising.
	SRO	Directs start of standby Circulating Water Pump.
	BOP	Starts the 1B Circulating Water Pump and dispatches an EO to the Cribhouse.
	BOP	Verifies the 1C Circulating Water Pump discharge valve closed.
SIM OP ROLE PLAY: As the EO dispatched to the Cribhouse, wait 5 minutes, then report: **"The 1B Circ Water Pump is running, upper and lower bearing oil levels are good. No issues."**		
	ATC	Monitors reactor power, pressure, and water level.
End of Events 6		

Quad Cities 2020 NRC Scenario No.2 Event No. 7 Page 1 of 1 Event Description: 1A RBCCW Pump Degradation		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP NOTE: At the lead Evaluators direction, insert/release the command to degrade the 1A RBCCW pump 50% over 2 minutes: **imf SW07A 50 2:**		
Key Parameter Response: At 912-1 panel: PI 1-3740-4, U1 DISCH HDR PRESS ↓ Expected Annunciator(s): 912-1 D-1, 901-4 G-3, 901-4 G-7 Automatic Actions: None		
	BOP	Acknowledges 912-1 D-1, RX BUILDING COOLING WATER LOW PRESSURE, alarm and refers to annunciator procedure.
	ATC	Reports 901-4 G-3 and 901-4 G-7, RECIRC PUMP A/B SEAL CLG WTR LOW FLOW alarms and refers to annunciator procedures.
	SRO	Directs BOP to place the ½ RBCCW Pump in operation to Unit 1.
	SRO	Directs ATC to monitor Recirc Pump seal cooling water temperatures at TR 1-262-19A/B on the 901-4 panel.
SIM OP ROLE PLAY: Call in as the Unit EO on rounds and report: **"The 1A RBCCW pump is sounding very noisy and the motor is running hot."**		
	BOP	Directs the Unit EO to valve in the ½ RBCCW Pump to Unit 1 per QCOP 3700-02.
SIM OP ROLE PLAY: When directed to valve in the ½ RBCCW Pump to Unit 1, wait 2 minutes, then report: **"I've completed steps F.4.a. through d, and am ready for you to start the ½ RBCCW pump."**		
	BOP	Starts the ½ RBCCW pump and verifies RBCCW discharge header pressure returns to the green band.
	ATC	Reports annunciators 901-4 G-3 and 901-4 G-7 have cleared.
	BOP	Secures the 1A RBCCW Pump and verifies system pressure is stable.
	BOP	Directs the EO to close the 1A RBCCW Pump suction and discharge valves per QCOP 3700-02 Attachment A step 1.c. and 1.d.
SIM OP ROLE PLAY: As the EO, wait 2 minutes, the call back and report: **"The 1A RBCCW suction and discharge valves are closed per QCOP 3700-02 Attachment A."**		
End of Event 7		

Quad Cities	2020 NRC Scenario No.2	Event No. 8/9	Page 1 of 5
Event Description: Loss of Main Condenser Vacuum / Hydraulic ATWS			

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: At the direction of the Lead Evaluator, insert/release the command for Main Condenser air in-leakage at a severity of 20% ramped over 5 minutes: **imf mc08 20 5:**		
Key Parameter Response: Main Condenser backpressure ↑, Main Chimney flowrate ↑, Off-Gas radiation level ↑, Main Generator MWe ↓ Expected Annunciator(s): 901-3 D-2, 901-7 H-3, 901-5 F-5, 901-5 A-11, 901-54 C-7 Automatic Actions: Reactor scram at 9 in HG backpressure		
	BOP	Acknowledges annunciator 901-54 C-7, NORMAL PROCESS FLOW HI/LO, reports rising Main Chimney flowrate.
	ATC	Reports Main Condenser backpressure rising.
	SRO	Enters and directs actions of QOA 3300-02.
	SRO	Sets scram criteria at 7.5 in.Hg Main Condenser backpressure.
	SRO	Directs ATC to initiate an Emergency Power Reduction to control Main Condenser backpressure < 6 in Hg.
	ATC	Reduces Recirc Pump speeds to minimum.
	ATC	Verifies all CRAM rods are inserted.
	ATC	Inserts control rods to Target-In beginning at last step of Control Rod Sequence and working in reverse order.
	SRO	Directs BOP to monitor and report Main Condenser backpressure.
	BOP	Verifies the following: o Off-Gas and SJAE valves are open o Turbine steam seal pressure is in band o Circulating Water System is operating normally o Hotwell Level is normal o Condenser vacuum breaker is closed
Events 8/9 Continued		

Quad Cities	2020 NRC Scenario No.2	Event No. 8/9	Page 2 of 5
Event Description: Loss of Main Condenser Vacuum / Hydraulic ATWS			

Time	Position	Applicant's Actions or Behavior
	BOP	Dispatches EOs to check Condenser vacuum breaker water seal and fill loop seals as necessary per QCOP 3300-09.
SIM OP ROLE PLAY: As the EO, when directed to fill loop seals and check the Condenser vacuum breaker water seal, state: **"I'll get a couple of EOs and we'll head out on both tasks immediately."**		
	BOP	Reports Main Condenser backpressure rising rapidly.
	SRO	Directs ATC to insert a manual reactor scram.
	ATC	Depresses both Manual Scram pushbuttons and places the Mode Switch to SHUTDOWN.
CT1	ATC	Reports a full core Hydraulic ATWS and performs the following Immediate Operator Actions: o Arm and Depress ARI pushbuttons o Injects with 1 SBLC pump and notes SBLC Tank level. o Verify both Recirc pumps are at minimum speed
	SRO	Enters QGA 100, (Rx power above 5% or unknown when scram required), then transitions to QGA 101.
	ATC	Determines reactor pressure stable and < 1200 psig, the injects SBLC with 2 pumps by positioning the keylock switch to SYS 1 & 2 OR SYS 2 & 1.
	SRO	Directs BOP to inhibit ADS and place both Core Spray pumps in PTL.
QGA 101 Power Leg Actions		
	BOP	Places AUTO BLOWDOWN INHIBIT keylock switch in INHIBIT and places the 1A and 1B Core Spray Pump control switches in PTL.
	SRO	Directs ATC to trip both Recirc pumps after ATWS actions and initial SBLC Tank level are reported.
	ATC	Trips both Recirc pumps by closing the discharge valves or depressing the ASD A/B EMERGENCY STOP pushbuttons.
	SRO	Directs ATC to insert control rods per QCOP 0300-28.
Events 8/9 Continued		

Quad Cities	2020 NRC Scenario No.2	Event No. 8/9	Page 3 of 5
Event Description: Loss of Main Condenser Vacuum / Hydraulic ATWS			

Time	Position	Applicant's Actions or Behavior
SIM OP ROLE PLAY: If an EO is dispatched to close/open the CRD Charging Header Isolation Valve (1-0301-25) use the commands listed below as needed and report back with the status: **irf rd04r close** **irf rd04r open**		
CT1	ATC	Bypasses RWM and inserts control rods starting with the center rod and spiraling out using Emergency In.
	ATC	Bypasses the SDV high level and attempts to reset the reactor scram, then directs the U2 BOP to install jumpers to bypass all automatic scram signals per QCOP 0300-28.
SIM OP/LEAD EVALUATOR ROLE PLAY: When directed by ATC to bypass auto scram signals, direct the SIM OP to insert/release the following command: **irf QG08R activate** Wait 3 minutes, then inform the ATC that **"the jumpers are installed to bypass all automatic reactor scrams."**		
	ATC	Resets the reactor scram and determines status of Scram Valves.
LEAD EVALUATOR NOTE: Depending on RPV water level and trend, the ATC may request the ARI logic fuses pulled. If so, direct the SIM OP to insert/release the following command: **irf QG14R activate** Wait 3 minutes, then inform the ATC that **"the ARI fuses are pulled."**		
	ATC	When the SDV is drained, (alarm 901-5 A-14 clears), directs U2 BOP to individually scram control rods.
LEAD EVALUATOR ROLE PLAY: If directed to individually scram control rods as the U2 BOP, wait 3 minutes, then inform the ATC that: **"Individual control rod scramming was NOT successful."**		
QGA 101 Pressure Leg Actions		
	SRO	Directs BOP to maintain RPV pressure between 800 and 1000 psig using Main Turbine Bypass valves.
	BOP	Reports Main Condenser backpressure 20 in. Hg and rising
Events 8/9 Continued		

Quad Cities	2020 NRC Scenario No.2	Event No. 8/9	Page 4 of 5
Event Description: Loss of Main Condenser Vacuum / Hydraulic ATWS			

Time	Position	Applicant's Actions or Behavior
	SRO	Directs BOP to transition to ADS valves for RPV pressure control.
	SRO	Directs BOP to start Torus Cooling.
	BOP	Starts Torus Cooling per QCOP 1000-30.
QGA 101 Level Leg Actions		
	SRO	Directs U2 BOP to bypass isolations per QCOP 0250-02 for MSIV closure and Off Gas high radiation.
SIM OP/LEAD EVALUATOR ROLE PLAY: If requested, direct the SIM OP to insert/release the flowing command to bypass MSIV and Off Gas isolations: **irf QG09R activate** As the U2 BOP, inform the SRO that: **"The MSIV and Off Gas Isolations are bypassed per QCOP 0250-02."**		
CT2	SRO	Directs ATC and BOP to terminate and prevent injection into the RPV except for Boron, CRD, and RCIC.
CT2	ATC	Places the Low Flow and both Feed Regulator Valve Flow Control Stations in MAN and reduces each controller output to zero.
	ATC	Closes both MO 1-3206A/B FW REG ISOL VLVs.
CT2	BOP	Trip-Latches the REMOTE HPCI TURB TRIP pushbutton.
	SRO	Directs ATC let RPV water level drop to at least -35 inches.
	SRO	Directs ATC to monitor SBLC Tank level and report when level lowers by 16%, (Tank level of 69%, Hot Shutdown weight of Boron).
	ATC	Reports RPV water level at -35 inches and lowering slowly.
	SRO	Direct ATC to report RPV water level when reactor power is < 5%
	ATC	Reports reactor power < 5% and RPV water level.
	SRO	Direct ATC to re-establish RPV injection with Condensate and Feedwater and maintain RPV water level between -35 in. and the level it was lowered to.
Event 8/9 continued		

Quad Cities	2020 NRC Scenario No.2	Event No. 8/9	Page 5 of 5

Event Description: Loss of Main Condenser Vacuum / Hydraulic ATWS

Time	Position	Applicant's Actions or Behavior
	ATC	Opens Low Flow Feed Reg Valve to re-establish injection and control RPV water level in band.
	ATC	Reports SBLC Tank level at 69%
	SRO	Directs ATC to raise water level above 0 inches and control RPV water level between 0 and 48 inches.
	ATC	Increases injection with Condensate and Feedwater and slowly raises level above 0 inches and establishes an RPV water level band of 0 to 48 inches.
SIM OP NOTE: At the direction of the Lead Evaluator, freeze the simulator when the Hot Shutdown Boron Weight (SBLC Tank Level ~ 69%) is injected and a controlled RPV water level rise has been established.		
End of Scenario		

END OF SCENARIO

Exelon Nuclear

2020 ILT NRC Exam Scenario

Scenario Number:

NRC Scenario 3

Revision Number: 00

Date: 09/16/2019

Developed by: _____ _____
Instructor Date

Validated by: _____ _____
SME or Instructor Date

Reviewed by: _____ _____
Operations Representative Date

Facility: Quad Cities Scenario: **2020 NRC Scenario 3** Op-Test No.: ILT 18-1
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: 90% Reactor power, 1B RHR pump out of service
Turnover: Complete QCOS 5600-08, Turbine Generator Quarterly Testing for the Bypass Valves, then continue load increase to full power.
Critical Tasks:

1. When Torus pressure exceeds 5 psig, INITIATE drywell sprays while in the safe region of the drywell spray initiation limit (DSIL) prior to Drywell temperature exceeding 281°F. (BWROG PC-5.1 INIT DW SPRAY)
2. Given an inability to maintain RPV water level above -59 inches, INHIBIT ADS, to prevent an uncontrolled depressurization IAW QGA 100.
3. Given 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 MSCRWL in accordance with QGA 100 and QGA 500-1. (BWROG RPV-1.1 LOSS HP INJ E/D TAF)

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	QCOS 5600-08, Turbine Generator Quarterly Testing for BPVs 7-9.
2	RR09A	SRO TS	1A Recirc ASD cell failure/bypass.
3	DIFC10262221 DIFC10262222	ATC C	Recirc System MASTER SPEED DEMAND Failure
4	None	ATC R	Raise Reactor power with Recirculation pumps
5	NM10B	ATC I/TS	RBM Channel 8 fails high
6	IA01C	BOP C	1/2 Instrument Air Compressor trip per QOA 912-1 C-7.
7	MC05	CREW M	Condensate Pit Flooding / Loss of Condensate/Feed System / Reactor SCRAM
8	DG04B	BOP C	1/2 Emergency Diesel Generator to auto-start failure.
9	RR11A	CREW M	LOCA / RPV Blowdown

* (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): **2** Abnormal Events (2-4): **2, 3, 5, 6** Major Transient(s) /E-Plan entry (1-2): **2** EOPs (1-2): **QGA 100 / 200** EOP Contingencies (0-2): **QGA 100 ALC / 500-1** Critical Tasks (2-3): **3**	ES-301-5 Quantitative attributes: BOP Normal: **E1** ATC Reactivity (1 per set): **E4** BOP I/C (4 per set): **E6, 8** ATC I/C (4 per set): **E3, 5** SRO-I I/C (4 per set inc 2 as ATC): **E3, 5, 6, 8** SRO Tech Spec (2 per set): **E2, 5** ALL Major Transients (2 per set): **E7, 9**

SUMMARY:

- Initial Conditions:
  - The plant is currently at 90% power with the 1B RHR Pump out of service.
  - QCOS 5600-08, Turbine Generator Quarterly Testing, for Bypass Valves only, is in progress. Bypass Valves 7, 8, and 9 are to be tested at the start of the shift.
- Event 1: The BOP resumes QCOS 5600-08, Turbine Generator Quarterly Testing for Bypass Valves 7, 8 and 9.
- Event 2: The 1A Recirc Pump speed lowers due to an ASD Cell failure. The ATC Operator and US respond per QCOA 202-08. The RRCS OWS will indicate an ASD Generated Speed Hold. When the problem is diagnosed, the Speed Hold can be reset. The A Recirc Pump speed will lower from 90% to ~85%, which will result in a loop flow mismatch of >5% that exceeds the Technical Specification requirement.
- Event 3/4: Recirc Master Speed Demand Failure: The SRO directs a load increase using Reactor Recircs per the ReMA and QCGP 3-1. When the ATC attempts to raise pump speeds in Master Mode, the “RAISE” pushbutton will not respond. The ATC will transfer to MANUAL Mode and raise pumps speeds using the individual pump controllers.
- Event 5: RBM Channel 8 Fails High: RBM Channel 8 fails upscale high causing a rod withdrawal block. RBM 8 is bypassed and the SRO enters TS 3.3.2.1 Condition A, (24 hours to restore channel to operable status).
- Event 6: 1/2 Instrument Air Compressor Trip: The BOP responds to a 912-1 C-7 alarm and reports the 1/2 Instrument Air Compressor has tripped and the 1A Instrument Air Receiver pressure is lowering. The BOP dispatches an EO and starts a standby Instrument Air Compressor.
- Event 7: Condensate Pit Flooding: A large Main Condenser water leak into the Condensate Pit results in a manual reactor scram and the securing of the Condensate and Feed Systems.
- Event 8: 1/2 Emergency Diesel Generator Fails to Autostart: The feed breaker from Bus 13 to Bus 13-1 trips when Aux power transfers. The 1/2 EDG fails to autostart leaving Division I de-energized. When the 1/2 EDG is manually started, it will re-energize Bus 13-1 and the Division I 480 VAC busses.
- Event 9: LOCA: Shortly after the scram, a break in the “A” Recirc Loop Suction Line will develop. Actions per QGA 100 and QGA 100 Alternate Level Control leg will be taken to try and maintain RPV water level above -142 inches (MSCRWL). Containment parameters will be controlled per QGA 200 actions. When conditions permit, the crew will enter QGA 500-1, depressurize the RPV, and restore level with low pressure ECCS systems.

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) prior to exceeding Drywell temperature 281°F. (BWROG PC-5.1 INIT DW SPRAY)

Critical Task #2: Given an inability to maintain RPV water level above -59 inches, INHIBIT ADS, to prevent an uncontrolled depressurization IAW QGA 100.

Critical task #3: Given 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 MSCRWL in accordance with QGA 100 and QGA 500-1. (BWROG RPV-1.1 LOSS HP INJ E/D TAF)

EXERCISE PERFORMANCE OBJECTIVES

SR-0202-P21	(Freq: LIC=I) Given a reactor plant with both recirc pumps operating in Individual-Manual speed control, transfer the recirc speed control to Master-Manual and back to Individual-Manual in accordance with QCOP 0202-03.
SR-0700-P11	(Freq: LIC=I) Given an operating plant with an RBM failure, take actions to bypass the failed RBM and meet TS requirements in accordance with QOP 0700-05.
SR-4700-P01	(Freq: LIC=I) Given a reactor plant at power, perform the control room actions to start an instrument air compressor and stop another in accordance with QCOP 4700-09 and QCOP 4700-10.
SR-5600-P02	(Freq: LIC=I) Given an operating reactor plant, perform the quarterly turbine generator tests in accordance with QCOS 5600-08.
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.
SR-1000-P02	(Freq: LIC=B) Given a reactor plant in an accident condition (QGA), operate torus sprays in accordance with QCOP 1000-30 and appropriate QGA.
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-0203-P07	(Freq: LIC=B) Given a reactor plant in a QGA condition, inhibit ADS in accordance with QGA 100 or QGA 101.
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 MSCRWL (Minimum Steam Cooling Reactor Water Level) in accordance with QGA 100 and QGA 500-1. (Important PRA Operator Action - emergency depressurization terminates 15 of top 100 Core Damage Sequences)
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-0002-P05	(Freq: LIC=B) (ILT-MP) Given a reactor plant at power, perform a power change discernible on neutron monitors using recirc flowin accordance with QCOP 0202-03 and QCGP 3-1.

:

Simulator Setup:

1. Reset to IC-21 (100% power).
2. Go to **RUN.**
3. Verify the following RWM Sequence is loaded: **6PHESD (or current shut down sequence)**
4. Notch in FCL steps 36 to 39. Raise 1B Recirc pump speed to 91.3% in Master. Let the plant stabilize and verify: 1A Recirc pump speed 90.8%, 1B Recirc pump speed 91.3%, Master 91.0%, FCL~99%, APRMs ~ 90%. Verify 901-4 A-5 is not in alarm.
5. Perform QCOS 5600-08 step H.3.c. and select BYPASS VALVE #6.
6. Place INFO cards as follows:
    a. Place the 1B RHR Pump C/S in PTL and hang card.
7. Insert Commands for setup:
    - **imf DG04B** (Auto Start Failure of 1/2 Emergency Diesel Generator)
    - **ior DIHS110021B ptl** (Override the 1B RHR pump c/s in PTL)
    - **imf HP03 90 3:** (Degrade the HPCI turbine 90% over 3 minutes, triggered by MO 1-2301-3 valve opening)
8. Verify the following commands for scenario performance**:**
    - **imf RR09A** (Fail an ASD A power cell)

    (Fail the Recirc Master Controller to operate with the following 2 commands)
    - **ior DIFC10262222 off** (Override the RAISE pushbutton OFF)
    - **ior DIFC10262221 off** (Override the LOWER pushbutton OFF)
    - **imf NM10B 100** (Fail RBM 8 to 100% of scale)
    - **imf IA01C** (Trip the ½ Instrument Air Compressor)
    - **imf ano9121a8 on** (Override annunciator 912-1 A-8 on)
    - **imf ano9121a9 on** (Override annunciator 912-1 A-9 on)
    - **dmf ano9121a8** (Delete override on annunciator 912-1 A-8)
    - **dmf ano9121a9** (Delete override on annunciator 912-1 A-9)
    - **imf MC05 20 3:** (Circ Water System leak into the Condensate Pit at 20% severity over 3 minutes)
    - **imf FW17A/B/C/D** (Trips the Condensate/Condensate Booster Pumps A thru D)
    - **irf ED80GR trip** (Trip the Bus 13 to Bus 13-1 Feed Breaker at Bus 13)
    - **irf RP02R mg_set** (Restart RPS A MG Set)
    - **irf RP29R reset** (Reset RPS A EPA breaker)
    - **imf RR10A .5 15:** (Recirc Suction Break Loop A at .5% severity over 15 minutes)
    - **imf RR10A 1.5 15:** (Recirc Suction Break Loop A at 1.5% severity over 15 minutes)
    - **irf RD01R both** (Valve in 2nd set of CRD suction filters)

9. Install “Protected System” placards and/or rings on the following equipment:
    - RBCCW pumps
    - Fuel Pool Cooling Water pumps

10. Provide the following paperwork:
    - Turnover
    - ReMA (Load Drop and Return)
    - Marked up copy QCOS 5600-08

11. Place the Zinc Injection placard on 1A RFP.

LIST OF POTENTIAL PROCEDURES

Annunciator Procedures

- 901(2)-3 D-13, ELECT RELIEF VALVES 3A 3B OPEN, Rev. 7
- 901(2)-3 E-13, ELECT RELIEF VALVES 3C/3D/3E OPEN, Rev. 6
- 901(2)-3 E-14, ACOUSTIC MON SAFETY RLF VALVES OPEN, Rev. 7
- 901-4, A-5, RRCS/ASD MINOR FAILURE, Rev. 7
- 901-4, C-1, RECIRC DRIVE A SPEED HOLD, Rev. 13
- 901(2)-3 A-16, PRI CNMT HIGH PRESSURE, Rev. 16
- 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. 18
- 901(2)-5 A-7, RBM HIGH OR INOP, Rev. 7
- 901(2)-5 C-3, ROD OUT BLOCK, Rev. 11
- 901(2)-5 F-8, RX VESSEL LOW LEVEL, Rev. 11
- QOA 900-7 D-10, CONDENSER PIT LOW LEVEL, Rev. 3
- QOA 900-7 E-10, CONDENSER PIT HIGH LEVEL, Rev. 5
- QOA 912-1 C-7, UNIT 1/2 INST AIR COMPR TRIP, Rev. 4

QCOP 0202-03, Reactor Recirculation System Flow Controller Operation, Rev. 26

QOP 0700-05, Rod Block Monitor, Rev. 17

QCOP 1000-30, Post-Accident RHR Operation, Rev. 32

QCOP 4700-09, Startup of Standby Instrument Air Compressor / Dryer, Rev. 18

QCOP 5750-19, Drywell Cooler Operation, Rev. 11

QCGP 2-3, Reactor Scram, Rev. 92

QCGP 3-1, Reactor Power Operations, Rev. 87

QOA 0030-01, Condenser Pit or Condensate Pump Room Flooding, Rev. 13

QCOA 0202-08, Reactor Recirculation Control System Trouble, Rev. 17

QCOA 0201-01, Increasing Drywell Pressure, Rev. 30

QOA 4700-02, Instrument Air Compressor Trip, Rev. 18

QCOA 6600-02, Diesel Generator 1/2 Fails to Start, Rev. 23

QCOS 5600-08, Turbine Generator Quarterly Testing, Rev. 38

QGA 100, RPV Control, Rev. 12

QGA 200, Primary Containment Control, Rev. 12

QGA 500-1, RPV Blowdown, Rev. 16

CREW TURNOVER

1.) Plant Conditions:

a.) Unit 1 is currently at 90% power for load following.

b.) Unit 2 is at 100% Power.

c.) Technical Specification limitations:

Unit 1: Day 1 of 30, TS 3.5.1 Condition A, 1B RHR pump inoperable

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:

a.) 1A ASD Minor Failure alarms are reoccurring due to high ASD cell cabinet temperatures. Frequency of alarms has been reduced following installation of temporary cooling.

b.) Electrical Maintenance is performing a motor winding inspection of the 1B RHR pump. Expected return to service in 3 days.

3.) Evolutions/maintenance for the oncoming shift:

a) Complete Main Turbine Bypass Valve testing per QCOS 5600-08, Turbine Generator Quarterly Testing which was carried over from last shift.

c.) Continue power ascension with Recircs to 2957 MWth per QCGP 3-1 after testing is complete.

Quad Cities	2020 NRC Scenario No.3	Event No. 1	Page 1 of 1

Event Description: Perform QCOS 5600-08, Turbine Generator Quarterly Testing, for Bypass Valves 7 thru 9.

Time	Position	Applicant's Actions or Behavior
	SRO	Directs BOP to complete QCOS 5600-08, Turbine Generator Quarterly Testing, step H.3.
	BOP	At Operators Workstation, selects <TESTS><BPV TEST>.
	BOP	Tests Bypass Valve #7 as follows: o Selects BYPASS VALVE #7. o Selects TEST START. o Verifies BPV fully opens in ~ 10 sec. o Records valve percentage opening. o Verifies BPV fully closes in ~ 10 sec.
	BOP	Tests Bypass Valve #8 as follows: o Selects BYPASS VALVE #8. o Selects TEST START. o Verifies BPV fully opens in ~ 10 sec. o Records valve percentage opening. o Verifies BPV fully closes in ~ 10 sec.
	BOP	Tests Bypass Valve #9 as follows: o Selects BYPASS VALVE #9. o Selects TEST START. o Verifies BPV fully opens in ~ 10 sec. o Records valve percentage opening. o Verifies BPV fully closes in ~ 10 sec.
	BOP	Selects EXIT on <BPV TEST> screen.
	ATC	Monitors RPV water level, pressure, and power.
End of Event 1		

Quad Cities	2020 NRC Scenario No. 3	Event No. 2	Page 1 of 2
Event Description: 1A Recirc ASD cell failure/bypass			

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: When directed by the Lead Examiner insert malfunction: **imf rr09a** (A Recirc ASD Cell Failure)		
Key Parameter Response: On 901-4, 1A Recirc Pump speed lowers from ≈94% to ≈88%. A & B Recirc Controllers shift to MANUAL. Expected Annunciator(s): 901-4, A-5, RRCS/ASD MINOR FAILURE 901-4, C-1, RECIRC DRIVE A SPEED HOLD Automatic Actions: A Recirc Pump speed lowers until control goes into Speed Hold Mode		
	ATC	Responds to the unexpected annunciators and informs the Unit Supervisor
	ATC	Recognize both Recirc Pump speed Controllers in MANUAL and the 1A Recirc pump is in Speed Hold Mode.
	SRO	Enters and directs actions of QCOA 0202-08
	ATC/BOP	May dispatch an EO to investigate at local HMI
SIMOP ROLE PLAY: As EO dispatched to investigate at local HMI, wait 2 minutes and then report: "**The 1A ASD HMI screen shows cell A1 bypassed, and that alarm 4-04 indicates the cell tripped on an over-temperature condition. I suspect a clogged cooling line."**		
	ATC	May activate the Transient Data Recorder from the RRCS Operator Work Station and notify the system engineer to retrieve the TDR data
	ATC	Check the RRCS Interlocks Display on the OWS to identify the Minor Failure (ASD Generated Speed Hold)
	ATC	Acknowledge alarms on the RRCS OWS
	SRO/ATC	Review QCOA 0202-08 Attachments A, B, & C for consequences and recommended actions
	SRO	May contact QNE to verify Thermal Limits
SIMOP ROLE PLAY: QNE as necessary. **"No Thermal Limit has been exceeded."**		
	BOP	Monitors Balance-of-Plant equipment
Event 2 Continued		

Quad Cities 2020 NRC Scenario No. 3 Event No. 2 Page 2 of 2

Event Description: 1A Recirc ASD cell failure/bypass

Time	Position	Applicant's Actions or Behavior
	SRO/ATC	Inform Maintenance Group and System Engineering of alarms and defective equipment
SIM OP ROLE PLAY: As the ASD System Engineer state: **"The ASD had a cell failure and responded as designed. The faulty cell was automatically bypassed. The Speed Hold can be reset and normal operation can be resumed."**		
	SRO	Directs resetting the 1A Recirc Speed Hold per QCOP 0202-39.
	ATC	Verify the 1A Recirc Controller Speed and Speed Demands are equal
	ATC	Momentarily place ASD A SPEED HOLD switch to the RESET position
	SRO/ATC	Identify Jet Pump Flow Mismatch between operating loops is ~ 6-7% (Greater than the 5% limit for ≥70% power operation)
TS	SRO	Enters Technical Specification 3.4.1 Condition B (Declare the A Loop to be "Not in operation" within 2 hours)
	SRO	After the Speed Hold problem is resolved, directs ATC to return the Recirc Controllers to MASTER mode and match Recirc loop flows per QCOP 0202-03.
	ATC	Transfers Recirc Flow Control from MANUAL mode to MASTER mode by: o Depressing MASTER pushbutton on the 1-0262-25A/B, LOOP A/B SPEED CONTROLLER. o Verifies MASTER pushbutton is lit on both LOOP A/B SPEED CONTROLLERS
	ATC	Depresses RAISE/LOWER SLOW pushbutton on 1(2)-0262-25A/B LOOP A/B SPEED CONTROLLER. o Verifies Recirc Pump speed of other loop changes in the opposite direction to maintain total core flow.
LEAD EVALUATOR NOTE: Loop flows may be balanced by raising/lowering individual Recirc pump speeds in MANUAL MODE in lieu of the biasing method described above.		
	ATC	Reports A and B Recirc loop flows are balanced.
End of Event 2		

Quad Cities	2020 NRC Scenario No.3	Event No. 3/4	Page 1 of 2
Event Description: Recirc Master Speed Demand Failure / Load Increase			

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: After the Recirc Loop flows have been equalized, fail the Master Controller RAISE and LOWER pushbuttons by releasing the following commands: • **ior DIFC10262222 off** (Override the RAISE pushbutton OFF) • **ior DIFC10262221 off** (Override the LOWER pushbutton OFF)		
SIM OP ROLE PLAY: As Generation Dispatch, call in and request Quad Cities Unit 1 increase to full power operation.		
LEAD EVALUATOR / SIM OP ROLE PLAY: If necessary, as the QNE, direct the crew to increase power by raising core flow to 98 Mlb/hr.		
	SRO	Directs ATC to raise reactor power per QCGP 3-1 and the ReMA to 2957 MWth.
	ATC	Reviews ReMA and QCGP 3-1 and verifies Recirc Flow Control is in MASTER Mode.
	BOP	Performs verification duties for reactivity addition.
	ATC	Depresses the "RAISE" pushbutton on the MASTER SPEED DEMAND unit.
	ATC	Reports the Recirc System is NOT responding to input from the MASTER SPEED DEMAND.
	SRO	Contacts Instrument Maintenance to investigate.
SIM OP ROLE PLAY: If contacted, as the Instrument Maintenance Supervisor, state: **"I will start a troubleshooting package to investigate the communication link between the RRCS and the MASTER SPEED DEMAND."**		
Event 3/4 Continued		

Quad Cities	2020 NRC Scenario No.3	Event No. 3/4	Page 2 of 2
Event Description: Recirc Master Speed Demand Failure / Load Increase			

Time	Position	Applicant's Actions or Behavior
LEAD EVALUATOR NOTE: The ATC operator may raise power by using the Individual SPEED CONTROLLERS or the OWS computer.		
If using the Individual SPEED CONTROLLERS:		
	ATC	Transfers Recirc Flow Control from MASTER mode to MANUAL mode by: o Depressing MANUAL pushbutton on the 1-0262-25A/B, LOOP A/B SPEED CONTROLLER. Verifies MANUAL pushbutton is lit on both LOOP A/B SPEED CONTROLLERS
	ATC	Depresses the "RAISE SLOW" pushbutton on <u>one</u> of the LOOP A/B SPEED CONTROLLERS and verifies APRM, MWe, and RPV pressure response.
	ATC	Matches Recirc pump speeds by depressing the "RAISE SLOW" pushbutton on the <u>other</u> LOOP A/B SPEED CONTROLLER and verifies APRM, MWe, and RPV pressure response.
If using the OWS computer:		
	ATC	At the OWS RRCS Overview Display: o Select the blue filled square in "Master Set" box. o Verify the button gets a white frame indicating selection o Select control button D1 "Raise". o Verify <u>both</u> ASD speeds slowly increase.
	ATC	Raises Reactor power with Recirc flow until 2957 MW(th) is reached.
End of Event 3/4		

Quad Cities	2020 NRC Scenario No.3	Event No. 5	Page 1 of 1
Event Description: RBM Channel 8 Fails Upscale			

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: When directed by the Lead Evaluator, fail RBM 8 upscale by inserting/releasing the command: **imf NM10B 100**		
Key Parameter Response: On 901-5 panel: RBM 8 HIGH light lit, RBM 8 reading 125 units on 1-750-10B IRM-ARPM/RBM recorder, ROD OUT PERMIT light out On 901-37 panel: RBM Channel 8 Meter reading 125 units Expected Annunciator(s): 901-5 A-7, 901-5 C-3 Automatic Actions: Rod Withdrawal Block		
	ATC	Acknowledges and reports the following annunciators: 901-5 A-7, RBM HIGH OR INOP 901-5 C-3, ROD OUT BLOCK
	ATC	Verifies a Rod Block exists and reports RBM 8 has spiked upscale and is indicating 125 units.
	SRO	Contacts Instrument Maintenance to investigate and repair RBM 8.
SIM OP ROLE PLAY: As the Instrument Maintenance Supervisor, state: **"I'll prepare a work package to check the circuit boards and replace if necessary."**		
TS	SRO	Declares RBM 8 inoperable and enters TS 3.3.2.1 Condition A, 24 hours to restore inoperable RBM channel.
	SRO	Directs ATC to bypass RBM 8 per QOP 0700-05.
	ATC	Places the RBM BYPASS joystick to CH 8 and verifies white BYPASS light is lit on 901-5 panel.
	BOP	Verifies RBM 8 BYPASS light is lit on 901-37 panel.
End of Event 5		

Quad Cities	2020 NRC Scenario No.3	Event No. 6	Page 1 of 2
Event Description: 1/2 Instrument Air Compressor Trip			

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: When directed by the Lead Evaluator, trip the 1/2 Instrument Air Compressor by inserting/releasing the command: **imf IA01C**		
Key Parameter Response: 1A INST AIR RCVR pressure ↓ approx. 10 psig Expected Annunciator(s): 912-1 C-7, 912-1 C-8 Automatic Actions: 1/2 Instr. Air Dryer Bypass valve opens		
	BOP	Acknowledges annunciator 912-1 C-7, and reports the 1/2 Instrument Air Compressor has tripped.
	BOP	Dispatches an EO to investigate.
SIM OP ROLE PLAY: As the EO dispatched to the 1/2 IAC, wait 2 minutes then report: **"There's indication of a motor overload trip at the local control panel. The System Engineer was out here and doesn't recommend a reset and restart until EMs check the motor. The System Engineer also is requesting that the compressor be quarantined until EMs have investigated."**		
LEAD EVALUATOR / SIM OP NOTE: The field reports/role plays are written for a start of the 1A Instrument Air Compressor, if the U2 Instrument Air Compressor is started, refer to QCOP 4700-09 for the field actions.		
	SRO	Directs BOP to start a standby Instrument Air Compressor and enter QOA 4700-02.
	BOP	Verifies a Service Air Compressor is running and Instrument Air pressure is being maintained.
	BOP	Directs EO to go to the 1A Instrument Air Compressor front gauge panel and verify the 1-4799-1706A, INST AIR ISOL VALVE FOR PS 1-4741-51A, is open.
SIM OP ROLE PLAY: As the EO, report back: **"The 1-4799-1706A valve is open."**		
	BOP	Starts the 1A Instrument Air Compressor and resets annunciators per QOA 912-1 C-7
Event 6 continued		

Quad Cities	2020 NRC Scenario No.3	Event No. 6	Page 2 of 2
Event Description: 1/2 Instrument Air Compressor Trip			

Time	Position	Applicant's Actions or Behavior
	BOP	Directs the EO to perform QCOP 4700-09 steps F.1.c. thru h. as necessary.
SIM OP ROLE PLAY: As the EO at the 1A IAC, wait 1 minute, then call back and state: **"I am at step F.1.c.(3). Annunciators 912-1 A-8 and A-9 will alarm when the Air Dryer Annunciator Cutout Switch is taken to NORMAL."** When the BOP directs the EO to proceed, simultaneously insert/release the commands to override the annunciators 912-1 A-8 and A-9 ON: **imf ano9121a8 on** **imf ano9121a9 on**		
	BOP	Reports to the EO that annunciators 912-1 A-8 and 912-1 A-9 are in alarm.
SIM OP ROLE PLAY: As the EO at the 1A IAC, inform the BOP that: **"I will perform steps F.1.c.(4) and F.1.c.(5) which will clear the alarms."** Wait 30 sec., then sequentially delete the annunciator overrides with the following commands: **dmf ano9121a8** **dmf ano9121a9**		
	BOP	Reports to the EO that annunciators 912-1 A-8 and 912-1 A-9 have cleared.
SIM OP ROLE PLAY: As the EO, wait 30 seconds and report: **"The 1A Instrument Air Compressor is running normally. The Air Dryer is pressurized and Air Dryer Purge pressure is 42 psig."**		
	BOP	Contacts Mechanical Maintenance to investigate cause of 1/2 Instrument Air Compressor trip.
SIM OP ROLE PLAY: As the MM Supervisor, state that you will investigate the cause of the IAC trip and determine a course of action with the Shift Manager.		
End of Event 6		

Quad Cities	2020 NRC Scenario No.3	Event No. 7	Page 1 of 2
Event Description: Condensate Pit Flooding			

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: At the direction of the Lead Evaluator, initiate a 20% severity Circulating Water System leak ramped over 3 minutes into the Condensate Pit with the following command: **imf MC05 20 3:**		
Key Parameter Response: Main Condenser vacuum ↓ Expected Annunciator(s): 901-7 D-10, 901-7 E-10, 901-7 F-10 Automatic Actions: Circulating Water Pumps trip		
	BOP	Acknowledges and reports annunciator 901-7 D-10, CONDENSER PIT LOW LEVEL.
	BOP	Refers to annunciator procedure and dispatches EO to the Condensate Pit to investigate.
	SRO	Directs BOP to enter QOA 0030-01.
	SRO	Sets scram criteria at onset of 901-7 E-10, CONDENSER PIT HIGH LEVEL alarm.
	BOP	Acknowledges and reports annunciator 901-7 E-10, CONDENSER PIT HIGH LEVEL alarm.
	ATC	Inserts a manual reactor scram by depressing both Manual Scram pushbuttons and placing the Mode Switch to Shutdown.
SIM OP ROLE PLAY: After the crew scrams the reactor and restores RPV water level in band, as the EO, report back: **"There is a large amount of water leaking into the Condensate Pit from under the Hotwell area. The Condensate/Condensate Booster Pump bases are covered with water and the water level is rising."**		
	ATC	Reports all rods in, RPV water level < 0 inches and recovering, RPV pressure < 1060 psig and controlled with Main Turbine Bypass Valves.
Event 7 Continued		

Quad Cities	2020 NRC Scenario No.3	Event No. 7	Page 2 of 2
Event Description: Condensate Pit Flooding			

Time	Position	Applicant's Actions or Behavior
	SRO	Enters QGA 100, (RPV water level below 0 inches), and directs actions.
	SRO	Directs ATC/BOP to secure the Circulating Water pumps and the Condensate/Feedwater System.
	ATC/BOP	Places control switches for the Circulating Water pumps in PTL.
	ATC/BOP	Places control switches for the Reactor Feed pumps in PTL.
	ATC/BOP	Places control switches for Condensate pumps in PTL.
SIM OP ROLE PLAY: If the crew does not secure the Condensate/Feedwater System, then report back as the EO at the Condensate Pit: **"The water level is just under the Condensate Pump motors and still rising."** If the crew does not secure the pumps after the second report, then sequentially trip the Condensate pumps with the following commands: **imf FW17A** **imf FW17B** **imf FW17C** **imf FW17D** If the pumps are secured by the ATC/BOP, execute the trip commands listed above to prevent restarting the system.		
	ATC	Carries out QCGP 2-3, Reactor Scram, actions.
	ATC/BOP	Verify auto actions for 0 in. RPV water level
	SRO	Directs RPV water level band of 0 to +48 inches using Preferred Systems: HPCI/RCIC/SSMP.
	ATC/BOP	Starts RCIC and/or SSMP for injection and attempts to control RPV water level within 0 to +48 in. band.
	SRO	Directs BOP to stabilize RPV pressure between 800 and 1000 psig using ADS valves.
End of Event 7		

Quad Cities	2020 NRC Scenario No.3	Event No. 8	Page 1 of 2

Event Description: 1/2 Emergency Diesel Generator auto-start failure

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: After the plant is stabilized and at the Lead Evaluators direction, trip the Bus 13 to Bus 13-1 feed breaker at Bus 13: **irf ED80GR trip**		
Key Parameter Response: Bus 13-1, Bus 18, and RPS A are de-energized Expected Annunciator(s): 901-8 A-1, 901-8 A-5, 901-8 E-3, 901-8 E-5 Automatic Actions: 1/2 EDG autostarts and re-energizes Bus 13-1.		
	BOP	Acknowledges 901-8 panel alarms and reports Bus 13 to Bus 13-1 breaker has tripped and the 1/2 EDG did NOT start.
	BOP	Verifies annunciator 901-8 G-5, DIESEL GEN 1/2 RELAY TRIP, is not in alarm, then places the DIESEL GEN 1/2 CONTROL SWITCH to START.
	BOP	Reports 1/2 EDG starts and verifies voltage and frequency are 4160 V and 60 Hz respectively and the 1/2 EDG output breaker auto-closes to Bus 13-1.
	BOP	Dispatches EOs to the 1/2 EDG, Bus 13 and Bus 13-1.
SIM OP ROLE PLAY: As the EOs dispatched, wait 3 minutes then report back as follows: From the 1/2 EDG Room: **"The 1/2 EDG is running normally and all operating parameters are in range. The ½ Diesel Generator Cooling Water pump and Vent Fan are also running."** From Bus 13: "**The feed breaker to Bus 13-1 at Bus 13 cubicle 13 is tripped but there are no targets up. Also, the charging springs have not re-charged. I'll get Electrical Maintenance to help investigate."**		
	SRO	Directs BOP to re-energize RPS A from its normal feed.
	BOP	Dispatches an EO to the Aux Electric Room to re-energize RPS A.
Event 8 continued		

Quad Cities	2020 NRC Scenario No.3	Event No. 8	Page 2 of 2
Event Description: 1/2 Emergency Diesel Generator auto-start failure			
Time	**Position**	**Applicant's Actions or Behavior**	
	BOP	Dispatches an EO to the Aux Electric Room to re-energize RPS A	
SIM OP ROLE PLAY: As the EO dispatched to re-energize RPS A, wait 3 minutes then insert/release the following two commands: **irf RP02R mg_set** **irf RP29R reset**			
	BOP	Dispatches an EO to the 1B Core Spray pump room to start the ECCS Keep Fill Pump.	
SIM OP ROLE PLAY: As the EO dispatched to restart the Keep Fill pump, wait 2 minutes, then insert/release the following command: **irf cs04r norm**			
End of Event 8			

Quad Cities	2020 NRC Scenario No.3	Event No. 9	Page 1 of 4
Event Description: LOCA—1A Recirc Pump Suction Pipe Break			

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: After RPS A is restored and/or at the direction of the Lead Evaluator, insert a .5% break in the 1A Recirc Pump Suction piping ramped over 15 minutes using malfunction RR10A: **imf rr10a .5 15:**		
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, 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.
	BOP	Attempts to locate and isolate leak. Checks Recirc pump seals, RBCCW alarms, PIC 1-1640-11, CONTAINMENT PRESS for normal operation.
	BOP	Starts all available Drywell cooling.
	BOP	Notifies Radiation Protection of elevated Containment pressure and evacuates the Reactor Building.
	ATC	Reports RPV water level lowering.
	BOP	Aligns HPCI for injection and reports HPCI pump discharge pressure degrading.
	BOP	Dispatches EO to the HPCI room to investigate.
SIM OP ROLE PLAY: As the EO dispatched to the HPCI room, wait 3 minutes, then report: **"The HPCI pump sounds loud and there may be a problem with the bearings. I recommend shutting it down because it's getting worse."**		
	BOP	Enables the REMOTE HPCI TURB TRIP pushbutton latch to secure HPCI and places MO 1-2301-14 valve c/s in PTL.
	SRO	Directs second CRD pump started for injection per QCOP 0300-16.
Event 9 Continued		

Quad Cities	2020 NRC Scenario No.3	Event No. 9	Page 2 of 4
Event Description: LOCA—1A Recirc Pump Suction Pipe Break			

Time	Position	Applicant's Actions or Behavior
	ATC	Starts second CRD pump for injection.
SIM OP ROLE PLAY: If dispatched to valve in the 2nd set of CRD suction filters, wait 2 minutes, insert/release the remote function: **irf rd01r both** Then as EO report: **"The 2nd set of CRD filters are valved in."**		
	SRO	Directs Alternate Systems (Detail E) for injection.
	SRO	Directs ATC to inject with SBLC system.
	ATC	Starts both SBLC pumps and reports system injection.
	BOP	Drywell pressure reading 2.5 psig and rising.
	SRO	Re-enters QGA 100 and enters QGA 200 on high Drywell pressure.
	ATC/BOP	Verify auto actions for 2.5 psig Drywell pressure.
	SRO	Directs an RPV cooldown at < 100°F/hr using ADS valves.
QGA 200, Primary Containment Control Actions		
	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.
	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.
Event 9 Continued		

Quad Cities	2020 NRC Scenario No.1	Event No. 9	Page 3 of 4
Event Description: LOCA—1A Recirc Pump Suction Pipe Break			

Time	Position	Applicant's Actions or Behavior
	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%.
	ATC	Reports RPV water level lowering.
QGA 100 Alternate Level Control Leg Actions		
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.
SIM OP NOTE: At the direction of the Lead Evaluator, modify the 1A Recirc suction leak to 1.5% ramped over 15 minutes: **mrf RR10A 1.5 15:**		
	BOP	Reports Low Pressure ECCS Subsystems and Safe Shutdown Makeup Pump are available.
	ATC	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 -162 inches.
	SRO	Directs actions of QGA 500-1, RPV Blowdown.
	SRO	Verifies all rods are in.
Events 9 Continued		

Quad Cities	2020 NRC Scenario No.3	Event No. 9	Page 4 of 4
Event Description: LOCA—1A Recirc Pump Suction Pipe Break			

Time	Position	Applicant's Actions or Behavior
	SRO	Verifies Drywell pressure < 2.5 psig, if Drywell sprays are operating.
	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 5 ADS valves are open by acoustic monitor indication on the 901-21 panel.
	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	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.		

END OF SCENARIO

Exelon Nuclear

2020 ILT NRC Exam Scenario

Scenario Number:

NRC Scenario 4

Revision Number: 00

Date: 09/20/2019

Developed by: _____ _____
Instructor Date

Validated by: _____ _____
SME or Instructor Date

Reviewed by: _____ _____
Operations Representative Date

Facility: Quad Cities Scenario: **2020 NRC Scenario 4** Op-Test No.: ILT 18-1
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions:
The plant is operating at 100% power.

Turnover: Swap Bus Duct Coolers for Preventive Maintenance.

Critical Tasks:

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

2. When Torus pressure cannot be maintained below the Pressure Suppression Pressure Limit initiate an Emergency Depressurization prior to exceeding primary containment design limits.

Event No.	Malf. No.	Event Type*	Event Description
1	NONE	BOP N	Swap Bus Duct Coolers IAW QCOP 5370-02.
2	RM05A	SRO TS	“A” Drywell Rad Monitor Upscale Failure
3	FW06B	ATC I	1B RFP Flow Transmitter Downscale Failure
4	NONE	ATC R	Power Reduction to Secure 1B RFP
5	PC11B	BOP C/TS	SBGTS Low Flow after Autostart on Refuel Floor High Radiation.
6	EG07B	BOP C	Degraded Stator Cooling Water Pump
7	MS04C	CREW M	“C” Main Steam Line Break Inside the Drywell
8	RP02B/D RP03B RD29	ATC C	Electric ATWS – Failure of RPS Channel B to Process Scram Signals
9	DIHS11001S17A RH20BR	BOP C	Drywell Spray Valves Fail to Operate / Blowdown

* (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): **2** Abnormal Events (2-4): **E2, 3, 5, 6** Major Transient(s) /E-Plan entry (1-2): **1** 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): **E4** BOP I/C (4 per set): **E5, 6, 9** ATC I/C (4 per set): **E3, 8** SRO-I I/C (4 per set inc 2 as ATC): **E3, 5, 6, 8, 9** SRO Tech Spec (2 per set): **E2, 5** ALL Major Transients (2 per set) **E7**

SUMMARY:

- Initial Conditions:
  - The plant is operating at 100% power, currently holding load per QCGP 3-1.
  - Swap Bus Duct Coolers per QCOP 5370-02, is the first activity scheduled for the shift.
- Event 1: The BOP places the 1B Bus Duct Blower in service and secures 1A Bus Duct Blower IAW QCOP 5370-02, Isolated Phase Bus Cooling System.
- Event 2: The 1-2419A, Drywell Radiation Monitor fails upscale resulting in a ½ Group II isolation. The SRO declares the Drywell Rad Monitor inoperable and enters TS 3.3.6.1, (PCI Instrumentation inoperable) AND TS 3.3.3.1, (PAM Instrumentation inoperable).
- Event 3: The 1B RFP flow transmitter fails downscale resulting in a momentary RPV water level transient. The failure will cause the "B" Reactor Feed Pump min flow valve to open and a reactor vessel high level alarm to annunciate. The ATC will transfer to 1-element control.
- Event 4: The crew will perform a power reduction to per QCGP 3-1 and secure the 1B Reactor Feed Pump. The QNE will recommend lowering core flow to 85 Mlb/hr by lowering FCL to 90% and reducing Recirc pump flow.
- Event 5: The 1-1705-16A, Fuel Pool Rad Monitor will spike high due to movement of hot trash on the Refuel Floor. The Reactor Building Ventilation system isolates and the "B" SBGTS Train autostarts, but will not develop sufficient flow. The SRO declares "B" SBGTS inoperable due to low flow and enters TS 3.6.4.3 Condition A. The BOP secures the B SBGTS, and places the "A" SBGTS in START.
- Event 6: The 1B Stator Cooling Pump (SCW) degrades. An EO dispatched to the pump reports the pump running hot. The BOP starts the 1A SCW pump and secures the 1B SCW pump
- Event 7/8: The crew inserts a manual reactor scram on high drywell pressure due to a "C" Main Steam Line break. An electric ATWS occurs as RPS Channel B does not process any automatic or manual scram signals. All control rods insert when the ATC initiates the ARI system. The SRO enters and directs actions of QGA 100 and 200.
- Event 9: The crew will be unable to spray the Drywell due to a malfunction of the S17 switch and a breaker trip of the MO 1-1001-26B valve. Prior to exceeding PSP limit, the SRO enters QGA 500-1 and the reactor is depressurized.
- 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 110ºF 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 Torus pressure cannot be maintained below the Pressure Suppression Pressure Limit initiate an Emergency Depressurization prior to exceeding primary containment design limits.

EXERCISE PERFORMANCE OBJECTIVES

SR-0002-P05	(Freq: LIC=B) (ILT-MP) Given a reactor plant at power, perform a power change discernible on neutron monitors using recirc flow in accordance with QCOP 0202-03 and QCGP 3-1.
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 2 of the top 100 most probable PRA 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.
SR-1000-P01	(Freq: LIC=A) (ILT-MP) Given a reactor plant either operating or shutdown, start the RHRSW system and RHR system in torus cooling in accordance with QCOP 1000-04 and QCOP 1000-09 or QCOP 1000-30. (Important PRA Operator Action – starting torus cooling in conjunction with other actions has a maximum RAW of 2.18E+4) (recovery of torus cooling after failure terminates 20 of 100 core damage sequences)
SR-1000-P02	(Freq: LIC=B) Given a reactor plant in an accident condition (QGA), operate torus sprays in accordance with QCOP 1000-30 and appropriate QGA.
SR-1000-P04	(Freq: LIC=B) Given a reactor plant with rising containment pressures 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 when torus pressure exceeds 5 psig in accordance with QGA 200 and QCOP 1000-30.
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 15 of top 100 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.

Simulator Setup:

1. Reset to IC-21 (100% power).
2. Go to **RUN.**
3. Verify the following RWM Sequence is loaded: **6PHESD (or current shut down sequence)**
4. Place INFO cards as follows:
    a. None

5. Insert Commands for setup:
    - **imf RP02B** (RPS Channel B1 auto scram relay failure)
    - **imf RP02D** (RPS Channel B2 auto scram relay failure)
    - **imf RP03B** (Channel B Manual Scram circuit failure)
    - **imf RD29** (Fail the Auto-ARI circuit)
    - **ior AOFI1754013B 3000** (Override the B SBGT Flow Meter to 3000 scfm triggered off of annunciator 901-3 G-16 with a 15 sec. delay)
    - **dor AOFI1754013B** (Delete SBGT Flow Meter override when 1/2B SBGTS Train control switch is taken to OFF)
    - **imf TC09A thru TC09I** (Fail all Main Turbine Bypass valves closed triggered off of Stop Valve #3 closure delayed 2 minutes)
    - **ior DIHS11001S17A off** (Override Loop A RHR Containment Cooling Permissive Switch to OFF position)
    - **irf RH20BR open** (Rack out RHR 26B valve breaker triggered off of control switch with 1 sec delay)

6. Verify the following commands for scenario performance**:**
    - **imf RM05A 100** (Fail the 1-2419A, Drywell Radiation Monitor upscale)
    - **imf FW06B 0 1:** (Fail the 1B RFP flow transmitter downscale ramped over 1 minute)
    - **imf EG07B 16 2:** (Degrade the B Stator Cooling Water 16% ramped over 2 minutes)
    - **imf ser0944 on** (Override annunciator 901-7 C-10 on, delayed 2 minutes)
    - **dmf ser0944** (Delete 901-7 C-10 annunciator override)
    - **imf RM02M .01** (Override the 1-1705-16A, Fuel Pool Rad Monitor to 100 mr/hr)
    - **dmf RM02M** (Delete the override on the 1-1705-16A Fuel Pool Rad Monitor, 5 sec. delay)
    - **imf MS04C 1.5 15:** (Inserts a 1.5% severity break over 15 minutes in the C MSL before the restrictor)
    - **bat sv** (silences 901-3 G-11 and C-13 alarms)

7. Install “Protected System” placards and/or rings on the following equipment:
    - RBCCW pumps
    - Fuel Pool Cooling Water pumps

8. Provide the following paperwork:
    - “Holding Load and Load Following” REMA

9. Place the Zinc Injection placard on 1A RFP.

LIST OF POTENTIAL PROCEDURES

Annunciator Procedures

- 901(2)-3 D-13, ELECT RELIEF VALVES 3A 3B OPEN, Rev. 7
- 901(2)-3 E-14, ACOUSTIC MON SAFETY RLF VALVES OPEN, Rev. 7
- 901(2)-3 G-16, FUEL POOL CHANNEL A HI RADIATION, Rev. 8
- 901(2)-3 A-16, PRI CNMT 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)-5 E-8, RX VESSEL HIGH LEVEL, Rev. 10
- 901(2)-5 F-8, RX VESSEL LOW LEVEL, Rev. 11
- 901(2)-7 C-10, GEN STATOR COOLING PANEL TROUBLE, Rev. 4
- 912-5 B-6, STANDBY GAS TREATMENT SYS A TROUBLE, Rev. 6
- QOA 912-5 A-1, RX BLD 1 VENT/EXH FAN TRIP, Rev. 7

QCOP 0600-12, Feedwater Level 3-Element Control Operation, Rev. 11

QCOP 3200-05, Reactor Feed Pump Shutdown, Rev. 39

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

QCOP 5370-02, Isolated Phase Bus Cooling System, Rev. 21

QCGP 2-3, Reactor Scram, Rev. 88

QCGP 3-1, Reactor Power Operations, Rev. 86

QCOA 0201-01, Increasing Drywell Pressure, Rev. 30

QCOA 5300-01, Loss of Stator Cooling, Rev. 21

QCOA 7500-01, Standby Gas Treatment System Auto Start, Rev. 20

QCOA 7500-03, Standby Gas Low Flow, Rev. 13

QGA 100, RPV Control, Rev. 11

QGA 200, Primary Containment Control, Rev. 11

QGA 500-1, RPV Blowdown, Rev. 15

CREW TURNOVER

1.) Plant Conditions:

a.) Unit 1 is currently at 100% power

b.) Unit 2 is at 100% power.

c.) Technical Specification limitations:

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:

a.) The Unit EO reported a small TBCCW leak on the 1A Bus Duct Blower. Mechanical Maintenance is requesting a clearance order and is preparing a work package.

3.) Evolutions/maintenance for the oncoming shift:

a) Start the 1B Bus Duct Cooler and secure the 1A Bus Duct Cooler IAW QCOP 5370-02, Isolated Phase Bus Cooling System, step F.2.

b.) Continue holding load per QCGP 3-1 and the ReMA.

Quad Cities 2020 NRC Scenario No.4 Event No. 1 Page 1 of 1 Event Description: Swap Bus Duct Coolers IAW QCOP 5370-02, Isolated Phase Bus Cooling System		
Time	**Position**	**Applicant's Actions or Behavior**
	SRO	Directs BOP to start the 1B Bus Duct Cooler and secure the 1A Bus duct Cooler IAW QCOP 5370-02, Isolated Phase Bus Cooling System.
	BOP	Directs the EO to verify open the 1-3899-77, BUS DUCT CLR 1B INLET valve.
SIM OP ROLE PLAY: When directed, as the EO, report: **"The 1-3899-77, BUS DUCT CLR 1B INLET valve is open."** If directed to vent the 1B Bus Duct Cooler, wait 1 minute, the report: **"QCOP 5370-02 steps F.2.b.(2) and F.2.b.(3)(b) are complete."**		
	BOP	Directs EO to open the 1-3899-74, BUS DUCT CLR 1B OUTLET valve.
SIM OP ROLE PLAY: When directed, as the EO, wait 30 seconds then report: **"The 1-3899-74, BUS DUCT CLR 1B OUTLET valve is open."**		
	BOP	Starts the B Bus Duct Blower at the 901-8 panel.
	BOP	Directs EO to verify the outlet damper for the 1B Bus Duct Blower is open and it is operating properly.
SIM OP ROLE PLAY: When directed, as the EO, wait 30 seconds then report: **"The outlet damper is open and the 1B Bus Duct Cooler is operating properly."**		
	BOP	Stops the 1A Bus Duct Blower by placing the control switch to OFF at the 901-8 panel.
	BOP	Directs EO to verify TBCCW outlet temperature is normal (70 to 115ºF)
SIM OP ROLE PLAY: As the EO, wait 30 seconds and report: **"TBCCW outlet temperature for the 1B Bus Duct Cooler on TI 1-3841-13 is 95ºF."**		
	BOP	Directs EO to close the 1-3899-75, BUS DUCT CLR 1A OUTLET valve and verify the 1A Bus Duct Cooler Blower outlet damper is closed.
SIM OP ROLE PLAY: As the EO, wait 30 seconds and report: **"The 1-3899-75, 1A Bus Duct Cooler outlet valve and outlet damper are closed."**		
	BOP	Notifies System Engineer Bus Duct Cooler swap.
End of Event 1		

Quad Cities	2020 NRC Scenario No.4	Event No. 2	Page 1 of 1
Event Description: "A" Drywell Rad Monitor Upscale Failure			

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: At the direction of the Lead Evaluator, fail the 1-2419A Drywell Rad Monitor upscale: **imf RM05A 100**		
Key Parameter Response: The 1-2419A Drywell Rad Mon indicates ~ 10^8 R/hr. Expected Annunciator(s): 901-5 A-8, 901-55 A-1 Automatic Actions: None		
	BOP	Acknowledges annunciator 901-55 A-1, DRYWELL HIGH RAD CONC, and reports the "A" Drywell Rad Monitor is indicating ~10^8 R/hr. The "B" Drywell Rad Monitor is indicating ~ 3 R/hr.
	ATC	Acknowledges and reports 901-5 A-8, GROUP II ISOL CH TRIP, alarm. Refers to annunciator procedure.
	SRO	Contacts Instrument Maintenance to investigate "A" Drywell Rad Monitor failure.
SIM OP ROLE PLAY: As the Instrument Maintenance Supervisor state: **"We'll come to the WEC and request a clearance order to remove the monitor and take it to the shop for troubleshooting."**		
TS	SRO	Declares the "A" Drywell Rad Monitor inoperable and enters: o TS 3.3.6.1 Condition A (24 hours to place the channel in trip) o TS 3.3.3.1 Condition A (30 days to restore channel to operable status)
SIM OP ROLE PLAY: If contacted, as the RP Supervisor acknowledge the report.		
End of Event 2		

Quad Cities	2020 NRC Scenario No.4	Event No. 3	Page 1 of 1
Event Description: 1B RFP Flow Transmitter Downscale Failure			

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: At the direction of the Lead Evaluator, fail the 1B RFP flow transmitter downscale ramped over 1 minute: **imf FW06B 0 1:**		
Key Parameter Response: FRVs open, RPV water level transient, MWe ↑, APRM power ↑, 1-640-24B, 1B RFP FLOW indicates 0 Mlb/hr. Expected Annunciator(s): 901-5 E-8, 901-6 G-9 Automatic Actions: DFWLC System restores RPV water level to 30 inches, 1B RFP min flow valve opens		
	ATC	Acknowledges and reports 901-5 E-8, REACTOR VESSEL HIGH LEVEL, alarm.
	ATC	Reports FI 1-640-24B, 1B RFP FLOW, is failing downscale and verifies DFWLC System is responding to control RPV water level.
	SRO	Directs ATC to transfer to 1-element control.
	ATC	Refers to QCOP 0600-12 step F.2 and performs the following at the Master Controller 1-640-18: o Momentarily depresses the SINGLE pushbutton o Verifies the SINGLE pushbutton backlights o Monitors RPV water level and Feedwater flow
	SRO	Contacts Instrument Maintenance to assist in troubleshooting the 1B RFP Flow transmitter.
SIM OP ROLE PLAY: As the Instrument Maintenance Supervisor state: **"We'll head out to the Feed Pump Room and check the Flow Transmitter."** Wait 2 minutes, then call back and report: **"There's a leak just upstream of the 1-3299-135B isolation valve for the Flow transmitter. We will need the Feed Pump shutdown to repair it."**		
End of Event 3		

Quad Cities 2020 NRC Scenario No.4 Event No. 4 Page 1 of 3 Event Description: Power Reduction to Secure 1B RFP		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP ROLE PLAY: If necessary, and at the direction of the Lead Evaluator, call in as the Shift Manager and inform the SRO that: **"Station management and Work Planning want the 1B RFP offline for some preventive maintenance in addition to the Feed flow transmitter repair."**		
	SRO	Notifies the QNE of the 1B RFP flow transmitter failure and the load drop.
LEAD EVALUATOR ROLE PLAY: If contacted as QNE, state: **"I'll monitor thermal power and do a check on the calculation. My recommendation is to lower FCL to ~ 90% then reduce core flow to 85 Mlb/hr. I'll provide a new ReMA for holding load and a return when you get to target power."**		
	SRO	Directs ATC lower FCL to 90% and then reduce power with Recircs per QCGP 3-1 until total core flow is 85 Mlb/hr.
	SRO	Notifies Generation Dispatch and Chemistry of load reduction.
SIM OP ROLE PLAY: If contacted, as Generation Dispatch, acknowledge power reduction.		
SIM OP ROLE PLAY: If contacted, as the Chemistry Technician state: **"I'll get the RETS samples when you have completed the load drop."**		
	ATC	Notches in control rods per FCL steps in Rod Sequence Book until FCL ~90%.
	ATC	Depresses LOWER pushbutton on the 1-0262-22, MASTER SPEED DEMAND to lower speed of both pumps.
	ATC	Monitors core flow, APRM power, RPV pressure and water level after each reduction of pump speeds.
	ATC	Informs SRO that core flow is 85 Mlb/hr.
LEAD EVALUATOR NOTE: If desired, at this point, the scenario can proceed to Event 5.		
Event 4 Continued		

Quad Cities 2020 NRC Scenario No.4 Event No. 4 Page 2 of 3

Event Description: Power Reduction to Secure 1B RFP

Time	Position	Applicant's Actions or Behavior
	SRO	Directs ATC to secure the 1B RFP and a Condensate/Condensate Booster Pump per QCOP 3200-05.
	ATC/BOP	Dispatch an EO to the Feed Pump room.
	ATC	Disables the 70% Reactor Recirc Runback Logic, per QCOP 0600-21.
	ATC	Places the RFP SELECTOR switch to OFF.
	ATC	Verifies the 1B RFP Aux Oil Pump has a red target and the yellow AUTO TRIP light is lit.
	ATC	Verifies reactor water level is stable.
	ATC	Places the control switch for the 1B RFP to STOP.
	ATC	Verifies the 1B RFP Aux Oil Pump starts as the RFP coasts down.
	ATC	Verifies the following: o Reactor water level stable. o RFP running currents are < 1115 amps. o RFP discharge header pressure has stabilized.
	ATC/BOP	Verifies RFP suction pressure is ≥ 250 psig.
SIM OP ROLE PLAY: As the EO in the Feed Pump Room, call back and report: **"No TBCCW leaks, 1B RFP bearing lube oil pressure is in range at 12 psig. RFP bearing oil pressure for the running pumps is also in range at 20 psig."**		
	ATC/BOP	Dispatches an EO to the Condensate Pit.
	ATC/BOP	Places the COND PMP SELECTOR switch to OFF.
	ATC/BOP	Places control switch to STOP for the Condensate Pump to be shut down.
Event 4 Continued		

Quad Cities 2020 NRC Scenario No.4 Event No. 4 Page 3 of 3

Event Description: Power Reduction to Secure 1B RFP

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	Selects the shutdown pump for standby using the COND PMP SELECTOR switch.
	ATC/BOP	Verifies running Condensate/Condensate Booster Pump currents are > 160 amps. (Adjusts AO 1-3401, COND RECIRC FCV TO CNDSR, if necessary)
	ATC/BOP	Directs EO to valve out Hydrogen injection on the shutdown pump.
SIM OP ROLE PLAY: As the EO, wait 1 minute, then call back and report: **"Hydrogen injection valves for the shutdown Condensate/Condensate Booster pump are closed."**		
End of Event 4		

Quad Cities 2020 NRC Scenario No.4 Event No. 5 Page 1 of 2 Event Description: SBGTS Auto-start on Fuel Pool Rad Monitor High – Low Flow		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP NOTE: At the direction of the Lead Evaluator, spike the Fuel Pool Rad Monitor: **imf RM02M .01** **dmf RM02M -5 sec delay**		
Key Parameter Response: Rx. Bldg. Vent Isolation, SBGTS autostart, Control Room Vent Isolation Expected Annunciator(s): 901-3 G-16, 901-4 B-18, 901-5 D-8, 912-5 A-6 Automatic Actions: SBGTS autostart, Rx. Bldg. and Control Room Vents Isolate.		
	BOP	Acknowledges and reports annunciator 901-3 G-16, FUEL POOL CHANNEL "A" HI RADIATION, is in alarm.
	BOP	Checks 901-10 panel ARMs and reports the 1-1705-16A, Fuel Pool Rad Mon trip light is lit, but it is now indicating a normal rad level ~5-7 mr/hr.
	ATC	Acknowledges 901-5 D-8 alarm and reports Control Room vent isolation.
	BOP	Verifies Reactor Bldg. vent isolation and SBGTS autostart.
SIM OP ROLE PLAY: Call in as the Fuel Handling Supervisor and report: "**We were moving some hot trash from the storage area and we heard the reactor building vents isolate. The RP Tech thinks we tripped one of the rad monitors."**		
	BOP	Reports the "B" SBGTS train is running at ~ 3000 scfm.
	SRO	Directs BOP to start the "A" SBGTS train and secure the "B" SBGTS train per QCOA 7500-03.
TS	SRO	Declares "B" SBGTS Train inoperable and enters TS 3.6.4.3 Condition A, (7 days to restore SGT to operable status).
Event 5 Continued		

Quad Cities 2020 NRC Scenario No.4 Event No. 5 Page 2 of 2

Event Description: SBGTS Autostart on Fuel Pool Rad Monitor High – Low Flow

Time	Position	Applicant's Actions or Behavior
	BOP	Places the ½ A SBGTS TRAIN MODE SELECTOR SWITCH to the START position. Verifies dampers reposition, Air Heater and Fan start, and flow indicates 3600 to 4400 scfm.
	BOP	Places the ½ B SBGTS TRAIN MODE SELECTOR SWITCH to the OFF position.
	SRO	Contacts Electrical Maintenance to investigate ½ B SBGTS train.
TS	SRO	Enters the following Technical Specification due to the Reactor Building Vents isolation: TS 3.3.6.2 Condition A, Secondary Containment Isolation Instrumentation inoperable (24 hours to place RB Vent rad monitor in trip) The following Technical Specifications are entered conditionally if the CREV system is declared inoperable: TS 3.3.7.1 Condition A and B, for CREV System inoperable (1 hour from discovery of loss of isolation capability and 24 hours to place channel in trip) TS 3.7.4 Condition A, for CREV System inoperable (7 days to restore CREV System to operable status)

SIM OP ROLE PLAY: As EO, if dispatched to the B HVAC Room to verify all Reactor Building Vent Isolation Dampers have closed, wait 1 minute, then report:

"All the Reactor Building Vent Isolation Dampers have a closed indication on the 0-9400-105 panel."

SIM OP ROLE PLAY: If contacted, as the Electrical Maintenance Supervisor, state:

"I'll request a clearance order and prepare a work package to inspect the fan and motor."

LEAD EVALUATOR NOTE: The SRO may direct the BOP to restart Reactor Building Vents and secure ½ B SBGTS train. In that event, after the BOP takes the initial actions to restart ventilation per QCOP 5750-02 by resetting the Fuel Pool Rad Monitor and Reactor Building Vent Isolation Dampers, move to the next scenario event.

End of Event 5

Quad Cities 2020 NRC Scenario No.4 Event No. 6		Page 1 of 1
Event Description: Degraded Stator Cooling Water Pump		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP NOTE: At the direction of the Lead Evaluator, degrade the 1B Stator Cooling Water pump 16% ramped over 2 minutes and override annunciator 901-7 C-10 on: **imf EG07B 16 2:** **imf ser0944 on (2 min. delay)**		
Key Parameter Response: NORMAL PRESS light out, SCW pump amps↓ Expected Annunciator(s): 901-7 C-10 Automatic Actions: Autostart of Standby SCW pump		
	BOP	Reports "Normal Pressure" light for the 1B Stator Cooling Water Pump is out.
	BOP	Acknowledges annunciator 901-7 C-10, GEN STATOR COOLING PANEL TROUBLE, and refers to procedure.
	BOP	Dispatches EO to the SCW panel to investigate.
SIM OP ROLE PLAY: As the EO dispatched to the SCW pumps, wait 1 minute, then report back: (If the standby pump has not been started) **"Alarm tile A-1, INLET LOW FLOW is in alarm. FIS 1-7441-1B, is reading 520 gpm and PI 1-7441-3, Stator Cooling Water Pumps Discharge Hdr is indicating 65 psig. Also, the pump is running hot."**		
	BOP	Reports the 1A SCW pump has not autostarted.
	SRO	Directs BOP to start the 1A SCW pump.
	BOP	Starts the 1A SCW pump and places the 1B SCW pump control switch in PTL.
	BOP	Contacts EO to check status of 1A SCW pump.
SIM OP ROLE PLAY: As the EO, clear the local alarm by entering the command and report: **dmf ser0944** **"The 1A SCW pump is running normally, pressures and flow is in the normal range."**		
End of Event 6		

Quad Cities 2020 NRC Scenario No.4 Event No. 7/8/9 Page 1 of 4

Event Description: MSL Break Inside Drywell – Electric ATWS – PSP Blowdown

Time	Position	Applicant's Actions or Behavior
SIM OP NOTE: At the Lead Evaluators direction, insert a "C" Main Steam Line break at 1.5% severity break ramped over 15 minutes: **imf MS04C 1.5 15:**		
Key Parameter Response: Drywell and Torus pressure/temperature rise Expected Annunciator(s): 901-3 A-16, 901-3 A-4, 901-3 A-6, 901-3 D-12, 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, PIC 1-1640-11, CONTAINMENT PRESS for normal operation.
	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 when scram criteria is met.
	ATC	Depresses both RX SCRAM CH A and CH B Pushbuttons. Places the Reactor Mode Switch to SHUTDOWN.
	ATC	Reports Electric ATWS, RPS Channel B did NOT de-energize.
CT1	ATC	Arms and Depresses ARI pushbuttons.
	SRO	Enters QGA 100, then transitions to QGA 101 and directs actions.
	BOP	Inhibits ADS and places Core Spray pumps in PTL.
	ATC	Reports ALL control rods inserted.
Events 7/8/9 continued		

Quad Cities	2020 NRC Scenario No.4	Event No. 7/8/9	Page 2 of 4

Event Description: MSL Break Inside Drywell – Electric ATWS – PSP Blowdown

Time	Position	Applicant's Actions or Behavior
	SRO	Exits QGA 101 and re-enters QGA 100.
	BOP	Verify auto actions for 0 in. RPV water level and 2.5 psig Drywell pressure.
	SRO	Directs RPV water level band of 0 to +48 inches using the Condensate/Feed System.
	ATC	Reports RPV water level in band and monitors
	SRO	Directs BOP to stabilize RPV pressure below 1060 psig psig using Main Turbine Bypass valves.
	SRO	Directs an RPV cooldown at < 100ºF/hr using the DEHC system.
	ATC/BOP	Attempts to initiate an automatic cooldown at < 100ºF/hr and reports the Main Turbine Bypass valves will NOT open.
	SRO	Directs ATC to initiate RPV cooldown using ADS valves.
	SRO	Directs actions of QGA 200, Primary Containment Control.
	SRO	Directs BOP to start and maximize Torus Cooling on both loops.
	BOP	Reports containment cooling valves on "A" RHR Loop will NOT open.
	BOP	Starts Torus Cooling on "B" RHR Loop and monitors Torus temperature.
	BOP	Contacts Electrical Maintenance to investigate failure of S-17 switch on RHR Loop A.

SIM OP ROLE PLAY: As the Electrical Maintenance Supervisor, state:

"I'll dispatch EMs to the Control Room and Aux Electric Room to troubleshoot the circuit."

Events 7/8/9 Continued

Quad Cities 2020 NRC Scenario No.4 Event No. 7/8/9 Page 3 of 4

Event Description: MSL Break Inside Drywell – Electric ATWS – PSP Blowdown

Time	Position	Applicant's Actions or Behavior
	SRO	Directs BOP to start Torus Sprays 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.
	SRO	Checks the DSIL curve and verifies both Recirc pumps are tripped and Drywell Coolers are secured.
	SRO	Directs BOP to initiate Drywell Sprays.
	BOP	Reports the MO 1-1001-26B valve breaker has tripped and dispatches an EO to reset the breaker.
SIM OP ROLE PLAY: As the EO dispatched to MCC 19-4 for the RHR 26B valve breaker, wait 3 minutes, then report back: **"The RHR 26B valve breaker will not reset. There is a slight odor of burnt insulation but NO fire. I'll contact EMs to assist in troubleshooting or possibly a breaker swap."**		
	BOP	Dispatches EOs and Mechanical Maintenance to manually open the RHR 26B valve,
SIM OP ROLE PLAY: As the EOs dispatched to the RHR 26B valve, state: **"We'll stop by the shop and pick up the MMs on our way out. We'll contact you when we start opening the valve."**		
	BOP	Reports containment Hydrogen level at 0%.
	SRO	Directs restart of RBCCW and Drywell Coolers.
	ATC/BOP	Verify Drywell temperature is < 260ºF, then Restart RBCCW pumps and Drywell Coolers per QCOP 5750-19, Hard Card.
	SRO	Monitors containment temperatures and pressures and establishes critical parameters for Torus pressure and Drywell temperature.
Events 7/8/9 Continued		

Quad Cities	2020 NRC Scenario No.4	Event No. 7/8/9	Page 4 of 4
Event Description: MSL Break Inside Drywell – Electric ATWS – PSP Blowdown			

Time	Position	Applicant's Actions or Behavior
SIM OP ROLE PLAY: The crew may attempt to contact personnel at MCC 19-4 or at the RHR 26B valve for a progress report. In either case, report efforts are continuing, but unsuccessful thus far.		
	SRO	Determines Torus pressure will not stay below the PSP curve and enters QGA 500-1.
	SRO	Verifies all rods are in.
	SRO	Verifies Drywell pressure > 2.5 psig.
	SRO	Directs BOP to prevent LPCI and Core Spray injection to the RPV.
	SRO	Verifies Torus level is above 5 ft.
CT2	SRO	Directs all 5 ADS Valves opened and switches left in Manual.
CT2	BOP	Opens all 5 ADS Valves and leaves switches in the MAN position.
	BOP	Confirms and reports 5 ADS valves are open by acoustic monitor indication on the 901-21 panel.
	ATC/BOP	Monitor RPV depressurization and water level.
	BOP	Prevents ECCS injection by placing RHR/Core Spray pumps in PTL as necessary when RPV pressure approaches 325 psig.
	ATC	Reports RPV pressure < 325 psig and lowering.
	ATC	Reports RPV water level stable in 0 to 48 in. band.
SIMOP NOTE: When Blowdown has been performed and RPV water level is stable and in band with concurrence of the Lead Examiner, place the simulator in **FREEZE.**		
End of Scenario.		

END OF SCENARIO