Exelon Nuclear

2019-301 ILT NRC Exam Scenario

Scenario Number:

NRC Scenario 1

Revision Number: 00

Date: 05/28/2019

Developed by: _____ _____
Instructor Date

Validated by: _____ _____
SME or Instructor Date

Reviewed by: _____ _____
Operations Facility Representative Date

Approved by: _____ _____
Training Department Date

Facility: Quad Cities Scenario: **2019-301 NRC Scenario 1** Op-Test No.: ILT 19-301
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions:
The plant is operating at 80% power with Drywell Spray Valve 23A is inoperable, Day 2 of a 7-Day of TLCO 3.6.a Condition a. 2A SW Pump and 1B EHC Pump are OOS.

Turnover: Start the third RFP. Return to full power.

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	Start a third Reactor Feed Pump IAW QOP 3200-03
2	None	ATC R	Normal Power up IAW REMA
3	RM05B	SRO TS	"B" Drywell Rad Monitor Upscale Failure **TS**
4	ED08Q	SRO TS	MCC 30 Feed Breaker trip on overcurrent **TS**
5	MC08	ATC C	Loss of Main Turbine Vacuum/ Emergency Power Reduction
6	RR10A	BOP C	Slow Recirc Leak resulting in a Scram
7	RR10A	Crew M	High Drywell Pressure results in entry into QGA 100 and 200.
8	HP11	BOP C	HPCI fails to initiate automatically. BOP must start HPCI manually.
9	DIHS11001S17B	Crew M	Div 2 Drywell Spray valves fail to open, Emergency Depressurization per QGA 500-1 when PSP exceeded
10		Crew M	Reference leg flashing results in entry into QGA 500-4

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

ES-301-4 Quantitative attributes:
Total Malfunctions (5-8): **7**
Malfunction(s) after EOP (1-2): **E8, 9**
Abnormal Events (2-4): **E5, 6**
Major Transient(s) /E-Plan entry (1-2): **E7**
EOPs (1-2): **QGA 100, 200**
EOP Contingencies (0-2): **QGA 500-1, 500-4**
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, E8**
ATC I/C (4 per set): **E5**
SRO-I I/C (4 per set inc 2 as ATC): **E5, 6, 8**
SRO Tech Spec (2 per set): **E3, 4**
ALL Major Transients (2 per set) **E6**

SUMMARY:

- Initial Conditions:

  Drywell Spray Valve 23A is inoperable, Day 2 of a 7-Day LCO

  2A SW Pump is OOS

  1B EHC Pump is OOS

- Event 1: The BOP will start a third Reactor Feed Pump IAW QOP 3200-03.
- Event 2: Raise Reactor Power using REMA.
- Event 3: "B" Drywell Rad Monitor Upscale Failure (TS). The BOP and SRO respond per QCAN 901-56 A-1 and Technical Specifications 3.3.3.1 Condition A and 3.3.6.1 Condition A.
- Event 4: MCC 30 Feed Breaker trips. Report from EO is that the breaker tripped on overcurrent. SRO enters TS 3.7.9.A.
- Event 5: An air leak will result in lowering Main Condenser Vacuum. The crew performs QOA 3300-02 and Emergency Power Reduction. Prompt action by Equipment Operators to re-fill a loop seal line will stabilize Main Condenser Vacuum.
- Event 6: A Recirc leak will develop in the Drywell causing Drywell Pressure to rise resulting in BOP performing actions of QCOA 201-01. Drywell pressure will stabilize when the 7th drywell cooler is started
- Event 7: Recirc Leak will become larger causing drywell pressure to rise at a greater rate. When Drywell Pressure reaches scram criteria, ATC will SCRAM the Reactor. All three Reactor Feed Pumps will trip when the Scram has been inserted. SRO will enter QGA 100 and 200.
- Event 8: HPCI will fail to start automatically at 2.5# drywell pressure. BOP must start HPCI manually IAW QCOP 2300-06.
- Event 9: When Division 2 Containment Spray valves cannot be opened, the crew must Blowdown per QGA 200 and 500-1, in order to avoid exceeding Pressure Suppression Pressure (PSP).
- After Blowdown has commenced, the drywell will reach saturation conditions. The SRO will enter QGA 500-4 and flood the RPV to the Main Steam Lines.
- Approximate Run Time: 1.5 Hours

CRITICAL TASKS:

Critical Task #1 When Drywell temperature CANNOT be maintained < 280 F OR Torus pressure CANNOT be maintained < the Pressure Suppression Pressure Limit, (PSP), INITIATE an Emergency Depressurization..

Critical Task #2: When RPV Level cannot be determined, flood the RPV to the elevation of the Main Steam Lines.

EXERCISE PERFORMANCE OBJECTIVES

SR-3200-K16	STATE the physical location and DESCRIBE the operation of the following Condensate/Feedwater System controls (local/remote): g. RFP control switches h. RFP selector switch i. RFP motor vent fan control switches l. Motor/air operated valve control switches (7) RFP discharge valves (MO 3201A/B/C) (8) RFP recirc valves (AO 3201A/B/C)
SR-0002-P05	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 2300-P01	Given a reactor plant in an accident condition where HPCI fails to autostart and/or fails to start with auto pushbutton, manually start HPCI for injection in accordance with QCOP 2300-06
SR-0001-P45	Given a reactor plant in a QGA condition, verify the proper actuation of containment isolations and ECCS and emergency DG starts in accordance with QGA 100 or QGA 101.
SR-1000-P02	Given a reactor plant in an accident condition (QGA), operate torus sprays in accordance with QCOP 1000-30 and appropriate QGA.
SR-3300-P09	Given a reactor plant at power with a loss of condenser vacuum, take action to attempt to locate and correct the cause for lowering vacuum in accordance with QOA 3300-02 and/or QOA 5450-05.
SR-0001-P23	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 280 degrees in accordance with QGA 200 and QGA 500-1.

Simulator Setup:

1. Reset to IC-20 (75% power).
2. Go to **RUN.**
3. Raise Recirc master controller speed until approximately 80% Rx Power
4. Place the Condensate Pump Selector Switch in OFF and Start the 1D Condensate Pump.
5. On DFWLC OWS, Place Recirc Runback Bypass to “activate”
6. Place 2A SW Pump in PTL
7. Place 1B EHC Pump in PTL
8. Verify the following RWM Sequence is loaded: **6PESU2 (or current shut down sequence)**
9. Place INFO cards as follows:
    a. 2A SW Pump
    b. 1B EHC Pump
    c. 1-1001-23a Valve
    d. 1-1001-26a Valve

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

10. Insert Commands for setup:
    - **Rack out Bkr for RHR 23A Valve**
        - **irf RH19AR open**
    - **Rack out Bkr for RHR 26A Valve**
        - **irf RH20AR open**
    - **'B' RPS Fails to Auto Trip**
        - **imf RP02B**
        - **imf RP02D**
    - **Failure of HPCI to Auto Initiate**
        - **imf HP11**
    - **Failure of RHR S17 Switch 'B' Loop**
        - **ior DIHS11001S17B off**
    - **Trip Feed Pumps on Trigger 2**
        - **imf fw01a (2)**
        - **imf fw01b (2)**
        - **imf fw01c (2)**

11. Verify the following commands for scenario performance**:**
    - 'A' DW Rad Monitor Fail High **(imf rm05a 100 :05)**
    - MCC 30 Trips **(imf ed08Q)**
    - Main Condenser Air Leak **(imf mc08 30 8:)**
    - Delete Main Condenser Air Leak **(dmf mc08)**
    - Recirc Suction Leak **(imf rr10a .01 15:)**
    - Increase Recirct Suction Leak **(mmf rr10a .5 15:)**
    - Trip 1A EHC Pump **(imf tc05a)**
    - Open Breakers for 23B and 26B valves **(irf rh19br open) (irf rh20br open)**
    - Increase Recirct Suction Leak after blowdown starts **(mmf rr10a 5 2:)**
    - Reference Leg Flashing **(bat seqflash5then6)**

Simulator Setup continued:

12. Install “Protected System” placards and/or rings on the following equipment:

- RBCCW pumps
- Fuel Pool Cooling Water pumps
- 1A EHC Pump

13. Provide the following paperwork:

- QCGP 3-1 signed off for raising power.
- QCOP 3200-03 signed off ready to start the 1C RFP on Bus 11.
- QCOP 0600-21, all steps N/A except F.13
- REMA

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

LIST OF POTENTIAL PROCEDURES

Annunciator Procedures

- 901(2)-3 A-16, Rev 016, PRIMARY CONTAINMENT HIGH PRESSURE
- 901(2)-3 D-2, Rev 016, HIGH RADIATION AT SJAE OUTLET 901-5 C-3 ROD OUT BLOCK
- 901(2)-5 A-8, Rev 014, GROUP 2 ISOL CH TRIP
- 901(2)-5 D-11, Rev 013, HIGH DRYWELL PRESSURE
- 901(2)-5 F-5, Rev 008, CONDENSER VACUUM LO
- 901(2)-7 H-3, Rev 009, CONDENSER LO VACUUM 24 IN HG
- 901-55 A-1, Rev 11 DRYWELL HIGH HIGH RAD CONC
- 912-8 A-8, Rev 005, SAFE SHUTDOWN MAKEUP PUMP SYSTEM TROUBLE

QCAP 0200-10, Emergency Operating Procedure (QGA) Execution Standards, Rev 56

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

QCOA 0201-01, Increasing Drywell Pressure, Rev 30

QCOP 0202-13, Reactor Recirculation Flow Control Line Determination, Rev 21

QCOP 0203-01, Reactor Pressure Control Using Manual relief Valve Actuation, Rev 17

QCOP 0600-21, Operation of the Feedwater Level Control System, Rev 21

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

QCOP 2300-06, HPCI System Manual Startup, Rev 36

QCOP 5750-19, Drywell Cooler Operation, Rev 11

QOP 3200-03, Start Up of the Second and Third Reactor Feed Pump, rev 51

QCGP 3-1, Reactor Power Operations, Rev 87

QGA 100, RPV Control, Rev 12

QGA 200, Primary Containment Control, Rev 12

QGA 500-1, RPV Blowdown, Rev 16

QGA 500-4, RPV Flooding, Rev 15

CREW TURNOVER

1.) Plant Conditions:

a.) Unit 1 is operating at 80% power due to rod pattern adjustment.

b.) Unit 2 is at 100% power.

c.) Technical Specification limitations:

1. Drywell Spray Valve MO 1-1001-23A is inoperable resulting in a 7 Day LCO per TLCO 3.6.a Condition A. On Day 2 of 7.

d.) On Line Risk is GREEN

e.) Fire Risk is GREEN

f.) Protected Equipment:

(1) RBCCW
(2) Fuel Pool Cooling
(3) 1A EHC Pump

2.) Significant problems/abnormalities:

a.) 2A SW Pump is OOS for motor bearing replacement.

b.) MO 1-1001-23A is OOS for valve stem replacement. MO 1-1001-26A valve is OOS as a boundary.

c.) 1B EHC Pump is OOS breaker inspection.

3.) Evolutions/maintenance for the oncoming shift:

a.) Start the 'C' RFP per QCOP 3200-03

b.) Return to 100% Power per QCGP 3-1 and REMA

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Event Description: Start a third Reactor Feed Pump IAW QOP 3200-03

Time	Position	Applicant's Actions or Behavior
	SRO	Directs BOP to start the 1C RFP on Bus 11 per QOP 3200-03.
	BOP	Places RFP Selector Switch to OFF
	BOP	Directs EO to perform step F.14 to prepare 1C RFP to be started.
SIMOP ROLE PLAY: After 2 minutes, as EO call the control room and report that step F.14 of QOP 3200-03 is complete and all personnel are clear of the U1 RFP room.		
	BOP	Closes the RFP Discharge Valve, MO 1-3201C.
	BOP	Opens the RFP Recirc Valve, AO 1-3201C. Informs US of expected 901-6 G-9 alarm when 1C RFP Recirc valve is open.
	BOP	Starts the 1C RFP from Bus 11.
	BOP	Verifies that the Auxiliary oil pump auto trips when the RFP starts and oil pressure builds.
	BOP	When flow stabilizes, returns the RFP Recirc Valve, AO 1-3201C to AUTO.
	BOP	Verifies the RFP Recirc Valve closes.
	BOP	Directs the in-plant operator to perform the post-start verifications per QOP 3200-03 Step F.25.
SIMOP ROLE PLAY: After 3 minutes, as EO call the control room and report QOP 3200-03 step F.25 is complete.		
	BOP	Directs EO to verify RFP warming line valves are open per QOP 3200-03 step F.28.
SIMOP ROLE PLAY: After 2 minutes, as EO call the control room and report QOP 3200-03 step F.28 is complete.		
	BOP	Enables 70% Reactor Recirc runback logic per QCOP 0600-21.
	BOP	Checks flow control line on power to flow graph (QCOP 0202-13).
End of Event 1		

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Event Description: Raise Reactor Power Using REMA

Time	Position	Applicant's Actions or Behavior
SIM OP: At the discretion of the lead examiner, contact the Control Room as the SOS and request to know the status of the power ascension. **Lead Examiner:** If QNE is requested to come to the control room, indicate the QNE is in the control room and is monitoring the power change.		
	SRO	Directs ATC operator to begin power ascension.
	SRO	Provides SRO oversight for reactor power increase using recirc flow.
	SRO	Verifies compliance with the approved ReMA.
	SRO	Directs RO to perform load increase IAW QCGP 3-1 step F.3.e.
	CREW	Announces the power change to the control room.
	ATC	Monitors plant response and verifies in compliance with REMA.
	ATC	Depresses RAISE pushbutton on 1-0262-22, MASTER SPEED DEMAND.
	ATC	Verifies "B" Recirc loop flow is $\leq$ 52.92 Mib/hr.
	ATC	Closely monitors power increase on APRMs.
	ATC	Monitors Flow Control Line.
	BOP	Maintains Load set a minimum of 10% above Main Generator load.
	BOP	Monitors Drywell Pressure and adjusts PIC 1-1640-11 as required.
	BOP	Monitors A/B Moisture Separator Drain Tank and D1/2/3 Feedwater Heater levels during the load increase.
	BOP	Provides peer check as requested for power changes.
End of Event 2		

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Event Description: Drywell Rad Monitor Failure			
Time	**Position**	**Applicant's Actions or Behavior**	
SIMOP: When directed by the Lead examiner, start the Drywell Rad Monitor Failure event (expert command: **imf rm05a 100 5:**)			
Key Parameter Response: 1-2419A Drywell Radiation Monitor indicating full upscale Expected Annunciator(s): 901-5 A-8, GROUP 2 ISOL CH TRIP 901-55 A-1, DRYWELL HIGH HIGH RAD CONC Automatic Actions: Rod Block ½ Group 2 Isolation			
	BOP	Acknowledges annunciator 901-55 A-1, DRYWELL HIGH HIGH RAD CONC and reports the 1-2419A Drywell radiation monitor is indicating full upscale.	
	ATC	Acknowledges annunciator 901-5 A-8, GROUP 2 ISOL CH TRIP and refers to annunciator procedure.	
	SRO	Confirms the 1-2419B Drywell radiation monitor is indicating normally (approximately 3-4 R/hr).	
EVALUATOR ROLE PLAY: If the BOP goes to confirm the PCI Relays have dropped out: CUE the following on Panel 901-15 **Relay 595-104A dropped out** **Relay 595-104C dropped out**			
	BOP	Informs RP of the failed Drywell radiation monitor.	
SIMOP ROLE PLAY: As RP, inform the Control Room that you will: **"Implement compensatory actions for the Drywell Radiation Monitor."** As IMD, if informed of the failed DW radiation monitor, state you will: **"Start a work package."**			
	SRO	Enters the following Technical Specifications for an inoperable Drywell Radiation monitor: • PCI 3.3.6.1, Condition A, Place the Channel in Trip Within 24 Hours • PAM 3.3.3.1, Condition A, Restore Required Channel to Operable Status Within 30 Days	
End of Event 3			

Quad Cities 2019-301 NRC Scenario No.1 Event No. 4 Page 1 of 1 Event Description: MCC 30 Feed Breaker trip on overcurrent		
Time	**Position**	**Applicant's Actions or Behavior**
SIM OP: At the Lead Evaluators discretion, trip the MCC 30 Feed Breaker: **imf ed08q**		
Key Parameter Response: MCC 30 Feed Breaker Trip. Expected Annunciator(s): 912-8 A-8 Automatic Actions: None		
	BOP	Acknowledges annunciator 912-8 A-8, Safe Shutdown Makeup Pump System Trouble, and reports that the MCC 30 Feed Breaker has tripped.
	SRO	Directs actions per QCAN 912-8 A-8
	BOP	Determines alarm is due to a valid breaker trip.
	BOP	Directs an EO to verify breaker trip flag at 4160V Bus 31
SIM OP NOTE: As EO sent to SSMP Room, wait 5 minutes and report to the Control Room that the MCC 30 Feed Breaker at Bus 30 has an overcurrent flag up.		
	BOP	Contacts Electrical Maintenance for assistance.
	ATC	Continuously monitors RPV power, pressure, and water level.
	SRO	References Tech Specs.
	SRO	Enters T.S. 3.7.9.A, Restore SSMP system to OPERABLE status within 14 Days.
SIM OP ROLE PLAY: If contacted, as Electrical Supervisor, state that you will: **"Prepare a troubleshooting package and dispatch a crew to investigate the MCC 30 Feed Breaker."**		
End of Event 4		

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Event Description: Loss of Main Condenser vacuum (Emergency Power Reduction)

Time	Position	Applicant's Actions or Behavior
SIM OP: When directed by the Lead Examiner, initiate a 100% loss of Main Condenser vacuum ramped over 25 minutes using malfunction MC08: **imf mc08 100 25:**		
Key Parameter Response: Main Condenser backpressure rising on PR 1-5640-79; Generator MW(e) lowering, Off gas flow to Main Chimney rising on FI 1-5440-7. Expected Annunciator(s): 901-3 D-2, OFF GAS HI RADIATION 901-7 H-3, CONDENSER LO VACUUM 24 IN HG 901-5 F-5, CONDENSER VACUUM LO 901-54 C-7, NORMAL PROCESS FLOW HI/LO Automatic Actions: Reactor Scram and Turbine trip		
	BOP	Acknowledges 901-3 D-2 alarm and refers to the QCAN.
	SRO	Directs that reactor power be held constant until the cause of the high radiation is determined.
	BOP	Monitors SJAE and Main Steam Line radiation levels.
	ATC/BOP	Report Off Gas Flow as indicated on FI 1-5440-7, OFF GAS FLOW TO MN CHIMNEY, is rising.
	ATC/BOP	Report Main Condenser backpressure rising.
	SRO	Enters and directs actions of QOA 3300-02, Loss of Condenser Vacuum.
	SRO	Directs an Emergency Power Reduction to control Condenser backpressure < 6 in. Hg.
	ATC	Reduces Recirc Pump speed(s) using the Master/Individual Controllers OR the Manual Runback pushbuttons.
	ATC	Inserts CRAM rods to maintain FCL within the MELLLA boundary.
	BOP	Dispatches EO's to verify Condenser vacuum breaker water seal is intact and loop seal are full.
	SRO	Sets scram criteria at 7.5 in Hg.
	BOP	Verifies Off-Gas and SJAE suction valves are open.
	BOP	Verifies Circulating Water System is operating normally.
	BOP	Verifies Main Condenser Hotwell level is normal.
Event 5 continued		

Quad Cities 2019-301 NRC Scenario No.1 Event No. 5 Page 2 of 2 Event Description: Loss of Main Condenser vacuum (Emergency Power Reduction)		
Time	**Position**	**Applicant's Actions or Behavior**
	BOP	Acknowledges and reports annunciator 901-7 H-3, CONDENSER LO VACUUM 24 IN. HG, is in alarm.
	BOP	Notifies Chemistry that Condenser vacuum has been lost and to align Unit 1 Reactor Building Sample Panel drains per CY-QC-110-608.
SIMOP ROLE PLAY: If contacted as Chemistry, state you will review CY-QC-110-608.		
SIMOP ROLE PLAY: When Emergency Power Reduction has been performed to the satisfaction of the Lead Examiner, AND If an EO/FS has been dispatched, then delete the in-leakage malfunction at 4 inches backpressure: **dmf mc08** AND As EO/FS report that "the Main Condenser Loop Seals have been re-filled."		
	BOP	Confirms that Condenser Backpressure is returning to normal.
	SRO	Directs the suspension of Emergency Power Reduction.
	ATC	Holds Recirc Flow as directed.
	SRO	Contacts Power Team and informs them of current power level and contacts QNE for assistance in determining thermal limits and recovery actions for control rods.
SIMOP ROLE PLAY: Acknowledge reports from the Unit Supervisor.		
End of Event 5		

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Event Description: Slow Recirc Leak		

Time	Position	Applicant's Actions or Behavior
SIM OP: When directed by the Lead Examiner, slow recirc leak of **lmf rr10a .01 15:**		
Key Parameter Response: Drywell Pressure rising, 901-3 A-16 annunciator. Expected Annunciator(s): 901-3 A-16 PRIMARY CONTAINMENT HIGH PRESSURE 901-5 D-11 PRIMARY CNMT HIGH PRESS Automatic Actions: None		
	BOP/ATC	Informs the US that alarm 901-3 A-16 is in and reports DW pressure value and trend.
	SRO	May set Scram Criteria of 2 psig.
	SRO	Directs BOP to take actions per QCOA 0201-01.
	BOP	Enters and performs QCOA 0201-01.
	BOP	Investigate cause of increasing Drywell Pressure
	ATC/BOP	Notify RP of elevated containment pressure.
	ATC/BOP	Consider evacuating the RB
	BOP	Start 7th Drywell cooler.
	BOP	Reports 7th Drywell cooler started.
	ATC	Verifies there is not a failure of the Recirc Pump Seals
	SRO	Notify Shift Manager to classify the event as a possible E-plan condition.
	SRO	May order the ATC to scram prior to 2.0 psig in the drywell based off trend of drywell pressure.
	ATC/BOP	After 7th Drywell cooler is started, reports that drywell pressure has stabilized at approximately 1.5 psig.
End of Event 6		

Quad Cities 2019-301 NRC Scenario No.1 Event No. 7/8 Page 1 of 4 Event Description: Recirc Leak/HPCI Auto failure		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Drywell Pressure Rising Expected Annunciator(s): 901-3 A-16 PRIMARY CONTAINMENT HIGH PRESSURE 901-5 D-11 PRIMARY CNMT HIGH PRESS Automatic Actions: (Not a complete list) Group 2, 3 Isolation, CR and RB Vents isolate, SBGTS starts, ECCS systems initiate, EDGs start (HPCI will not Auto Start)		
SIMOP: When directed by the Lead Evaluator, modify recirc leak with the following malfunction: **mmf rr10a .5 15:**		
	BOP/ATC	Reports that drywell pressure is rising at a greater rate.
	SRO	Orders ATC to manually scram at 2.0 psig Drywell Pressure.
	ATC	Depresses both manual scram pushbuttons.
SIMOP: After the scram, trip the 1A EHC Pump: **lmf tc05a**		
	SRO	Enters QGA 100, RPV Control and QGA 200, Primary Containment Control, on 2.5 psig DW pressure
	SRO	Directs ATC/BOP to verify 0 ″and 2.5 psig isolations and auto-starts
	ATC	Gives Scram Report, reports to the SRO that all Reactor Feed Pumps have tripped.
	SRO	Orders BOP to start RCIC and to maintain RWL 0"- +48"
	SRO	Orders pressure band of 800-1000# using ADS
	BOP	Starts RCIC
	BOP	Reports that HPCI failed to autostart.
	BOP	Directs EO to investigate the cause of Reactor Feed Pump Trips and HPCI failing to Start.
Events 7/8 continued		

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Event Description: Recirc Leak/HPCI Auto failure			
Time	**Position**	**Applicant's Actions or Behavior**	
SIM OP ROLE PLAY: As the EO sent to investigate Reactor Feed Pump Trips, wait 5 minutes and report: **"All three Reactor Feed Pump Breakers have overcurrent flags up, Electrical Maintenance has been contacted."** As the EO sent to investigate HPCI, wait 3 minutes and report: **"There is no apparent cause to why HPCI did not automatically start, Instrument Maintenance is on the scene investigating."**			
	ATC	Reports that RWL is dropping.	
	SRO	Directs BOP to start HPCI manually.	
	BOP	Starts HPCI manually per QCOP 2300-06	
	BOP/ATC	Coordinates with HPCI and RCIC to bring RWL to 0"- +48"	
	ATC/BOP	Verifies Diesels auto started	
	BOP	As directed, verifies 1A and 1B CAMs operating	
	SRO	May direct actions to start all available drywell cooling	
	ATC/BOP	As directed, restores RBCCW and DW coolers per QCOP 5750-19	
		Verifies Bus 18 and 19 voltage >450 volts	
		Takes the U1 DIV I DW CLR/RBCCW/FPC TRIP BYPASS switch to BYPASS position	
		Takes the U1 DIV II DW CLR/RBCCW/FPC TRIP BYPASS switch to BYPASS position	
		Checks Drywell temperature is less than 260 °F	
		Starts 1A and 1B RBCCW pump	
		Starts drywell coolers one at a time	
Events 7/8 Continued			

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Event Description: Recirc Leak/HPCI Auto failure

Time	Position	Applicant's Actions or Behavior
		Starts Drywell Booster Fan
	SRO	Verifies Torus level <27 ft.
	SRO	Before Torus Pressure reaches 5 psig, directs BOP to place Torus Sprays on IAW QCOP 1000-30
	BOP	Maintains the following during Post-Accident RHR Operation: • RHR Service Water Pressure 15-20 psig > RHR Pressure • RHR Service Water flow <3600 gpm/pump • RHR Pressure 100-250 psig
	BOP	Prepares RHR for Operation
		Verifies RHR Pumps running
		Places LOOP A/B CONTAINMENT COOLING PERMISSIVE Switch 17 to ON
		Places LOOP A/B RHR SW START PERMISSIVE Switch 19 to MANUAL OVERRIDE
	BOP	Starts RHR Service Water
		Opens MO 1-1001-5A/B to approximately 40%
		Starts A/B RHR SW Pump
		Throttles MO 1-1001-5A/B as necessary
		Throttles MO 1-1001-16A/B as necessary
	BOP	As directed, initiates Torus Sprays per QCOP 1000-30
		Opens MO 1-1001-34A
		Opens MO 1-1001-37A
	BOP	Opens/Throttles MO 1-1001-36A as necessary to maintain RHR Discharge Pressure
	SRO	Directs BOP to secure Torus Sprays before Torus Pressure drops to 0 psig
	SRO	If Torus water temperature cannot be held <95°F, directs start of all available Torus Cooling

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Event Description: Recirc Leak/HPCI Auto failure

Time	Position	Applicant's Actions or Behavior
	BOP	As directed, initiates Torus Cooling per QCOP 1000-30
		Opens MO 1-1001-34A/B
		Opens/Throttles MO 1-1001-36A/B as necessary to maintain RHR Discharge Pressure
SIMOP: If PSP Blowdown conditions will not be met and when directed by Lead Examiner, modify the leak to 2%. **mmf rr10a 2**		
	BOP	Reports Torus pressure >5 psig.
	SRO	Verifies Torus level <17 ft.
	SRO	Verifies inside DW Spray Limit Curve
	SRO	Verifies Recirc pumps and DW Coolers are tripped
	SRO	Directs BOP to start DW Sprays
	BOP	As directed, attempts to initiate Drywell Sprays per QCOP 1000-30
		Attempts to open MO 1-1001-23B
		Attempts to open MO 1-1001-26B
	BOP	Recognizes and reports that the B Loop Drywell Sprays will not open
	SRO/BOP	Directs EO investigate 23B & 26B valve breaker and locally open the Containment spray valve(s)
SIMOP ROLE PLAY: If requested to locally operate the B Drywell Spray valves, **wait 2 minutes** and then open the breakers for MO 1-1001-23B and 26B: **irf rh19br open** and **irf rh20br open** **Wait an additional 5 minutes** and report that MO 1-1001-23B and 26B cannot be opened.		
SIMOP ROLE PLAY: If dispatched to manually open the MO 1-1001-34B and 36B valves, wait 5 minutes then open the breakers using: **irf rh23br open** and **irf rh24br open** respectively. **DO NOT OPEN THE VALVES.** Report back as necessary that they are "stuck" OR "the declutch lever is broken and you are getting maintenance to assist."		
End of Events 7/8		

Quad Cities 2019-301 NRC Scenario No.1 Event No. 9 Page 1 of 1

Event Description: Emergency Depressurization per QGA 500-1 when PSP exceeded

Time	Position	Applicant's Actions or Behavior
	SRO	Enters QGA 500-1 to blowdown the vessel when it is determined drywell temperature cannot be restored below 280ºF or torus pressure cannot be maintained within PSP limits
	Crew	Recognizes that the MSIVs have closed and may begin investigation
CT1	SRO	Directs actions of QGA 500-1
	ATC/BOP	Prevent injection from Core Spray and LPCI not needed for Core Cooling by diverting LPCI flow to Torus cooling and/or placing pumps in PTL
	ATC	Maintains Rx water level with RCIC/HPCI
	SRO	Verifies torus level > 5 feet
CT1	ATC/BOP	Opens all ADS valves, leaves switches in MAN IAW QCOP 0203-01, Manual Relief Valve Actuation, using hard card
SIMOP ROLEPLAY: When all 5 ADS Valves are open, increase size of leak: **mmf rr10a 5 2:**		
	ATC/BOP	Reports to the SRO Drywell Pressure and Temperature.
End of Event 9		

Quad Cities 201-301 NRC Scenario No.1 Event No. 10 Page 1 of 1

Event Description: QGA 500-04

Time	Position	Applicant's Actions or Behavior
SIMOP ROLEPLAY: When Saturation Conditions are met, simulate instrument leg flashing using batch file flashing: **bat seqflash5then6**		
	SRO	Determines the Drywell is in saturation conditions.
	SRO	Determines that RPV level is unknown and exits QGA 100 and 500-1, then enters QGA 500-4
	SRO	Verifies Torus level above 5 feet.
	SRO	Verifies all 5 ADS valve switches in MAN
	SRO	ATC/BOP reports RPV pressure <75 psi above Torus pressure.
CT2	SRO	Orders RPV flooded to the Main Steam Lines using systems listed in QGA 500-4 and briefs on plant indications to be monitored per QCAP 0200-10.
CT2	ATC/BOP	Confirms RPV flooded to MSL's per criteria of QAP 0200-10
	SRO	Directs BOP/ATC to isolate MSL's, MSL Drains, RCIC, HPCI.
	ATC/BOP	Isolates MSL's, MSL Drains, RCIC, HPCI.
LEAD EVALUATOR: At the discretion of the Lead Evaluator, Freeze the simulator.		
END OF SCENARIO		

END OF SCENARIO

Exelon Nuclear

2019-301 ILT NRC Exam Scenario

Scenario Number:

NRC Scenario 2

Revision Number: 00

Date: 05/28/2019

Developed by: _____ _____
Instructor Date

Validated by: _____ _____
SME or Instructor Date

Reviewed by: _____ _____
Operations Facility Representative Date

Approved by: _____ _____
Training Department Date

Appendix D **Scenario Outline** **Form ES-D-1**

Facility: Quad Cities Scenario No. **2019-301 NRC Scenario 2** Op-Test No. ILT 19-301
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions:
A normal plant shutdown is in progress currently at 75% power.

Turnover: Reduce Recirc Flow to Lower Reactor power.

Event No.	Malf. No.	Event Type*	Event Description
1	None	ATC R	Reduce Recirc Flow to Lower Reactor power.
2	SER1494 AOTI324087	ATC C	Feed Pump Vent Fan degraded.
3	FW01A FW02	ATC C	1A RFP trips with the standby RFP failing to auto-start. ATC will start the 1C RFP per QCOA 3200-01
4	AD01D AD07D	BOP C	Stuck open relief valve (QCOA 0203-01) and Reactor Scram
5	RD13A	Crew M	Hydraulic ATWS. Crew Takes actions per QGA 101 to control reactor power, level and pressure.
6	RD27C	ATC C	Running CRD pump trips. ATC takes actions to start standby CRD pump

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

ES-301-4 Quantitative attributes:
Total Malfunctions (5-8): **5**
Malfunction(s) after EOP (1-2): **E6**
Abnormal Events (2-4): **E2, 3, 4**
Major Transient(s) /E-Plan entry (1-2): **E5**
EOPs (1-2): **QGA 100**
EOP Contingencies (0-2): **QGA 101**
Critical Tasks (2-3): **3**

ES-301-5 Quantitative attributes:
BOP Normal:
ATC Reactivity (1 per set): **E1**
BOP I/C (4 per set): **E4**
ATC I/C (4 per set): **E2, 3, 6**
SRO-I I/C (4 per set inc 2 as ATC): **E2, 3, 4, 6**
SRO Tech Spec (2 per set):
ALL Major Transients (2 per set) **E5**

SUMMARY:

- Initial Conditions:
  - The plant is operating at 75%.
  - Relief valve 3D Tailpipe Temperature is elevated and rising 1°F/Day.
- Event 1: The SRO and ATC reduce Recirc Flow to Lower Reactor power.
- Event 2: A Reactor Feed Pump vent fan will become degraded, requiring a shift to the alternate fan after receiving high temp alarms.
- Event 3. 1A RFP trips with a failure of 1C RFP auto-starting. ATC will take actions per QCOA 3200-01 to start the 1C RFP and perform Emergency Power Reduction if necessary to maintain RWL.
- Event 4: The D Relief Valve will actuate and stick open. The crew responds per QCOA 0203-01 and scram the reactor prior to exceeding 95°F Torus Water Temperature. The Relief valve will close after the ATWS.
- Event 5: When the ATC inserts a manual scram no control rods will insert. The crew will recognize they are in a hydraulic ATWS and enter QGA 100, “RPV Control” and then they will rapidly transition to QGA 101 “RPV Control (ATWS)”. The crew will attempt to insert control rods per QCOP 0300-28, but they will have little success beyond driving individual driving rods. The SRO will enter the Level/Power Control section of QGA 101 and lower reactor level to control reactor power.
- Event 6: After entry into QGA 101, the running CRD pump will trip. ATC will take actions per QCOA 0300-01 to start the standby CRD pump.
- Approximate Run Time: 1 Hour

CRITICAL TASKS:

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

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

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

SR-0002-P04	Given a reactor plant at power, perform a power change discernible on neutron monitors using control rods in accordance with QCOP 0280-01, QCGP 3-1 and QCGP 4-1.
SR-0002-P05	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-0203-P02	Given an operating plant with a stuck open relief valve, take actions to attempt to close the valve in accordance with QCOA 0203-01.
SR-0001-P11	(Freq: LIC=B) Given a reactor plant with an ATWS, take action to reduce heat input into 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-P12	(Freq; LIC=B) 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-P13	(Freq: LIC=B) Given a reactor plant with an ATWS and conditions are met to re-establish RPV injection during power/level control, use Preferred ATWS Systems (QGA Detail G) to attempt to maintain RPV water level between MSCRWL (Minimum Steam Cooling Reactor Water Level) and the level to where it was lowered in accordance with QGA 101.
SR-0001-P45	Given a reactor plant in a QGA condition, verify the proper actuation of containment isolations and ECCS and emergency DG starts in accordance with QGA 100 or QGA 101.

Simulator Setup:

1. Reset to IC-20 (Approximately 75% power).
2. Go to **RUN.**
3. Verify the following RWM Sequence is loaded: **6PESU2 (or current shut down sequence)**

(The following commands to be utilized for this scenario are contained in the CAEP file: 2018 CERT Scenario 5.cae)

4. Insert Commands for setup:

- **Standby RFP Fails to Auto Start**
  - **imf fw02**
- **Hydraulic ATWS**
  - **imf rd13a 100**
  - **imf rd13b 100**
- **Override 'D' ADS Valve Switch**
  - **ior DIHS10287303D auto**
- **Stick 'D' ADS Valve at 100%**
  - **imf ad07d 100**

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

- **Feed Pump Vent Fan Degradation**
  - **ior aoti1324087 150 1:**
  - **imf ser1494 (none 1:) on**
- **Remove Vent Fan Degradation**
  - **ior aoti1324087 103 5:00**
  - **dmf ser1494**
- **'A' RFP Trip**
  - **imf fw01a**
- **'D' ADS Valve Setpoint Drift**
  - **imf ad01d 0 2:**
- **'D' ADS Valve Remove/Install Fuses**
  - **irf ad04r remove**
  - **irf ad04r norm**
- **After ATWS is recognized delete ADS Malf.**
  - **dor DIHS10287303D**
  - **dmf ad01d**
  - **dmf ad07d**
- **Trip 'A' CRD Pump**
  - **imf rd07a**
- **Close 1-301-25**
  - **irf rd04r close**
- **Install Jumpers**
  - **irf qg08r activate**
- **Pull ARI fuses**
  - **irf qg14r activate**
- **Open 1-301-25**
  - **irf rd04r open**

6. Take the following components Out of Service:
   a. None

7. Place “Protected Equipment” rings on the RBCCW pump C/S’s
8. Provide a current revision of the following procedures, signed off as specified:
   - Provide a copy of QCOS 0005-05 (INCREASED MONITORING SURVEILLANCE) for the D relief valve signed off through today’s shift
   - Provide a copy of QCGP 3-1 with Steps F.2.a. and F.2.b. signed off.
9. Provide a lowering power REMA signed off to be at 75% power.
10. Need to have blank EST available for use during the scenario.
11. Perform the applicable “Post Simulator Exam Security Actions” of TQ-QC-201-0113 “Simulator Exam Security Actions Checklist.

Annunciator Procedures

- 901-3 E-13 ELECT RELIEF VALVES 3C/3D/3E OPEN
- 901(2)-3 E-14, Rev 007, ACOUSTIC MON SAFETY RLF VALVES OPEN
- 901-3 E-16 VALVE LEAK DET SYS HIGH TEMP
- 901(2)-5 A-1, Rev 009, SCRAM VALVE AIR SUPPLY LOW PRESSURE
- 901(2)-5 B-4, Rev 009, GROUP 1 ISOL NOT RESET
- 901(2)-5 B-7, Rev 021, GROUP 1 ISOL CH TRIP
- 901(2)-6 E-9, Rev 011, REACTOR FEED PUMP VENTILATION EXHAUST AIR HIGH TEMP
- 901(2)-6 F-7, Rev 016, REACTOR FEED PUMP AUTO TRIP
- QOA 900-6 H-7, Rec 05, RFP 1A(2A) BRG OIL LOW PRESS

QCOA 0203-01, Failure of a Relief Valve to Close or Reseat Properly, Rev 13
QCOA 0300-01, Control Rod Drive Pump Failure, Rev 18
QCOA 3200-01, Reactor Feed Pump Auto Trip, Rev 23
QCOP 0250-02, Bypassing MSIV Group I Isolation Signal From Low Low Reactor Water Level, Rev 13
QCOP 0300-28, Alternate Control Rod Insertion, Rev 33
QCOP 1000-09, Torus Cooling Start Up and Operation, Rev 28
QCOP 1000-30, Post Accident RHR Operation, Rev 32
QCOP 5750-15, Reactor Feed Pump Motor Ventilation System, Rev 7
QCOS 0005-05, Increased Monitoring Surveillance, Rev 9
QCGP 2-3, Reactor Scram, rev 92
QCGP 3-1, Reactor Power Operations, Rev 87
QGA 100, RPV Control, Rev 12
QGA 101, RPV Control (ATWS), 16

1.) Plant Conditions:

a.) Unit 1 is at 75% Power.

b.) Unit 2 is at 100% Power.

c.) Technical Specification limitations:

(1) Unit 1: None

(2) Unit 2: None

d.) On Line Risk is GREEN.

e.) Protected Equipment:

- RBCCW
- Fuel Pool Cooling

.

2.) Significant problems/abnormalities:

a.) Relief valve 1-203-3D Tailpipe Temperature is elevated and rising 1°F/Day.

a. QCOS 0005-05, Increased Monitoring Surveillance, being performed once/shift to verify no unexpected torus temperature increase.

3.) Evolutions/maintenance for the oncoming shift:

a. Power reduction for an upcoming weekend outage to repair the 1-203-3D relief valve per QCGP 3-1, Step F.2.c. The Shift Manager will direct the power reduction.

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 1 Page 1 of 1

Event Description: Reduce Recirc Flow to Lower Reactor power.

Time	Position	Applicant's Actions or Behavior
SIMOP: When directed by the Lead Examiner, contact the Control Room as the Shift Manager and inform the US to lower power by 30 MWe using recircs. Inform the US that the SM will make all necessary notifications.		
Lead Examiner Role Play: Qualified Verifier (QV) as necessary		
	SRO	Provides SRO oversight for lowering reactor power using core flow
	ATC	Depresses LOWER pushbutton on Recirc MASTER SPEED DEMAND
	ATC	Verifies Reactor pressure (Comp Pt C109 or C109_FILT or PI 1-640-25A) in the acceptable region of the CORE Power vs. Reactor Pressure Curve (Att D)
	ATC	Closely monitors power decrease on APRMs
	ATC	Verifies POWERPLEX is operating and monitors outputs for peaking
	ATC	Verifies Reactor Recirc Pumps remain at approximately equal flows
	BOP	Provides peer check as requested for power changes
End of Event 1		

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 2 Page 1 of 2 Event Description: Feed Pump Vent Fan Degraded		
Time	**Position**	**Applicant's Actions or Behavior**
SIMOP: When directed by the Lead Evaluator, initiate this event as follows: **ior aoti1324087 150 1: imf ser1494 (none 1:) on** Ramps RFP Vent Temp to 150°F over one minute and provides a high temperature alarm .		
Key Parameter Response: RFP AIR EXHAUST TEMP indicator on 901-6 Expected Annunciator(s): 901-6 E-9 RFP VENT EXH AIR HIGH TEMP Automatic Actions: None		
	ATC	Responds to annunciator and informs the Unit Supervisor.
	SRO	Directs the actions of QCAN 901-6 E-9.
	ATC	Checks the RFP AIR EXHAUST TEMP indicator, TI 1-3240-87, on 901-6 (Reading upscale at 150°F to match the annunciator setpoint).
	ATC	Verifies the "A" Vent Fan is running.
	ATC	Dispatches an operator to investigate high temperature alarm.
	ATC/BOP	Monitors RFP motor winding temperatures with computer points.
SIMOP ROLE PLAY: As in-plant personnel dispatched to investigate: Wait 2 minutes and then report that the "A" RFP Vent Fan is very noisy and vibrating like a bearing has failed.		
	SRO	Directs or approves shifting to the "B" RFP Vent Fan.
	ATC	Starts the "B" RFP Vent Fan IAW QCOP 5750-15
	ATC	Places the "B" RFP Vent Fan control switch to START and verifies the discharge damper has opened.
SIMOP ROLE PLAY: As the EO dispatched to the RFP room, when asked about the position of the "B" RFP vent fan damper report the damper is open (QCOP 5750-15 step F.2.b).		
	ATC	Stops the "A" RFP Vent Fan and verifies its discharge damper has Closed. May place C/S in P-T-L and install an orange ring.
SIMOP ROLE PLAY: As the EO dispatched to the RFP room, when asked about the position of the "A" RFP vent fan damper report the damper is closed (QCOP 5750-15 step F.3.c.(2)).		
Event 2 Continued		

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 2 Page 2 of 2 Event Description: Feed Pump Vent Fan Degraded		
SIMOP: When the B Vent Fan has been started and the A Vent Fan has been secured, remove the failures as follows: **Modify Override ior aoti324087 103 05** to lower RFP air temp to 103 over 5 minutes then wait 1 minute and **delete malfunction dmf ser1494** to clear the high temp alarm.		
	BOP	Provides peer checks and monitors Balance of Plant parameters
	ATC	Reports RFP high Temp alarm cleared and monitors temperature until it returns to normal.
End of Event 2		

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 3 Page 1 of 1

Event Description: 1A RFP trip with failure of Standby Pump to auto-start.

Time	Position	Applicant's Actions or Behavior
SIMOP: At the Lead Evaluator's direction, trip the 1A Reactor Feed Pump using malfunction: **imf fw01a**		
Key Parameter Response: 1A RFP trips with failure of Standby Pump to auto-start. Expected Annunciator(s): 901-6 F-7, RFP AUTO TRIP 901-6 H-7, 1A RFP BRG OIL LOW PRESS Automatic Actions: None (Standby Pump auto-start is defeated)		
	ATC	Reports 1A RFP has tripped and Standby Pump has failed to auto-start.
	ATC	Manually starts the 1C RFP.
	SRO	Sets Scram criteria for ATC of RWL +11" lowering and +44" rising.
	SRO	Directs ATC to perform Emergency Power Reduction to maintain RWL.
	ATC	Performs Emergency Power Reduction to maintain RWL at +30 inches.
	ATC	Reports RPV water level is +30 inches and stable.
	SRO	Directs BOP/ATC to take actions per QCOA 3200-01, Reactor Feed Pump Auto Trip.
	ATC/BOP	May place the RFP Selector Switch to OFF
	ATC/BOP	Verifies proper operation of the Feed Water Reg Valves.
	ATC/BOP	Dispatches EO to Bus 11 to check for any red targets on the breaker compartment.
SIMOP: As the EO sent to Bus 11, wait 4 minutes and inform the Control Room that there is an overcurrent target up on the 1A RFP Breaker. As EMD sent to investigate why 1C RFP did not auto-start, inform the Control Room that a troubleshooting package is being prepared.		
End of Event 3		

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 4 Page 1 of 4

Event Description: Stuck Open Relief Valve (QCOA 0203-01)

Time	Position	Applicant's Actions or Behavior
SIMOP: When directed by the Lead Examiner, Fail the 1-203-3D Relief Valve open by inserting the following: **imf ad01d 0 2:** Delete Override for 3D high temp: **dor aotr1026020L**		
Key Parameter Response: Generator MWe lowering, Torus Water Temperature rising Expected Annunciator(s): 901-3 E-13 ELECT RELIEF VALVES 3C/3D/3E OPEN 901-3 E-14 ACOUSTIC MON SAFETY RLF VALVES OPEN 901-3 E-16 VALVE LEAK DET SYS HIGH TEMP Automatic Actions: None		
	BOP	Acknowledges annunciators and reports the "D" Relief Valve indicates open
	ATC	Reports RPV water level and pressure are stable
	SRO	Directs actions of QCOA 0203-01
	BOP	Places the "D" Relief Valve key switch to the "OFF" position
	BOP	Cycle the key switch between MANUAL and AUTO (because the SRV did not close)
	BOP/SRO	Recognizes that the "D" SRV will not close
SIMOP: If requested to remove D SRV control power fuses, role-play as necessary. Wait until **AFTER** the ATWS occurs, then use fuse removal Remote Function: **irf ad04r remove** and report the fuses are removed If directed to re-install SRV fuses, re-install using the Remote Function: **irf ad04 norm** and report the control power fuses are re-installed.		
	CREW	(Continuous) Monitor Torus Water Temperature
	SRO	Enters TS 3.4.3 Cond A, 14 day LCO (May not have time prior to scram)
	SRO	May set SCRAM CRITERIA based on Torus Water Temperature
Event 4 Continued		

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 4 Page 2 of 4

Event Description: Stuck Open Relief Valve (QCOA 0203-01)

Time	Position	Applicant's Actions or Behavior
	SRO/ATC	Manually Scram the reactor prior to exceeding 95°F Torus Water Temperature
	SRO	Directs the initiation of Torus Cooling per QCOP 1000-09 or per QCOP 1000-30 (Hard Card)
	BOP	If per QCOP 1000-04, establishes RHRSW flow
		Verifies RHR HX A/B in either NORMAL or REVERSE FLOW lineup
		Throttles open MO-1-1001-5A/B RHR SW HX Discharge Valve, to at least 40% open
		Starts the first RHRSW Pump in each loop
		Throttles MO-1-1001-5A/B to establish <3600 gpm and <350 psig Discharge Pressure
		Monitor Process Liquid Monitor 1-1705-12
		May start a second RHRSW Pump in each loop
		Throttles MO-1-1001-5A/B to establish approximately 140 psig Discharge Pressure
		Starts a second RHRSW Pump in each loop
		Throttles MO-1-1001-5A/B to establish <7200 gpm and <350 psig Discharge Pressure in each loop
		Maintains RHRSW pressure at least 20 psig higher than RHR pressure in each loop
	BOP	If per QCOP 1000-30 Hard Card, establishes RHRSW flow
		Places RHR LOOP A/B CONTAINMENT CLG permissive switch 17 to the ON position
		Places RHR LOOP A/B RHR SW START PERMISSIVE SWITCH 19 to the MANUAL OVERRIDE position
		Throttles open MO-1-1001-5A/B RHR SW HX Discharge Valve, to approximately 40% open
		Starts the first RHRSW Pump in each loop
		Throttles MO-1-1001-5A/B to establish <3600 gpm/pump, <350 psig Discharge Pressure and RHRSW pressure at least 20 psig higher than RHR pressure
Event 4 Continued		

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 4 Page 3 of 4

Event Description: Stuck Open Relief Valve (QCOA 0203-01)

Time	Position	Applicant's Actions or Behavior
		Throttle closed MO 1-1001-16A/B (HX Bypass) on each Loop
		May start the second RHRSW Pump in each loop and adjusts as necessary
	BOP	If per QCOP 1000-09, establishes RHR flow in both loops
		Verifies MO 1-1001-19A & B (Loop Crosstie Valves) are OPEN (Not on Hard Card)
		Verifies CLOSED on opposite loop: (Not on Hard Card) MO 1-1001-37A/B (Torus Spray Shutoff) MO 1-1001-29A/B (LPCI Inject) MO 1-1001-23A/B & 26B (Drywell Spray Valves) MO 1-1001-36A/B (Torus Test) MO 1-1001-34A/B (Torus Test or Spray)
		Verifies B Loop RHR discharge pressure is > 57 psig (Not on Hard Card)
		Opens MO 1-1001-34A/B
		Starts the first RHR pump on each loop
		Throttles open the MO 1-1001-36A/B establishing approx. 3500 gpm flow rate
		If desired to start a second RHR pump on each loop
		Throttles the 36A/B valve to establish discharge pressure < 200 psig
		Starts a second RHR pump and throttles the 36A/B valve to maintain discharge pressure
		Throttle closed MO 1-1001-16A/B (HX Bypass) on each Loop
	BOP	If per Hard Card, establishes RHR flow in both loops
		Verifies RHR Pumps running
		Opens MO 1-1001-34A/B
		Opens/Throttles MO 1-1001-36A/B as necessary to maintain RHR Discharge Pressure
		Throttle closed MO 1-1001-16A/B (HX Bypass) on each Loop
Event 4 Continued		

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 4 Page 4 of 4

Event Description: Stuck Open Relief Valve (QCOA 0203-01)

Time	Position	Applicant's Actions or Behavior
	SRO	Directs the actions from QCGP 2-3 Attachment A
	SRO/ATC	May reduce Total Core Flow to not less than 53mlb/hr.
	ATC	Depresses both RX SCRAM CH A and CH B Pushbuttons prior to Torus Temperature reaching 110°F
End of Event 4		

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 5/6 Page 1 of 3

Event Description: Hydraulic ATWS/1A CRD Pump Trip

SIMOP: After the ATWS is identified, delete the ADS Malfunction: **dor DIHS10287303D**
dmf ad01d
dmf ad07d
Trip 'A' CRD pump by inserting: **imf rd07a**

Key Parameter Response: RPV pressure/level increase, RFP +48" trip, No control rod movement on manual / auto scrams.

Expected Annunciator(s): 901-5 A-1, 901-5 B-4, 901-5 B-7

Automatic Actions: Group II, III isolations,

Time	Position	Applicant's Actions or Behavior
	SRO	Enters QGA 100, then transitions to QGA 101 and directs actions.
CT2	BOP	Inhibits ADS and places Core Spray Pumps in PTL.
	ATC	Actuates the ARI system.
CT1	ATC	Injects SBLC by selecting SYS 1 or SYS 2.
	ATC	Reports SBLC system injection and Tank Level.
	ATC	Verifies Recirc pumps operating at minimum speed.
	SRO	Verifies reactor power > 5% and directs ATC to trip the Recirc pumps.
	ATC	Trips both Recirc pumps by closing discharge valves, using Emergency Stop Pushbutton, or ASD control switches.
	SRO	Directs ATC to insert control rods per QCOP 0300-28.
	ATC	Informs the SRO that the 1A CRD Pump has tripped.
	SRO	Directs ATC to start 1B CRD Pump per QCOA 0300-01.
	ATC/BOP	Calls EO to investigate trip of the 1A CRD Pump
SIMOP ROLEPLAY: As EO sent to investigate CRD Pump trip, wait 3 minutes and inform Control Room that the 1A CRD Pump tripped on overcurrent and EMD is investigating.		
	ATC	Verifies closed MO 1-301-B, 1B PMP DISCH VLV, for the 1B CRD Pump
	ATC	Starts the 1B CRD Pump
	ATC	Throttles MO 1-301-2B to maintain 1400 to 1500 psig discharge pressure.
	ATC	Informs the SRO that the 1B CRD Pump is running.
Event 5/6 continued.		

Quad Cities 2019-301 NRC Scenario No. 2 Event No. 5/6 Page 2 of 3

Event Description: Hydraulic ATWS/1A CRD Pump Trip

Time	Position	Applicant's Actions or Behavior
SIM OP ROLE PLAY: If dispatched to close the 1-301-25 valve, wait 3 minutes then insert the command using remote function RD04R and report back: **irf rd04r close**		
CT1	ATC	Bypassess the RWM and begins inserting control rods starting from the center and spiraling out.
	ATC	Adjusts Drive Water pressure as necessary by dispatching an EO to close the 1-301-25 valve and/or manually adjusting the CRD FCV.
	ATC	Bypasses the SDV high level scram and attempts to reset the scram.
	ATC	Contacts an EO to place jumpers in the 901-15 and 901-17 panels per QCOP 0300-28 to bypass reactor scram signals.
SIM OP ROLE PLAY: As the EO, directed to install jumpers, wait 2 minutes, then insert the command using remote function QG08R and report back to the ATC: **irf qg08r activate**		
	ATC	Resets the reactor scram and verifies scram valves are closed.
	ATC	If necessary, dispatches an EO to the Aux Electric Room to de-energize ARI by pulling fuses in the 2201-70A/B panels per QCOP 0300-28.
SIM OP ROLE PLAY: If dispatched to pull ARI fuses in the Aux Electric Room, wait 2 minutes, then insert remote function QGR14R and report back to the ATC: **irf qg14r activate**		
	ATC	If desired, directs an EO to re-open the 1-301-25 valve.
SIM OP ROLE PLAY: If dispatched to open the 1-301-25 valve, wait 3 minutes then insert the command using remote function RD04R and report back: **irf rd04r open**		
	ATC	Directs Shift Supervisor to individually scram control rods from the 901-16 panel when the SDV has drained, (as indicated by alarm 901-5 A-14 resetting).
SIMOP ROLE PLAY: After 3 minutes or at the direction of the Lead Evaluator, report to the ATC: **"Individual control rod scramming is NOT successful."**		
	SRO	Directs action of QGA 101, Level Leg.
	SRO	Directs BOP to verify isolations and auto actions for 0" RPV water level.
Event 5/6 continued.		

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Event Description: Hydraulic ATWS/1A CRD Pump Trip

Time	Position	Applicant's Actions or Behavior
	SRO	Orders isolations to be bypassed per QCOP 0250-02
	BOP	Orders EO to bypass isolations per QCOP 0250-02.
SIM OP ROLE PLAY: As the EO, directed to bypass isolations, wait 2 minutes, then insert the command using remote function QG07R and report back to the ATC: **irf qg07r activate** **imf ser0736 on**		
CT3	SRO	Directs BOP and ATC to terminate and prevent all RPV injection except Boron, CRD, and RCIC.
CT3	ATC	Terminates and prevents injection from the 901-5 panel as follows: • Places the Low Flow FWRV in MANUAL and reduces output to zero. • Places A & B FWRVs in MANUAL and reduces both controller outputs to zero. Closes A & B FWRV Isolations MO 1-3206A/B.
CT3	BOP	Trip-Latches the HPCI turbine.
	SRO	Directs ATC to lower RPV water level and report at -35 inches.
	ATC	Reports RPV water level at -35 inches and lowering.
	SRO	Records RPV water level when one of the following conditions are met: • Reactor power < 5% • RPV water level at TAF • All ADS valves closed and Drywell pressure stays < 2.5 psig
	SRO	Assigns RPV water level band of -162" and the recorded level at which one of the three conditions was met.
	SRO	Directs ATC to maintain RPV water level in assigned band using Preferred ATWS Systems (Detail G).
	ATC	Re-establishes injection using Condensate/Feedwater system.
SIM OP NOTE: With concurrence of the Lead Evaluator, the scenario is terminated when RPV water level is being controlled in band, RPV pressure is stable and in band, and reactor power is lowering.		
End of Scenario		

END OF SCENARIO