Facility: Quad Cities Scenario No.: 1 Op-Test No.: 2018

Examiners: _____ Operators: _____

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Initial Conditions: 100% RTP, Bus 12 feed breaker to 1C RFP OOS

Turnover: Perform surveillance QCOS 0202-13, "Monthly Testing Reactor Recirculation System Air Operated Valves"

Critical Tasks: #1: When Torus pressure exceeds 5 psig, INITIATE drywell sprays while in the safe region of the drywell spray initiation limit (DSIL).

#2: Given the plant with the inability to maintain level above –59 inches, INHIBIT ADS, to prevent an uncontrolled depressurization IAW QGA 100.

#3: Given the plant with an inability to maintain RPV water level above -142 inches with an injection source lined-up and running, initiate an emergency depressurization before RPV water level drops to -162 inches in accordance with QGA 100 and QGA 500-1.

Event No.	Position	Event Type*	Event Description
1	BOP	N	Perform surveillance QCOS 0202-13.
2	BOP	C	Trip of a running service water pump. 1B service water pump auto starts, but is degraded. Will require manual pump shift IAW QCOP 3900-01.
3	SRO	TS	Level transmitter LT-1-263-23B fails low as indicated on LI-1-263-100B on 901-5 panel. Assess for affected systems IAW Operator Aid and QCOA 6800-05. Enter Technical Specifications 3.3.2.2, 3.3.5.1 and 3.3.5.2. Review Technical Specification 3.3.4.1.
4	BOP	C/TS	Spurious opening of 'B' ERV. Enter TS 3.4.3.A and 3.5.1.H.
5	ATC	I	CRD Flow Controller 1-340-1 fails closed in auto. Take manual control IAW QCOA 0300-06.
6	ATC	R	Steam leak on 'B' RFP called in from the field. Initiate emergency power reduction with reactor recirculation and CRAM rods IAW QCGP 3-1 prior to turning off 1B RFP.
7	ATC	C	Isolate the source of the steam leak, by turning off the 1B RFP and shutting the pump discharge valve MO 1-3201B.
8	Crew	M/C	Small LOCA inside DW. Bus 11 locks out on auto transfer, loss of remaining feedwater pumps. HPCI fails to start. Emergency depressurization due to unable to restore RPV level above -142". Enter contingency EOP QGA 500-1.

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

Event 1: Perform surveillance QCOS 0202-13, "Monthly Testing Reactor Recirculation System Air Operated Valves"

Event 2: Trip of a running service water pump. 1B service water pump auto starts, but is degraded. Will require manual pump shift IAW QCOP 3900-01.

Event 3: Level transmitter LT-1-263-23B fails low as indicated on LI-1-263-100B on 901-5 panel. Assess for affected systems IAW Operator Aid and QCOA 6800-05. Enter Technical Specifications 3.3.2.2, 3.3.5.1 and 3.3.5.2. Review Technical Specification 3.3.4.1.

Event 4: Spurious opening of 'B' ERV. Take action per QCOA 0203-01. Fuses must be removed to reclose ERV. Operators may take action to initiate torus cooling. QGA 200 entry possible. Enter TS 3.4.3.A (safety and relief valves) and TS 3.5.1.H (ADS function of ECCS during operations).

Event 5: CRD flow controller fails closed in auto. ATC able to restore flow by taking FIC 1-340-1 to manual per QCOA 0300-06.

Event 6: Steam leak on 'B' RFP called in from the field. Initiate emergency power reduction with reactor recirculation and CRAM rods IAW QCGP 3-1.

Event 7: ATC isolate steam leak from 1B RFP by shutting down pump and closing discharge valve MO 1-3201B at 901-6.

Event 8: Small (1%) LOCA inside DW. Bus 11 locks out on auto transfer, loss of remaining feedwater pumps. Enter QGA 100 and QGA 200. HPCI fails to start (not recoverable). Emergency depressurization due to unable to restore RPV level above -142". Enter contingency EOP QGA 500-1. Level will be able to be restored > TAF on condensate booster pumps, RHR, and core spray once emergency depressurization < 325 psig is completed.

Facility: Quad Cities Scenario No.: 2 Op-Test No.: 2018

Examiners: _____ Operators: _____

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Initial Conditions: 25% RTP, DW to torus differential pressure <1psid, restoring containment and reactor power following a DW entry for maintenance on the DWFDS pumps. Entered LCOs 3.6.2.5 A.1 10 hours ago.

Turnover: Restore primary containment for operations, exiting LCO 3.6.2.5 and restore reactor to full power with recirculation flow and control rods IAW approved REMA.

Critical Tasks: #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.

#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.

#3: During an ATWS with conditions met to perform power/level control, TERMINATE AND PREVENT INJECTION as necessary, in order to establish ATWS level band IAW QGA 101.

Event No.	Position	Event Type*	Event Description
1	BOP	N	Establish primary containment differential pressure IAW QCOP 1600-20.
2	ATC	R	Raise reactor power with control rods IAW QCGP 1-1, "Normal Unit 1 Startup" and QCGP 4-1, "Control Rod Movements and Control Rod Sequence" following the REMA.
3	ATC	C/TS	Stuck control rod, perform QCOA 0300-02. Enter TS 3.1.3.
4	BOP	C	Degrading running EHC pump causes EHC low pressure alarm, with pump auto swap failure. Restore EHC pressure by manually starting standby pump IAW QCOP 5650-10.
5	ATC	I/TS	Failure of reactor Flow Drive Unit 1 upscale. OPRM Channels 1, 2, 3, 7 become disenabled. Manually insert ½ SCRAM on 'A' RPS. Enter TS 3.3.1.3 (OPRM), TS 3.3.1.1 (APRM), and TS 3.3.2.1 (RBM).
6	BOP	C	Running TBCCW pump degrades until low pressure alarm is received. Swap TBCCW pumps IAW QCOP 3800-02.
7	Crew	M	DEHC pressure controller failure high resulting in a loss of pressure control. Turbine Control Valves and Bypass Valves come open resulting in a low steam line pressure Group 1 containment isolation. Control rods fail to insert on scram signal (hydraulic ATWS). Enter QGA 100, QGA 101, and possible QGA 200.
8	ATC	C	Initially selected SBLC pump does not start. Operator will need to start other SBLC pump.

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

Event 1: Establish primary containment differential pressure IAW QCOP 1600-20, “Nitrogen Inerting of Primary Containment Using the Vaporizers and Reactor Building Ventilation System.”

Event 2: Raise reactor power with control rods (M-12 and D-4) IAW QCGP 1-1, “Normal Unit 1 Startup” and QCGP 4-1, “Control Rod Movements and Control Rod Sequence” following the REMA.

Event 3: Stuck control rod (H-8 at position 20), perform QCOA 0300-02. Enter TS 3.1.3. Operator unable to free control rod in an intermediate position.

Event 4: Degrading running EHC pump causes EHC low pressure alarm, with failure of pump auto swap. Operator carries out actions of QCOP 5650-01 to swap EHC pumps before turbine trip. Degrading pump condition does not cause EHC pressure to decrease below 1150 psig if operator does not manually swap EHC pumps.

Event 5: OPRM Trouble annunciator along with amber Flow Comparator Upscale/Inop indication on back panel 901-37 indicates a failure of reactor Flow Drive Unit 1 upscale. OPRM Channels 1, 2, 3, 7 become disenabled. Enter TS 3.3.1.3 (OPRM), TS 3.3.1.1 (APRM), and TS 3.3.2.1 (RBM). Operators may take actions of QCOP 0700-10, “OPRM Operation” to manually enable OPRM 1, 2, 3, and 7. Operator will initiate a ½ SCRAM on ‘A’ RPS.

Event 6: Running TBCCW pump degrades until a low pressure alarm is received. Operators swap running TBCCW pumps IAW QCOP 3800-02, “Unit 1 TBCCW System Operation”.

Event 7: DEHC pressure controller fails high resulting in a loss of pressure control. Turbine Control Valves and Bypass Valves come open resulting in a low steam line pressure Group 1 containment isolation. Control rods fail to insert on scram signal (hydraulic ATWS). Enter QGA 100, QGA 101, and possibly QGA 200 on high torus temperature when SRVs lift on MSIV closure ATWS. Operators will carry out actions of QCOP 0300-28, “Alternate Rod Insertion” to insert control rods. Manual insertion of control rods will be delayed but will ultimately be successful after the operators have begun injecting SBLC and have taken actions per Event 8. Scram –reset – scram will be successful to fully insert all control rods after the operators have begun injecting SBLC and have taken actions per Event 8.

Event 8: SBLC pump started by operator will trip. Operators will take actions IAW QCOP 1100-02, “Injection of Standby Liquid Control” to initiate opposite train.

Appendix D	Scenario Outline	Form ES-D-1

Facility: Quad Cities Scenario No.: 3 Op-Test No.: 2018

Examiners: _____ Operators: _____

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Initial Conditions: 75% RTP, YELLOW PRA Risk, Day 1 of 7 of Technical Specification 3.6.4.3.A.1 for the 'A' train of SBGT OOS for planned maintenance.

Turnover: Perform QCOS 5600-08, "Turbine Generator Quarterly Testing" step H.1 testing the Main Stop Valves (MSVs).

Critical Tasks: #1: Given an operating reactor plant with a primary system discharging into the reactor building and with Standby Gas Treatment failing to auto start. Take action to start the standby SBGT train.

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

Event No.	Position	Event Type*	Event Description
1	BOP	N	Test the MSVs IAW surveillance procedure QCOS 5600-08. Begin at step H.1.
2	ATC	C	Running CRD pump trips on a motor shaft shear casualty. ATC carries out the actions of QCOA 0300-01. Swap to standby CRD pump.
3	BOP	C	1A RBCCW pump fails due to a motor fault. BOP swaps to ½C RBCCW pump. Pump will need to be aligned to Unit 1.
4	ATC BOP	C/TS	Control Rod Drift alarm received. Rod (F-8) drifts outward with operators unable to maintain at position '00'. ATC carry out actions of QCOA 0300-11and US enter TS 3.1.3.C.1 Control Rod Operability. BOP will SCRAM F-8 from 901-16.
5	ATC	R/TS	Trip of the 1A ASD/RR pump due to a failed power cell. Single loop operations IAW QCOA 0202-04. Emergency power reduction IAW QCGP 3-1. Enter TS 3.4.1 and acknowledge actions for TS 3.2.1, 3.2.2, 3.2.3, 3.3.1.1, and 3.3.2.1.
6	Crew	M	Fuel failure results in high-high off gas radiation alarms. Enter QCOA 1700-04. Manually SCRAM and enter QCGP 2-3. Report from the field indicates a leak in the SDV piping. Enter EOPs QGA 300 and QGA 100, and AOP QCOA 0201-05. Enter contingency EOP QGA 500-1 for 2 areas exceeding max safe radiation levels.
7	BOP	C	Failure of 'B' SBGT train to start on low reactor water level. BOP carry out actions of QCOA 7500-02.

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

Event 1: Test the MSVs IAW surveillance procedure QCOS 5600-08, “Turbine Generator Quarterly Testing.” Perform procedure starting at step H.1.

Event 2: Running CRD pump trips on a motor shaft shear casualty. ATC carries out the actions of QCOA 0300-01, “Control Rod Drive Pump Failure” swaps to standby CRD pump.

Event 3: Annunciator 912-1, D-1 RBCCW Low Pressure is received in the main control with an indication of 1A RBCCW tripped. 1A RBCCW pump failed due to a motor fault as indicated by an overcurrent flag locally at its breaker. BOP swaps to ½C RBCCW pump which will need to be aligned to Unit 1 after verifying that it is not required for Unit 2 operations IAW QCOP 3700-02, “RBCCW System Startup and Operation”. Operators will monitor various temperatures IAW QCOA 3700-01, “RBCCW Low Pressure” but temperatures will not exceed limits or require isolating the system as long as operators establish flow from the ½C RBCCW pump.

Event 4: Control Rod (F-8) Drift alarm received for intermediate position control rod. Rod will be drifting outward with operators unable to maintain at position ‘00’. ATC carry out actions of QCOA 0300-11, “Control Rod Drift” and US enter TS 3.1.3.C.1 Control Rod Operability. BOP will SCRAM F-8 from the 901-16 panel.

Event 5: Trip of the 1A ASD/RR pump. Single loop operations IAW QCOA 0202-04, “Reactor Recirc Pump Trip – Single Pump”. Emergency power reduction IAW QCGP 3-1, “Reactor Power Operations”. Enter TS 3.4.1 and acknowledge actions for TS 3.2.1, 3.2.2, 3.2.3, 3.3.1.1, and 3.3.2.1.

Event 6: Fuel defect results in HIGH-HIGH Off gas radiation alarms. Enter QCOA 1700-04, Abnormal Off Gas Radiation.” Procedure will eventually direct operators to manually initiate a reactor SCRAM and enter QCGP 2-3, “Reactor SCRAM.” Report from the field indicates that a failure in the SDV piping has occurred. Enter EOPs QGA 300, “Secondary Containment Control” and QGA 100, “RPV Control” and AOP QCOA 0201-05, “Primary System Leaks (Slow Leaks) Outside Primary Containment”. Enter contingency EOP QGA 500-1, “RPV Blowdown” for 2 areas exceeding max safe radiation levels.

Event 7: Failure of ‘B’ SBGT train to start initially on low reactor water level. BOP carry out actions of QCOA 7500-02, “Standby Gas Treatment Fan Tripped or Failed to Start Automatically”. Train will start with operator manual action from the main control room.

Facility: Quad Cities Scenario No.: 4 Op-Test No.: 2018

Examiners: _____ Operators: _____

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Initial Conditions: 50% RTP. 'A' RPS bus on reserve power supply, equipment operators clearing tags for restoration of 'A' RPS MG Set during the shift.

Turnover: Perform QCOP 6600-05, "Shared Unit Diesel Generator Start Up." Load the diesel to 1000KW for 1 hour.

Critical Tasks: #1: With a reactor SCRAM required and the reactor not shutdown, initiate ARI to depressurize the SCRAM air header and insert control rods.

#2: Given an operating reactor plant when a station blackout occurs, take actions to monitor plant parameters and restore electrical power using the emergency DGs, SBO DGs, or unit 4KV crossties in accordance with QCOA 6100-04, QCOA 6100-03 and/or QCOP 6500-08.

#3: Given an operating reactor plant with a rupture in the primary containment system and torus level cannot be maintained above 11 feet, INITIATE an emergency depressurization.

#4: Given an operating reactor plant with a rupture in the primary containment system and torus level cannot be maintained above 11 feet, PREVENT HPCI operation provided HPCI operation is NOT needed for core cooling.

Event No.	Position	Event Type*	Event Description
1	BOP	N	Perform QCOP 6600-05 and load the diesel to 1000KW for 1 hour.
2	ATC	C/TS	'A' RPS bus reserve feed fails due faulted EPA breaker opening. ½ scram and ½ containment isolations received. Take actions per QCOA 7000-01, "120 VAC Reactor Protection Bus Failure". Restore RPS bus with QCOP 7000-03, "Unit 1 RPS MG Sets". Enter TS 3.3.8.2.
3	BOP	C/TS	Report from EO in ½ EDG room indicates starting air leak on EDG. BOP shuts down the ½ EDG IAW QCOP 6600-06, "Diesel Generator ½ Shutdown". Enter TS 3.8.1.B.
4	ATC	C	Seismic event results in a turbine trip and an electrical ATWS. Enter QGA 101 and QCOA 0010-09. ARI manual actuation successful at inserting all control rods.
5	Crew	M	After shock seismic event results in Loss of Offsite Power and Torus Leak. Enter QCOA 6100-03 and QCOA 1600-05. Prevent HPCI operation when it is determined that Torus level cannot be maintained above 11 feet. Enter contingency EOP QGA 500-1 due to inability to maintain torus level above 11ft.
6	BOP	C	Unit 1 EDG fails to auto start on LOOP. Manual start will be successful. SBO diesel started to power Bus 13-1/18 per QCOA 6100-04.
7	BOP	C	ERVs D and E actuators fail due to the seismic event. Supplement Emergency Depressurizaton using alternate systems.

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

Event 1: Perform QCOP 6600-05, “Shared Unit Diesel Generator Start Up” and load the diesel to 1000KW for 1 hour.

Event 2: ‘A’ RPS bus reserve feed fails due faulted EPA breaker opening. ½ scram and ½ containment isolations received. Take actions per QCOA 7000-01, “120 VAC Reactor Protection Bus Failure”. Report to the control room that the ‘A’ RPS MG Set is available. Restore RPS bus with the ‘A’ RPS MG Set IAW QCOP 7000-03, “Unit 1 RPS MG Sets”. Enter TS 3.3.8.2.

Event 3: A report will be received from an EO in the ½ EDG room indicating a starting air leak on the EDG and a recommendation to unload and shutdown the EDG. BOP unloads and shuts down the ½ EDG IAW QCOP 6600-06, “Diesel Generator ½ Shutdown”. Enter TS 3.8.1.B.

Event 4: Seismic event results in a turbine trip and an electrical ATWS. Enter QGA 101, “RPV Control (ATWS) and QCOA 0010-09, “Earthquake.” ARI manual actuation is successful at inserting all control rods.

Event 5: After shock seismic event results in Loss of Offsite Power and Torus Leak. Enter QCOA 6100-03, “Loss of Offsite Power,” QCOA 1600-05, “Torus Leak,” and QGA 200, “Primary Containment Control.” Prevent HPCI operation when it is determined that Torus level cannot be maintained above 11 feet. Enter contingency EOP QGA 500-1 due to inability to maintain torus level above 11ft.

Event 6: Unit 1 EDG fails to auto start on LOOP. Manual start will be successful. SBO diesel manually started to power Busses 13-1/18 per QCOA 6100-04, “Station Blackout.”

Event 7: ERVs D and E actuators fail due to the seismic event. Supplement blowdown using alternate depressurization systems (Detail O).

Appendix D	Scenario Outline	Form ES-D-1

Facility: Quad Cities Scenario No.: 5 Op-Test No.: 2018

Examiners: _____ Operators: _____

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Initial Conditions: 10% RTP, Startup in progress per QCGP 1-1, "Normal Unit 1 Startup". 'A' and 'C' CD/CB pumps running with 'B' in standby.

Turnover: IAW QCGP 1-1, step F.6.bb perform QCOS 1300-05, "RCIC Pump Operability Test". Once completed, continue reactor startup with control rods per QCGP 4-1, "Control Rod Movements and Control Rod Sequence".

Critical Tasks: #1: When RPV pressure is below 330 psig, SLOWLY RAISE AND CONTROL INJECTION into the RPV to maintain RPV water level above TAF".

#2: When Torus pressure exceeds 5 psig, INITIATE drywell sprays while in the safe region of the drywell spray initiation limit (DSIL).

Event No.	Position	Event Type*	Event Description
1	BOP	N	Perform QCOS 1300-05, "RCIC Pump Operability Test."
2	BOP	C/TS	RCIC flow controller 1-1340-1 fails downscale. Enter TS 3.5.3.
3	ATC	C	Condensate pump trip with failure of standby pump to auto start. ATC takes actions of QCOA 3300-01.
4	ATC BOP	I/TS	APRM 5 fails high resulting in an incomplete half scram event (not all 4 scram lights on RPS 'B' bus are off). ATC/BOP take actions of QCOA 0500-01. BOP will operate 'B' RPS key lock test switch and ATC will bypass APRM 5. Enter TS 3.3.1.1.
5	BOP	C/TS	Inadvertent HPCI initiation, BOP take actions of QCOA 2300-01. Enter TS 3.5.1.G and 3.5.1.I.
6	Crew	M	Large LOCA on 'A' recirculation loop suction line. Enter QGA 100 and QGA 200. 'A' Core Spray pump fails to start (not recoverable) and MCC 15-2 fails (not recoverable).
7	BOP	C	'B' RHR injection valve fails to open. BOP takes actions of QCOA 1000-04 and QCOP 1000-30.

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

Event 1: Perform QCOS 1300-05, “RCIC Pump Operability Test”. Operators will be informed that equivalent HPCI surveillance is not required to be performed during this startup. Start at step H.3.

Event 2: RCIC flow controller 1-1340-1 fails downscale. Enter TS 3.5.3.

Event 3: 1C condensate/condensate booster pumps trip with a failure of standby pump to auto start. ATC takes actions of QCOA 3300-01, “Loss of Condensate Pump” to start an additional condensate/condensate booster pump.

Event 4: APRM 5 fails upscale, resulting in an incomplete half scram event (not all 4 scram lights on RPS ‘B’ bus are off). ATC takes actions of QCOA 0500-01, “Partial Scram Actuation.” BOP will insert a ½ SCRAM on ‘B’ RPS by operating key for RPS Test Switch. ATC will bypass APRM 5. SRO enters TS 3.3.1.1.

Event 5: Inadvertent HPCI initiation, BOP take actions of QCOA 2300-01, “HPCI Automatic Initiation”. Report from the field indicates that a cleaning staff member bumped a cart into the HPCI initiation logic instrument rack in the reactor building. SRO enters TS 3.5.1.G and then immediately 3.5.1.I because RCIC is already inoperable.

Event 6: Large (20%) LOCA on ‘A’ recirculation loop suction line. Enter QGA 100, “RPV Control” and QGA 200, “Primary Containment Control”. ‘A’ Core Spray pump fails to start on 2.5 psig DW pressure signal (not recoverable) and MCC 15-2 trips resulting in a loss of power to the main feed regulating isolation valves which are in a closed condition (not recoverable).

Event 7: ‘B’ RHR Injection Valve 1-1001-29B fails to open when ECCS low pressure permissive activates (325 psig). BOP takes actions of QCOA 1000-04, “LPCI Auto Initiation” and QCOP 1000-30 “Post Accident RHR Operation” to manually align ‘B’ RHR for LPCI injection. Manual actions will be successful.