

Exelon Nuclear

2014 ILT NRC Exam Scenario

Scenario Number:

**NRC Scenario 2**

Revision Number: 00

Date: 10/17/2013

Developed By: \_\_\_\_\_  
Instructor Date

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Training Department Date

Facility: Quad Cities Scenario No.: **2014 NRC Scenario 2** Op-Test No.: ILT 12-1  
 Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions:

Unit 1 is in Mode 1 at 47% power. Startup is in progress per QCGP 1-1.

Turnover:

DEHC PLU test per QCGP 1-1 Step F.9.cc.

Continue control rod withdrawal for startup.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	BOP N	DEHC PLU test per QCGP 1-1 Step F.9.cc.
2	N/A	SRO TS	SBLC Pump Suction Piping Low Temperature <b>TS</b>
3	N/A	ATC R	Raise power with control rods using continuous rod withdrawal
4	RD01R2247	ATC C	Uncoupled Control Rod (QCOA 0300-03)
5	None	BOP C	Emergency Swap of RBCCW Pumps
6	NM08 RP02B&D	ATC I	APRM 5 fails inoperable, but RPS fails to trip <b>TS</b>
7	EG07B EG05A	BOP C	Loss of Stator Cooling Water (QCOA 5300-01)
8	MS05	Crew M	Steam leak in Drywell
9	RP02 RP03 RD22	Crew M	RPS Failure (Electric ATWS)

\* (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): **E9**  
 Abnormal Events (2-4): **E4-7**  
 Major Transient(s) /E-Plan entry (1-2): **E8, 9**  
 EOPs (1-2): **200, 100**  
 EOP Contingencies (0-2): **E9**  
 Critical Tasks (2-3): **2**

ES-301-5 Quantitative attributes:

BOP Normal **E1**  
 ATC Reactivity (1 per set): **E3**  
 BOP I/C (4 per set): **E5 & 7**  
 ATC I/C (4 per set): **E4 & 6**  
 SRO-I I/C (4 per set inc 2 as ATC): **E4-7**  
 SRO Tech Spec (2 per set): **E2 & 6**  
 ALL Major Transients (2 per set) **E8, 9**

- Initial conditions:
  - Unit 1 is in Mode 1 at 47% power. Startup is in progress per QCGP 1-1.
- Event 1: DEHC PLU test per QCGP 1-1 Step F.9.cc.
- Event 2: The Reactor Bldg EO contacts the Control Room to report low out-of-spec temperature on B SBLC Pump Suction Temperature, at 82°F (TS Required  $\geq 83^\circ\text{F}$ ). The Heat Tracing controller and A Pump Suction Temperature appear normal. The SRO should reference Surveillance Requirement 3.1.7.3 and Technical Specifications 3.1.7 Cond A for one SBLC Pump inoperable.
- Event 3: Raise power using control rods in continuous withdrawal mode.
- Event 4: Uncoupled Control Rod (QCOA 0300-03)
- Event 5: The BOP performs an emergency swap from the 1B to the  $\frac{1}{2}$ C RBCCW pump per QCOP 3700-02.
- Event 6: APRM 5 will fail INOPERABLE but a  $\frac{1}{2}$  Scram will not occur due to a problem in the APRM Trip Unit. The ATC must manually insert a B RPS  $\frac{1}{2}$  Scram because it is an Automatic Action that failed to occur. The SRO must address Tech Specs 3.3.1.1, RPS Instrumentation, for a second APRM inoperable on RPS Channel B and address TRM 3.3.a for Rod Block Instrumentation.
- Event 7: Stator cooling will be lost resulting in a Turbine runback. At the initial power level the plant will remain on line. The BOP and SRO must take compensatory measures per QCOA 5300-01.
- Event 8: Two TCV's will fail full open causing a rapid drop in steam pressure resulting in a group I isolation. The transient will cause a small steam leak and Drywell pressure will rise to 2.5 psig in approximately 2.5 minutes. The crew responds per QGA 200 to mitigate the accident without further problems.
- Event 9: RPS Failure (Electric ATWS). The initial reactor power is low and it will remain low through the ATWS. The Crew will perform QGA 100 to stabilize RPV parameters. The Crew will perform QGA 101, and QCOP 300-28 actions to shutdown the reactor. Removing RPS fuses will be effective.
- Approximate Run Time: 1.5 hours

**CRITICAL TASKS:**

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

**Critical task #2** When Torus pressure exceeds 5 psig, INITIATE drywell sprays while in the safe region of the drywell spray initiation limit (DSIL). (BWROG PC-5.1 INIT DW SPRAY)

## EXERCISE PERFORMANCE OBJECTIVES

SR-5652a-K16	STATE the physical location and DESCRIBE the operation of the following Main Turbine Control - EHC Logic screen controls: e. Tests (1) PLU
SR-1100-K32	Given SBLC operability status OR key parameter indications, various plant conditions and a copy of Tech Specs, DETERMINE Tech Spec compliance and required actions, if any.
SR-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-0302-K26	EVALUATE given key Control Rod Drive parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s): a. Uncoupled rod
SR 0700-P07	Given an operating reactor plant with an APRM failure, take actions to bypass the failed APRM and meet TS requirements in accordance with QCOP 0700-04 and QCAP 0230-19. (SOER 90-3 r1)
SR-3700-K26	EVALUATE given key RBCCW parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s): a. High or low expansion tank level b. High RBCCW temperature c. Low RBCCW pressure
SR-5300-P01	Given a reactor plant at power when a loss of stator cooling occurs, take action to reduce turbine load to prevent a turbine trip in accordance with QCOA 5300-01.
SR-0203-P07	Given a reactor plant in a QGA condition, inhibit ADS in accordance with QGA 100 or QGA 101. (Important PSA task / Inhibiting ADS terminates 5 of top 200 Core Damage Sequences)
SR-0300-P07	Given a reactor plant in an ATWS condition (QGA), perform the NSO actions to insert control rods in accordance with QCOP 0300-28.
SR-0002-P03	Given a reactor plant at power with a reactor scram, place the plant into a stable condition in accordance with QCGP 2-3.
SR-0001-P11	Given a reactor plant with an ATWS, take action to reduce heat input into the containment in accordance with QGA 101. (ATWS is a key event in 1 of the 100 most probable PRA Core Damage Sequences)
SR-1000-P02	Given a reactor plant in an accident condition (QGA), operate torus sprays in accordance with QCOP 1000-30 and appropriate QGA. (Important PRA Operator Action - starting containment sprays has a RAW value of 82.5)

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SR-1000-P04	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. (Important PRA Operator Action - starting containment sprays has a RAW value of 82.5)
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.



2014 NRC Scenario  
2.cae



Scenario 2 ReMA  
.doc



Scenario 2 QCGP  
1-1.pdf



Scenario 2 QCGP  
3-1.pdf

## Simulator setup:

1. Reset to **IC 18**. (40% power in Mode 1)
2. Go to **RUN**.
3. Verify the following RWM Sequence is loaded: PHESU
  - Withdraw control rods in step 37 until rod L-3 is at position 32.
  - Mark up the Control Rod Move Sheet to reflect all rods withdrawn up to Step 37.
  - Markup Step 37 with all rods withdrawn to position 32 through rod L-3.
4. Lower Recirc Pump speed using master controller to approximately 48%. This establishes conditions to allow event 1 to start and provide conditions to subsequently perform events 3 and 4 in a timely manner.
5. Start the "B" SWC pump and secure the "A" SWC pump. [Must be done before caep]
6. Place load set at 70% on DEHC OWS.
7. Bypass APRM 6 and place an EST stating APRM 6 has a faulty circuit card.
8. Verify the LOCA TRIP ENABLED label is placed ONLY above the 1C Circ Water Pump.
9. Place 1A FRV in auto.

(Commands to be utilized during this scenario are contained in the CAEP file:  
2014 NRC Scenario 2.cae)

10. Insert Commands for setup:
  - **irf nm01r 1.016** (Adjust APRM 1 gain)
  - **irf nm03r .93** (Adjust APRM 3 gain)
  - **irf nm05r 1.014** (Adjust APRM 5 gain)
  - **imf rp03a** (Manual Scram Circuit Failure Channel A)
  - **imf rd22a** (Manual Alternate Rod Insertion Circuit Failure Channel A)
  - **imf rd22b** (Manual Alternate Rod Insertion Circuit Failure Channel B)
  - **imf rp02a** (Auto Scram Circuit Failure Channel A1)
  - **imf rp02b** (Auto Scram Circuit Failure Channel B1)
  - **imf rp02c** (Auto Scram Circuit Failure Channel A2)
  - **imf rp02d** (Auto Scram Circuit Failure Channel B2)
  - **imf eg05a** (A Stator Cooling Pump trips immediately when started)
  - **imf rd01r2247** (uncoupled control rod F-12)
  - **imf tc08c (1)** (CV #3 fails open tied to trigger 1)
  - **imf tc08d (1)** (CV #4 fails open tied to trigger 1)
  - **imf ms05a (1 0:05) 1 20:** (MSL Break Inside Drywell 1% severity, 20 minute ramp, 5 second delay on trigger 1)
  - **trgset 3 "zdihs10281302(1) "** (set trigger 3 when rod motion switch taken to insert)
  - **trg 3 "dmf rd01r2247"** (deleted uncoupled control rod F-12 on trigger 3)
  - **imf rd29** (Fail auto ARI)
  - **ior dihs11130301 off** (override SBLC switch to OFF)

11. Verify the following commands for scenario performance:

- **ior dihs10700ap5md 3** (fail APRM 5 by overriding the mode switch to the Zero (3 position))
- **imf eg07b 100 6:** (B Stator Cooling Pump degraded at 100% severity on a 6 min ramp)
- **trg! 1** (manually set trigger 1 true)
- **mrf qg09r activate** (RPV Lo-Lo Level Isolation Bypass per QCOP 0250-2 as requested)
- **bat rpsfuseremoval** (RPS Fuse Removal per QCOP 300-28 as requested)
  - **This batch file contains these items (delay removed for backup manual insertion of the commands)**
  - **irf rp20r (none 2) remove**
  - **irf rp22r (none 5) remove**
  - **irf rp24r (none 7) remove**
  - **irf rp26r (none 10) remove**
  - **irf rp21r (none 15) remove**
  - **irf rp23r (none 17) remove**
  - **irf rp25r (none 20) remove**
  - **irf rp27r (none 22) remove**
- **irf ia07r close** (Venting the Scram air header when requested)
- **irf ia11r 100** (Venting the Scram air header when requested)
- **mrf ia07r open** (Restoring the Scram air header when requested)
- **mrf ia11r 0** (Restoring the Scram air header when requested)
- **bat sv** (silence vacuum breakers when requested)

12. Provide the crew with the scenario 2 REMA.

13. Provide a current revision of the following procedures, signed off as specified:

- QCGP 1-1 signed off up through Step F.9.bb.
- QCGP 3-1 with the following marked up: Circle all steps up to F.1. Sign off steps F.3.a, F.3.b (1) through (6)(a)., N/A step F.3. b (6)(b) and (c), Sign off steps F.3.c, d and e(1), leave F.3.e(2) blank, sign off steps F.3.e(3), e(3)(a), F.3.f.(1) through (7), leave F.3.f.(7)(a) blank, N/A step F.3.f.(8), sign off step F.3.g.(1), N/A step F.3.g.(1)(a), sign off steps F.3.g.(2), (2)(a), (2)(b), (3) and (4). All other steps remain blank.

14. Perform the applicable steps of TQ-QC-201-0113 "Simulator Exam Security Actions Checklist".

14. Ensure (2) orange rings are available to provide equipment status.

15. Ensure (2) EST's are available to provide equipment status.

**Annunciator Procedures**

- 901-3 A-16, PRI CNMT HIGH PRESSURE, Rev.14
- 901-5 C-5, IRM DOWNSCALE, Rev. 5
- 901-5 A-2, ROD OVERTRAVEL, Rev. 6
- 901-5 A-3, ROD DRIFT Rev. 7
- 901-5 B-11, CHANNEL A/B NEUTRON MONITOR Rev. 10
- 901-5 C-3, ROD OUT BLOCK, Rev. 11
- 901-5 D-13, CHANNEL 4-6 APRM HI-HI OR INOP, Rev. 10
- 901-5, H-1, OPRM TROUBLE/INOP, Rev. 3
- 901-7 A-5, MAJOR TROUBLE TURB CONTROL, Rev. 0
- 901-7 B-4, TURBINE RUBACK INTIATED, Rev. 3
- 901-7 C-10, GEN STATOR COOLING PANEL TROUBLE, Rev. 4
- 901-7 G-3, TURBINE BYPASS VALVE OPEN, Rev. 5
- 901-5 C-6 APRM DOWNSCALE, Rev. 5
- 901-5 H-4, TURB PRESS GEN LOAD REJ STM VLV BYPASS, Rev. 10
- 901-5 A-9 and 16, CHANNEL A AND B MAIN STM LINE LOW PRESSURE, Rev. 13
- 901-3 A-14, TORUS HIGH/LOW LEVEL, Rev. 9
- 901-3 A-13, DW LOW PRESSURE CNMT SPRAY INHIBITED, Rev. 7

QCGP 1-1, Normal Unit 1 Startup, Rev. 94

QCGP 4-1, Control Rod Movements and Control Rod Sequence, Rev. 44

QCGP 2-3, Reactor Scram, Rev. 80

QGA 100, RPV Control, Rev. 9

QGA 101, RPV Control (ATWS) Rev. 13

QGA 200, Primary Containment Control, Rev. 9

QCOA 0201-01, Increasing Drywell Pressure, Rev. 23

QCOA 0700-03, Loss of Neutron Flux Indication. Rev. 8

QCOA 1000-04, LPCI Automatic Initiation, Rev. 17

QCOA 1100-01, SBLC Tank Abnormal Temperature, Rev. 15

QCOP 0300-28, Alternate Control Rod Insertion, Rev. 31

QCOP 1000-30, Post-Accident RHR Operation, Rev. 29

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

QCOA 0300-03, Uncoupled Control Rod, Rev. 14

QCOP 3700-02,RBCCW System Startup and Operation, Rev. 27

QCOP 5750-19, Drywell Cooler Operation, Rev. 10



**1. Plant Conditions:**

- a.) Unit 1 is in Mode 1 at 47% power. Startup is in progress per QCGP 1-1.
- 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

**2.) Significant problems/abnormalities:**

- a.) APRM 6 has a faulty circuit card and is bypassed.

**3.) Evolutions/maintenance for the oncoming shift:**

- a.) DEHC PLU test per QCGP 1-1 Step F.9.cc.
- b.) Continue control rod withdrawal for startup.
- c.) EOs standing by to put on additional Condensate Demineralizers as necessary.

Quad Cities		Scenario No.: 2	Event No.: 1	Page 1 of 1
Event Description: DEHC PLU test per QCGP 1-1 Step F.9.cc.				
Time	Position	Applicant's Actions or Behavior		
	SRO	Directs BOP to perform the DEHC PLU test per QCGP 1-1 Step F.9.cc		
	BOP	Verifies DEHC PLU is "ENABLED".		
	BOP	Verifies on <TESTS><PLU TEST> screen, slot 17 and 18 PLU status indicates OFF.		
	BOP	Selects PLU test ON.		
	BOP	Selects OK to start test.		
	BOP	Verifies PLU TEST SUCCESSFUL is displayed for <R><S>and <T> core for slot 17 and 18.		
	BOP	Selects PLU test OFF.		
	BOP	Selects OK to terminate testing.		
	BOP	Informs Unit Supervisor that DEHC PLU testing is complete per QCGP 1-1 step F.9.cc.		
<b>End of Event 1</b>				

Quad Cities	Scenario No.: 2	Event No.: 2	Page 1 of 1
Event Description: SBLC Pump Suction Piping Low Temperature <b>TS</b>			
Time	Position	Applicant's Actions or Behavior	
<p>Note: This event is a Technical Specification exercise for the SRO only.</p> <p><b>SIMOP:</b> At the direction of the Lead Examiner, contact the Control Room as the Reactor Bldg EO to make the following report:</p> <p style="padding-left: 40px;">"B" SBLC Pump Suction Temperature, TI 1-1141-20B is reading 82°F which is out-of-tolerance low on the rounds. TI 1-1141-20A for the A SBLC Pump Suction is reading 92°F. The Heat Tracing controller has power.</p>			
	BOP/ATC	Forward this report to the Unit Supervisor as necessary	
	SRO	May reference QCOA 1100-01, SBLC Tank Abnormal Temperature	
	Crew	May direct EO to report SBLC storage tank temperature and TIC 1-1154 setpoint.	
<p><b>SIMOP:</b> If requested, report SBLC storage tank temperature and TIC 1-1154 setpoint are 95 °F.</p> <p>If requested, report "B" SBLC heat trace controller setpoint is 92 °F.</p>			
	Crew	May direct EO to verify circuit breaker #20 at MCC 18-1A-1 is ON.	
<b>SIMOP:</b> If requested, report circuit breaker #20 at MCC 18-1A-1 is ON.			
	SRO	Reference Surveillance Requirement 3.1.7.3 and Technical Specification 3.1.7 Cond A for one SBLC Pump inoperable (7 day LCO)	
	Crew	Contacts Electrical Maintenance to troubleshoot.	
<p><b>SIMOP:</b> As EMD acknowledge the request to troubleshoot the heat trace associated with the "B" SBLC suction piping and inform the control room you will start a troubleshooting work package.</p>			
<b>End of Event 2</b>			

Quad Cities	Scenario No.: 2	Event No.: 3	Page 1 of 1
Event Description: Raise power with control rods using continuous rod withdrawal			
Time	Position	Applicant's Actions or Behavior	
<b>SIMOP:</b> If the crew does not promptly begin the task, call the control room as the Shift Manager and ask them to begin.			
<b>SIMOP Role Play:</b> Perform duties as Qualified Verifier (QV) as necessary.			
	SRO	Directly supervises control rod moves and directs the RO to raise power using control rods per the REMA.	
	BOP	Monitors balance of plant parameters.	
	ATC	(CONTINUOUS) Monitors reactor parameters.	
	ATC	Begins power increase with control rods.	
	ATC	Selects an in-sequence control rod.	
	ATC	On the RWM verifies proper rod selected, its current position and bounds.	
	ATC	Communicates to the QV "Control Rod XX-YY is selected. Withdrawing from position __ to position __ "(continuously or by notching).	
	QV	Replies, "Understand Control Rod XX-YY is selected. You are moving it from position __ to position __." (continuously or by notching).	
	ATC	Replies: "That is correct".	
	ATC	Verifies control rod and moves it to the desired position.	
	ATC/BOP	Place keeps rod moves in the rod movement book.	
<b>End of Event 3</b>			

Quad Cities		Scenario No.: 2	Event No.: 4	Page 1 of 1
Event Description: Uncoupled Control Rod (QCOA 0300-03)				
Time	Position	Applicant's Actions or Behavior		
<p>Key Parameter Response: When rod F-12 is tested for coupling, it will indicate uncoupled and no digital readout will be provided for rod position.</p> <p>Expected Annunciator(s):            901-5 A-2, ROD OVERTRAVEL            901-5 A-3, ROD DRIFT            901-5 B-3, ROD WORTH MIN BLOCK</p> <p>Automatic Actions: None</p>				
	ATC	Acknowledges annunciator 901-5 A-2 ROD OVERTRAVEL and 901-5 A-3 ROD DRIFT then reports ROD F-12 is uncoupled.		
	ATC	Verifies control rod position.		
	ATC	Performs the actions per QCOA 0300-03.		
	ATC	Disables blocks to full on the RWM or bypasses the RWM.		
	ATC	Inserts control rod to position 46.		
	ATC	Withdraws control rod to position 48.		
	ATC	Performs coupling check and reports that rod is coupled.		
	ATC	Resets alarms and performs additional coupling checks.		
	ATC	Restores RWM to normal		
<b>End of Event 4</b>				

Quad Cities	Scenario No.: 2	Event No.: 5	Page 1 of 1
Event Description: Emergency Swap of RBCCW Pumps			
Time	Position	Applicant's Actions or Behavior	
<b>SIMOP:</b> When directed by the Lead Examiner, contact the ATC operator and report the following as an EO: "The 1B RBCCW Pump is running with a low oil level due to a broken bubbler and the pump is extremely hot. The pump will be out of oil in 30 minutes".			
Key Parameter Response: On the 912-1 panel: Pump indications, RBCCW Header Pressure Expected Annunciator(s): None Automatic Actions: None			
	ATC/BOP	Relays the report to the Unit Supervisor.	
	SRO	Directs the BOP to start the ½C RBCCW Pump and secure the 1B Pump.	
	BOP	Places the ½C RBCCW Pump in operation per QCOP 3700-02.	
<b>LEAD EVALUATOR:</b> If asked as Unit 2 US about the use of the ½C RBCCW Pump: The ½C RBCCW Pump is not needed for Unit 2.			
	BOP/SRO	Verifies that the ½C RBCCW Pump is not required for Unit 2 operation.	
<b>SIMOP ROLE PLAY:</b> As the EO at the RBCCW Pumps: Acknowledge the directives to line up the ½C RBCCW Pump.			
	BOP	Directs EO to lineup the ½C RBCCW to Unit 1 and vent the pump (QCOP 3700-02 Step F.4.b through F.4.d). <ul style="list-style-type: none"> <li>• Verify the ½C RBCCW pump suction and discharge valves to U-2 2-3799-68 and 2-3799-66 are locked closed.</li> <li>• Open the ½C RBCCW pump suction and discharge valves to U-1 1-3799-68 and 1-3799-66 valves.</li> <li>• Vent the ½C RBCCW pump.</li> </ul>	
<b>SIMOP ROLE PLAY:</b> As EO, wait 2 minutes and report back the ½C RBCCW pump is lined up to Unit 1 and vented per QCOP 3700-02 steps F.4.(b) through F.4.(d).			
	BOP	Starts the ½C RBCCW pump from Bus 19 (preferred) or Bus 29.	
	BOP	Stops the 1B RBCCW pump.	
	BOP	Verifies RBCCW header pressure is normal (in green band).	
<b>SIMOP ROLE PLAY:</b> As the EO at the RBCCW Pumps: Acknowledge the directives to isolate the 1B RBCCW Pump. (No simulator commands) Wait 2 minutes to report completion.			
	BOP	Directs the EO to close the 1B RBCCW Pump Suction and Discharge Valves, 1-3799-61 & 59.	
	ATC	If directed, monitors Reactor Recirculation pump seal temperatures.	
<b>End of Event 5</b>			

Quad Cities		Scenario No.: 2	Event No.: 6	Page 1 of 1
Event Description: APRM 5 fails downscale/inoperable (RPS B fails auto ½ scram)				
Time	Position	Applicant's Actions or Behavior		
<p><b>SIMOP:</b> When directed by the Lead Examiner, fail APRM 5 INOPERABLE by overriding the mode switch to the Zero (3) position: <b>ior dihs10700ap5md 3</b></p>				
<p>Key Parameter Response: APRM 5 recorder and meter indicate DN SCL / INOP lights lit on 901-5 and 37.</p> <p>Expected Annunciator(s):            901-5 C-3, ROD OUT BLOCK            901-5 C-6, APRM DOWNSCALE            901-5 H-1, OPRM TROUBLE/INOP            901-5 B-11, CHANNEL A/B NEUTRON MONITOR            901-5 D-13, CHANNEL 4-6 APRM HI HI OR INOP</p> <p>Automatic Actions: Rod Block (AUTO ½ Scram on RPS Channel B disabled)</p>				
	ATC	Acknowledges annunciators and reports APRM 5 indicates downscale /inoperable AND there was no ½ scram on RPS B.		
	ATC	Manually inserts a ½ scram in RPS B.		
	SRO	Refers to QCOA 0700-03 and directs crew to hold Reactor power constant.		
	BOP	May verify APRM 5 indicates DOWNSCALE at the 901-37 panel.		
	SRO	<p>Enters TS 3.3.1.1 Condition A, for 2 APRMs inoperable on RPS Ch B (12 hours to restore either APRM 5 or 6).</p> <p>May enter TS 3.3.1.1 Condition C for loss of RPS B trip capability (1 hour to restore trip capability).</p> <p>Verifies minimum number of APRM's (4) per TRM 3.3.a are operable (may state tracking only).</p>		
	CREW	Contacts Instrument Maintenance to troubleshoot APRM 5 and failure to scram on RPS B.		
<p><b>SIMOP ROLE PLAY:</b> As Instrument Maintenance, report that you will start a work package to troubleshoot APRM 5 and failure to process an auto scram signal for RPS B.</p>				
<b>End of Event 6</b>				

Quad Cities		Scenario No.: 2	Event No.: 7	Page 1 of 2
Event Description: Loss of Stator Cooling Water				
Time	Position	Applicant's Actions or Behavior		
<p><b>NOTE: This event takes approximately 4 minutes to reach the first annunciator setpoint.</b></p> <p><b>SIMOP:</b> At the direction of the Lead Examiner insert slow-failure of the 1B stator water pump over 6 minutes as follows: Insert Malfunction <b>imf eg07b 100 6:</b></p> <p>Key Parameter Response: Pump B Normal Pressure light extinguished, Pump A will not start; (During runback) Gen MWe lowering, BPVs opening, Reactor Power rising due to loss of Feedwater heating.</p> <p>Expected Annunciator(s):            901-7 C-10, GEN STATOR COOLING PANEL TROUBLE            901-7 A-5, MAJOR TROUBLE TURB CONTROL            901-7 B-4, TURBINE RUNBACK INITIATED            901-7 G-3; TURBINE BYPASS VALVE OPEN</p> <p>Automatic Actions: Turbine Runback</p>				
	BOP	Responds to annunciator 901-7 C-10 GEN STATOR COOLING PANEL TROUBLE and refers to the annunciator procedure.		
	BOP	Dispatches an EO to the stator cooling water panel and the pumps.		
	BOP	Reports "NORMAL PRESSURE" light is out on "B" SWC pump.		
	BOP	Attempts to manually start the "A" SWC pump.		
	BOP	Reports the "A" SWC pump indicates tripped. May dispatch EO to MCC 15-1 to investigate the supply breaker.		
<p><b>SIMOP Role Play:</b> 2 minutes after being dispatched as the EO to the SWC skid, report the "B" SWC pump is making a "grinding sound." If asked, Stator cooling flow is lowering.</p> <p><b>SIMOP Role Play:</b> If dispatched as an EO to MCC 15-1, report the breaker is tripped. If directed to reset and close the breaker, report the breaker will not reset.</p>				
	SRO	Directs the actions of QCOA 5300-01.		
	BOP	Responds to annunciator 901-7 B-4 TURBINE RUNBACK INITIATED and refers to the annunciator procedure.		
	BOP	Verifies a Runback is in progress by checking Load Set and reports number of bypass valves open.		
<p><b>NOTE: Per QCOA 5300-01, the generator must be tripped within 1 hr.</b></p>				
	ATC	Monitors reactor controls and indications.		



Quad Cities		Scenario No.: 2	Event No.: 7	Page 2 of 2
Event Description: Loss of Stator Cooling Water				
Time	Position	Applicant's Actions or Behavior		
	SRO	Directs Emergency Power Reduction.		
	ATC	Performs Emergency Power Reduction.		
	ATC	Inserts in-sequence control rods and/or reduces Recirc pump speeds.		
	BOP	Reduces VARS on generator to zero.		
	BOP	Dispatches an EO to check stator cooling water conductivity or determines Stator water inlet conductivity using computer point G-130.		
<b>SIMOP ROLE-PLAY:</b> As EO dispatched to check stator cooling water conductivity report Conductivity is 0.1 $\mu$ mho.				
<b>LEAD EVALUATOR:</b> If BOP reviews computer point G-130 state stator cooling water conductivity reads 0.1 $\mu$ mho.				
	BOP	Checks stator amps < 9121 after runback.		
<b>LEAD EVALUATOR:</b> Continuing to lower power is optional to obtain the 901-5 H-4 alarm.				
	ATC	Continues to lower power by Inserting in-sequence control rods and/or reducing Recirc pump speeds until 901-5 H-4 alarm actuates and the SER indicates relays 1-0590-123A/B/C/D are energized.		
	BOP	May dispatch an EO to obtain a Generator Core monitor sample per QCOA 6000-01.		
<b>SIMOP ROLE-PLAY:</b> If dispatched as an EO to obtain a Generator Core monitor sample, acknowledge.				
<b>End of Event 7</b>				

Quad Cities	Scenario No.: 2	Event No.: 8	Page 1 of 4
Event Description: Steam leak in Drywell			
Time	Position	Applicant's Actions or Behavior	
Key Parameter Response: Rising Drywell Pressure			
Expected Annunciator(s): 901-5 A-9 and 16, CHANNEL A AND B MAIN STM LINE LOW PRESSURE 901-3 A-14, TORUS HIGH/LOW LEVEL (Resetting) 901-3 A-13, DW LOW PRESS CNMT SPRAY INHIBITED (Resetting) 901-3 A-16, PRI CNMT HIGH PRESSURE			
Automatic Actions: Reactor Scram (failed). Initiation of SBGT, HPCI, LPCI, Core Spray, Emergency Diesel Generators. Isolation of Group 2 valves, Reactor Bldg and Control room Ventilation.			
Time	Position	Applicant's Actions or Behavior	
<b>SIMOP:</b> When directed by the Lead Examiner, fail TCVs 3 & 4 full open by manually inserting trigger 1 using <b>trg! 1</b> (malfunctions <b>imf tc08c 100</b> and <b>imf tc08d 100</b> ) which results in a group I isolation and lifting reliefs and safety valves. The Group I causes a LOCA and is inserted following a time delay <b>imf ms05a (1 0:05) 1 20:</b> (MSL Break Inside Drywell 1% severity, 20 minute ramp) [inserted on trigger 1 also but with a 5 second time delay]			
	ATC	Reports Reactor pressure lowering.	
	CREW	Identifies Group I isolation.	
	ATC	Identifies reactor failed to scram automatically (see event 9)	
	BOP	Reports Drywell pressure above 2.5 psig along with current value and trend.	
	CREW	Notifies Radiation Protection of elevated drywell pressure and directs them to control access.	
	CREW	Makes announcement to evacuate the Reactor building.	
	SRO	Enters QGA 100 and 200 on 2.5 psig DW press.	
	ATC	Verifies HPCI is not needed and places in trip-latch.	
	ATC/BOP	Reports ECCS auto started.	
	ATC/BOP	Verifies Emergency Diesel Generators auto started.	
	BOP	As directed, verifies 1A and 1B CAMs operating.	
	ATC/BOP	As directed, restores RBCCW and DW coolers per QCOP 5750-19.	

Quad Cities		Scenario No.: 2	Event No.: 8	Page 2 of 4
Event Description: Steam leak in Drywell				
Time	Position	Applicant's Actions or Behavior		
		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 1/2C RBCCW pump.		
		Starts drywell coolers one at a time and DW 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: <ul style="list-style-type: none"> <li>• RHR Service Water Pressure 15-20 psig &gt; RHR Pressure</li> <li>• RHR Service Water flow &lt;3600 gpm/pump</li> <li>• RHR Pressure 100-250 psig</li> </ul>		
	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.		

Time	Position	Applicant's Actions or Behavior
Quad Cities Scenario No.: 2 Event No.: 8 Page 3 of 4		
Event Description: Steam leak in Drywell		
	BOP	Initiates <u>Torus Cooling</u> per QCOP 1000-30.
		Opens MO 1-1001-34A/B.
		Opens/Throttles MO 1-1001-36A/B as necessary to maintain RHR Discharge Pressure.
	BOP	Starts 2 <sup>nd</sup> RHR Service Water pump.
		Opens MO 1-1001-5A/B to achieve approximately 140 psig RHR Service Water pressure.
		Starts C/D RHR SW Pump.
		Throttles MO 1-1001-5A/B as necessary to maintain flow <7200 gpm and discharge pressure <350 psig.
	BOP	As directed, initiates <u>Torus Sprays</u> per QCOP 1000-30.
		Opens MO 1-1001-34A/B.
		Opens MO 1-1001-37A/B.
	BOP	Opens/Throttles MO 1-1001-36A/B as necessary to maintain RHR Discharge Pressure.
	SRO	Directs BOP to secure Torus Sprays before Torus Pressure drops to 0 psig.
	BOP	Reports Torus pressure >5 psig.
	SRO	Verifies Torus level >17 ft.
	SRO	Verifies inside DW Spray Initiation Limit Curve.
	SRO	Verifies Recirc pumps and DW Coolers are tripped. Directs tripping of the Drywell coolers if they were previously restarted.
	BOP	Trips drywell coolers.
<b>CT2</b>	SRO	Directs BOP to start DW Sprays.
<b>CT2</b>	BOP	As directed, initiates <u>Drywell Sprays</u> per QCOP 1000-30.

Quad Cities		Scenario No.: 2	Event No.: 8	Page 4 of 4
Event Description: Steam leak in Drywell				
Time	Position	Applicant's Actions or Behavior		
		Opens MO 1-1001-23A/B.		
		Opens MO 1-1001-26A/B.		
		Verifies open MO 1-1001-34A/B.		
	SRO	Directs BOP to <u>secure DW Sprays</u> before DW Pressure drops to 0 psig.		
	BOP	Before DW Pressure drops to 0 psig, secures DW Sprays.		
		Closes MO 1-1001-23A/B.		
		Closes MO 1-1001-26A/B.		
		Throttles MO 1-1001-36A/B as necessary to maintain RHR Discharge Pressure.		
	SRO	If Torus water temperature cannot be held <95°F, directs start of all available Torus Cooling.		
	ATC	(CONTINUOUS) Monitors RPV water level and pressure.		
<b>LEAD EVALUATOR/SIMOP:</b> If requested to silence the vacuum breaker alarms, run batch file <b>bat SV</b> to silence alarms and inform the requestor.				
<b>SIMOP:</b> When the reactor is shutdown (event 9), RPV and Containment parameters are stable and/or at the discretion of the Lead Examiner, place the simulator in <b>FREEZE</b> .				

Time	Position	Applicant's Actions or Behavior
Quad Cities Scenario No.: 2 Event No.: 9 Page 1 of 4		
Event Description: RPS Failure (Electric ATWS)		
	ATC	Attempts to manually scram the reactor.
	ATC	Takes mode switch to SHUTDOWN and reports no rod movement due to an electric ATWS.
	SRO	Enters QGA 100, RPV Control and transitions to QGA 101 on failure to scram when above 5% power.
	ATC	Manually attempts to initiate ARI.
	ATC	Places SBLC PUMP SELECT to either SYS 1 or SYS 2.
		Identifies SBLC does not respond and places SBLC PUMP SELECT to opposite SYS position.
		Identifies SBLC still does not respond and reports lack of response to the Unit Supervisor.
	ATC	Verifies Recirc pumps are at minimum speed or automatically tripped.
	SRO	Directs ADS inhibited.
	ATC/BOP	Inhibits ADS.
	SRO	Directs Core Spray Pumps placed in in P-T-L.
	ATC/BOP	Places Core Spray Pumps in P-T-L.
	ATC	Reports Recirc pumps are tripped.
	SRO	Directs RPV pressure band of 800-1000 psig using ADS valves.
	ATC/BOP	Maintains RPV pressure between 800-1000 psig using ADS valves.
	SRO	If reactor power is < 5%, directs RPV water level be maintained in a band between -166 and +48 inches with preferred systems.
<b>EVALUATOR NOTE:</b> Reactor power is very low initially, so Terminate and Prevent actions may not be necessary.		
	SRO	If reactor power is > 5% with RPV Water level > -35 inches, directs NSO and ANSO to terminate and prevent injection.
	ATC/BOP	Terminates and prevent injection per the hard card.
	SRO	Directs NSO to let water level lower to at least -35 inches.
	ATC/BOP	Lowers RPV water level to -35 inches and reports.

Quad Cities		Scenario No.: 2	Event No.: 9	Page 2 of 4
Event Description: RPS Failure (Electric ATWS)				
Time	Position	Applicant's Actions or Behavior		
CT1	SRO	Directs actions of QCOP 0300-28.		
	ATC	Performs QCOP 0300-28 actions.		
CT1	ATC	Directs removal of scram solenoid fuses.		
<p><b>EVALUATOR NOTE:</b> Removal of scram solenoid fuses is the expected way to satisfy Critical Task 1 (CT1). However, manual rod insertion and venting the Scram Air Header will alternately achieve Critical Task 1 (Alt CT1). <b>ATC will direct the Lead Evaluator to remove the scram solenoid fuses and Lead Evaluator will direct the SIMOP to remove the fuses.</b></p>				
<p><b>SIMOP:</b> If directed to remove RPS fuses per QCOP 0300-28, wait 3 minutes and then activate the fuse Removal Batch File: <b>bat rpsfuseremoval</b> [If the batch file does not function, insert the "irf rp2Xr remove" commands in the caep file manually]</p>				
Alt CT1	ATC	Manually inserts control rods from 901-5.		
Alt CT1	ATC	May dispatch an EO to depressurize the scram air header.		
<p><b>SIMOP:</b> If directed to vent the scram Air Header, wait 5 minutes and then activate the following Remote Functions: <b>irf ia07r close</b> and <b>irf ia11r 100</b>. When the Scram Air header has vented, modify these Remote Functions: <b>mrf ia07r open</b> and <b>mrf ia11r 0</b></p>				
	ATC	Reports all rods in when fuses are removed or scram air header is depressurized.		
	SRO	Exits QGA 101 and re-enters QGA 100 when all rods are in.		
	SRO	If necessary, directs NSO to stop injecting boron.		
	ATC	If directed to stop injecting boron, places SBLC switch to off to prevent spurious injection.		
	SRO	If necessary, directs RPV Water Level be maintained 0 to +48 inches.		
<p><b>LEAD EVALUATOR/SIMOP:</b> If requested to silence the vacuum breaker alarms, run batch file <b>bat_SV</b> to silence alarms and inform the requestor.</p>				
	ATC	Maintains RPV Water Level as directed.		

Quad Cities		Scenario No.: 2	Event No.: 9	Page 3 of 4
Event Description: RPS Failure (Electric ATWS)				
Time	Position	Applicant's Actions or Behavior		
	ATC	Performs applicable QCGP 2-3 actions as time allows.		
		Verifies the SDV vent and drain valves are closed.		
		Attempts to maintain RPV level 0 to +48" with preferred injection systems.		
		Verifies DFWLC in Single Element.		
		May isolate Feed Water Reg Valve(s).		
		May place Low Flow Feed Reg Valve in Service.		
		May secure unnecessary Feed and Condensate Pumps.		
		Manually inserts SRMs and IRMs.		
		Verifies Main Turbine trips, all SV's, CV's, ISV's, IV's and extraction steam check valves close.		
		Verifies Main Generator Output Breakers tripped and places control switches in PTL.		
		Verifies Main Generator Field and Exciter Field Breakers (alarm 901-8 H-9) tripped.		
		Verifies all 4 KV buses powered from T-12.		
		Starts the Control Room AFU Booster Fan within 40 minutes.		
		Dispatches EO to reset the Generator 86 Relays.		
<b>SIMOP ROLE PLAY:</b> As necessary, the EO dispatched to reset 86 Relays and open the Main Disconnects.				
	ATC	Verifies Group 2 isolation.		
	SRO	Directs a cooldown of the RPV using ADS valves.		
	ATC/BOP	Lowers RPV Pressure as directed.		



Quad Cities	Scenario No.: 2	Event No.: 9	Page 4 of 4
Event Description: RPS Failure (Electric ATWS)			
Time	Position	Applicant's Actions or Behavior	
<b>SIMOP:</b> When RPV and Containment parameters are stable and/or at the discretion of the Lead Examiner, place the simulator in <b>FREEZE</b> .			