

# Draft Submittal

(Pink Paper)

**MCGUIRE MARCH 2007 EXAM**

**EXAM NOS. 05000369, 370/2007301**

**MARCH 19 - 22, 2007**

**MARCH 29, 2007 - WRITTEN**

Operating Test Simulator Scenarios

# DRAFT

Appendix D, Rev. 9

Scenario Outline

Form ES-D-1

Facility: McGuire	Scenario No.: 1	Op-Test No.: _____
Examiners: _____	Operators: _____	_____
_____	_____	_____
_____	_____	_____
<p>Initial Conditions: 100% Power, 'B' Train Components in Service, '1A' Auxiliary Feedwater Pump is tagged, '1A' Diesel Generator is tagged.</p> <hr/> <p>Turnover: Reduce load to perform Turbine Valve Movement Test</p> <hr/> <hr/>		

Event No.	Malf. No.	Event Type*	Event Description
1		C	(RO) MSR Relief Valve Failure
2		R	(CREW) Reduce load due to Steam Leak (MSR)
3		N	(CREW) Reduce load due to Steam Leak (MSR)
4		C	(BOP) PZR PORV Fails OPEN without interlock – Must close block valve.
5		I	(RO) 'D' S/G CF flow channel failure
6		C	(BOP) Charging Line Leak Upstream of Regen HX.
7		M	(CREW) Steam Break Inside Containment
			MSIVs fail to close on automatic signal – RO must close or initial signal manually
			No Automatic Safety Injection
			'A' Reactor Trip fails to open from the control room
<p>* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor</p>			

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class 23

TOPIC: NRC Simulator Exam

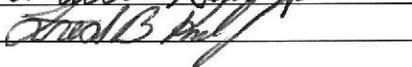
Scenario 1

**REFERENCES:**

1. McGuire Technical Specifications
2. AP/1/A/5500/004 Rapid Downpower
3. AP/1/A/5500/006 Loss of S/G Feedwater
4. AP/1/A/5500/011 Pressurizer Pressure Anomalies
5. AP/1/A/5500/001 Steam Leak
6. AP/1/A/5500/010 NV Leakage Within Capacity of Charging Pumps
7. EP/1/A/5000/E-0 Reactor Trip or Safety Injection
8. EP/1/A/5000/E-2 Faulted Steam Generator Isolation
9. EP/1/A/5000/ES 1.1 Safety Injection Termination
10. EP/1/A/5000/FR-Z-1 Response to High Containment Pressure
11. RP/O/A/5700/00 Classification of Emergency

Author:

Facility Review:

  
\_\_\_\_\_  
  
\_\_\_\_\_

January 2, 2007  
Rev. 3

## EVENT SUMMARY

1. MSR Relief Valve Opens. Enter AP-01
2. PZR. PORV fails open. Enter AP-11
3. Steam Generator 'D' Steam Pressure Channel Failure. Enter AP-06
4. Charging Line Leak. Enter AP-12
5. Steam Break Inside Containment. PZR Level going down requires Rx. Trip and SI. Enter E-0, Z-1, E-2 then ES 1.1

### SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>	Sim. Setup	<b>Rod Step On</b>	
<input type="checkbox"/>		<b>IC - 131</b>	
<input type="checkbox"/>		<b>RUN</b>	
<input type="checkbox"/>		<b>Update</b> Status Board,  <b>Setup OAC</b>  <b>Setup</b> ICCM, Turbine Displays, & Trend Recorders.  <b>Check</b> Rod Step Counters agree with rod positions	See Shift Turnover Information
<input type="checkbox"/>		<b>(M) EPQ001A</b>  <b>Set = 1</b>	Loss of D/G "1A" Control Power
<input type="checkbox"/>		<b>(LOA) CA009</b>  <b>Set = F</b>	Rackout breaker for "1A" Auxiliary Feedwater Pump
<input type="checkbox"/>		<b>(M) ISE 006A</b> <b>(M) ISE 006B</b>	Failure of Automatic Main Steam Isolation –both trains
<input type="checkbox"/>		<b>(M) ISE002A</b> <b>(M) ISE002B</b>	Failure of automatic Safety Injection – both trains
<input type="checkbox"/>		<b>(M) IPE001A</b> <b>(M) IPE002A</b>	Failure of the "A" reactor trip breaker to open from the control room.
<input type="checkbox"/>			

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>		Freeze.	
<input type="checkbox"/>		Update Fresh Tech. Spec. Log.	
<input type="checkbox"/>		Fill out the NLO's Available section of Shift Turnover Info.	
<input type="checkbox"/>	Prior to Crew Briefing	RUN	
<input type="checkbox"/>	<p style="text-align: center;"><b>Crew Briefing</b></p> <ol style="list-style-type: none"> <li>1. Assign Crew Positions based on evaluation requirements</li> <li>2. Review the Shift Turnover Information with the crew.</li> <li>3. Direct the crew to Review the Control Boards taking note of present conditions, alarms.</li> </ol>		
<input type="checkbox"/>	T-0	Begin Familiarization Period	
<input type="checkbox"/>	At direction of examiner	<b>(MALF) MSR003A</b> <b>Set 50</b> <b>Ramp 30</b> <b>Trigger 1</b>	MSR Relief leak
<input type="checkbox"/>	At direction of examiner	<b>(MALF) NC003F</b> <b>Severity 100</b> <b>Ramp 10</b> <b>Trigger 2</b>	Fails PORV open without interlock control
<input type="checkbox"/>	At direction of examiner	<b>(XMT) CF018</b> <b>Set 120</b> <b>Ramp 10</b> <b>Trigger 3</b>	Fails 'D' S/G CF flow channel 1 HIGH

	<b>Bench Mark</b>	<b>ACTIVITY</b>	<b>DESCRIPTION</b>
<input type="checkbox"/>	At direction of examiner	<b>(MALF) NV008A</b> <b>Set 25</b> <b>Ramp 30</b>	Charging line leak Upstream of Regen. HX.
	At direction of examiner	<b>(M) SM008B</b> <b>Ramp 900</b> <b>Set 4. E6</b> <b>Trigger 5</b>	Steam line break inside containment.
<input type="checkbox"/>	At direction of examiner		
<input type="checkbox"/>			
<input type="checkbox"/>	<b>Terminate the scenario upon direction of Chief Examiner</b>		

**EVENT: Load Reduction for Turbine Valve Movement Test**

<b>Time</b>	<b>Pos.</b>	<b>Expected Actions/ Behavior</b>	<b>Comments</b>
	<b>Crew</b>	Reviews requirement of OP	
	<b>RO</b>	Enters load reduction into DEH panel	
	<b>BOP</b>	Adds Boric Acid	

Discuss with NRC.

**EVENT 1: MSR Relief Valve Leak**

Time	Pos.	Expected Actions/ Behavior	Comments
	CREW	Recognizes trip of a decrease in load other symptom of steam leak.	
	SRO	Implements AP/01 Steam Leak	
	CREW	Monitor foldout page	
	RO	Reduces load to maintain <ul style="list-style-type: none"> <li>• Excores less than 100%</li> <li>• NC Loop D/Ts less than 60 degrees D/T</li> <li>• T-ave at T-ref</li> </ul>	
	SRO	Check containment entry in Progress	<b>NO, Go to Step 5.</b>
	BOP	Check Pzr Pressure prior to event – GREATER THAN P-11.	
	BOP	Check Pzr level – STABLE OR GOING UP	
	RO	Announce occurrence on page.	
	RO	Identify and isolate the leak: <ul style="list-style-type: none"> <li>• Check SM PORVs - CLOSED</li> <li>• Check condenser dump valves – CLOSED</li> <li>• Check containment conditions</li> <li>• Check TD CA pump – OFF</li> <li>• Unit 2 Steam Header pressure – GREATER THAN 200 PSIG</li> <li>• Dispatch operator to check for leaks.</li> </ul>	
	BOP	Check UST level – STABLE OR GOING UP	
	SRO	Evaluate unit shutdown	

**EVENT 2/3: Load Reduction**

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Implements AP-04	SRO may implement AP-04 Rapid down power or may choose a power level to go to.
	Crew	Monitor Foldout page Announce occurrence on page	
	RO	Check turbine control – IN AUTO	
	RO	Check MW loop in service.	
	SRO	Check shutdown to Mode 3 desired.	<b>NO GO TO Step 8</b>
	SRO	Determine the required power reduction per table	
	RO	Check control rods – IN AUTO	
	Crew	Notify SOC of load reduction	
	RO	Initiate load reduction	
	BOP	Borates NC system per table	
	Crew	Will stabilize and leak will reseal.	

**Event 4: Pzr PORV Fails OPEN**

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Recognizes PORV Failure	
	SRO	Goes to AP/11 Pressurizer Pressure Anomalies	
	BOP	Check actual Pzr pressure – HAS GONE DOWN	
	BOP	Check all PZR pressure channels – INDICATING THE SAME.	<b>YES</b>
	BOP	Check Pzr PORVs – CLOSED	No, NC-36B is OPEN a. Close PORVs b. If PORV will not close, THEN close PORV isolation valve.
	BOP	Check Pzr spray valves - CLOSED	
	BOP	Check Pzr PORVs - CLOSED	Close 1NC-36B, 1NC-269
	BOP	Check Pzr spray valves - CLOSED	
	SRO	Go TO Step 9	
	RO	Announce occurrence on page.	
	BOP	Check 1NV-21A - CLOSED	
	BOP	Check the following Pzr heaters – ON <ul style="list-style-type: none"> <li>• 1A</li> <li>• 1B</li> <li>• 1D</li> </ul>	
	BOP	Check 1C Pzr heaters - ON	
	BOP	Check Pzr pressure – GOING UP TO DESIRED PRESSURE	
	BOP	Check “1NC-27 PRESSURIZER SPRAY EMERGENCY CLOSE” switch – SELECTED TO “NORMAL”	
	BOP	Check “1NC-29 PRESSURIZER SPRAY EMERGENCY CLOSE” switch – SELECTED TO “NORMAL”	
	SRO	GO TO Step 24	
	BOP	Ensure “PZR PRESS REC SELECT” is on operable channel.	
	SRO	Tech Specs. 3.4.1, 3.4.11	

**EVENT 5: 'D' CF Channel Flow Instrument Failure**

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Refer to annunciator responses for <b>1AD-4</b> <ul style="list-style-type: none"> <li>•</li> </ul>	Per annunciator response and AP/06 the operator will swap failed channel to operable channel  1AD-4 A-4, C-4
	SRO	Enters AP/06 Loss of S/G Feedwater	
	RO	Places Feed Regulator to Manual Restores S/G level to program level	<i>Immediate Action</i>
	RO	Checks if CF pumps speed control has failed	<i>Immediate Action</i>
	RO	Checks the following channel indicating the same: <ul style="list-style-type: none"> <li>• Feed flow</li> <li>• Steam Flow</li> <li>• S/G Level</li> </ul>	Selects operable channel  Channel 2
	RO	Checks the reactor trip breakers closed > P-11	Yes
	RO	Monitor S/G NR Level	If at any time S/G NR Level approaches 17% or 83%, then trip Reactor
		<b>Should announce occurrence on page</b>	
	RO	Check reactor power - GREATER THAN 3%	
	BOP	Check CM/CF feeding S/G	
	RO	S/G level stable or trending to program level	
	BOP	Checks NC temperature with NC pumps on stable or trending to programmed temperature	
	RO	Check all S/G CF control valves - IN AUTO	When the following are met then return affected S/G CF control to automatic <ul style="list-style-type: none"> <li>• Automatic control is desired</li> <li>• Affected S/G level restored to program level</li> <li>• Selected control channels indicated correctly</li> <li>• Feed flow</li> <li>• Steam flow</li> <li>• S/G level</li> </ul>

**Event 1:** Steam Generator "1D" Steam Pressure Channel 1 Failure "**HIGH**".

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Check all S/G CF control bypass valves - IN MANUAL AND FULL OPEN	
	RO	Checks both CF pumps - IN AUTO	
	RO	Check all CA pumps - OFF	
	SRO	Contacts WCC to have WR written, have I&E investigate and repair failed channel and evaluate T.S..  Exit procedure	<b>Failure will not be repaired</b>  <b>There are no Tech Specs for this instrument.</b>

**Event 6: Charging Line Leak**

Time	Pos.	Expected Actions/ Behavior	Comments
	Crew	Recognizes loss of charging.	
	SRO	Enters AP/10	
	SRO	Check containment entry in progress	NO
	SRO	Check leak known to be in the Auxiliary building	NO
	BOP	Check PZR level stable or going up	
	BOP	If at any time while in this procedure PZR level can not be maintained STABLE, then perform step 3.	
	BOP	Check PZR pressure – STABLE OR TRENDING TO 2235 PSIG.	
	RO	Check main steam line intact: <ul style="list-style-type: none"> <li>• Reactor power – AT TURBINE POWER</li> <li>• NC Loop T-ave - STABLE</li> </ul>	NO
	RO	Announce occurrence on page.	
	BOP	Estimate the leak rate	
	SRO	REFER to RP/000 Classification of Emergency	
	SRO	If NC leakage exceeds Tech Spec then: <ul style="list-style-type: none"> <li>• Ensure OAPFT in service</li> <li>• Evaluate if leakage greater than SLC 16.9.7</li> </ul>	<b>HOW HANDLE OAPFT?</b>
	SRO	If VCT level goes below 16% then swap suction to FWST	
	SRO	If containment pressure goes above Tech Spec limit then evaluate placing all 4 VL AHUs in high speed.	
	BOP	Check seal leakoff on all NC pumps – LESS THAN 6 GPM.	
	BOP	Check NC pump thermal barriers intact.	
	SRO	Go To Step 17.	

**Event 2: Charging Line Leak**

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Check leak – Suspected on letdown line near demineralizers.	<b>NO go to Step 19.</b>
	SRO	Check leak – Known to be on normal letdown line.	<b>NO, go to Step 21.</b>
	SRO	Check leak – Known to be on VCT	<b>NO, go to Step 23</b>
	SRO/ BOP	Check leak – Known to be on Normal Charging line downstream of 1NV-244A	
	BOP	Isolate the leak as follows: <ul style="list-style-type: none"> <li>• Close letdown isolation valves</li> <li>• Isolate charging</li> <li>• Check leak – ISOLATED</li> <li>• Establish excess letdown per G-1</li> <li>• Go To Step 30</li> </ul>	
	SRO	Notify chemistry as to size and location of leak.	
	SRO	Contact station management to evaluate need to shutdown.	
	SRO	Check unit shutdown required	<b>NO, go to Step 35</b>
	SRO	When leak less than Tech Spec limits, then realign VCT.	
		<b>AT END OF AP-10 INSERT STEAM LEAK</b>	

**Event 7: Steam Leak Requiring Shutdown**

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	May reference AP-01 Steam Leak	See actions on page 12.
	RO	a. Trip reactor b. Close all MSIVs using individual pushbuttons c. Continue with the AP as time allows d. Go to E-0 Reactor Trip or SI	Crew will trip reactor at some point based on conditions

**Event 7: Steam Line Break Inside Containment**

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Enters E-0	
	Crew	Monitors Foldout page	
<b>* Critical to open bkr</b>	RO	Check Reactor Trip: <ul style="list-style-type: none"> <li>• rod bottom lights</li> <li>• reactor trip breakers open</li> <li>• I/R amps decreasing</li> </ul>	<i>Immediate Action</i> 'A' RTB will not open – must dispatch someone to open to reset SI
	RO	Check Turbine Generator tripped <ul style="list-style-type: none"> <li>• TV's closed</li> </ul>	<i>Immediate action</i>
	BOP	Check ETA and ETB energized	<i>Immediate action</i>
	RO	Check SI status light - LIT	<i>Immediate action</i>
	BOP	Check LOCA sequencers (A & B) actuated	<i>Immediate action</i>
	SRO/ RO	Announce "Unit 1 Safety Injection" on page	
	BOP	Checks ESF Monitor Light Panel <ul style="list-style-type: none"> <li>• Groups 1,2 and 5 DARK</li> <li>• Group 3 LIT</li> <li>• Checks OAC in service</li> </ul>	
	BOP	Checks Group 4, Rows A thru F LIT as Required	Auto actuation of Phase A is blocked BOP will <ul style="list-style-type: none"> <li>• ensure both trains Phase A Isolation are initiated</li> <li>• Align or start S/I and Phase A components with individual windows in Group 4 as required.</li> <li>• Go to Step 7.f</li> </ul>
	BOP	Check LOCA Sequencer Actuated status light on energized train(s) - LIT	
	BOP	Check the following on Monitor Light Panel Group 4 LIT <ul style="list-style-type: none"> <li>• C-3</li> <li>• C-6</li> <li>• F-4</li> <li>• F-5</li> </ul>	
	RO	Checks CA is running and at least 3 S/G's NR level > 17%	

**Event 7: Steam Line Break Inside Containment**

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Checks KC pumps running	
	BOP	Checks RN pumps running	
	SRO	Dispatch operator to stop affected D/G using emergency stop pushbutton.	
	RO BOP	Monitor affected RN cooled components and shut down as necessary.	
	SRO	Directs Unit 2 Operator to throttle RN to minimum & start 2A RN pump	<b>EXAMINER CUE:</b> • 2A RN pump is running
	RO	Checks all S/G pressures > 775 psig	Probably NO at this time as the 'B' S/G depressurizes  a. Check the following closed: • All MSIVs • All MSIV bypass valves • All SM PORVs b. If any valve open, THEN: • Initiate Main Steam Isolation • If any valve still open, then close valve.
	BOP	Checks Containment pressure has remained less than 3 psig	NO
	BOP	Checks NV Pump to Cold Leg Flow gauge - indicating flow - YES checks NC pressure < 1600 psig  Check NI pumps indicating flow.	NO, will ensure ND mini-flow valves are open Go to step 15
	SRO	When available notifies OSM or other SRO to implement Generic Enclosure 22	<b>EXAMINER CUE:</b> <b>OSM will ensure Generic Enclosure 22 implemented.</b>
	RO	<ul style="list-style-type: none"> <li>• Checks CA flow &gt; 450 gpm and takes control of CA to maintain no load levels</li> <li>• checks VI header pressure &gt; 60 psig</li> <li>• Maintains N/R level between 11% and 50%</li> </ul>	
	BOP	Checks NC pumps ON and Tave stable or trending to 557 degrees	If not stable and decreasing crew will go to Enclosure 3
	BOP	Checks Pzr PORV & Spray Valves closed	
	RO	Checks subcooling > 0 deg.	

**Event 7: Steam Line Break Inside Containment**

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Checks all main steam lines INTACT <ul style="list-style-type: none"> <li>All S/G pressure – STABLE OR GOING UP</li> <li>All S/G - PRESSURIZED</li> </ul>	If any S/G is faulted, THEN: <ol style="list-style-type: none"> <li>Implement F-0</li> <li>GO TO E-2 Faulted Steam Generator Isolation.</li> </ol> * Critical to chose right procedure

**FR-Z-1 Response to High Containment Pressure**

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	IF loss of emergency coolant recirc has occurred, THEN this procedure may be completed as time allows.	
	CREW	Monitor foldout page	
	BOP	Stop all NC pumps.	
	BOP	Ensure all RV pumps are in manual and off.	
	SRO	Dispatch operators to remove white tags and close the following breakers; <ul style="list-style-type: none"> <li>1EMXA-R2A</li> <li>1EMXB1-6B</li> </ul>	
	SRO	Check containment pressure less than 15 psig.	
	SRO	Check any NS pump on - YES	
	SRO	Perform the remainder of this procedure as time allows.	
	SRO	Should exit this procedure and go to E-2.	

Event 7: E-2 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	CREW	Monitor Foldout Page	
	CREW	Maintain at least one S/G available for NC System cooldown in subsequent steps.	
	CREW	Maintain any faulted F/G or secondary break isolated during subsequent recovery action unless needed for NC System cooldown.	
	RO	Check the following – CLOSED <ul style="list-style-type: none"> <li>• All MSIVs</li> <li>• All MSIV bypass valves</li> </ul>	NO, 'B' MSIV will be open and can not be closed
	RO	Check at least one S/G pressure – STABLE OR GOING UP	
	RO	Identify faulted S/G(s) <ul style="list-style-type: none"> <li>• Any S/G pressure – GOING DOWN IN AN UNCONTROLLED MANNER</li> <li>• Any S/G - DEPRESSURIZED</li> </ul>	
	RO	Check faulted S/G SM PORV - CLOSED	
	RO	Reset CA modulating valve	
	RO	If TD CA pump is the only source of feedwater, THEN maintain steam flow to it from at least on S/G.	
	RO	Isolate faulted S/G as follows: <p>b. For 1B S/G</p> <ol style="list-style-type: none"> <li>1. Check 'S/G B FDW ISOLATED' status light – LIT</li> <li>2. Close 1CA - 54A</li> <li>3. Close 1CA - 58A</li> <li>4. Dispatch operator to unlock and close:               <ul style="list-style-type: none"> <li>• 1SA-2</li> <li>• 1SA-78</li> </ul> </li> <li>5. Check BB valves – CLOSED               <ul style="list-style-type: none"> <li>• 1BB-2B</li> <li>• 1BB-6A</li> </ul> </li> <li>6. Close 1SM-89</li> </ol>	

**Event 7: E-2 Evaluation**

	BOP	Check is S/G tubes intact	YES
	CREW	<p>Check is S/I termination criteria:</p> <ul style="list-style-type: none"> <li>a. NC subcooling based on core exit T/Cs – GREATER THAN 0° F</li> <li>b. Secondary heat sink</li> <li>c. NC pressure – STABLE OR GOING UP</li> <li>d. Pzr level – GREATER THAN 11%</li> <li>e. GO TO ES 1.1 Safety Injection Termination</li> </ul>	<p>The crew may go to E-1 Loss of Secondary Coolant for a few steps.</p> <p>However, they will ultimately end up in SI termination.</p>

**Event 7:** Steam Line Break ES – 1.1 SI Termination

	Pos.	Expected Actions/ Behavior	Comments
	SRO	Monitor foldout page	
	SOP	Reset the following: a. S/I b. Sequencers c. Phase A isolation d. Phase B isolation	
	CREW	If at any time a B/O signal occurs, then restart S/I equipment previously on.	
	BOP	Establish VI to containment. a. Open the following • 1VI-129B • 1VI-160B • 1VI-150B b. Check VI header pressure – GREATER THAN 85 PSIG.	
	SRO	Check is NS pumps should be stopped: a. Any NS pump - ON	NO, go to Step 5
	BOP	Stop all but one NV pump.	
	BOP	Check NC pressure – STABLE OR GOING UP	
	BOP	Isolate NV S/I flowpath: a. Check NV pump – SUCTION ALIGNED TO FWST b. Check NV pumps miniflow valves – OPEN: • 1NV-150B • 1NV-151A c. Close the following valves: • 1NI-9A • 1NI-10B	

**TERMINATE SCENARIO ONCE 1NI-9 AND 1NI -10 ARE CLOSED**

**Note to Examiner:** Be sure SRO classifies event at end of scenario.

**Alert due to Explosion 4.6.A.1**



# DRAFT

Appendix D, Rev. 9

Scenario Outline

Form ES-D-1

Facility: McGuire	Scenario No.: 2	Op-Test No.: _____
Examiners: _____	Operators: _____	_____
_____	_____	_____
_____	_____	_____
<p>Initial Conditions: 90% Power, 'B' Train Components in Service, '1A' Auxiliary Feedwater Pump is tagged, '1A' Diesel Generator is tagged</p> <hr/> <p>Turnover: Turbine Valve Movement Test is complete. Increase load to 100%.</p> <hr/> <hr/> <hr/>		

Event No.	Malf. No.	Event Type*	Event Description
1		I	(RO) Power Range 41 Fails High
2		I	(BOP) Charging Flow Transmitter Fails Low
3		C	(RO) Feed Reg Valve Controller Fails go to Alternate Control
4		C	(RO/BOP) EKVA Breaker Opens (Inverter Output Breaker)
5		N	(CREW) Load Reduction due to Steam Generator Tube Leak / Rods fail to move in auto
6		R	(CREW) Boration due to Steam Generator Tube Leak
			(CREW) Steam Generate Tube Leak requiring shutdown
7		M	Steam Generator Tube Rupture 'C' S/G
			'C' S/G MSIV will not close – Crew must use S/G PORVs to Cooldown
			Failure of Phase 'A' Train 'A' in automatic
			1NV-221 and 1NV-222 will not open automatically on Safety Injection signal.

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

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class 23

TOPIC: Nuclear Regulatory Commission Simulator Exam  
Scenario 2

**REFERENCES:**

1. McGuire Technical Specifications
2. OP/1/A/6100/003 Controlling Procedure for Unit Operation
3. AP/1/A/5500/004 Rapid Downpower
4. AP/1/A/5500/010 NC System Leakage Within Capacity of both NV Pumps
5. AP/1/A/5500/016 Malfunction of Nuclear Instrumentation
6. AP/1/A/5500/006 S/G Feedwater Malfunction
7. AP/1/A/5500/015 Loss of Vital or Aux Control Power
8. EP/1/A/5000/E-0 Reactor Trip or Safety Injection
9. EP/1/A/5000/E-3 Steam Generator Tube rupture
10. RP/O/A/5700/000 Classification of Emergency

Author:

Facility Review:


January 2, 2007  
Rev. 1

## EVENT SUMMARY

1. Power Range N-41 Fails
2. Charging Flow transmitter fails
3. Feed regulating valve controller failure
4. Loss of Vital Power EKVA
5. Load reduction due to steam generator tube leak.
6. SGTL. Enter AP-10
7. Manual Rx Trip and SI. Enter E-0
8. Implement F-0 and Go to E-3 from E-0 step 21

### SIMULATOR OPERATOR INSTRUCTIONS

—	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>	Sim. Setup	<b>Rod Step On</b>	
<input type="checkbox"/>		<b>IC - 132</b>	
<input type="checkbox"/>		<b>RUN</b>	
<input type="checkbox"/>		<b>Update</b> Status Board,  <b>Setup OAC</b>  <b>Setup</b> ICCM, Turbine Displays, & Trend Recorders.  <b>Check</b> Rod Step Counters agree with rod positions	See Shift Turnover Information
<input type="checkbox"/>		<b>(M) EPQ001A</b>  <b>Set = Insert</b>	Loss of D/G "1A" Control Power
<input type="checkbox"/>		<b>(LOA) CA009</b>  <b>Set = Rack Out</b>	Rack out breaker for "1A" Auxiliary Feedwater Pump
<input type="checkbox"/>		<b>(MALF) SM08C</b>  <b>Insert</b>	'C" MSIV will not close on ruptured S/G
<input type="checkbox"/>		<b>(M) ISE003A</b>	Phase A Train A isolation fails to actuate automatically
<input type="checkbox"/>		<b>(M) ISE0010A</b> <b>(M) ISE0010B</b>	1NV-221A Will not open automatically 1NV-222B Will not open automatically
<input type="checkbox"/>		<b>(M) IRE010B8</b>  <b>(M) IRE010F2</b>	Control Rod B8 stuck  Control Rod F2 stuck

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>		Freeze.	
<input type="checkbox"/>		Update Fresh Tech. Spec. Log.	
<input type="checkbox"/>		Fill out the NLO's Available section of Shift Turnover Info.	
<input type="checkbox"/>	Prior to Crew Briefing	RUN	
<input type="checkbox"/>	<p style="text-align: center;"><b>Crew Briefing</b></p> <ol style="list-style-type: none"> <li>1. Assign Crew Positions based on evaluation requirements</li> <li>2. Review the Shift Turnover Information with the crew.</li> <li>3. Direct the crew to Review the Control Boards taking note of present conditions, alarms.</li> </ol>		
<input type="checkbox"/>	T-0	Begin Familiarization Period	
<input type="checkbox"/>	At direction of examiner	(MALF) ENB004A Insert Trigger 1	Fails Power Range N41 High Voltage
<input type="checkbox"/>	At direction of examiner	(XMT) NV044 Set = 0 Ramp 30 Delay 10 Trigger 2	Fails Charging Line flow transmitter
<input type="checkbox"/>	At direction of examiner	(MALF) IFE009A Ramp 10 Delay 10 Severity 100 Trigger 3	S/G 'A' Feedwater Controller Failure – Normal fails
<input type="checkbox"/>	At direction of examiner	(LOA) EPL028 Insert Trigger 4	Loss of vital power

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>	1EVIA Actions per AP	<b>INSERT:</b> <b>LOA: IPE007</b> <b>Set = Door Open</b>  <b>ANN: AD12-B03</b> <b>Set = OFF</b> <b>Trigger 5</b> <b>ANN: AD12-B04</b> <b>Set = OFF</b> <b>Trigger 5</b> <b>Delete MAL – EPL003A</b> <b>And Activate Trigger 5</b> <b>Close Door</b> <b>IPE007</b> <b>Set = Door Closed</b>	<p>Report to the CR that 'AC Output NO.1" located on 1EVIA Manual Bypass switch is open.</p> <p>Notify CR, breakers are opened to SSPS and Prot. Cab 1.</p> <p>Notify CR that he "AC Output NO.1" breaker on 1EVIA Manual Bypass switch panel is "TRIPPED" and will close per AP-15 guidance.</p> <p>Inform CR that the breaker is closed and voltage on 1EKVA is 120v and IAE need to complete step 8 of Encl 10.</p> <p>Simulates restoring power to 1EKVA.</p> <p>Clear annunciators for SNSWP and Lo and Lo Levels.</p>
<input type="checkbox"/>	At direction of examiner	<b>(MALF) SG001C</b> <b>Set 40</b> <b>Ramp 300</b> <b>Trigger 6</b>	Initiates a S/G tube leak on 'C' steam generator
<input type="checkbox"/>			Will increase tube leak after load reduction has commenced.
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>	<b>Terminate the scenario upon direction of Chief Examiner</b>		

**EVENT: Load Increase After Turbine Valve Movement Test**

<b>Time</b>	<b>Pos.</b>	<b>Expected Actions/ Behavior</b>	<b>Comments</b>
	<b>Crew</b>	Reviews requirement of OP	
	<b>RO</b>	Enters load increase into DEH panel	
	<b>BOP</b>	Dilutes as required	

**EVENT 1: Power Range N-41 Fails High**

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Place control rods in Manual.	Immediate Action
	RO	Check S/G levels at program level.	
	RO	Announce occurrence on the page.	
	RO	Check P/R channels – ONLY ONE CHANNEL FAILED	
	RO	Position “PR TO S/G PROGRAM LEVEL CHANNEL DEFEAT” switch to defeat inoperable channel.	
	RO	Secure any power increase in progress.	
	RO	Check interlocks in required state: <ul style="list-style-type: none"> <li>• P-7</li> <li>• P-8</li> <li>• P-10</li> </ul>	
	BOP	Perform the following actions at the ‘MISCELLANEOUS CONTROL AND INDICATION PANEL’ drawer <ul style="list-style-type: none"> <li>• Rod stop bypass</li> <li>• Power mismatch bypass</li> </ul>	
	BOP	Perform the following actions at the “DETECTOR CURRENT COMPARATOR” drawer. <ul style="list-style-type: none"> <li>• Upper Section to failed channel position</li> <li>• Check defeat light for upper section - LIT</li> <li>• Lower Section to failed channel position</li> <li>• Check defeat light for lower section - LIT</li> </ul>	
	BOP	Perform the following actions at the “COMPARATOR AND RATE” drawer. <ul style="list-style-type: none"> <li>• Place the “COMPARATOR CHANNEL DEFEAT” switch to the failed channel position.</li> <li>• Check the “COMPARATOR DEFEAT “ light - LIT</li> </ul>	
	BOP	Trip bistables of failed channel. Remove fuses	
	RO	Check the following status lights for the failed channel – LIT <ul style="list-style-type: none"> <li>• “NUC OVERPOWER ROD STOP”</li> <li>• P/R HI FLUX LO STPT</li> <li>• P/R HI FLUX HI STPT</li> <li>• P/R HI FLUX RATE</li> </ul>	

Event 1: P/R 41 Failure

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Check the following annunciator lights – LIT <ul style="list-style-type: none"> <li>• P/R HI VOLATABGE FAILURE</li> <li>• P/R HI FLUX HI STPT ALERT</li> <li>• P/R HI FLUX RATE ALERT</li> </ul>	
	RO	Check the following status lights on 1SI-18 – LIT <ul style="list-style-type: none"> <li>• P/R LO SETPOINT TRAIN A TRIP BLOCKED</li> <li>• P/R LO SETPOINT TRAIN B TRIP BLOCKED</li> </ul>	
	RO	If desired return reg valves to AUTO.	
	RO	Ensure operable P/R channel selected to record on NIS recorder	
	RO	Adjust control rods to maintain T-ave at T-ref.	
	RO	WHEN T-ave within 1 degree of T-ref and auto rod control is desired, then return control rods to AUTO.	
	SRO	Have IAE trip bistables within 6 hours. <ul style="list-style-type: none"> <li>• OPDT</li> <li>• OTDT</li> </ul>	
	RO	WHEN IAE completes Step 19, THEN check status light for affected P/R For P/T 41 <ul style="list-style-type: none"> <li>• NC LOOP A OPDT RX TRIP</li> <li>• NC LOOP A OTDT RX TRIP</li> </ul>	
	SRO	Contacts WCC to write WR, have I&E repair PR 41	<b>Failure will not be repaired</b> T.S 3.3.1.2, 3.3.1.3, 3.3.1.6, 3.3.1.16b, 3.3.1.16c, 3.3.1.16d, 3.3.1.7

**Event 2: Charging Flow Transmitter Failure**

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Recognizes reduced charging flow indication	<i>NV-238 will be opening</i>
	CREW	Refers to Annunciator response for AD-7 G-2	
	BOP	Take manual control of normal charging	
	SRO	Call WCC SRO	

**Event 3: Feed Reg Valve Failure**

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Refer to annunciator responses for <b>1AD-4</b> <ul style="list-style-type: none"> <li>A-1, B-1, C-1</li> </ul>	
	SRO	Enters AP/06 Loss of S/G Feedwater	
	RO	Places Feed Regulator to Manual Restores S/G level to program level	<b>Immediate Action</b> <b>Must go Alternate Control</b>
	RO	If CF pump speed control has failed, THEN: <ul style="list-style-type: none"> <li>Adjust affect CF pump(s) in "OCS MAN"</li> <li>Adjust CF pump speed as necessary to restore S/G levels to program.</li> </ul>	<b>Immediate Action</b>
	RO	Checks the following channel indicating the same: <ul style="list-style-type: none"> <li>Feed flow</li> <li>Steam Flow</li> <li>S/G Level</li> </ul>	
	RO	Checks the reactor trip breakers closed > P-11	Yes
	SRO	If at any times S/G NR level approaches 17% or 83% then: <ul style="list-style-type: none"> <li>Trip reactor</li> <li>Go To E-0 Reactor Trip</li> </ul>	
	RO	Announce occurrence on the page.	
	RO	Check Reactor power > 3%.	
	BOP	Check CM/CF feeding S/G	
	RO	S/G level stable or trending to program	
	BOP	Checks NC temperature with NC pumps on stable or trending to programmed temperature	
	RO	Check all S/G CF control valves – IN AUTO.	
	RO	Check all S/G CF control bypass valves – IN MANUAL AND FULL OPEN.	

**Event 3: Feed Reg Valve Failure**

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Check both CF pumps – IN AUTO.	
	RO	Check all CA pumps - OFF	
	SRO	Contacts WCC to have WR written, valve and evaluate T.S. Exit procedure	<b>Failure will not be repaired</b>

**Event 4: EKVA Failure**

Time	Pos.	Expected Actions/ Behavior	Comments
	CREW	Recognizes a loss of Channel 1	
	RO	If channel 1 failed THEN place control rods in manual.  If controlling S/G channel failed, THEN: <ul style="list-style-type: none"> <li>• Place affected CF control valves in manual.</li> <li>• Restore S/G levels to program.</li> <li>• Go to Step 3.</li> </ul>	
	RO	Ensure the following switches are selected to operable channel on each S/G. <ul style="list-style-type: none"> <li>• Feed Flow</li> <li>• Steam Flow</li> <li>• S/G Level</li> </ul>	
	SRO	Check ND in RHR Mode	NO, Go to Step 7
	BOP	Check all Pzr pressure channels indicated the same.	NO, if controlling channel malfunctioning then: <ul style="list-style-type: none"> <li>• Place Pzr pressure master in manual</li> <li>• Adjust Pzr Master output to 50%</li> <li>• Place PZR PRESS CNTRL SELECT” switch to backup switch.</li> <li>• Place “PZR PRESS MASTER” in AUTO as desired.</li> </ul>
	BOP	Check all Pzr level channels indicated the same.	Place Back-up channel in service  Reduce charging to minimum while maintaining 6 gpm per pump  Pzr at program level.  Energize Pzr heaters as desired.
	RO	Check MSIVs - OPEN	
	RO	Check all CF control valves – IN AUTO	
	SRO	Check Vital AC panelboard1EKVA energized.	NO  Establish letdown or excess letdown
	SRO	Check Vital AC panelboard1EKVD energized.	

**Event 4: EKVA Failure**

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Check KXA energized.	
	SRO	Check all Vital DC panelboards energized as follows: <ul style="list-style-type: none"> <li>• OAC in service</li> <li>• The following energized EVDA, EVDB, EVDC, EVDD</li> <li>• GO TO Step 31.</li> </ul>	
	SRO	Check Vital AC panelboards energized: <b>1EKVA - NO</b>	<b>Go to Step 33</b>
	SRO	Dispatch an operator to perform the following while continuing in this procedure. <ul style="list-style-type: none"> <li>• Determine the cause of the alarm</li> <li>• Restore power to 1EKVA per Enclosure 10.</li> </ul>	<b>DISCUSS TIMING WITH NRC</b> <b>PULL UP MALF AND CLOSE BREAKER</b>
		<b>ENCLOSURE 10</b>	<b>See instructions on how to restore EKVA</b>
	SRO	Dispatch IAE to open breakers in 7300 cabinets.	
	SRO	Ensures breakers are open before restoring power to 1EKVA.	
	SRO	On 1EVIA Manual Bypass switch panel check closed "AC OUTPUT TO NO. 1" breaker – CLOSED	NO, close breaker Go to step 8
	SRO	Exit enclosure and returns to Step 34 in body of procedure	
	SRO	Go to Step 81	
	BOP	Check EMF Trip II alarms - RESET	
	BOP	Restores 1EMF 38, 39 and 40	
	BOP	Establishes VQ flowpath	
		Steam generator tube leak begins now.	

**Event 7: SGTR on "C" S/G**

Time	Pos.	Expected Actions/ Behavior	Comments
	Crew	Recognizes symptoms of SG Tube Leak	
	SRO	Enters AP-10 Case 1	
	RO	Checks PZR level Stable or going up	
	BOP	Performs the following <ul style="list-style-type: none"> <li>• Charging flow &lt;175 gpm</li> <li>• Ensures 1NV-238 opening</li> <li>• Open 1NV-241 maintain 6 gpm seal flow</li> <li>• Isolate letdown</li> <li>• Start 1B NV pump</li> </ul>	<b>Annunciators:</b> <b>1RAD1</b> <b>D-1, D-2</b> <b>B-1</b>
<b>Critical</b>	SRO	IF PZR level going down with max Charging flow	No
		Direct Tripping of Reactor and ensure S/I initiated.	

**EVENT: Load Reduction due to Tube Leak AP-04**

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Implements AP-04	SRO may implement AP-04 Rapid down power or may choose a power level to go to.
	Crew	Monitor Foldout page Announce occurrence on page	
	RO	Check turbine control – IN AUTO	
	RO	Check MW loop in service.	
	SRO	Check shutdown to Mode 3 desired.	<b>NO GO TO Step 8</b>
	SRO	Determine the required power reduction per table	
	RO	Check control rods – IN AUTO	
	Crew	Notify SOC of load reduction	
	RO	Initiate load reduction	
	BOP	Borates NC system per table	
	RO	Check control rods – IN AUTO	

Event 7: SGTR on "C" S/G E-0 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Enters E-0	
	Crew	Monitors Foldout page	
	RO	Check Reactor Trip: <ul style="list-style-type: none"> <li>• rod bottom lights</li> <li>• reactor trip breakers open</li> <li>• I/R amps decreasing</li> </ul>	<i>Immediate action</i> All rod bottom lights will not be lit due to 2 rods being stuck out. Per RNO RO will trip Reactor and SRO and RO should determine the Reactor is tripped.
	RO	Check Turbine Generator tripped <ul style="list-style-type: none"> <li>• TV's closed</li> </ul>	<i>Immediate action</i>
	BOP	Check ETA and ETB energized	<i>Immediate action</i>
	RO	Check SI status light - LIT	<i>Immediate action</i>
	BOP	Check LOCA sequencers (A & B) actuated	<i>Immediate action</i>
	SRO/ RO	Announce "Unit 1 Safety Injection" on page	
	BOP	Checks ESF Monitor Light Panel <ul style="list-style-type: none"> <li>• Groups 1,2 and 5 DARK</li> <li>• Group 3 LIT</li> <li>• Checks OAC in service</li> </ul>	
	BOP	Checks Group 4, Rows A thru F LIT as Required	Auto actuation of Phase A is blocked BOP will <ul style="list-style-type: none"> <li>• ensure both trains Phase A Isolation are initiated</li> <li>• Align or start S/I and Phase A components with individual windows in Group 4 as required.</li> </ul>
	BOP	Check the following on Monitor Light Panel Group 4 LIT <ul style="list-style-type: none"> <li>• C-3</li> <li>• C-6</li> <li>• F-4</li> <li>• F-5</li> </ul>	
	RO	Checks CA is running and at least 3 S/G's NR level > 17%	

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Checks KC pumps running	
	BOP	Checks RN pumps running	
	SRO	Directs Unit 2 Operator to throttle RN to minimum & start 2A RN pump	<b>EXAMINER CUE:</b> • 2A RN pump is running
	RO	Checks all S/G pressures > 775 psig	
	BOP	Checks Containment pressure has remained less than 3 psig	
	BOP	Checks NV Pump to Cold Leg Flow gauge - indicating flow - YES checks NC pressure < 1600 psig	BOP will ensure ND pump mini-flow valves are open
	SRO	When available notifies OSM or other SRO to implement Generic Enclosure 22	<b>EXAMINER CUE:</b> <b>OSM will ensure Generic Enclosure 22 implemented.</b>
	RO	<ul style="list-style-type: none"> <li>• Checks CA flow &gt; 450 gpm and takes control of CA to maintain no load levels</li> <li>• checks VI header pressure &gt; 60 psig</li> <li>• Maintains N/R level between 11% and 50%</li> </ul>	
	BOP	Checks NC pumps ON and Tave stable or trending to 557 degrees	If not stable and decreasing crew will go to Enclosure 3
	BOP	Checks Pzr PORV & Spray Valves closed	
	RO	Checks subcooling > 0 deg.	
	RO	Checks all main steam lines INTACT	
	RO/ BOP	Report S/G tube rupture parameters indicate that S/G tubes NOT intact	PER RNO Implement F-0 and Go to E-3
	SRO	Implement CSF Status Trees and go to E-3	

Event: STGR on "C" S/G E-3 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Enter E-3	
	CREW	Monitor foldout page	
	RO	Identify "C" as the ruptured S/G	
	RO	Check at least one S/G - AVAILABLE FOR NC SYSTEM COOLDOWN	
<b>Critical</b>	RO	Isolate steam flow from ruptured S/Gs as follows: <ul style="list-style-type: none"> <li>• checks ruptured S/G PORV closed</li> <li>• check S/G 1B and 1C INTACT</li> <li>• check 1BB-3B and 1BB-7A Closed</li> <li>• close 1SM-95</li> </ul>	Close 1SA-1 and 1SA-77
<b>Critical</b>	RO	Close the following on ruptured S/Gs: <ul style="list-style-type: none"> <li>• MSIV</li> <li>• MSIV bypass valve</li> </ul>	MSIV on 'C' will not close will have to close other MSIVs. <ul style="list-style-type: none"> <li>• Initiate MSI</li> <li>• Off/Rest on dumps</li> <li>• Close valves per Enclosure 3</li> </ul>
<b>Critical</b>	RO	Checks ruptured S/G NR levels greater than 11% Isolates feed flow to "C" S/G <ul style="list-style-type: none"> <li>• Close 1CA-50B</li> <li>• Close 1CA-46B</li> </ul>	
	RO	Check closed on ruptured S/Gs <ul style="list-style-type: none"> <li>• MSIV</li> <li>• MSIV bypass valve</li> </ul>	<b>NO</b>
	RO	Check ruptured S/G pressure – GREATER THAN 280 PSIG.	
	BOP	Check any NCP running.	
	BOP	Check Pzr Pressure – GREATER THAN 1955 PSIG.	

Time	Pos.	Expected Actions/ Behavior	Comments	
Critical	RO & BOP	<p>Initiate a NC system cooldown as follows:</p> <p>Determine required core exit temperature based on lowest ruptured S/G pressure.</p> <p>Check:</p> <ul style="list-style-type: none"> <li>• COND AVAILABLE FOR STEAM DUMP" status light – LIT</li> <li>• MSIV on intact S/Gs OPEN</li> </ul> <ol style="list-style-type: none"> <li>1. If Pzr pressure is greater than 1955 psig, then depressurize to 1900 psig using Pzr PORV.</li> <li>2. Depress "BLOCK" on low pressure steam line isolation block switches</li> <li>3. Maintain NC pressure less than 1955 psig.</li> <li>4. Ensure Main Steam Isolation reset.</li> <li>5. Ensure S/G PORVs reset.</li> <li>6. Dump steam using all intact S/Gs PORVs at maximum rate as follows: <ul style="list-style-type: none"> <li>• Close S/G PORV manual loader on ruptured S/G</li> <li>• Place intact S/G PORV manual loaders at 50%</li> <li>• Select "MANUAL" on "SM PORV MODE SELECT"</li> <li>• Adjust manual loader on intact S/G PORVs as required to control intact S/G depressurization rate at approximately 2 psig per second.</li> </ul> </li> </ol> <p>Check low pressure steamline isolation – BLOCKED</p> <p>Check core exit T/Cs – less than required temperature.</p> <p>Stop NC system coodown</p> <p>Maintain core exit T/Cs less than required temperature.</p>	<p><b>BASED ON TIME CAN STOP HERE</b></p>	
	RO	Control intact S/G levels		
	BOP	Checks Pzr PORV and isolation valves		
	BOP	Resets: S/I, Sequencers, Phase 'A'		
	BOP	Establish VI to containment Opens 1VI-129B, 1VI-160B and 1VI-150B Check header pressure > 85 psig		

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Check is NC System cooldown should be stopped as follows: <ul style="list-style-type: none"> <li>• CETCs less than required temperature</li> <li>• Stop cooldown</li> </ul>	
	RO	Check ruptured S/G pressure – STABLE OR GOING UP	
	RO	Check NC subcooling based on CETCs greater than 20 degrees.	
	BOP	Depressurize NC System <ul style="list-style-type: none"> <li>• Check ruptured S/G NR level less than 73%</li> <li>• Check normal spray available</li> <li>• Initiate depressurization using max spray</li> </ul> Do not continue until any of the following conditions are satisfied. <ul style="list-style-type: none"> <li>• NC Subcooling &lt; 0</li> <li>• PZR level &gt;76%</li> </ul> OR NC pressure < ruptured S/G pressure & PZR level > 11%  Close PORV or spray valve.  Check NC pressure – GOING UP.	If spray becomes ineffective then use PORV.
	CREW	Checks for S/I termination criteria <ol style="list-style-type: none"> <li>1. NC subcooling greater than 0 degrees</li> <li>2. Secondary heat sink</li> <li>3. NC pressure – stable or going up</li> </ol> Pzr level greater than 11%	
	BOP	Stop NI pumps and one NV pump	
	BOP	Check NV pump suction aligned to FWST Open 1NV-150B & 1NV-151A Close 1NI-9A & 1NI-10B	
Terminate Scenario			

**Note to Examiner: Be sure SRO classifies event at end of scenario.**

**Classification of Event: Site Area Emergency due to:**

- 1) Release of Secondary side to atmosphere with primary to secondary leakage > Tech Spec allowable.

**AND**

- 2) Primary- to- Secondary leak rate exceeds the capacity of one charging pump in the normal charging mode with letdown isolated.

## SHIFT TURNOVER INFORMATION

### UNIT 1 STATUS:

Power Level: 90%      NCS [B] 99 ppm      Pzr [B]: 99 ppm      Xe: Per OAC

---

Power History: 906% Turbine Valve Movement      Core Burnup: 485 EFPDs  
Complete

---

**CONTROLLING PROCEDURE:** OP/1/A/6100/03 Controlling Procedure for Unit Operation

### OTHER INFORMATION NEEDED TO ASSUME TO SHIFT:

Increase load to 100%.  
"1A" Diesel Generator tagged for PM.  
"1A" Motor Driven Auxiliary Feedwater Pump is white tagged for PM  
Unit 2 is available for Auxiliary Steam  
Thunderstorms are in the area  
Offsite Power Verification PT completed one hour ago

**Work Control SRO/Offsite Communicator**      **Tim**

**Plant SRO**      **Gary**

### NLO's AVAILABLE

#### Unit 1

Aux Bldg. Missy

Turb Bldg. Al

5<sup>TH</sup> Rounds. Tom

Extra(s) Richard, Andy

#### Unit 2

Aux Bldg. Warren

Turb Bldg. Greg

# DRAFT

Appendix D, Rev. 9

Scenario Outline

Form ES-D-1

Facility: McGuire	Scenario No.: 3	Op-Test No.: _____
Examiners: _____	Operators: _____	_____
_____	_____	_____
Initial Conditions: 75% Power, 'B' Train Components in Service, '1A' Auxiliary Feedwater Pump is tagged, '1A' Diesel Generator is tagged _____		
Turnover: Increase Power at 2 Mw/minute to 100%		

Event No.	Malf. No.	Event Type*	Event Description
1		N	(RO) Increasing Load to 100%
2		R	(BOP) Dilution
3		I	(BOP) Pzr Level Channel 1 Fails low – Loss of Letdown
4		C	(BOP) NV-2A Fails Closed on Restoration of Letdown
5		C	(RO) FWPT Malfunction
6		C	(RO) Feedwater Pump Trip/Failure of the Turbine to Runback in Automatic
7		M	ATWS/Loss of Heat Sink
			'B' Motor Driven Auxiliary Feedwater Pump trips
			Turbine Driven Auxiliary Feedwater Pump trips
			Reactor Trip Breakers will not open from the Control Room
			Steam Generator PORV opens – must close block valve

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

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class 23

TOPIC: NRC Simulator Exam

Scenario 3

**REFERENCES:**

1. McGuire Technical Specifications
2. OP/1/A/6100/003 Controlling Procedure for Unit Operation
3. AP/1/A/5500/12 Loss of Charging, Letdown, or Seal Injection
4. AP/1/A/5500/03 Load Rejection
5. EP/1/A/5000/E-0 Reactor Trip or Safety Injection
6. EP/1/A/5000/FR-S-1 Response to Nuclear Generation/ATWS
7. EP/1/A/5000/FR-H.1 Loss of Heat Sink
8. RP/0/A/5700/000 Classification of Emergency

Author:

Facility Review:

Charles Sawyer  
And B. Smith

January 4, 2007  
Rev. 1

## EVENT SUMMARY

1. Pressurizer Level Channel 1 fails low. Enter AP-12
2. 1NV-2A fails closed on realignment to normal letdown. Must align Excess Letdown per AP-12
3. Oil leak on 1A Main Feedwater Pump. Must trip pump and enter AP-03.
4. Turbine fails to runback automatically. Must manually close the governor valves per AP-03
5. High temperature and thrust bearing wear on 1B Main Feedwater Pump. Pump trips, resulting in reactor trip signal.
6. Reactor fails to trip from the Control Room. Enter FR-S.1
7. CA pumps trip, resulting in loss of Heat Sink. Enter FR-H.1

### SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>	Sim. Setup	<b>Rod Step On</b>	
<input type="checkbox"/>		<b>IC - 135</b>	
<input type="checkbox"/>		<b>RUN</b>	
<input type="checkbox"/>		<b>Update</b> Status Board,  <b>Setup OAC</b>  <b>Setup</b> ICCM, Turbine Displays, & Trend Recorders.  <b>Check</b> Rod Step Counters agree with rod positions	See Shift Turnover Information
<input type="checkbox"/>		<b>(M) CA 009B</b> <b>(M) CA 005</b>	"B" CA pump trips on overcurrent  TDCAP trips
<input type="checkbox"/>		<b>(M) IPE 001A</b> <b>(M) IPE 001B</b> <b>(M) IPE 002A</b> <b>(M) IPE 002B</b>	Failure of the reactor trip breakers to open from the control room.
<input type="checkbox"/>		<b>(M) DEH 002B6</b>	Blocks automatic turbine runback.
<input type="checkbox"/>		<b>(MALF) EPQ001A</b>	'A' D/G tagged out
<input type="checkbox"/>		<b>(LOA) CA009</b>	'A" CA pump racked out
<input type="checkbox"/>		<b>(MALF) SM002A</b>  <b>Set 100</b>  <b>Trigger 6</b>	S/G PORV Fails Open

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>		Freeze.	
<input type="checkbox"/>		Update Fresh Tech. Spec. Log.	
<input type="checkbox"/>		Fill out the NLO's Available section of Shift Turnover Info.	
<input type="checkbox"/>	Prior to Crew Briefing	RUN	
<input type="checkbox"/>	<p style="text-align: center;"><b>Crew Briefing</b></p> <p>1. Assign Crew Positions based on evaluation requirements</p> <p>2. Review the Shift Turnover Information with the crew.</p> <p>3. Direct the crew to Review the Control Boards taking note of present conditions, alarms.</p>		
<input type="checkbox"/>	T-0	Begin Familiarization Period	
<input type="checkbox"/>	At direction of examiner	<b>(XMT) ILE 001</b> <b>Severity = 0</b> <b>Ramp 5</b> <b>Trigger 1</b>	Pzr Level Channel 1 fails low. Letdown auto isolates.
<input type="checkbox"/>	<b>WHEN</b> 1NV-2A is opened in AP-12	<b>(OVR) NV 062C</b> <b>Set = ON</b> <b>Trigger 2</b>	1NV-2A fails closed. Operators must align Excess Letdown.
<input type="checkbox"/>	At direction of examiner	<b>(MALF) LF 002A</b> <b>Severity = 75</b> <b>Ramp = 300</b> <b>Trigger 3</b>	Oil leak on 1A CF pump

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>	At direction of examiner	(XMT) LF 003B Trigger 4 - ALL (XMT) LF 0046 Set 240 (XMT) LF066 Set 260 (XMT) LF 060 Set 260	High temperature on 1B CF pump bearings
<input type="checkbox"/>	At direction of examiner	(MALF) LF 003B Trigger 5	1B CF pump trips.
	Wait at least 2 minutes after FWPT trip <b>AND</b> 30 seconds after directed to locally trip the reactor.	<b>DELETE the following malfunctions:</b> (M) IPE 001A (M) IPE 001B (M) IPE 002A (M) IPE 002B	Locally trips the reactor.
<input type="checkbox"/>	At direction of examiner	(MALF) SM002A Set 100 Trigger 6	Fails open S/G PORV
<input type="checkbox"/>			
<input type="checkbox"/>	Terminate the scenario upon direction of Chief Examiner		



**Events 3 and 4:** Pressurizer Level Channel 1 Fails Low and NV-2A fails closed after opening

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Recognizes loss of letdown	
	SRO	If a loss of charging through the Regenerative HX has occurred. – NO	
	BOP	Check Pzr level – LESS THAN 96%	
	SRO	If at any time 'REGEN HZ LETDN HI TEMP' alarms THEN close <ul style="list-style-type: none"> <li>• 1NV-1A</li> <li>• 1NV-2A</li> </ul>	
	SRO	Stop any power or temperature changes.	<b>RO should go to hold on the turbine load increase.</b>
	SRO	Announce occurrence on paging system.	
	SRO	If this AP entered due to loss of letdown only, <b>THEN GO TO Step 36.</b>	
	BOP	Ensure the following valves are closed: <ul style="list-style-type: none"> <li>• 1NV-458A</li> <li>• 1NV-457A</li> <li>• 1NV-35A</li> </ul>	
	BOP	Ensure 'NC SYS M/U CONTROLLER' in 'AUTO'	
	BOP	Ensure charging flow going down to maintain Pzr at program level.	
	BOP	Check 'LETDN RELIEF HI TEMP' alarm – HAS REMAINED DARK	
	BOP	Check 1NV_21A - CLOSED	
	BOP	Operate Pzr heaters as follows: <ul style="list-style-type: none"> <li>• Check all Pzr heater group supply breakers – CLOSED</li> <li>• Check normal Pzr spray – AVAILABLE</li> <li>• Place A, B, D heaters groups in manual and ON.</li> </ul>	BOP will have to: <ul style="list-style-type: none"> <li>• Ensure level control channel and recorder are on operable channels.</li> <li>• Close Pzr heater group supply breakers</li> </ul>
	BOP	Check the following valves – OPEN <ul style="list-style-type: none"> <li>• 1NV-1A</li> <li>• 1NV-2A</li> </ul>	<b>NO, NV-2A will be closed</b> <b>Go to Step 44</b>

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Determine if both 1NV-A and 1NV-2A have both been open in the past 30 minutes.  Check orifice isolation valves – AUTO CLOSED  Check if orifice isolation valves reached fully closed – PRIOR TO 1NV-1A OR 1NV-2A CLOSING	<b>GO TO Step 48</b>
	BOP	Establish normal letdown <ul style="list-style-type: none"> <li>• Ensure 1NV-459 is closed</li> <li>• Place 1NV-124 in manual between 10-20% open.</li> <li>• Check the following open 1NV-1A and 1NV-2A</li> <li>• Establish cooling to Reg HX by</li> <li>• Establish at least 65 gpm charging flow by throttling open 1NV-238</li> <li>• Throttle 1NV-241 to establish approximately 8 gpm seal injection flow to each NC pump.</li> <li>• Open letdown line isolation valves               <ul style="list-style-type: none"> <li>• 1NV-7B</li> <li>• 1NV-1A</li> <li>• 1NV-2A</li> <li>• 1NV-35A</li> </ul> </li> </ul>	<b>1NV-2A will go back closed once open</b>  <b>Go to Step 49</b>
	SRO	Establish excess letdown	
	BOP	Adjust charging to minimum while maintaining the following: <ul style="list-style-type: none"> <li>• NC pump seal injection flow greater than 6 gpm</li> <li>• Pzr level at program level</li> </ul> Open the following valves <ul style="list-style-type: none"> <li>• 1KC-315B</li> <li>• 1KC-305B</li> </ul> Ensure 1NV-27B selected to VCT position Open 1NV-26 wait 2 minutes and then close 1NV-26 <ul style="list-style-type: none"> <li>• Check the following valves open:               <ul style="list-style-type: none"> <li>• 1NV-94AC and 1NV-95C</li> </ul> </li> </ul>	

Time	Pos.	Expected Actions/ Behavior	Comments
		Open 1NV-24B Open 1NV-25B Check the following: <ul style="list-style-type: none"> <li>• Reactor critical</li> <li>• 1NV-27B – ALIGNED TO VCT</li> </ul> Slowly open 1NV-26 Notify primary chemistry that excess letdown is in service. Adjust charging flow as desired while maintaining: <ul style="list-style-type: none"> <li>• NC pump seal injection flow greater than 6 gpm</li> <li>• Pzr level at program level</li> </ul>	
	SRO	Return to procedure and step in effect.	

**Events 5 and 6:** Feedwater Pump Trips with Failure of Turbine to Runback in Automatic

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Enters AP-03 Load Rejection	SRO will have to make decision to trip FWPT.
	RO	Ensures Control Rods in Auto	<i>This is an immediate action step.</i>
	RO	Check Turbine Generator Tied to Grid and output going down.	NO, RO will have to reduce turbine load in manual. Reduce load in fast action until impulse pressure is 400-410 psig. Go to Step 3
	RO	Checks Control rods moving in as required & aligned with associated bank.	
	BOP	Checks proper CM system operation: <ul style="list-style-type: none"> <li>Standby Hotwell and Condensate Booster pumps RUNNING</li> <li>1CM-420 - OPEN</li> </ul>	
	RO	Ensures impulse pressure < 410 psig	
	RO	Announce occurrence on page.	
	RO	Check P/R meters less than 20%	No
	SRO	Designates an operator to continuously monitor reactor power and go to step 9.	
	RO	Checks condenser dump valves modulating open	
	BOP	Check 'IPB AIR FLOW TROUBLE' alarm 'DARK'	
	BOP	Check Pzr pressure control response <ul style="list-style-type: none"> <li>Ensure Pzr heaters are in auto</li> <li>Pzr Spray control valves are in auto</li> <li>Pzr PORVs – CLOSED</li> <li>Pzr spray control valves - CLOSED</li> </ul>	
	RO	Check load rejection – DUE TO LOSS OF CF PUMP.	

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Dispatch operator as necessary to determine cause of CF pump trip.	
	RO	Ensure running CF pump properly responds in AUTO as follows: <ul style="list-style-type: none"> <li>• Monitor discharge pressure</li> <li>• Monitor S/G NR levels</li> </ul>	At this time bearing temperature and thrust bearing wear alarms will start to come in on running pump.
	RO	Check turbine impulse pressure – LESS THAN 260 PSIG	NO
	SRO	Will have to make decision to trip other FWPT based on high bearing temperature and thrust bearing wear annunciator. This will start the ATWS/Loss of Heat Sink event.	

**Event 7:** ATWS with a loss of Heat Sink

	Pos.	Expected Actions/ Behavior	Comments
	Crew	Recognizes ATWS	
	SRO	Goes to E-0	
	RO	Checks Reactor trip: <ul style="list-style-type: none"> <li>• All rod bottom lights LIT</li> <li>• Reactor trip and bypass breakers OPEN</li> <li>• I/R amps – Going Down</li> </ul>	RO should attempt to trip reactor using switches and will realize the turbine has not tripped and should trip the turbine.
	SRO	Recognizes reactor did not trip and implements F-0 and goes to FR-S.1	
<b>Critical</b>	RO	Checks Reactor trip: <ul style="list-style-type: none"> <li>• All rod bottom lights LIT</li> <li>• Reactor trip and bypass breakers OPEN</li> <li>I/R amps – Going Down</li> </ul>	Manually inserts rods
<b>Critical</b>	RO	Checks turbine trip: <ul style="list-style-type: none"> <li>• All throttle valves closed</li> <li>• All governor valves closed</li> </ul>	Manually trips turbine if not already done.
	Crew	Monitors fold out page	
	BOP	Checks proper CA pump status: <ul style="list-style-type: none"> <li>• MD CA pumps – ON</li> <li>• Check N/R level in at least 3 S/Gs greater than 17%</li> </ul>	1A Tagged out 1B no power 1ETB deenergized TD CA tripped on over speed
	BOP	Initiates emergency boration of NC system: <ul style="list-style-type: none"> <li>• Ensures one NV pumps ON</li> <li>• Opens 1NV-265B</li> <li>• Starts both boric acid transfer pumps</li> <li>• Checks emergency boration flow &gt; 30 gpm</li> <li>• Checks 1NV-244A and 1NV-245B OPEN</li> <li>• Checks Pzr pressure &lt; 2335 psig</li> </ul>	1NV-265B no power  Will have to align NV pump suction to the FWST 1NV-245B position will be verified using OAC
	BOP	Close 1VQ-1A,1VQ-6A,1VQ-2B & 1VQ-5B	

	Pos.	Expected Actions/ Behavior	Comments
	SRO	If an S/I signal exists or occurs perform Encl. 3	
	SRO	Checks the following trips have occurred: <ul style="list-style-type: none"> <li>• Reactor trip</li> <li>• Turbine trip</li> </ul>	Dispatches operator to open: <ul style="list-style-type: none"> <li>• Reactor trip breakers</li> <li>• Reactor trip bypass breakers</li> <li>• M/G Set Generator Breakers</li> <li>• M/G set Motor Breakers</li> </ul>
	RO	Controls S/G levels: <ul style="list-style-type: none"> <li>• Checks NR level in at least one S/G &gt; 11%</li> <li>• Checks VI header pressure &gt; 60 psig</li> <li>• Throttles feed flow to maintain S/G NR level between 11% and 50%</li> </ul>	If CA flow is less than 700 gpm, then start pumps and align valves as required.  Maintain total CA flow greater than 700 gpm until at least on S/G NR level greater than 11%
	BOP	Checks all dilution paths ISOLATED <ul style="list-style-type: none"> <li>• Places NC System M/U controller to OFF</li> <li>• Places Reactor Makeup water pumps to STOP</li> </ul>	
	RO	Checks steam lines intact: <ul style="list-style-type: none"> <li>• All S/G pressures – Stable or Going UP</li> <li>• All S/G pressurized</li> </ul>	If any S/G depressurized or pressure going down in an uncontrolled manner ensure the following closed: <ul style="list-style-type: none"> <li>• All MSIVs</li> <li>• All MSIV bypass valves</li> </ul>
	BOP	Checks NC T-colds – Stable or Going UP	
	RO	Checks Core Exit T/Cs < 1200 degrees	
	SRO	Checks the reactor subcritical: <ul style="list-style-type: none"> <li>• P/R channels &lt; 5%</li> <li>• I/R SUR – NEGATIVE</li> <li>• W/R Neutron Flux &lt; 5%</li> </ul>	Yes
	SRO	Calls chemistry to obtain current boron concentration	
	SRO	Refers to RP/000 Classification of Emergency	
	SRO	Return to procedure and step in effect.	Due to RED Path on Heat Sink goes to H-1.
	SRO	Goes to FR-H.1	
	Crew	Determines feed flow is less than 450 gpm but not due to operator action	

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Checks to see if heat sink is required: <ul style="list-style-type: none"> <li>• NC Pressure &gt; greater than any non-faulted S/G pressure</li> <li>• Any NC T-hot – greater than 350 degrees</li> </ul>	Yes
	Crew	Monitor foldout page	At this point in the scenario Feed and Bleed criteria may be met.
<b>Critical</b>	SRO	IF Feed and Bleed Criteria met go to step 20 From foldout page criteria.	Goal is not to need to go to feed and bleed.
	BOP	Check at least one of the following NV pumps – AVAILABLE: <ul style="list-style-type: none"> <li>• 1A NV Pump</li> <li>• 1B NV Pump</li> </ul>	
	RO	Check if NC system feed and bleed should be initiated: <ul style="list-style-type: none"> <li>• Check W/R level in at least 3 S/Gs – LESS THAN 24%</li> </ul>	NO, go to step 6.
	RO	Ensure S/G BB and NM valves closed Per Enclosure 3.	
	RO	Attempt to establish CA flow to at least one S/G as follows: <ul style="list-style-type: none"> <li>• Check power to both motor driven pumps – AVAILABLE</li> <li>• Ensure control room CA valves aligned per Enclosure 4.</li> <li>• Start all available CA pumps.</li> <li>• Check TD CA pump running.</li> <li>• Check total flow to S/G(s) – GREATER THAN 450 GPM</li> </ul>	GO TO Step 8.
	RO	Check steam dumps: “STEAM DUMP SELECT” - IN T-AVE MODE. Perform the following: <ol style="list-style-type: none"> <li>1. Ensure ‘STM PRESS CONTROLLER’ setpoint at 1092 psig.</li> <li>2. Place “STM PRESS CONTROLLER” in manual.</li> <li>3. Adjust “STM PRESS CONTROLLER” output to equal “STEAM DUMP DEMAND” signal.</li> <li>4. Place “STEAM DUMP SELECT” in steam pressure mode.</li> <li>5. Place “STM PRESS CONTROLLER” IN auto.</li> </ol>	
	BOP	Stop all NC pumps.	

	RO	<p>Reset Feedwater Isolation as follows:  Check the following alarms – DARK:</p> <ul style="list-style-type: none"> <li>• 1AD-5, G-6 Inner Doghouse Level Hi</li> <li>• 1AD-5, H-6 Outer Doghouse Level Hi</li> </ul> <p>Dispatch operator to block Feedwater Isolation signal PER Enclosure 6.  Check S/I – HAS BEEN ACTUATED</p>	<p><b>INSERT 5 MINUTES AFTER REQUESTED</b></p> <p>MALF ISE 007A  MALF ISE 007B  BLOCK BOTH  Allows reset of FW Isolation</p>
	BOP	<p>Check CM System in service:</p> <ul style="list-style-type: none"> <li>• Hotwell pumps – ON</li> <li>• Condensate Booster pumps – ON</li> <li>• Check CF pumps – AT LEAST ONE AVAILABLE TO START</li> </ul>	<p>NO, go to step 15.</p>
	BOP	<p>Depressurize Pzr to less than 1905 PSIG as follows:</p> <ul style="list-style-type: none"> <li>• Check Pzr pressure – GREATER THAN 1905 PSIG.</li> <li>• Ensure pressure is maintained above 1845 PSIG until Pzr S/I signal is blocked in step 16.</li> <li>• Check normal letdown in service.</li> <li>• Depressurize Pzr to less than 1905.</li> <li>• Close Pzr spray valves.</li> <li>• Open 1NV-21A</li> <li>• Close 1NV-13B and 1NV-16A</li> <li>• Turn off Pzr heaters</li> <li>• Raise charging flow up to 200 GPM.</li> </ul>	
	BOP	<p>Block Pzr S/I actuation circuit and Low Pressure Steamline Isolation</p> <ul style="list-style-type: none"> <li>• Check P-11 status light – LIT</li> <li>• Depress 'BLOCK' on Pzr S/I block switches.</li> <li>• Depress 'BLOCK' on Low Pressure Steamline block switches.</li> <li>• Designate operator to control Pzr pressure per Enclosure 8.</li> </ul>	

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	<p>Attempt to establish feed flow from CM system as follows:</p> <ul style="list-style-type: none"> <li>• Check hotwell pumps – AT LEAST 2 PUMPS ON</li> <li>• Check condensate booster pumps – AT LEAST 2 PUMPS ON</li> <li>• Check ‘CF Header Pressure’ – GREATER THAN 500 PSIG.</li> <li>• Depressurize at least one S/G to less than 5000 PSIG in the following steps.</li> <li>• Close MSIV on S/Gs not to be depressurized.</li> <li>• Check condenser available.</li> <li>• Place ‘STM PRESS CONTROLLER’ in manual.</li> <li>• Check ‘STEAM DUMP SELECT’ – IN STEAM PRESSURE MODE.</li> <li>• When P-12 LO LO TAVG status light lit – then place steam dumps in bypass interlock.</li> <li>• When S/G pressure is less than 500 PSIG, then stabilize pressure less than 500 psig.</li> <li>• Close the following valves CF-35,30,28,26</li> <li>• Place the following in manual and close manual loaders for all CF control and bypass valves.</li> <li>• Depress and release the Feedwater Isolation reset pushbuttons.</li> <li>• Check feed and bleed established. – NO`</li> <li>• Align feed flow:</li> <li>• Open Valves on S/G to be feed.</li> <li>• Throttle open SF control bypass valve for S/G to be fed.</li> <li>• Check if Step 17.q or 17.r – IMPLEMENTED – NO go to stepp17.w</li> <li>• Check feedwater flow to depressurized S/G – FLOW INDICATED. - YES</li> </ul>	
<p>Terminate Scenario When Feed Flow has been established to one S/G</p>			

**Note to Examiner: Be sure SRO classifies event at end of scenario.**

**UNIT 1 STATUS:**

Power Level: 75% NCS [B] 1136 PPM Pzr [B]: 1136 PPM Xe: Per OAC

Power History: Returning to power after repair of FWPT Core Burnup: 250 EFPDs

**CONTROLLING PROCEDURE:** OP/1/A/6100/03 Controlling Procedure for Unit Operation

**OTHER INFORMATION NEEDED TO ASSUME TO SHIFT:**

"1A" Diesel Generator tagged for PM.  
"1A" Motor Driven Auxiliary Feedwater Pump is white tagged for oil sample.  
Unit 2 is available for Auxiliary Steam

Thunderstorms are in the area.

Crew will perform the following:

Increase power at 2 MW/min to 100% power.

**Work Control SRO/Offsite Communicator** **Tim**

**Plant SRO** **Gary**

**NLO's AVAILABLE**

**Unit 1**

**Aux Bldg. Ken**

**Turb Bldg. Al**

**5<sup>th</sup> Rounds. Tom**

**Extra(s) Richard, Fred**

**Unit 2**

**Aux Bldg. John**

**Turb Bldg. Greg**

# DRAFT

Appendix D, Rev. 9

Scenario Outline

Form ES-D-1

Facility: McGuire	Scenario No.: Spare	Op-Test No.: _____
Examiners: _____	Operators: _____	_____
_____	_____	_____
_____	_____	_____
Initial Conditions: 10–8 amps Power, 'A' Train Components in Service		
_____		
Turnover: Begin with step 3.22 in OP/1/A/6100/003 Enclosure 4.1.		
_____		

Event No.	Malfunction No.	Event Type*	Event Description
1		N	(BOP) Swap from Variable Orifice to 45 gpm Orifice
2		R	(RO) Increase Power to 1-2%
3		C	(BOP) Low Level Intake Leak – Swap suction and discharge to the SNSWP
4		C	(RO) Steam Generator Bypass Valve Failure
5		C	(RO) Steam Pressure Controller Fails
6		C	(BOP) Reactor Coolant Pump Malfunction
7		M	LOCA Outside Containment
			No Automatic Safety Injection
			Failure of Automatic Feedwater Isolation
			Failure of 'B' NI pump to start on Safety Injection

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

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class 23

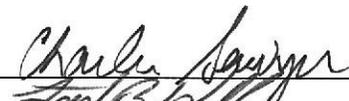
TOPIC: Nuclear Regulatory Commission Simulator Exam  
Spare Scenario

**REFERENCES:**

1. McGuire Technical Specifications
2. OP/1/A/6100/003 Controlling Procedure for Unit Operation
3. AP/1/A/5500/20 Loss of RN
4. AP/1/A/5500/06 Loss of S/G Feedwater
5. AP/1/A/5500/11 Pressurizer Pressure Anomalies
6. AP/1/A/5500/08 Malfunction of NC Pump
7. EP/1/A/5000/E-0 Reactor Trip or Safety Injection
8. EP/1/A/5000/E-1 Loss of Reactor or Secondary Coolant
9. EP/1/A/5000/ECA 1.2 LOCA Outside Containment
10. RP/O/A/5700/00 Classification of Emergency

Author:

Facility Review:

  
\_\_\_\_\_  
  
\_\_\_\_\_

January 4, 2007

Rev. 1

## EVENT SUMMARY

1. Leak on the Low Level intake piping.
2. Steam Generator bypass valve failure.
3. Steam Pressure Controller Failure.
4. KC leak into Reactor coolant oil
5. LOCA Outside Containment

### SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>	Sim. Setup	<b>Rod Step On</b>	
<input type="checkbox"/>		<b>IC - 133</b>	
<input type="checkbox"/>		<b>RUN</b>	
<input type="checkbox"/>		<b>Update</b> Status Board,  <b>Setup OAC</b>  <b>Setup ICCM</b> , Turbine Displays, & Trend Recorders.  <b>Check</b> Rod Step Counters agree with rod positions	See Shift Turnover Information
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>		<b>(M) ISE002A</b> <b>(M) ISE002B</b>	Failure of automatic Safety Injection – both trains
<input type="checkbox"/>		<b>(M) ISE007A</b> <b>(M) ISE007B</b>	Failure of automatic feedwater isolation – both trains
<input type="checkbox"/>		<b>(M) NI001B</b>	Failure of 'B' NI pump to start in Automatic on SI.
<input type="checkbox"/>			
<input type="checkbox"/>			

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>			
<input type="checkbox"/>		Freeze.	
<input type="checkbox"/>		Update Fresh Tech. Spec. Log.	
<input type="checkbox"/>		Fill out the NLO's Available section of Shift Turnover Info.	
<input type="checkbox"/>	Prior to Crew Briefing	RUN	
<input type="checkbox"/>	<p style="text-align: center;"><b>Crew Briefing</b></p> <ol style="list-style-type: none"> <li>1. Assign Crew Positions based on evaluation requirements</li> <li>2. Review the Shift Turnover Information with the crew.</li> <li>3. Direct the crew to Review the Control Boards taking note of present conditions, alarms.</li> </ol>		
<input type="checkbox"/>	T-0	Begin Familiarization Period	
<input type="checkbox"/>	At direction of examiner	<b>(MALF) RN006</b> <b>Ramp 10</b> <b>Severity 1000</b> <b>Trigger 1</b>	Leak on Low Level intake piping
<input type="checkbox"/>	At direction of examiner	<b>(MAL) IFE008D</b> <b>Ramp = 30</b> <b>Set = 100</b> <b>Trigger 2</b>	S/G 'D' bypass valve failure
<input type="checkbox"/>	At direction of examiner	<b>(OVR) SB002B</b> <b>Trigger 3</b>	Fails steam dumps closed
	At direction of examiner	<b>(MAL) NC006A</b> <b>Trigger 4</b>	KC leak into reactor coolant pump oil

	Bench Mark	ACTIVITY	DESCRIPTION
<input type="checkbox"/>	At direction of examiner	(MALF) ND008A Severity 100 Ramp 10 Trigger 5	Fails ND to NC Check valves
<input type="checkbox"/>	At direction of examiner	(MAL) ND011A Set 2000 Ramp 60 Time Delay 60 Trigger 5	LOCA outside containment
<input type="checkbox"/>			
<input type="checkbox"/>	Terminate the scenario upon direction of Chief Examiner		

**EVENT: Start Up Activities**

<b>Time</b>	<b>Pos.</b>	<b>Expected Actions/ Behavior</b>	<b>Comments</b>
	<b>BOP</b>	Swap from variable to 45 gpm orifice	
	<b>RO</b>	Withdraws rods to increase power to 1-2%	
	<b>SRO</b>	Provides oversight and guidance	

**EVENT 1:** Low Level Intake Piping Leak

Time	Pos.	Expected Actions/ Behavior	Comments
	Crew	Recognizes indications of RN leak.	
	SRO	Enters AP/20	SRO may start in Case 1 but will be directed to go to Case 2.
	BOP	Checks 1A sequencer reset light - LIT	
	SRO	Will have Unit 2 Check 2A sequencer reset light - LIT	<b>YES</b>
	BOP	Align RN suction to the SNSWP as follows: <ul style="list-style-type: none"> <li>• Open 0RN-7A</li> <li>• Open 0RN-9B</li> </ul> Wait 60 seconds for valves to open	
	BOP	Check 0RN-7A OPEN and Check 0RN-9B OPEN	
	SRO	Checks RN pumps on both units – ANY PUMP SUSPECTED OF BEING AIR BOUND	<b>If Yes, dispatch operator to vent pump. NO, GO TO STEP 9</b>
	SRO	Announce occurrence on page	
	BOP	Isolate RN suction for LLI and RC as follows: <ul style="list-style-type: none"> <li>• Check 0RN-07A OPEN</li> <li>• Close 0RN-12AC</li> <li>• Close 0RN-13A</li> <li>• Close 0RN-2B</li> <li>• Close 0RN-3A</li> <li>• Check 0RN-9B – OPEN</li> <li>• Close 0RN-10AC</li> <li>• Close 0RN-11B</li> <li>• Close 0RN-4AC</li> <li>• Close 0RN-5B</li> </ul>	
	BOP	Align B Train discharge to SNSWP as follows: <ul style="list-style-type: none"> <li>• Open 0RN-152B</li> <li>• Close 0RN-283AC</li> <li>• Close 0RN-284B</li> </ul>	
	SRO	Ensures Unit 2 operators are performing unit 2 AP concurrently	<b>UNIT 2 REPLY</b>
	BOP	Checks Unit 1 RN pumps – AT LEAST ONE RUNNING	<b>NO</b> <ul style="list-style-type: none"> <li>• Place manual loader for 1RN-190B to 10% open.</li> <li>• Start 1B RN pump</li> <li>• Place 1RN-86A to manual and open</li> </ul>

Time	Pos.	Expected Actions/ Behavior	Comments
			<ul style="list-style-type: none"> <li>Ensure VC/YC chiller running per Enclosure 3.</li> </ul> <b>HOW DO WE HANDLE THIS</b>
	BOP	Perform on operating train: <ul style="list-style-type: none"> <li>If A Train is running then throttle RN-190B to maintain less than 13,000 gpm</li> </ul>	
	SRO	If RV pumps have lost suction, then ensure all RV pumps are in manual and off.	
	SRO	Check Tave – GREATER THAN 200 degrees	
	RO	Align 1B RN to suction of TD CA pump as follows: <ul style="list-style-type: none"> <li>Open 1RN-162B</li> <li>Open 1CA-116B</li> <li>Open 1RN-297B</li> <li>Open 0RN-152B</li> </ul>	
	RO	Isolate 1A RN to suction of TD CA pump as follows: <ul style="list-style-type: none"> <li>Close 1CA-86A</li> <li>Dispatch operator to open 1EMXA-F06C</li> </ul>	<b>(LOA) CA018 RACK OUT</b>
	SRO	Must ensure Unit 2 completes step 32	<b>CUE</b>
	BOP	Aligns A Train discharge to SNSWP as follows: <ul style="list-style-type: none"> <li>Open 0RN-149A</li> <li>Close 0RN-147A</li> <li>Close 0RN-148AC</li> </ul>	
	SRO	Checks suction and discharge of both RN trains: <ul style="list-style-type: none"> <li>Aligned to SNSWP</li> <li>Isolated from Lake Norman</li> </ul>	
	SRO	Dispatch operator to open the following breakers: <ul style="list-style-type: none"> <li>1EMXH-3C 0RN-7A</li> <li>1EMXH-4C 0RN-13A</li> <li>1EMXH-6A 0RN-149A</li> <li>1EMXH1-2B 0RN-12AC</li> <li>1EMXH1-3B 0RN-147AC</li> <li>1EMXH1-1E 0RN-148AC</li> </ul>	<b>ALL LOAs</b> RN032 RN035 RN040 RN034 RN049 RN045
		The next malfunction will come in after these breakers are open.	

**Event 2: Steam Generator Bypass Regulating Valve Failure**

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Recognizes failure of bypass valve	Annunciator C-4 on AD-4 Lo CF Flow
	SRO	Enters AP/06 Loss of S/G Feedwater	
	RO	Places Feed Regulator to Manual Restores S/G level to program level	<b>Immediate Action</b> If CF control valve is not responding THEN: 1. Swap CF control valve "SELECTOR SWITCH" to other circuit. <ul style="list-style-type: none"><li>• "ALT"</li></ul> OR <ul style="list-style-type: none"><li>• "NORM"</li></ul> 2. Restore S/G level to program.
	RO	IF CF pump speed control has failed, THEN: <ul style="list-style-type: none"><li>• Ensure affected CF pump in "OCS MAN"</li><li>• Adjust CF pump speed as necessary to restore S/G levels to program.</li></ul>	<b>NO</b>
	RO	Checks the following channel indicating the same: <ul style="list-style-type: none"><li>• Feed flow</li><li>• Steam Flow</li><li>• S/G Level</li></ul>	
	RO	Checks the reactor trip breakers closed Pressurizer Press.> P-11	Yes
	RO	If at any time S/G NR Level approaches 17% or 83%, THEN: <ul style="list-style-type: none"><li>• trip Reactor</li><li>• GO TO E-0</li></ul>	
		Announce occurrence on the page	
	RO	Check reactor power – GREATER THAN 3%.	<b>Could be a YES OR NO</b>
	BOP	Check CM/CF feeding S/G	
	RO	S/G level stable or trending to program	
	BOP	Checks NC temperature with NC pumps on stable or trending to programmed temperature	

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Check all S/G CF control valves – IN AUTO.	When the following are met then return affected S/G CF control to automatic: <ul style="list-style-type: none"> <li>• Automatic control desired</li> <li>• Affected S/G level – AT PROGRAM LEVEL</li> <li>• Selected control channels indicated correctly</li> <li>• Feed flow</li> <li>• Steam flow</li> <li>• S/G level</li> </ul>
	RO	Checks ALL S/G control bypass valves – IN MANUAL AND FULL OPEN.	No, they are the controlling valves
	RO	Check both CF pumps – IN AUTO	
	RO	Check all CA pumps – OFF.	
	SRO	Contacts WCC to have WR written, have I&E investigate and repair failed valve  Exit procedure	<b>Failure will not be repaired</b>

**EVENTS 3: Steam Pressure Controller Failure**

Time	Pos.	Expected Actions/ Behavior	Comments
	RO	Recognizes increase in Tave	
	SRO	Direct RO to take control of dumps and restore temperature in manual	

**Events 4: KC leak into NCP oil reservoir**

Time	Pos.	Expected Actions/ Behavior	Comments
	CREW	Recognizes oil reservoir level increase via computer alarm	
	SRO	Goes to AP/08 Case 2	
	BOP	Checks NC pump parameters within operating limits: <ul style="list-style-type: none"> <li>• Stator winding temps &lt; 311</li> <li>• Motor bearing temps &lt; 195</li> <li>• Reservoir level between – 1.25 and + 1.25</li> </ul>	
	SRO	If at anytime an operating limits is exceeded to go to step 4.	
	RO	Announce occurrence on page.	
		<b>Once parameter is exceeded crew will go back to step 4.</b>	
	BOP	Stop affect NC pump as follows: <ul style="list-style-type: none"> <li>• Close 1NC-27</li> <li>• Trip reactor</li> <li>• Stop affected pump</li> <li>• Go to E-0</li> </ul>	

**Event 5 Post Trip Response**

<b>Time</b>	<b>Pos.</b>	<b>Expected Actions/ Behavior</b>	<b>Comments</b>
	SRO	Go to E-0 and directs activities	
	SRO	Reviews Foldout page with crew	
	RO	Report Reactor Trip: <ul style="list-style-type: none"> <li>• rod bottom lights</li> <li>• reactor trip breakers open</li> <li>• I/R amps decreasing</li> </ul>	<i>Immediate Action</i>
	RO	Reports Turbine Generator tripped <ul style="list-style-type: none"> <li>• TV's closed</li> </ul>	<i>Immediate Action</i>
	BOP	Reports ETA and ETB energized	<i>Immediate Action</i>
	RO	Reports SI status light - not LIT	<i>Immediate Action</i> SI is not needed at this time. Will go to ES 0.1
		<b>ES 0.1</b>	
	SRO	Monitor Fold out pages - CREW	
	BOP	Checks the following: <ul style="list-style-type: none"> <li>• VI pressure – GREATER THAN 6 PSIG</li> <li>• Unit 1 6900V busses - ENEERGIZED</li> </ul>	
	RO	Announce occurrence on page	
	SRO	Refers to classification of emergency	<b><i>Done after scenario is over</i></b>
	BOP	Checks NC Temperatures	
	RO	Checks both generator breakers - OPEN	
	RO	Checks MSR 'RESET" light - LIT	
		<b>LOCA WILL BE INSERTED HERE</b>	

Event 5    LOCA Outside Containment

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	May reference AP/10	<b>Once it is necessary to SI the crew will go back to E-0 and start again.</b>
	SRO	Go to E-0 and directs activities	
	SRO	Reviews Foldout page with crew	
	RO	Report Reactor Trip: <ul style="list-style-type: none"> <li>• rod bottom lights</li> <li>• reactor trip breakers open</li> <li>• I/R amps decreasing</li> </ul>	<i>Immediate Action</i>
	RO	Reports Turbine Generator tripped <ul style="list-style-type: none"> <li>• TV's closed</li> </ul>	<i>Immediate Action</i>
	BOP	Reports ETA and ETB energized	<i>Immediate Action</i>
	RO	Reports SI status light - not LIT	<i>Immediate Action</i>
	BOP	Report LOCA sequencers (A & B) actuated	<i>Immediate Action</i>
	RO	Announce "Unit 1 Safety Injection" on page	
	BOP	Checks ESF Monitor Light Panel <ul style="list-style-type: none"> <li>• Groups 1,2 and 5 DARK</li> <li>• Group 3 LIT</li> <li>• Checks OAC in service</li> </ul>	
	BOP	Reports all Ss and St components in Group 4 LIT C-3, C-6, F-4 F-5 LIT	B NI pump is off – should be started at this time if not already started.
	RO	Reports that CA is running and at least 3 S/G's NR level > 17%	
	BOP	Reports KC pumps running	
	BOP	Reports RN pumps running	
	SRO	Directs Unit 2 Operator to throttle RN to minimum & start 2A RN pump	<b>EXAMINER CUE:</b> <ul style="list-style-type: none"> <li>• 2A RN pump is running</li> </ul>
	RO	Checks/reports all S/G pressures > 775 psig	
	BOP	Reports Containment pressure has remained less than 3 psig	
			<b>How handle?</b>

Event 5

LOCA Outside Containment

Time	Pos.	Expected Actions/ Behavior	Comments
	BOP	Report NV Pump to Cold Leg Flow gauge - indicating flow - YES <ul style="list-style-type: none"> <li>• checks NC pressure &lt; 1600 psig</li> <li>• checks NI pumps indicating flow</li> </ul>	
	SRO	When available notifies OSM or other SRO to implement Generic Enclosure 22	<b>EXAMINER CUE: OSM will ensure Generic Enclosure 22 is implemented.</b>
	RO	<ul style="list-style-type: none"> <li>• Checks CA flow &gt; 450 gpm and takes control of CA to maintain no load levels</li> <li>• checks VI header pressure &gt; 60 psig</li> <li>• Maintains N/R level between 11% and 50%</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• If any NC pump ON, then check Tave stable or trending to 557 degrees</li> <li>• If all NC pumps off, then check NC T-colds stable or trending to 557 degrees.</li> </ul>	If not stable and decreasing crew will go to Enclosure 3
	BOP	Reports Pzr PORV & Spray Valves closed	
	BOP	Reports subcooling > 0 deg.	
	BOP	Reports all main steam lines INTACT	
	RO/ BOP	Report S/G tube rupture parameters indicate that S/G tubes intact	
	BOP	Checks if NC system is intact: <ul style="list-style-type: none"> <li>• Containment EMFs – normal</li> <li>• Ice Condenser Lower Inlet Doors Open alarm – DARK</li> <li>• Containment pressure &lt; 1 psig</li> <li>• Containment sump level normal</li> </ul>	
	SRO	Check SI Termination criteria.	Not met go to step 36
	CREW	Implement F-0	
	RO	Control S/G levels – maintain between 11% and 50%	
	BOP	Check secondary radiation	
	BOP	Check aux building radiation – NORMAL	NO, go to ECA 1.2

Event 5

ECA 1.2 Evaluation

Time	Pos.	Expected Actions/ Behavior	Comments
	SRO	Enters ECA 1.2	
	SRO	Dispatches an operator to remove white tags and place power on the following breakers: <ul style="list-style-type: none"> <li>• 1EMXA-R2A</li> <li>• 1EMXA-R1E</li> <li>• 1EMXB1-6B</li> </ul>	NI- 173A (LOA) NI024 NI-162A (LOA) NI019 NI-178B (LOA) NI025 Insert 5 minutes after requested.
	BOP	Check if ND pumps should be stopped and isolated as follows: <ul style="list-style-type: none"> <li>• Check NC pressure – GREATER THAN 286 PSIG.</li> <li>• ND Pumps suction – ALIGNED TO FWST</li> <li>• Check the following for indication of leak into ND system.</li> <li>• ND to NC Cold leg A and B temperature</li> <li>• NC to NC Cold leg C and D temperature</li> <li>• Abnormal ND system pressure</li> <li>• Check leak on ND system</li> <li>• Check any ND pump - ON</li> </ul>	
	BOP	Stop ND pumps and isolate potential FWST depletion path as follows: <ul style="list-style-type: none"> <li>• Reset S/I</li> <li>• Rest Sequencers</li> <li>• Stop both ND pumps</li> <li>• Close 1ND-19A, 1ND-4B, 1FW-27A</li> </ul>	
	SRO	If at anytime NS actuates - NO	
	BOP	Check proper valve alignment as follows: <ul style="list-style-type: none"> <li>• 1ND-1B – CLOSED</li> <li>• 1ND-2AC – CLOSED</li> <li>• 1NI-183B – CLOSED</li> <li>• 1NI-121A – CLOSED</li> <li>• 1NI-152B – CLOSED</li> <li>• 1NV-840 - CLOSED</li> </ul>	

	SRO	<p>Check the following for indication of leak into ND system.</p> <ul style="list-style-type: none"> <li>• ND to NC Cold leg A and B temperature</li> <li>• NC to NC Cold leg C and D temperature</li> <li>• Abnormal ND system pressure</li> </ul> <p>Check leak location – ON ND SYSTEM</p> <p>Do not continue until breakers for following valves are closed. – Close Valves</p> <ul style="list-style-type: none"> <li>• 1NI-173A</li> <li>• 1NI-178B</li> </ul>	
	SRO	<p>Check if break is isolated as follows:</p> <ul style="list-style-type: none"> <li>• NC system pressure</li> <li>• RVLIS</li> <li>• Pzr level</li> <li>• ND system pressure</li> <li>• Local observation</li> </ul>	
	SRO	<p>Check leak – ISOLATED YES, go to E-1</p>	

Event 5

E-1

Time	Pos.	Expected Actions/ Behavior	Comments
	CREW	Monitor foldout page	
	RO	Check NC subcooling based on CETCs greater than 20 degrees	
	RO	Check Main Steamlines - INTACT	
	RO	Control intact S/G levels	
	BOP	Check secondary EMFs - NORMAL	
	BOP	Check PZR PORVs and isolation valves	
	SRO	Check S/I termination criteria If met go to ES 1.1 S/I Termination	If no go to step 7.f.
	SRO	Check is NS pumps should be stopped.	
	SRO	Check is ND pumps should be stopped • Stop ND pumps if pressure is > 286 psig	
	BOP	Check NC and S/G pressures	
	SRO	Check if D/Gs should be stopped	
	SRO	Check containment H2 concentration • Ensure operator dispatched to stop Unit 1 NF AHUs • Check H2 analyzers in service	Go to step 13
	BOP	Evaluate plant status: 1) Any ND pump available 2) Power available to 1ND-19A 1NI-185A 1ND-58A 1ND-4B 1NI-184B 1NI-136B 1NI-332A 1NI-333B 1NI-334B 1NI-147A 1NI-115B 1NI-144B 8) S Latch LIT for: 1NI-184B 1NI-185A 4) EMF-41 NORMAL 5) All area monitors NORMAL 6) Notify Chemistry to sample appropriately 7) Notify RP to sample Cont air 8) Consult Station Management on recovery	

	BOP	Report NC pressure > 286 psig GO TO EP-ES 1.2 Post LOCA Cooldown and Depressurization.	

TERMINATE SCENARIO

**Note to Examiner: Be sure SRO classifies event at end of scenario.**

- 1) **Classification of Event: Alert due to 4.1.A.1**

