

**Minnesota Valley Electric  
Cooperative**

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**Outage Simulation Plan  
April 6<sup>th</sup> 2006**

## Version Control

Version	Date	Related pages	Changes	Remarks

## Review

Reviewed by	Role	Version	Date

## Approval

Reviewed and approved by	Role	Version	Date	Signature

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## 1 OVERVIEW

This document is the test plan for Minnesota Valley Electric Cooperative's Outage Simulation Test Plan. This document is to act as a reference for planning the test.

## 2 PURPOSE

The purpose of this test is to determine MVEC's ability to respond to a major system outage. In the past, issues have arisen in time of significant system outages. Some past issues include:

1. Inability to accurately predict size of outage
2. Inability to react to size of outage
3. Phone and communication failures
4. Computer system failures
5. Inadequate employee response
6. Outdated dispatch manual
7. Lack of employee ERP training
8. Mapping errors
9. Equipment failures
10. Materials shortages
11. Contingency plan failures
12. Crew preparedness
13. Vehicle readiness

This test attempts to simulate an environment in which the previously enumerated issues can be tested, measured, and subsequently resolved.

## 3 Outage Description

The April 6<sup>th</sup> 2006 outage simulation test will assume the following conditions:

1. A sleet storm has passed through the southern half of MVEC's service territory (South of HWY #19).
2. Storm impact at 7:00PM
3. 5,000 members are without service
4. MVEC employees have NO notice of test date, other than the E-team and Dave Beckius

## 4 Operational Plan

### 4.1 Phase I – Initial Report of Outage

At 12:00pm the day of the outage, Marvin, Dave, and Ryan will review weather reports for the next three days to determine the possibility of major storms. Information will then be given to E-team to determine a go/no go for the night's simulation.

At 3:00pm the day of the outage, Marvin, Dave and Ryan will again view the weather reports. E-team will be notified ONLY if weather has changed. Current grid status will also be analyzed to ensure resources are not heavily allocated to jobs (use SCADA, check with dispatch, and check with Bill).

At 6:45pm the night of the outage, Marvin Denzer and Dave Beckius will make the final Go/No Go call for the simulation. The decision will be made after verifying current utility needs will not be compromised (i.e. crews currently working on outages, inclement weather). (use SCADA, check with dispatch, check with Bill).

At 6:50pm, Ryan Hentges will contact Spanlink (company performing call flooding) to give the final go ahead.

At 7:00pm, Spanlink will begin sending a small numbers of calls to MVEC (approximately 30 in the first 15 minutes). By 7:30pm, Spanlink will gradually increase the number to simulate approximately 5,000 calls per hour.

WH dispatch supervisor will be advised of the simulation in advance. When calls begin coming in, they will follow normal procedures.

Tom Gilhousen will be the on call supervisor and will handle the outage from start to finish. He will be assisted by Bill, Mike, and Daryl.

The on-call supervisor will begin to make calls to get the necessary personnel to headquarters. For purposes of this simulation, the following people will be deemed necessary:

- Line personnel
- Admin.
- Engineers, Technicians, Locators and Warehouse Personal
- Marketing
- I.S.
- MSRs

## **4.2 Phase II – Outage Data**

The outage will affect 5 substations: Montgomery, St. Thomas, Elysian, Cleveland, and New Prague. This will be simulated by supplying Spanlink numbers from those service areas (See section on Prework).

Approximately 200 poles will be in need of replacement. Poles will be identified and tagged in advance of the simulation. The responding employees (engineers, line-crews) will find the tagged poles and call in the situation described on the tag.

## **4.3 Phase III – Dispatching Crews/Restoring Power**

The on-call supervisor will use the dispatch manual to respond to the outage.

It will be the responsibility of the on-call supervisor and delegated supervisors (as needed), to use the information gathered from the employees in the field, in addition to the OMS and SCADA systems, to properly dispatch crews.

Once the scope of the outage is identified, outside crews will be contacted for availability and ETA. Outside crews will NOT need to report to MVEC.

We will then implement our current power restoration plan for transmission, substations, 3-phase, 1-phase, and individual customers. Emergency back-feeds will be targeted and measured.

## **4.4 Phase IV – Ensuring Power Restoration**

After the power has been restored, AMR will be used to verify restoration.

#### 4.5 Summary of Personnel Involved

Name	Responsibility
E-team	Approve simulation
Marvin Denzer	Plan simulation – involvement during simulation based only on Dispatch manual job duties.
Ryan Hentges	Plan simulation – assist during simulation
Dave Beckius	Plan simulation – involvement during simulation based only on Dispatch manual job duties.
Tom Gilhousen	Primary – run simulation – designate responsibilities
Mike Dietz	Respond to simulation based upon ERP and dispatch manual
Bill Heimkes	Respond to simulation based upon ERP and dispatch manual
Daryl Hoffman	Respond to simulation based upon ERP and dispatch manual
Sue Busch	Respond to simulation based upon ERP and dispatch manual
Dianne Schoenbauer	Respond to simulation based upon ERP and dispatch manual
Eric Nordin	Setup phone simulation. Respond to simulation based upon ERP and dispatch manual
Engineers	Respond to simulation based upon ERP and dispatch manual
Dispatch	Respond to simulation based upon ERP and dispatch manual
Line Crews	Respond to simulation based upon ERP and dispatch manual

#### 5 Required Pre-work

1. Test script completed
2. Develop list of phone numbers
3. January employee quarterly meeting – outage simulation overview will be given
4. Contact WH Dispatch
5. Identify simulation roles

6. Phone systems
  - i. Spanlink – Setup test, Pre-test
  - ii. Frontier – Setup monitoring on
  - iii. Marco – prepare to be onsite
7. AMR
  - i. Setup performance monitoring
8. OMS
  - i. Setup performance monitoring
9. WAN
  - i. Setup performance monitoring
10. SCADA
  - i. Ensure system operability

## 6 Component Involvement and Measures

The following components will be part of the outage simulation test.

### 6.1 Evaluating magnitude of outage

Measurement Description: Maximum time from time of initial outage report to field observations:

Measurements:

1. 25% of outages identified – 1 hour
2. 50% of outages identified – 1.5 hours
3. 75% of outages identified - 2 hours
4. 100% of outages identified - 3 hours

Measurement Process: Dispatch will send line crews to various locations and look for simulation markers on poles. On call supervisor will send engineers to locations as well. In advance of the simulation, markers will be placed on poles and will have a narrative the engineers and line crews will read back to MVEC dispatch.

Dave will keep track of reports and times on scorecard.

Past Issue: Yes – Inability to accurately predict size of outage

### 6.2 Response time to outage site

Measurement Description: Maximum time from initial outage report for MVEC line crews to arrive at their 1<sup>st</sup> job site.

Measurements:

1. 50% MVEC line crew response to outage site – 90 minutes or less
2. 100% MVEC line crew response to outage site – 2 ½ hours or less

Measurement Process: Using AVL, Dave will track crew response and record on scorecard.

Past Issue: Yes – due to conservative approach to adding additional crews

### 6.3 Outside Crew Response

Measurement Description: Amount of time from initial outage report to determine if outside assistance is necessary, and arrange commitments for additional crews from other utilities within 1 hour drive of Jordan.

Measurement:

1. 10 outside crews at MVEC headquarters in 3 hours or less.

Measurement Process: On-Call supervisor will delegate per dispatch manual. Dave will record crew availability on scorecard.

Past Issue: Yes – supervisors used conservative approach

### 6.4 Phone System

The phone system will be tested to verify it is capable of handling 5,000 calls per hour. This test will be accomplished by flooding the systems with “spoofed” phone numbers.

Measurement Description: Determine if phone system can handle 5,000 calls per hour.

Measurement:

1. Real time measurement: Calls come through to OMS in numbers expected.
2. Post test measurement: Logs from Spanlink, Frontier, and OMS show all calls completed successfully.

Measurement Process: Real time: If outages are showing up in OMS in roughly the number expected, it will appear the phone system is working. Post test measurement: Logs from Spanlink, Frontier, and OMS show all calls completed succeeded. Ryan and Eric will call the outage number during the test to verify calls are completing successfully.

In addition, during the test, MVEC, Marco, Frontier, and Spanlink will be on a conference call. This will allow for quick troubleshooting because all will be able to look at performance real time.

Past Issue: Phone and communication failures

#### SUBCOMPONENTS

Due to complexity, the phone system sub-components will also be measured.

1. Frontier PRI card

This is the main card that routes traffic from Frontier’s central office in Jordan to MVEC.

History: This card has failed in the past during high call volumes. Frontier believes they have resolved the issue; however, the system has not been stressed since.

Test responsibility: Frontier engineers

Success Measurement: A successful test will be demonstrated through logs from Frontier showing the PRI card was able to route calls to MVEC during peak usage. If the card does not need to be reset and routes traffic, it will be deemed to be a success.

2. MVEC’s Mitel switch

This is the switch that routes calls received from Frontier to the appropriate MVEC number.

History: This switch has sent a high number of errors to Frontier's PRI card. In addition, programming issues have caused the incorrect routing of numbers in the past. MARCO believes these issues are resolved.

Test responsibility: Eric Nordin and MARCO

Success Measurement: MARCO will be monitoring the switch and watching call routing. Issues will be identified and remedied real time. If no errors exist by the end of the test, this measurement will be deemed a success. If errors still exist, Eric will log any problem that occurs that is not resolvable real time.

### 3. MVEC's PORCHE

This is the automated system that enables users to report an outage without talking to a dispatcher.

History: There have been routing problems between MVEC and WH due to PBX programming.

Test Responsibility: MARCO, Eric Nordin, Sue Busch

Success Measurement: MARCO will monitor the Mitel switch for errors. In addition, Eric, Ryan and Sue will call in during the outage and use the system 5 times. They will record any issues during the calls (long waits, incorrect routing). If no errors are reported by MARCO, and manual tests are correct, this measure will be deemed successful.

### 4. Frontier's Overflow Call Capability

MVEC has purchased overflow capability from Frontier. This increases MVEC's simultaneous call handling capacity from 23 to 98.

Test responsibility: Frontier

Success Measurement: If the 19 through 98 simultaneous calls are routed to Milsoft in Texas, this measure will have succeeded.

### 5. Milsoft's Call Center

Milsoft's call center is located in Texas and will handle up to 80 simultaneous calls from MVEC members.

History: Has not been tested in production

Test responsibility: Eric Nordin, Sue Busch and Milsoft

Success Measures: Calls 19 - 98 are handled, logged, and show up on MVEC's OMS system.

## 6.5 Outage Management System (OMS) Performance

Measurement Description: Ensure the outage management system (OMS) is capable of handling a large outage.

### Measurements:

1. Recorded voice mail describing outage is effective and efficient
2. Accuracy of predicting line device affected by outage
  - i. 100% Accuracy of phone #'s
  - ii. 100% accuracy of maps
3. OMS server performance is 100% accurate.

Measurement Process:

1. Roger will call outage number and determine if the message effectively describes the outage.
2. Message time will be checked to determine if it meets the requirements necessary to handle 5,000 calls.
3. Phone logs will be compared to OMS data to determine if all calls were entered into OMS
4. If OMS predictions are correct, maps will be deemed to be accurate.
5. Performance monitoring tools will be running on the OMS server to capture hd usage, network traffic, mem usage, processor usage, and page file.

Past Issue: Yes – Computer systems failures, mapping errors, inability to accurately predict size of outage.

## 6.6 Software/computer system reliability

Measurement Description: Ensure computer systems remain functional during a major outage. This includes: Email, file/print server, NISC, Network, computer room, TASKE.

Measurement: No failure on any system

Measurement Process: Sue B will use a scorecard to track system uptime. In addition, performance monitoring tools will be used to capture hd usage, network traffic, mem usage, processor usage, and pagefile.

Past Issue: Yes – Computer system failures

## 6.7 Dispatch Manual

Measurement Description: Ensure the dispatch manual is accurate and up to date.

Measurement: All procedures are 100% up to date and accurate

Measurement Process: Dave will verify the night of the outage.

Past Issue: Yes – Outdated dispatch manual

## 6.8 AMR

Measurement Description: This determines the ability of AMR to verify outage/repair in a timely manner.

Measurement:

1. 100% voltage verification from 32 AMR meters (4 feeders per AMR sub, calling 2 AMR meters per feeder)
2. Data received within 5 minutes

Measurement Process: On-call supervisor will have someone ping the meters. Dave will track success on scorecard.

Past Issue: Yes – AMR verification unreliable

## 6.9 SCADA

Measurement Description: Ensure SCADA is able to be used to view alarms.

Measurement: All alarms are accurate (100%)

Measurement Process: On-call supervisor will use SCADA to view alarms. Dave will track success on scorecard.

Past Issue: Yes – alarm accuracy poor

## 6.10 AVL

Measurement Description: Ensure crews and trucks are traceable via AVL during an outage.

Measurement: Crew positions are accurate 100% of the time.

Measurement Process: Crew positions will be tracked by dispatch.

Past Issues: Yes – early trouble tracking system in some vehicles becoming disable due to low battery settings

## 6.11 Radio/Mobile Phones

Measurement Description: Ensure radio and mobile phones have connectivity in all areas.

Measurement: Communication is 100% consistent throughout the night.

Measurement Process: Communication problems will be logged on the score sheet by Dave.

Past Issues: Yes – areas of no radio coverage

## 6.12 Vehicle readiness

Measurement Description: Ensure vehicles are ready to quickly respond to an outage. This includes being gassed and stocked with materials, tools, and equipment adequate for jobs

Measurement:

1. 50% of line truck vehicles fuelled when line crews initially arrive at MVEC headquarters.
2. 100% of small vehicles fuelled when design engineers/locators initially arrive at MVEC headquarters.
3. 100% line truck equipment functional, i.e. booms, digger derricks,

Measurement Process: Track # of vehicles fuelled on scorecard.

Past Issues: Yes – Inadequate readiness of vehicles

## 6.13 Employee Emergency Response Plan (ERP) Training

Measurement Description: Ensure employees are aware and able to complete their part of the emergency response plan.

Measurement: 100% of Employees are able to perform job assigned.

Measurement Process: Employee performance will be monitored and tracked on the scorecard.

Past Issues: Yes – Lack of employee ERP training.

#### **6.14 Mapping errors**

Measurement Description: Ensure MVEC maps are accurate as of two weeks prior, for all new connects.

Measurement: 99% of all maps are accurate

Measurement Process: Map accuracy will be tracked by through evaluation of line crews being in the right location, and OMS being able to predict the correct location of the outage. Member number accurately depicts location on map.

Past Issues: Mapping errors

#### **6.15 Equipment failures**

Measurement Description: Ensure line equipment does not fail (i.e. line switches)

Measurement: All line switches are functional.

Measurement Process: Crews will verify line switches are 100% operable. Dave will track success on scorecard.

Past Issues: Yes – Equipment failures

#### **6.16 Distribution back-feeding contingency plans**

Measurement Description: Ensure distribution back-feeding contingency plans are up to date, including temporary line-feed changes.

Measurement: All plans are 100% accurate.

Measurement Process: Dave will review the procedures the night of the outage.

Past Issues: Yes – Contingency plan failure.

#### **6.17 Line Material needs**

Measurement Description: Ensure necessary line materials are available.

Measurement: All line materials are available.

Measurement Process: Dave will call will suppliers (pole company) and determine if they can meet our needs for downed poles. Information will be recorded on the scorecard.

Past Issues: Yes – Material shortages

### 6.18 Board Member/GM Communication

Measurement Description: Ensure GM/Board is getting information as necessary.

Measurement: Board/GM update procedures are followed.

Measurement Process: GM provides feedback to Marvin informing that GM has adequate information (or not adequate information) to update board.

Past Issues: No

### 6.19 Media communication – Radio, news paper

Measurement Description: Ensure media communications are completed timely and accurately.

Measurement:

1. 1st press release – information is 100% accurate and released to identify radio stations within 1.5 hours of initial outage report.
2. 2<sup>nd</sup> press release - information is 100% accurate and released to identify radio stations within 2.5 hours of outage report.

Measurement Process: Press releases will be read by Dan and Marvin to determine accuracy and timeliness.

Past Issues: Yes - timeliness

### 6.20 Laptop Computers in line trucks

Measurement Description: Ensure laptop computer in line trucks are functional.

Measurement: Laptops are 100% functional

Measurement Process: Any laptop problems will be reported by line crews, to supervisor and identified on the scorecard.

Past Issues: No

### 6.21 Accounting Reporting

Measurement Description: Ensure accounting follows FEMA guidelines for natural disaster reimbursement.

Measurement: 100% of employee and outside crews are assigned, and use storm unique work order number.

Measurement Process: Accounting will review paperwork, after simulation, to verify all employees; contractors/outside crews use storm unique work order number.

Past Issues: Yes – inadequate tracking

## 6.22 Crew preparedness

Measurement Description: Ensure personal equipment, including protective, availability and are ready for quick response to an outage. This includes climbing gear, personal protective equipment: safety glasses, hard-hat, and flashlights.

Measurement:

1. 100% preparedness of line crews; having all of their personal equipment with them when arriving on outage site.

Measurement Process: Inventory of individual line personal at outage site. Documentation completed on scorecard and turned into supervisor for evaluation.

Past Issues: Yes – Inadequate preparedness of personal equipment.