Patric R. O'Brien
Senior Counsel

February 15, 2011

VIA OVERNIGHT AND ELECTRONIC FILING

Honorable Jaclyn A. Brilling
Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, New York 12223-1350

Re: Case 04-M-0159 – Proceeding on Motion of the Commission to Examine the Safety of Electric Transmission and Distribution Systems – 2010 ANNUAL REPORT

Dear Secretary Brilling:

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") submits for filing its *2010 Annual Stray Voltage Testing and Facility Inspection Report* in the above proceeding. Also included are the original certifications required by the Order.

Should you have any questions or concerns, please do not hesitate to contact me. Thank you for your time and attention.

Respectfully submitted,

/s/Patric R. O'Brien
Patric R. O'Brien

Enclosures
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State of New York
Public Service Commission

Case 04-M-0159

Niagara Mohawk Power Corporation
d/b/a National Grid

Stray Voltage Testing and Facility Inspection

2010 Annual Report

Report on the results of stray voltage testing and facility inspections
for the 12-month period ended December 31, 2010

February 15, 2011

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I. Background

The New York State Public Service Commission's ("Commission") Electric Safety Standards adopted on January 5, 2005 in Case 04-M-0159, with subsequent revisions issued on July 21, 2005, December 15, 2008, and July 21, 2010 (collectively referred to herein as the "Safety Standards" or "Order"), requires electric utilities in New York State to test annually all of their publicly accessible transmission and distribution facilities for stray voltage and to inspect their electric facilities every five years.

This report describes Niagara Mohawk Power Corporation's d/b/a National Grid ("National Grid" or "Company") stray voltage detection program and facility inspection program conducted for the 12-month period ended December 31, 2010.

II. Company Overview

National Grid provides electric service to approximately 1,600,000 customers in a service area of approximately 25,000 square miles in New York State. The Company operates an electric transmission and distribution system. For the stray voltage detection and facility inspection programs, National Grid divided its system into subprograms to schedule and track testing and inspections. The subprograms include the Company's (a) distribution overhead system, (b) distribution and transmission underground system, (c) streetlight system, (d) transmission system, and (e) substations.

a. Distribution Overhead System

National Grid's distribution overhead system consists of structures supporting circuits energized at voltages of up to 15kV. This system spans close to 32,000 miles and is made up of approximately 1,243,814 utility poles. Stray voltage testing of the distribution system is currently performed by contractors. Facility inspections of the distribution system are currently performed by the Company's internal workforce.

b. Distribution and Transmission Underground System

National Grid's distribution and transmission underground system is made up of facilities such as manholes, hand-holes, vaults, URD pad mounted transformers, and switchgear, among others. Fiberglass hand holes are exempt from stray voltage testing under the Safety Standards.[1] Stray voltage testing of the Company's underground system, which consists of approximately 95,831 assets, is currently performed by contractors. Facility inspections of the underground system, which consists of approximately 88,429 underground and 60,749 padmount assets, are currently performed by the Company's internal workforce.

[1] *See* July 21, 2005 Order, at 23; December 15, 2008 Order, at Appendix A, § 3(a).

c. Streetlight System

National Grid's streetlight system contains approximately 88,267 underground fed metallic streetlight standards and municipally-owned streetlights and traffic control devices. Overhead fed streetlights on wooden poles are not counted within the streetlight program. For the underground fed metallic streetlight standards, contractors performed the stray voltage testing at night when the lights were operational. The traffic control stray voltage testing takes place in conjunction with the contractors' testing of the overhead and underground systems during the daytime hours. The streetlight facility inspections on Company-owned facilities take place during the day and are performed by an external workforce.

d. Transmission System

National Grid's transmission system, which includes the sub-transmission system, consists of structures that support circuits energized at voltages of 12 kV, 23kV, 34.5kV, 46kV, 69kV, 115kV, 230kV, and 345kV. The transmission system spans the entire State, is approximately 8,465 miles in length, and contains approximately 100,000 structures (wood and steel). Stray voltage testing on the transmission system is performed by contractors. In many instances, the most difficult part of testing a transmission tower is physically getting to the tower. Therefore, National Grid programmed its database and internal hand held computers to perform stray voltage testing on transmission structures while an employee was at the location for a visual inspection or the contractor was at the tower for a stray voltage test.

e. Substations

There are 909 substations in National Grid's New York State service territory. Stray voltage results for substation fences were collected internally by the operating group. The initial dataset identified 909 substation locations to be tested of which a number of these are customer-owned locations.

III. Stray Voltage Testing Program

During the calendar year ended December 31, 2010, National Grid conducted stray voltage testing of 100% of its publicly accessible transmission and distribution facilities that are capable of conducting electricity and 100% of all Company and non-Company owned metallic streetlights and traffic signals.

In addition, and in compliance with the Safety Standards, National Grid:

a. Immediately safeguarded and/or mitigated all voltage findings ≥ 1.0 volt. In instances where the stray voltage finding was determined to be caused by customer-owned equipment, the area was immediately made safe and the customer or responsible person associated with the premises was notified of the unsafe condition and the need for the customer to arrange for a permanent repair. Voltage findings determined to be caused by a

b. Tested all publicly accessible structures and sidewalks within a 30 foot radius of the electric facility or streetlight where there was a stray voltage finding ≥ 1. 0 volt.

c. Responded, investigated, and mitigated positive findings of shock incidents reported by the public.

All facilities that comprise National Grid's transmission and distribution system were visited. Of the 1,527,963 facilities visited, 392,676 did not require stray voltage testing because: the facilities are wood utility poles that have no attached appurtenances capable of conducting electricity; their electrically conductive appurtenances are not accessible to the public (pre-wired wood); the facilities are enclosed in fiberglass (non-conductive materials); de-energized facilities; and/or the facilities are inaccessible to the public.

Inaccessible facilities include:

a. Locked Gate/Fence – Poles behind locked gates and fences that are not accessible to the public, *i.e*., facilities located in fenced areas owned by other utilities, such as water companies.

b. Dangerous Grades – Poles located on cliffs and other dangerous grades are generally inaccessible to Company personnel and the general public and are approached only under urgent circumstances. The performance of stray voltage testing on these facilities would constitute an unacceptable risk to the employee.

c. Company Property – Poles located on Company property, such as substations, are accessible only to Company personnel and authorized contractors.

d. Vaults - Structures located inside buildings. These structures are accessible only to Company and building maintenance personnel.

e. Limited Access Highway Facilities – Structures located on highways and exit and entrance highway ramps. The performance of stray voltage testing on these structures would constitute an unacceptable risk to the employee.

As required by the Safety Standards, National Grid performed 2,873 miles (Scan 1 = 1,638 miles and Scan 2 = 1,235 miles) of mobile testing system scans between January 1, 2010 and December 31, 2010. A summary of the results of the mobile testing scans is contained in Appendix 8. Please note that Appendix 8 is the original mobile scan report submitted to Staff, with the exception of Appendix C (Financial Detail) which has been updated to reflect financial data as of December 31, 2010.

IV. Facility Inspection Program

The Safety Standards require National Grid to visually inspect approximately 20% of its facilities annually, resulting in a five year inspection goal for all facilities to be inspected. The year ended December 31, 2010 was the first year of the Cycle 2 inspection program.

National Grid visually inspects its overhead distribution and transmission systems on a five-year cycle, from the ground, as prescribed by the Safety Standards.

In addition, National Grid also performs the following inspections, some of which are recurring on specific cycles, some of which are scheduled on an as-needed basis:

- Aerial Infrared – Helicopter based thermographic imaging of connections and equipment.
- Tower Footing – Embedded support structure that supports a transmission tower.
- Wood Pole – Inspection of the wood pole at and below the ground line.
- Aerial Patrols – Helicopter based visual examination of transmission facilities and equipment.
- Comprehensive Helicopter Patrol – A comprehensive methodical examination of all components comprising the transmission system by helicopter.

National Grid's ground-based visual inspection program is segmented into five categories: distribution facility inspection; underground facility inspections; streetlights inspections; transmission facility inspections; and substation inspections.[2] Each program is summarized by its associated procedure document. The inspections include visual inspections of the assets to determine if deficiencies exist. Deficiencies are captured by codes entered into handheld computers. Data is then downloaded for review and follow up work.

In accordance with the Safety Standards, National Grid uses the following severity levels to establish priority for repairs and scheduling:

a. Level I – Repair as soon as possible but not longer than one week. A Level I classification represents an actual or imminent safety hazard to the public or a serious and immediate threat to the delivery of power. Critical safety hazards present at the time of the inspection shall be guarded until the hazard is mitigated.

b. Level II – Repair within one year. A Level II classification represents conditions that are likely to fail prior to the next inspection cycle and represent a threat to safety and/or reliability should a failure occur prior to repair.

[3] Substation inspections are more complex than those performed on other facilities and differ in a variety of ways including, but not limited to, inspection schedules, system through which inspection data is captured, and work prioritization (supervisory review determines work to be completed versus Levels I-IV), among others. Substation inspection procedure and protocols are contained in SMS 400.06.1 entitled "Substation V&O Inspection Standard" and SMP 400.06.2 entitled "Substation V&O Inspection Procedure."

c. Level III – Repair within three years. A Level III classification represents conditions that do not present immediate safety or operational concerns and would likely have a minimal impact on the safe and reliable delivery of power should a failure occur prior to repair.

d. Level IV – A Level IV classification represents conditions found but repairs are not needed at this time. Level IV is used to track atypical conditions that do not require repair within a five year timeframe. This level should be used for future monitoring purposes and planning proactive maintenance activities.

In accordance with the Safety Standards, when a temporary repair is located during an inspection or is performed by the Company, best efforts are made to make a permanent repair of the facility within 90 days. Temporary repairs that remain on the system for more than 90 days are due to extraordinary circumstances, *i.e.,* storms, outage constraints, and usually require extensive repair activity. National Grid has compiled a list of exceptions of temporary repairs that still remain in place after the 90 day requirement. The list and justifications can be found in Appendix 5 of this report.

National Grid provides classroom and field training to personnel inspecting facilities per the Company's Electric Operating Procedures ("EOPs"). The classroom training covers topics including, EOPs, distribution maintenance inspection and elevated voltage testing training, Computapole handheld training, Computapole database training, distribution vegetation training, geographic information system training, feeder patrols training, and basic electricity training.

The Company provides new distribution inspectors with training upon hiring, with ongoing yearly refresher courses. As part of the refresher training, National Grid updates all training materials due for updates from the following year. Specifically, the updates are done yearly using relevant EOPs and Company standards that have been updated.

V. Company Facilities

National Grid has approximately 1,527,963 individual facilities that require testing for the presence of stray voltage of which approximately 1,502,546 individual facilities require a facility inspection. These facilities are broken down into the following five main categories:

a. Distribution Overhead – National Grid has approximately 1,243,814 distribution pole structures in its New York service territory. The Company's testing criterion for distribution overhead facilities involves testing all Company-owned or joint-owned wood poles with utility electrical facilities located on both public thoroughfares and customer property, including backyards or alleys. Stray voltage testing is performed on all wooden poles with metallic attachments, such as ground wires, ground rods, anchor guy wires, riser pipes, or any electrical equipment within reach of the general public. Distribution overhead facilities are included in both the stray voltage and facility inspection programs.

b. Distribution and Transmission Underground Facilities – National Grid has 95,831 underground facilities in its New York service territory. The Company's testing criterion for underground facilities involves testing all subsurface structures, including above ground, pad-mounted structures. Included in the underground facilities are padmount switchgear cases, padmount transformer cases, electric utility manhole covers, submersible transformer covers, electric utility handhole covers, network vaults, and grates. These facilities are included in both the stray voltage and facility inspection programs.

c. Streetlights and Traffic Signals – There are approximately 61,000 metal pole streetlights and approximately 27,000 traffic signals in National Grid's New York service territory. The streetlight total includes Company-owned metal pole streetlights and municipal-owned metal pole streetlights to which the Company provides service. The testing criterion for streetlights and traffic signals involves testing all metal pole streetlights, traffic signals, and pedestrian crosswalk signals located on publicly accessible thoroughfares. Stray voltage testing of streetlights is performed at night while the fixtures are energized. Privately-owned light fixtures are not included in the stray voltage testing program, per the Safety Standards. All Company-owned streetlights are included in the facility inspection program.

d. Substation Fences - National Grid operates and maintains 909 substation facilities that are necessary for the operation of the electric grid. These substations are fenced in for security, as well as to ensure the safety of the general public. Substation fences are included in the stray voltage testing program.

e. Transmission Structures – There are 99,139 individual poles/towers that comprise National Grid's transmission system in New York. The testing criteria for transmission structures involves testing all structures, guys, and down leads attached to the facilities. Transmission structures support circuit voltages of 23 kV and greater. Transmission poles with distribution underbuild are included in the transmission category. All transmission structures are included in both the stray voltage and facility inspection programs.

VI. Annual Performance Targets

In compliance with the Safety Standards, National Grid met the annual performance target for stray voltage testing of 100% of electric facilities and streetlights for the calendar year ended December 31, 2010.

In addition, in compliance with the Safety Standards, National Grid met the yearly performance target for inspection of approximately 20% (*i.e.*, 95% of the annual target of 20%, or 19%) of its electric facilities for the period ended December 31, 2010.

The results are summarized in the tables below.

Stray Voltage Testing Results

Elevated Voltage Testing Annual Summary			
Program	**Total Units**	**Units Completed**	**% Completed**
Distribution	1,243,814	1,243,814	100
Underground	95,831	95,831	100
Streetlights*	88,267	88,267	100
Transmission	99,139	99,139	100
Substation	909	909	100

*Note: Streetlights include traffic controls but exclude fiberglass standards.

Facility Inspection Program Results

Category	Total System Units	Units Completed as of 2010	Actual Cumulative Inspected as of 2010
Overhead Distribution	1,196,700	232,604	19%
Overhead Transmission	94,977	18,261	19%
Underground	88,429	17,624	20%
Pad-mounted Transformers	60,749	10,619	17%
Streetlights	61,691	2,315	4%
TOTAL	1,502,546	281,423	19%

Inspection Performance Summary

Overhead Distribution Facilities

Inspection Year	Number of Overhead Distribution Structures Inspected	% of Overall System Inspected (Cumulative)
2010	232,604	19%

Overhead Transmission Facilities

Inspection Year	Number of Overhead Transmission Facilities Inspected	% of Overall System Inspected (Cumulative)
2010	18,261	19%

Underground Facilities

Inspection Year	Number of Underground Facilities Inspected	% of Overall System Inspected (Cumulative)
2010	17,624	20%

Padmount Transformers

Inspection Year	Number of Padmount Transformers Inspected	% of Overall System Inspected (Cumulative)
2010	10,619	17%

Streetlights

Inspection Year	Number of Streetlights Inspected	% of Overall System Inspected (Cumulative)
2010	2,316	4%

As a result of the 2010 manual and mobile stray voltage testing efforts, 2,309 streetlights with findings of $\geq$1 volt were both inspected and mitigated/repaired. Cycle 2 Streetlight inspections will be part of a new strategic sourcing plan to be implemented in 2011. National Grid anticipates completing 40% of streetlight inspections by close of 2011, then 20% annually thereafter. All Streetlight inspections will be completed in accordance with the 5 year inspection requirement due by end of calendar year 2014.

VII. Certifications

Pursuant to section 7 of Appendix A of the Safety Standards, the president or officer of each utility with direct responsibility for overseeing stray voltage testing and facility inspections shall provide an annual certification to the Commission that the utility has, to the best of his or her knowledge, exercised due diligence in carrying out a plan, including quality assurance, that is designed to meet the stray voltage testing and inspection requirements, and that the utility has:

- Tested all of its publicly accessible electric facilities and street lights, and
- Inspected the requisite number of electric facilities.

The certifications are attached as Appendix 18 to this report.

VIII. Analysis of Causes of Findings and Stray Voltage

The Safety Standards require the electric utilities to perform an inventory on all stray voltage findings and report on the number of these findings each year. Section 1(f) of the December 15, 2008 Order defines a finding as "[a]ny confirmed voltage reading on an electric facility or streetlight greater than or equal to 1 volt measured using a volt meter and 500 ohm shunt resistor." Section 1(c) defines stray voltage as "[v]oltage conditions on electric facilities that should not ordinarily exist. These conditions may be due to one or more factors, including, but not limited to, damaged cables, deteriorated, frayed, or missing insulation, improper maintenance, or improper installation." Utilities are required to report on all findings whether or not the voltage is normal to the electric system.

National Grid identified 376 instances of stray voltage during the stray voltage testing program in 2010. These voltages resulted from a variety of conditions including: deterioration of conductors; age of equipment; exposure to the elements; and various customer related issues. A majority (198) of stray voltage conditions identified were on streetlights. The ground connection on streetlights was the leading cause of stray voltage findings.

The following table contains a breakdown of the causes of stray voltage findings identified through the Company's 2010 manual testing effort. National Grid has repaired and/or mitigated all findings in accordance with the Safety Standards. Mobile testing findings are addressed in the Mobile Stray Voltage Testing Report attached as Appendix 8.

Structure Type	Cause of Stray Voltage	Stray Voltages Found
Distribution	Info Missing	1
Distribution	Arrestor	1
Distribution	Cable & Ground	1
Distribution	Cable Feed	1
Distribution	Down Ground	40
Distribution	Equipment – Other	14
Distribution	Ground Connection	26
Distribution	Guy	33
Distribution	Induce Voltage	2
Distribution	Insulator	3
Distribution	Neutral	2
Distribution	None Required	17
Distribution	Service Wire	1
Distribution	Customer Problem	1
Underground	None Required	1
Street Lights – Traffic Signals	Cable & Ground	8
Street Lights – Traffic Signals	Cable Feed	9
Street Lights – Traffic Signals	Equipment – Other	28
Street Lights – Traffic Signals	Ground Connection	95

Street Lights – Traffic Signals	Luminaire Change	7
Street Lights – Traffic Signals	Neutral	17
Street Lights – Traffic Signals	None Required	3
Street Lights – Traffic Signals	Poor Insulation	2
Street Lights – Traffic Signals	Remade All Connections	28
Street Lights – Traffic Signals	Customer Problem	1
Transmission	Down Ground	2
Transmission	Ground Connection	9
Transmission	Guy	3
Transmission	None Required	4
TOTAL		360

- In accordance with the Safety Standards, when National Grid discovered a finding on an electric facility or streetlight during stray voltage testing, the Company tested all publicly accessible structures and sidewalks within a minimum 30 foot radius of the electric facility or streetlight. National Grid did not identify any additional findings associated with the initial test structure as a result of the 30-foot radius testing.

The University of Buffalo ("UB") is working with National Grid to investigate stray voltage issues related to the street lighting system in the greater Buffalo area. UB is conducting the investigation as follows: a review of industry practices as they relate to the identification and mitigation of stray voltage; based upon this review and UB research, develop specific recommendations on how National Grid can continue to remediate stray voltage findings in compliance with codes, orders, and industry practices; review of the testing methods utilized for the measurement of stray voltage by National Grid to ensure they represent the state of the art; and address any additional issues associated with stray voltage. A concise report summarizing the research performed with recommendations is expected in May 2011.

IX. Analysis of Inspection Results

Note: Total Number of Deficiencies may add up to more than the total Locations w/ Deficiencies due to deficiencies on multiple facilities at a single location.

Overhead Distribution Structures

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
232,604	134,804	58%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	417	.13%
2	21,431	6%
3	42,720	13%
4	267,177	81%

Total:	331,745	100%

Overhead Transmission Facilities

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
18,261	6,900	38%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	10	0.1%
2	180	2%
3	1,326	14%
4	7,972	84%
Total:	9,488	100%

Underground Facilities

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
17,624	5,728	33%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	34	.4%
2	1,773	21%
3	235	3%
4	6,553	76%
Total:	8,595	100%

Pad-mount Transformers

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
10,619	1,941	18%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	36	.5%
2	268	3%
3	924	12%
4	6,584	84%
Total:	7,812	100%

Streetlights

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
2,315	2,315	100%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	2,309	100%
2	6	0.01%
3	0	0%
4	0	0%
Total:	2,315	100%

In 2010, National Grid identified an overall total of 359,955 deficiencies:

- Priority Rating 1 Total = 2,806, or 0.7% of the overall total.
- Priority Rating 2 Total = 23,658, or 7% of the overall total.
- Priority Rating 3 Total = 45,205, or 13% of the overall total.
- Priority Rating 4 Total = 288,286 (inventory), or 80% of the overall total.

X. Quality Assurance

Quality Assurance provides a level of confidence that National Grid's facility inspection and stray voltage testing programs have resulted in data that is verified to be indicative of the condition of assets and follow-up repairs.

A. Quality Control ("QC") Audit Program - Facility Inspections

The National Grid Inspections department performed QC audits on approximately 2,082 distribution, transmission and sub-transmission assets inspected during 2010. The QC program was designed to confirm and/or achieve a minimum confidence level of 95% compliance in consistency and adherence to procedures. The method used to confirm and/or achieve the required quality of inspections involved additional QC inspections of randomly sampled assets from the population of previously inspected assets at a rate of ten assets per inspector per month.

Each audit cycle would have one of the following outcomes:

a. **confirmation of 95% compliance** – if an inspector achieves 95% compliancy, they would continue to be audited only on a monthly cycle.
b. **additional random samples are required** – if an inspector fails to achieve 95% compliancy, they would continue to be audited on a weekly basis until the 95% compliancy is reached.

An audit was determined to be passing only if there was a correlation between the results of the inspection and those of the audit. The combination of maintenance codes, levels, and quantities were examined during the audit.

The 2010 QC audits achieved an overall compliancy of 98.04%.

B. Quality Assurance ("QA") Audit Program – Facility Inspections

National Grid enlisted the support of a vendor to gather data for the QA program. The QA program and vendor operated under the direction of the Operations Performance function.

The methodology involved performing an additional QA inspection of a randomly-selected sample of previously inspected assets with the intent of verifying previously identified maintenance codes. The process captured "missed" maintenance codes, and noting instances of repairs when evident. Commonly applied statistical principles are applied to assess, with a 95% level of confidence, the validity of entire population of inspection data based on an analysis of the results of the sample.

For the 2010 QA program:

- The number (population) of assets inspected during the inspection year:
  - Distribution: 232,604 (locations)
  - Transmission: 9,170
  - Sub-transmission: 9,091

- The sample size for the QA inspection: (internal)
  - Distribution 2056 assets (locations)
  - Transmission 135
  - Sub-Transmission 37

The sample size for the QA inspection: (external)
  - Distribution 867
  - Transmission 158

Analysis of Inspections

The analysis of the QA program data is intended to understand the nature and magnitude of "defects" as applicable to the facility inspection program results. A "defect" was tallied when the QA inspector added one or more Computapole Level 1, 2, or 3 codes at a single asset location that were not previously identified during the original inspection. For example, at a single distribution pole (asset location), if a QA inspector added one Level 2 code and one Level 3 code that were not listed on the spreadsheet of previously identified Computapole codes for that asset location, it was counted as one "defect."

The following indicates QA program "defects" found:

Asset Category	QA Inspection Locations	"Defects" Found	"Defects" as % of QA Inspection Locations
Distribution	2923	Level 1 = 0 Level 2 = 23 Level 3 = 16 Total = 37	1.10%
Transmission	293	Level 1 = 0 Level 2 = 4 Level 3 = 15 Total = 19	6.48%
Sub-Transmission	37	Level 1 = 0 Level 2 = 0 Level 3 = 8 Total = 8	21.62%
Totals	3253	64	1.96%

* 99% Confidence Level is interpreted as meaning that for the number of QA inspection locations (sample size) surveyed, National Grid is 99% confident that the Defect % for the entire population of inspection locations will fall within the range indicated. For instance, for the 243,224 distribution assets that comprise the population of original inspection locations, National Grid is over 99% confident that the original inspectors missed identifying Level 1, 2, or 3 inspection codes for less than 1.96% of asset locations, which correlates with a greater than 98.04% accuracy rate.

Results – Inspections

National Grid has set a threshold for inspection results accuracy compliance of 95%, meaning that in order for the data to be accepted as being a true indication of actual asset condition, 95% of asset locations original inspections must agree with QA inspection results.

Results – Repairs

The 2010 QA process was performed for assets that were not inspected since April 2009 to coincide with a newly revised inspection procedure. Therefore, no Level 2 or Level 3 repairs would have been required for those particular assets by the time of the QA inspection.

Internal Audit

During the 2010 – 2011 fiscal year an internal process audit of the system was performed by the Electricity Operations Quality Assurance Department. The audit was performed to the PAS 55-1:2008 standard. The Inspection and Maintenance department areas that were audited included: Overhead Inspection, Underground Distribution Inspection, Sub-Transmission Line Inspection, and Elevated Equipment Voltage Testing.

The audit was carried out over seven separate interview/audit meetings in Brockton, Waltham, and Albany with management representatives from Distribution Inspections, Scheduling, Project Management, Workflow Assurance, Design and Customer Operations.

Auditors were able to identify that 20% of all overhead structures in Upstate New York are inspected annually and that the required inspections for 2011 are currently on target for completion by year end. Each Structure identified as a deficiency "Level 1," is inspected/visited twice. That is also the minimum number of visits for deficiency "Level 3" assemblies. Each Structure identified as a deficiency "Level 2" is inspected/visited a minimum of three times.

Improvement Opportunities:

The best practice and opportunities for improvement as of 1/31/2011 are:
- The system process steps required are not uniformly identified, documented, and communicated.
- The methodology the distribution organization uses to identify 20% of annual inspections is not defined or documented.
- The methodology, steps, inputs and outputs for Workflow Assurance and Design & Scheduling utilizes to process and release level 2 & 3 capital maintenance work is not documented.
- Fluke Meters used in Elevated Voltage Testing were discovered to be missing from the annual calibration list (this has been corrected).

National Grid's Asset Management department formed a committee to document, communicate, and drive efficiencies in the system processes. To include: Distribution Inspections, Inspectors, Schedulers, Project Management, Workflow Assurance, Design, Customer Operations and Work Crew.

C. Quality Assurance ("QA") Audit Program – Stray Voltage Testing

During 2010, National Grid continued to enlist the support of vendors to perform its stray voltage testing. The vendors were required to perform quality control audits of the preloaded assets.

National Grid also enlisted the support of a vendor to gather data for the stray voltage testing QA program, upon which National Grid performed subsequent analysis. The stray voltage QA program and vendor operated under the direction of the Operations Performance function. The QA testing was performed from a randomly-selected sample of previously QC vendor tested assets.

For QC and QA testing, both must achieve a minimum confidence level of 95% for distribution, underground, transmission, sub-transmission and 98% for streetlights with the intent of verifying that each asset that was tested had a "testable object." In order for the QA/QC test to have "passed," it must confirm that all assets that had a "testable object" must have been tested.

Results

During 2010, QA testing was performed on 3,770 structures. The results yielded 45 failures for a 1.2% failure rate. The overall compliancy achieved for the QA testing program was 98.8%

A testing failure was recorded when the EV tester and QC auditor both determined that there was no testable object, but the vendor determined there was a testable object.

QC data quality failures were recorded when the vendor's test result was different than the testing company's auditors:
1) The EV tester and QC auditor determined there was a testable object and the vendor stated there was not a testable object.
2) When the QC auditor stated there was not a testable object and the vendor and EV tester determined there was a testable object. The structure had been tested properly by the EV tester and reported incorrectly during the field audit.

	48		50		51		54		56		57		60		62		
Structure Type	Data Quality	PSC Failure	Data Quality	PSC Failure	Data Quality	PSC Failure	Data Quality	PSC Failure	Data Quality	PSC Failure	Data Quality	PSC Failure	Data Quality	PSC Failure	Data Quality	PSC Failure	Totals
Distribution	4	2	0	2	0	0	32	6	12	6	22	4	26	14	32	5	167
Underground	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	1	5
Transmission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
SubTransmiss	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4
Streetlights	0	1	0	0	0	0	9	0	2	0	1	0	4	0	13	0	30
Totals	5	4	0	2	0	0	38	6	17	7	23	4	30	16	47	6	208

	NGRID Regions								
Structure Type	48	50	51	54	56	57	60	62	Totals
Distribution	392	253	189	500	330	425	546	528	3,163
Underground	16	2	3	60	18	16	26	57	198
Transmission	39	21	10	21	10	20	37	9	167
Sub Transmission	13	2	4	15	10	10	10	2	66
Streetlights	50	11	26	28	11	9	9	32	176
Totals	510	289	232	624	379	480	628	628	3,770

D. Independent Transmission Facility Inspection Audit

Independent Transmission Facility Inspection Audit findings are addressed in the Asset Management Summary of Audit Report attached as Appendix 17.

APPENDIX SUMMARY

Appendix 1: Stray Voltage Testing Summary

Appendix 2: Summary of Energized Objects

Appendix 3: Summary of Shock Reports from the Public

Appendix 4: Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Appendix 5: Temporary Repair Exceptions

Appendix 6: Inspections Summary

Appendix 7: Summary of Overdue Repairs

Appendix 8: Mobile Testing

Appendix 9: NG-USA EOP G016 Elevated Equipment Voltage Testing

Appendix 10: NG-USA EOP D004 Distribution Line Patrol and Maintenance

Appendix 11: NG-USA EOP UG006 Underground Inspection and Maintenance

Appendix 12: NG-USA PR 06.01.601.001 Transmission Line Maintenance Procedure

Appendix 13: NG-USA EOP G017 Street Light Standard Inspection Program

Appendix 14: NG-USA EOP G004 Shock Complaints

Appendix 15: NG-USA SMS 400.06.1 Substation V&O Inspection Standard and SMP 400.06.2 Substation Inspection Procedure

Appendix 16: NG-USA EOP G029 Tracking Temporary Repairs To Electric System

Appendix 17: Asset Management Summary of Audit

Appendix 18: Certifications

Appendix 1

Appendix 1

Stray Voltage Testing Summary

nationalgrid Data as of December 31, 2010	Total System Units Requiring Testing	Units Completed	Percent Completed	Units with Voltage Found (>= 1.0v)	Percent of Units Tested with Voltage (>= 1.0v)	Units Classified as Inaccessible
Distribution Facilities	1,243,814	1,243,814	100.00%	149	0.012%	15,620
Monthly Update		28,892	2.32%	2	0.007%	276
Underground Facilities	95,831	95,831	100.00%	1	0.001%	1,644
Monthly Update		1,068	1.11%		0.000%	52
Street Lights / Traffic Signals	88,267	88,267	100.00%	208	0.236%	665
Monthly Update		661	0.75%		0.000%	
Substation Fences	909	909	100.00%			
Monthly Update						
Transmission	99,139	99,139	100.00%	18	0.02%	2,741
Monthly Update						
TOTAL	1,527,960	1,527,960	100.00%	376	0.02%	20,670

Appendix 2

Appendix 2

Summary of Energized Objects (Manual Testing)

nationalgrid
Data as of December 31, 2010

	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	120	21	8	149	143	0	0
Pole (910)	0	1	0	1	1	0	0
Ground (914)	51	11	1	63	62	0	0
Guy (915)	70	2	1	73	69	0	0
Riser (916)	7	1	1	9	9	0	0
Other	11	6	6	23	22	0	0
Underground Facilities	1	0	0	1	1	0	0
Handhole / Pull box (950)	0	0	0	0	0	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	1	0	0	1	1	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	87	112	9	208	199	0	0
Metal Street Light Pole (971/981)	87	107	9	203	194	0	0
Traffic Signal Pole (991)	0	0	0	0	0	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	1	0	1	1	0	0
Other	11	10	5	26	6	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	13	5	0	18	18	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	7	3	0	10	10	0	0
Guy (934)	0	0	0	0	0	0	0
Other	6	3	0	9	9	0	0
Miscellaneous Facilities	27	7	3	37	36	1	0
Sidewalk	1	0	0	1	1	0	0
Gate/Fence/Awning	0	0	0	0	0	0	0
Control Box	6	4	0	10	10	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	3	0	1	4	3	1	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	17	3	2	22	22	0	0
Totals	248	145	20	413	397	1	0

Appendix 3

Appendix 3

Summary of Shock Reports from the Public

nationalgrid 2010 1st Qurater January 1, 2010 - March 31, 2010	Quarterly Update	Yearly Total
I. Total shock calls received:	**36**	**36**
Unsubstantiated	11	11
Normally Energized Equipment	3	3
Stray Voltage:		
Person	22	22
Animal		
II. Injuries Sustained/Medical Attention Received Due To SV		
Person	1	1
Animal		
III. Voltage Source:	**22**	**22**
Utility Responsibility		
Issue with primary, joint, or transformer	1	1
Secondary joint (Crab)		
SL service Line	1	1
Abandoned SL service line		
Defective service line		
Abandoned service line		
OH Secondary		
OH Service		
OH Service neutral	5	5
Pole		
Riser		
Other	3	3
Customer Responsibility		
Contractor damage		
Customer equipment/wiring	12	12
Other Utility/Gov't Agency Responsibility		
SL Base Connection		
SL Internal wiring or light fixture		
Overhead equipment		
IV. Voltage Range:	**22**	**22**
1.0V to 4.4V		
4.5V to 24.9V	3	3
25V and above	1	1
Unknown	18	18

nationalgrid 2010 2nd Quarter April 1, 2010 - June 30, 2010	Quarterly Update	Yearly Total
I. Total shock calls received:	**63**	**99**
Unsubstantiated	8	19
Normally Energized Equipment	17	20
Stray Voltage:		
Person	38	60
Animal		
II. Injuries Sustained/Medical Attention Received Due To SV		
Person	1	2
Animal		
III. Voltage Source:	**38**	**60**
Utility Responsibility		
Issue with primary, joint, or transformer	2	3
Secondary joint (Crab)		
SL service Line	2	3
Abandoned SL service line		
Defective service line		
Abandoned service line		
OH Secondary	2	2
OH Service		
OH Service neutral	9	14
Pole		
Riser		
Other	2	5
Customer Responsibility		
Contractor damage		
Customer equipment/wiring	21	33
Other Utility/Gov't Agency Responsibility		
SL Base Connection		
SL Internal wiring or light fixture		
Overhead equipment		
IV. Voltage Range:	**38**	**60**
1.0V to 4.4V	6	6
4.5V to 24.9V	5	8
25V and above	8	9
Unknown	19	37

nationalgrid 2010 3rd Quarter July 1, 2010 - September 30, 2010	Quarterly Update	Yearly Total
I. Total shock calls received:	**78**	**177**
Unsubstantiated	10	29
Normally Energized Equipment	19	39
Stray Voltage:		
Person	48	108
Animal	1	1
II. Injuries Sustained/Medical Attention Received Due To SV		
Person	2	4
Animal	2	2
III. Voltage Source:	**49**	**109**
Utility Responsibility		
Issue with primary, joint, or transformer	9	12
Secondary joint (Crab)	1	1
SL service Line		3
Abandoned SL service line		
Defective service line		
Abandoned service line		
OH Secondary	2	4
OH Service	5	5
OH Service neutral	1	15
Pole		
Riser		
Other	1	6
Customer Responsibility		
Contractor damage	1	1
Customer equipment/wiring	29	62
Other Utility/Gov't Agency Responsibility		
SL Base Connection		
SL Internal wiring or light fixture		
Overhead equipment		
IV. Voltage Range:	**49**	**109**
1.0V to 4.4V	5	11
4.5V to 24.9V	6	14
25V and above	10	19
Unknown	28	65

Report includes 1 Pending Shock Report from 2nd Quarter

nationalgrid 2010 4th Quarter October 1, 2010 - December 31, 2010	Quarterly Update	Yearly Total
I. Total shock calls received:	**34**	**211**
Unsubstantiated	7	36
Normally Energized Equipment	7	46
Stray Voltage:		
Person	20	128
Animal		1
II. Injuries Sustained/Medical Attention Received Due To SV		
Person	2	6
Animal		2
III. Voltage Source:	**20**	**129**
Utility Responsibility		
Issue with primary, joint, or transformer		12
Secondary joint (Crab)		1
SL service Line		3
Abandoned SL service line		
Defective service line		
Abandoned service line		
OH Secondary	2	6
OH Service		5
OH Service neutral	1	16
Pole		
Riser		
Other		6
Customer Responsibility		
Contractor damage		1
Customer equipment/wiring	17	79
Other Utility/Gov't Agency Responsibility		
SL Base Connection		
SL Internal wiring or light fixture		
Overhead equipment		
IV. Voltage Range:	**20**	**129**
1.0V to 4.4V	1	12
4.5V to 24.9V	4	18
25V and above	4	23
Unknown	11	76

Report includes 1 Pending Shock Report from 3rd Quarter

Appendix 4

Appendix 4

Summary of Deficiencies and Repair Activity Resulting from the Inspections Process - Distribution				
Overhead Facilities	**2010**			
Priority Level	**I**	**II**	**III**	**Temp Repairs**
Repair Expected	**Within 1 week**	**Within 1 year**	**Within 3 years**	**Within 90 days**
Poles				
Pole Condition				
Number of Deficiencies	26	2286	8698	33
Repaired in Time Frame	25	303	271	28
Repaired - Overdue	1	0	0	2
Not Repaired - Not Due	0	1983	8427	3
Not Repaired - Overdue				
Grounding System				
Number of Deficiencies	50	3617	8724	0
Repaired in Time Frame	50	1121	859	0
Repaired - Overdue				
Not Repaired - Not Due	0	2496	7865	0
Not Repaired - Overdue				
Anchors/Guy Wire				
Number of Deficiencies	3	2093	5104	13
Repaired in Time Frame	3	1141	165	11
Repaired - Overdue				
Not Repaired - Not Due	0	952	4939	0
Not Repaired - Overdue	0	0	0	2
Cross Arm/Bracing				
Number of Deficiencies	41	734	2994	0
Repaired in Time Frame	41	256	113	0
Repaired - Overdue				
Not Repaired - Not Due	0	478	2881	0
Not Repaired - Overdue				
Riser				
Number of Deficiencies	2	1235	538	0
Repaired in Time Frame	2	488	63	0
Repaired - Overdue				
Not Repaired - Not Due	0	747	475	0
Not Repaired - Overdue				
Conductors				
Primary Wire/Broken Ties				
Number of Deficiencies	104	203	87	2

Repaired in Time Frame	104	72	2	2
Repaired - Overdue				
Not Repaired - Not Due	0	131	85	0
Not Repaired - Overdue				
Secondary Wire				
Number of Deficiencies	24	134	592	7
Repaired in Time Frame	24	45	45	6
Repaired - Overdue				
Not Repaired - Not Due	0	89	547	0
Not Repaired - Overdue	0	0	0	1
Neutral				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Insulators				
Number of Deficiencies	18	219	295	2
Repaired in Time Frame	17	85	10	1
Repaired - Overdue	1	0	0	0
Not Repaired - Not Due	0	134	285	1
Not Repaired - Overdue				
Pole Equipment				
Transformers				
Number of Deficiencies	3	7547	1363	1
Repaired in Time Frame	3	2011	288	1
Repaired - Overdue				
Not Repaired - Not Due	0	5536	1075	0
Not Repaired - Overdue				
Cutouts				
Number of Deficiencies	45	70	7260	2
Repaired in Time Frame	45	29	347	2
Repaired - Overdue				
Not Repaired - Not Due	0	41	6913	0
Not Repaired - Overdue				
Lightning Arrestors				
Number of Deficiencies	0	4	1267	0
Repaired in Time Frame	0	1	74	0
Repaired - Overdue				
Not Repaired - Not Due	0	3	1193	0
Not Repaired - Overdue				
Other Equipment				
Number of Deficiencies	1	1061	1298	0
Repaired in Time Frame	1	517	70	0
Repaired - Overdue				

Not Repaired - Not Due	0	544	1228	0
Not Repaired - Overdue				
Miscellaneous				
Trimming Related				
Number of Deficiencies	20	0	2006	0
Repaired in Time Frame	20	0	293	0
Repaired - Overdue				
Not Repaired - Not Due	0	0	1713	0
Not Repaired - Overdue				
Temporary Repairs				
Number of Temp Repairs	0	0	0	13
Repaired in Time Frame	0	0	0	9
Repaired - Overdue				
Not Repaired - Not Due	0	0	0	1
Not Repaired - Overdue	0	0	0	3
Other				
Number of Deficiencies	0	1	0	0
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due	0	1	0	0
Not Repaired - Overdue				
Overhead Facilities Total				
Total				
Number of Deficiencies	**337**	**19204**	**40226**	**73**
Repaired in Time Frame	335	6069	2600	60
Repaired - Overdue	2	0	0	2
Not Repaired - Not Due	0	13135	37626	5
Not Repaired - Overdue	0	0	0	6

Summary of Deficiencies and Repair Activity Resulting from the Inspections Process - Transmission				
Transmission Facilities	**2010**			
Priority Level	**I**	**II**	**III**	**Temp Repairs**
Repair Expected	**Within 1 week**	**Within 1 year**	**Within 3 years**	**Within 90 days**
Towers/Poles				
Steel Towers				
Number of Deficiencies	0	12	45	0
Repaired in Time Frame	0	1	12	0
Repaired - Overdue				
Not Repaired - Not Due	0	11	33	0
Not Repaired - Overdue				
Poles				
Number of Deficiencies	0	35	617	0
Repaired in Time Frame	0	9	9	0
Repaired - Overdue				
Not Repaired - Not Due	0	26	608	0
Not Repaired - Overdue				
Anchors/Guy Wire				
Number of Deficiencies	0	9	123	0
Repaired in Time Frame	0	7	6	0
Repaired - Overdue				
Not Repaired - Not Due	0	2	117	0
Not Repaired - Overdue				
Crossarm/Brace				
Number of Deficiencies	0	13	84	0
Repaired in Time Frame	0	4	6	0
Repaired - Overdue				
Not Repaired - Not Due	0	9	78	0
Not Repaired - Overdue				
Grounding System				
Number of Deficiencies	0	25	192	0
Repaired in Time Frame	0	2	31	0
Repaired - Overdue				
Not Repaired - Not Due	0	23	161	0
Not Repaired - Overdue				
Conductors				
Cable				
Number of Deficiencies	0	2	6	0
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due	0	2	6	0

Not Repaired - Overdue				
Static/Neutral				
Number of Deficiencies	0	4	21	0
Repaired in Time Frame	0	2	0	0
Repaired - Overdue				
Not Repaired - Not Due	0	2	21	0
Not Repaired - Overdue				
Insulators				
Number of Deficiencies	1	43	194	0
Repaired in Time Frame	1	19	13	0
Repaired - Overdue				
Not Repaired - Not Due	0	24	181	0
Not Repaired - Overdue				
Miscellaneous				
Right of Way Condition				
Number of Deficiencies	0	0	6	0
Repaired in Time Frame	0	0	6	0
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Temporary Repairs				
Number of Temp Repairs	0	0	0	6
Repaired in Time Frame	0	0	0	2
Repaired - Overdue	0	0	0	2
Not Repaired - Not Due	0	0	0	1
Not Repaired - Overdue	0	0	0	1
Other				
Number of Deficiencies	9	37	38	0
Repaired in Time Frame	9	19	1	0
Repaired - Overdue				
Not Repaired - Not Due	0	18	37	0
Not Repaired - Overdue				
Transmission FacilitiesTotal				
Total				
Number of Deficiencies	**10**	**180**	**1326**	**6**
Repaired in Time Frame	10	63	84	2
Repaired - Overdue	0	0	0	2
Not Repaired - Not Due	0	117	1242	1
Not Repaired - Overdue	0	0	0	1

Summary of Deficiencies and Repair Activity Resulting from the Inspections Process - Underground				
Underground Facilities	**2010**			
Priority Level	**I**	**II**	**III**	**Temp Repairs**
Repair Expected	**Within 1 week**	**Within 1 year**	**Within 3 years**	**Within 90 days**
Underground Structures				
Damaged Cover				
Number of Deficiencies	0	11	84	0
Repaired in Time Frame	0	0	1	0
Repaired - Overdue				
Not Repaired - Not Due	0	11	83	0
Not Repaired - Overdue				
Damaged Structure				
Number of Deficiencies	30	569	14	0
Repaired in Time Frame	30	69	1	0
Repaired - Overdue				
Not Repaired - Not Due	0	500	13	0
Not Repaired - Overdue				
Congested Structure				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Damaged Equipment				
Number of Deficiencies	1	15	0	0
Repaired in Time Frame	1	3	0	0
Repaired - Overdue				
Not Repaired - Not Due	0	12	0	0
Not Repaired - Overdue				
Conductors				
Primary Cable				
Number of Deficiencies	0	49	0	0
Repaired in Time Frame	0	2	0	0
Repaired - Overdue				
Not Repaired - Not Due	0	47	0	0

Not Repaired - Overdue				
Secondary Cable				
Number of Deficiencies	3	0	0	0
Repaired in Time Frame	3	0	0	0
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Neutral Cable				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Racking Needed				
Number of Deficiencies	0	296	0	0
Repaired in Time Frame	0	14	0	0
Repaired - Overdue				
Not Repaired - Not Due	0	282	0	0
Not Repaired - Overdue				
Miscellaneous				
Temporary Repairs				
Number of Temp Repairs				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Other				
Number of Deficiencies	0	833	137	0
Repaired in Time Frame	0	24	10	0
Repaired - Overdue				
Not Repaired - Not Due	0	809	127	0
Not Repaired - Overdue				
Underground Facilities Total				
Total				
Number of Deficiencies	**34**	**1773**	**235**	0
Repaired in Time Frame	**34**	**112**	**12**	0
Repaired - Overdue				
Not Repaired - Not Due	0	**1661**	**223**	0

Not Repaired - Overdue				

Summary of Deficiencies and Repair Activity Resulting from the Inspections Process – Padmount Transformers				
Pad Mount Transformers	**2010**			
Priority Level	**I**	**II**	**III**	**Temp Repairs**
Repair Expected	**Within 1 week**	**Within 1 year**	**Within 3 years**	**Within 90 days**
Pad Mount Tansformers				
Damaged Structure				
Number of Deficiencies	11	119	43	0
Repaired in Time Frame	11	30	1	0
Repaired - Overdue				
Not Repaired - Not Due	0	89	42	0
Not Repaired - Overdue				
Damaged Equipment				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Cable Condition				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Oil Leak				
Number of Deficiencies	2	41	0	0
Repaired in Time Frame	2	6	0	0

Repaired - Overdue				
Not Repaired - Not Due	0	35	0	0
Not Repaired - Overdue				
Off Pad				
Number of Deficiencies	23	105	0	0
Repaired in Time Frame	23	32	0	0
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Lock/Latch/Penta				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Miscellaneous				
Temporary Repairs				
Number of Temp Repairs				
Repaired in Time Frame	0	0	0	1
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Other				
Number of Deficiencies	0	3	881	0
Repaired in Time Frame	0	1	8	0
Repaired - Overdue				
Not Repaired - Not Due	0	2	873	0
Not Repaired - Overdue				
Pad Mount Total				
Total				
Number of Deficiencies	**36**	**268**	**924**	**1**
Repaired in Time	**36**	**69**	**9**	**1**

Frame				
Repaired - Overdue				
Not Repaired - Not Due	0	**199**	**915**	0
Not Repaired - Overdue				

Summary of Deficiencies and Repair Activity Resulting from the Inspections Process – Streetlights				
Overhead Facilities	**2010**			
Priority Level	**I**	**II**	**III**	**Temp Repairs**
Repair Expected	**Within 1 week**	**Within 1 year**	**Within 3 years**	**Within 90 days**
Streetlight				
Base/Standard/Light				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Handhole/Service Box				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Service/Internal Wiring				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Access Cover				
Number of Deficiencies	0	6	0	0
Repaired in Time Frame	0	6	0	0
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Miscellaneous				
Temporary Repairs				
Number of Temp Repairs				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				
Other				
Number of Deficiencies				
Repaired in Time Frame				
Repaired - Overdue				
Not Repaired - Not Due				

Not Repaired - Overdue				
Streetlight Total				
Total				
Number of Deficiencies	0	**6**	0	0
Repaired in Time Frame	0	6	0	0
Repaired - Overdue				
Not Repaired - Not Due				
Not Repaired - Overdue				

Summary of Deficiencies and Repair Activity Resulting from the Inspections Process – Level IV Conditions		
Overhead Facilities	**2010**	
	Number of Conditions Found	**Number of Conditions Repaired**
Overhead Facilities		
Pole Condition		
Pole Condition	27232	20144
Grounding System	70719	2
Anchors/Guy Wire	44865	18412
Cross Arm/Bracing	16354	1
Riser		
Conductors		
Primary Wire/Broken Ties	1198	0
Secondary Wire	445	0
Neutral		
Insulators	18864	3
Pole Equipment		
Transformers	28901	194
Cutouts	23814	0
Lightning Arrestors	1685	0
Other Equipment	11964	0
Miscellaneous		
Trimming Related		
Other	27	1
Overhead Facilities Total	246068	38757
Transmission Facilities		
Towers/Poles		
Steel Towers	161	0
Poles	853	0
Anchors/Guy Wire	595	224
Crossarm/Brace	1	0
Grounding System	47	7
Conductors		
Cable	14	0
Static/Neutral		
Insulators	204	1
Miscellaneous		
Right of Way Condition	376	1

Other	5721	2103
Transmission Facilities Total	7972	2336
Underground Facilities		
Underground Structures		
Damaged Cover	72	2
Damaged Structure	350	128
Congested Structure		
Damaged Equipment	189	6
Conductors		
Primary Cable	4	4
Secondary Cable	5	5
Neutral Cable		
Racking Needed	25	25
Miscellaneous		
Other	5908	2362
Underground Facilities Total	6553	2532
Pad Mount Transformers		
Underground Structures		
Damaged Structure	2236	1825
Damaged Equipment		
Damaged Cable		
Oil Leak		
Off Pad		
Lock/Latch/Penta		
Miscellaneous		
Other	4348	4203
Pad Mount Transformer Total	6584	6028
Streetlights		
Streetlight		
Base/Standard/Light		
Handhole/Service Box		
Service/Internal Wiring		
Access Cover		
Miscellaneous		

Other		
Streetlight Total		
Total Level IV Conditions		
Overall Total	267,177	49,653

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process							
Year	**Priority Level / Repair Expected**		**Deficiencies Found (Total)**	**Repaired In Time Frame**	**Repaired - Overdue**	**Not Repaired - Not Due**	**Not Repaired - Overdue**
2010							
	I	Within 1 week	417	415	2	0	0
	II	Within 1 year	21431	6319	0	15112	0
	III	Within 3 years	42720	2706	0	40014	0
	IV	N/A	267177	49653	0	217524	0
	Temp Repairs	Within 90 days	80	63	4	6	7

Appendix 5

Appendix 5

Temporary Repair Exceptions

National Grid has 8 temporary repair exceptions to report.

Feeder #	Line #	Pole #	Location	Region	Op District	Date Inspected	Comments	Maint Code	Priority	Comments	Work Order #	Quantity
6961	16	136	RTE 62 NEAR FRISSELL RD	51	Lakewood	04/13/2010 10:59		117	2		8718999	1
6961	16	136	RTE 62 NEAR FRISSELL RD	51	Lakewood	04/13/2010 10:59		950	9	temp tied/new on sit		1
9154	1	2	Rogers Rd	51	Angola	05/05/2010 11:51	Pole cracked @-base/Temp.repaired w/X-arm bolted to bottom of pole	100	4			1
9154	1	2	Rogers Rd	51	Angola	05/05/2010 11:51	Pole cracked @-base/Temp.repaired w/X-arm bolted to bottom of pole	103	4			1
9154	1	2	Rogers Rd	51	Angola	05/05/2010 11:51	Pole cracked @-base/Temp.repaired w/X-arm bolted to bottom of pole	110	2	cracked @-base	8739376	1
9154	1	2	Rogers Rd	51	Angola	05/05/2010 11:51	Pole cracked @-base/Temp.repaired w/X-arm bolted to bottom of pole	207	4			6
9154	1	2	Rogers Rd	51	Angola	05/05/2010 11:51	Pole cracked @-base/Temp.repaired w/X-arm bolted to bottom of pole	289	4	600-amp (open)		3
9154	1	2	Rogers Rd	51	Angola	05/05/2010 11:51	Pole cracked @-base/Temp.repaired w/X-arm bolted to bottom of pole	950	9	pole cracked @-base		1
9154	1	666-1	LAKESHORE RD	51	Angola	05/05/2010 9:47	temp.repair w/slack block (@-Library)	126	4			4
9154	1	666-1	LAKESHORE RD	51	Angola	05/05/2010 9:47	temp.repair w/slack block (@-Library)	223	2		8739376	1
9154	1	666-1	LAKESHORE RD	51	Angola	05/05/2010 9:47	temp.repair w/slack block (@-Library)	950	9	slk blck temp.repair		1
73352	6	19	MARKET ST	57	Clayton	08/26/2010 11:16		135	4			3
73352	6	19	MARKET ST	57	Clayton	08/26/2010 11:16		225	4			1
73352	6	19	MARKET ST	57	Clayton	08/26/2010 11:16		227	9	guy to stump		1
82961	10	9	MT ARAB LAKE EAST SIDE	57	Saranac Lake	09/01/2010 13:07	transformer on pole but not energized & grnd wire cut ?? tree cutter damage ??	117	3		9713388	1
82961	10	9	MT ARAB LAKE EAST SIDE	57	Saranac Lake	09/01/2010 13:07	transformer on pole but not energized & grnd wire cut ?? tree cutter damage ??	151	3	customer = no power	9713385	1
82961	10	9	MT ARAB LAKE EAST SIDE	57	Saranac Lake	09/01/2010 13:07	transformer on pole but not energized & grnd wire cut ?? tree cutter damage ??	225	4	not to spec		1
82961	10	9	MT ARAB LAKE EAST SIDE	57	Saranac Lake	09/01/2010 13:07	transformer on pole but not energized & grnd wire cut ?? tree cutter damage ??	227	9	tied to tree		1
82961	10	21-1	MT ARAB LAKE EAST SIDE	57	Saranac Lake	08/31/2010 10:50		227	9	tied to tree		1
82961	10	21-1A	MT ARAB LAKE EAST SIDE	57	Saranac Lake	08/31/2010 11:46	2ndy tied to tree between primary pole #21 & pole #21-1A - needs trimming too 2ndy rubbing trees	232	9			1

Circuit ID #	Structure #	Region	District	Location	Structure Type	Date Inspected	Maint Code	Priority	Quantity	Comments	Circuit Name	Work Order #
T3160	19	57	Potsdam	rt 56-irish settlement rd	SI	03/30/2010 0:00	534	3		x brace	9 Colton to Carry Falls (T3160)	8549843
T3160	19	57	Potsdam	rt 56-irish settlement rd	SI	03/30/2010 0:00	543	3	1	restaple	9 Colton to Carry Falls (T3160)	8549843
T3160	19	57	Potsdam	rt 56-irish settlement rd	SI	03/30/2010 0:00	950	9		bayonet scab inplace	9 Colton to Carry Falls (T3160)	

Appendix 6

Appendix 6

NATIONAL GRID 2010- 2014 Inspection Summary	Total System Units	2010 Units Completed	2011 Units Completed	2012 Units Completed	2013 Units Completed	2014 Units Completed	2010 - 2014 Units Completed	2010 - 2014 Percent Completed
Distribution - Unique Inspections	1,196,700	232,604		0	0	0	232,604	19.44%
Distribution - Total Inspections		233,011		0	0	0	233,011	n/a
Underground Facilities - Unique	88,429	17,624		0	0	0	17,624	19.93%
Underground Facilities - Total		18,043		0	0	0	18,043	n/a
URD - Unique Inspections	60,749	10,619		0	0	0	10,619	17.48%
URD -Total Inspections		10,629		0	0	0	10,629	n/a
Street Light / Traffic Sig - Unique	61,691	2,315		0	0	0	2,315	3.75%
Street Light / Traffic Sig - Total		2,315		0	0	0	2,315	n/a
Transmission - Unique Inspections	94,977	18,261		0	0	0	18,261	19.23%
Transmission - Total Inspections		18,808		0	0	0	18,808	n/a
Grand Total - Unique Inspections	1,502,546	564,229		0	0	0	564,229	37.55%

Appendix 7

Appendix 7

Summary of Overdue Repairs for Level II Repairs									
		-- Repaired -- Number of Days Overdue				-- Not Repaired -- Number of Days Overdue			
Year	Facilities	1-30	31-90	91-180	>180	1-30	31-90	91-180	>180	Comments
2009	Distribution	26								Not all deficiency repairs were completed overdue. Due to total work order being incomplete at time of due date, the completion date was assigned to all the items within that work order, regardless of when the work was actually done.
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2010	Distribution									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2011	Distribution									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2012	Distribution									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2013	Distribution									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									

Summary of Overdue Repairs for Level III Repairs										
		-- Repaired -- Number of Days Overdue				-- Not Repaired -- Number of Days Overdue				
Year	Facilities	1-30	31-90	91-180	>180	1-30	31-90	91-180	>180	Comments
2009	Distribution									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2010	Distribution									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2011	Distribution									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2012	Distribution									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2013	Distribution									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									

Appendix 8

Patric R. O'Brien
Senior Counsel

December 10, 2010

VIA ELECTRONIC FILING

Honorable Jaclyn A. Brilling
Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, New York 12223-1350

Re: Case 10-E-0271 – In the Matter of Examining the Mobile Testing Requirements of the Electric Safety Standards

Dear Secretary Brilling:

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") submits for filing its 2010 Mobile Stay Voltage Testing Report pursuant to the Commission's *Order Requiring Additional Mobile Stray Voltage Testing* in the above proceeding. The report details the results of National Grid's mobile testing in the cities of Buffalo, Niagara Falls, and Albany during 2010.

Should you have any questions or concerns, please do not hesitate to contact me. Thank you for your time and attention.

Respectfully submitted,

/s/Patric R. O'Brien
Patric R. O'Brien

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nationalgrid

2010 Mobile Stray Voltage Testing Report
December 10, 2010

A Background

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid" or "Company") submits its 2010 Mobile Stray Voltage Testing Report ("Report") pursuant to the Public Service Commission's *Order Requiring Additional Mobile Stray Voltage Testing* ("Order"), issued July 21, 2010 in Case 10-E-0271. In compliance with the Commission's Order, National Grid's 2010 mobile testing consisted of one mobile scan in Albany and Niagara Falls and two mobile scans in Buffalo. The results of the mobile scans are detailed in the tables below.

National Grid utilized Power Survey LLC ("Power Survey"), which is currently the sole source vendor for mobile testing in New York State, to conduct the mobile scans. National Grid also utilized Power Survey to perform the mobile scans for the Company in 2009.

B. Mobile Testing Verification Process

As noted in the Company's 2009 Report, National Grid and Staff agreed that the Company would verify a stray voltage finding made by the mobile scan by using its own internal testing verification procedure as outlined in Section V of the Company's Electric Operating Procedure NG-USA EOP G016. This entails using a HD probe to test all metallic objects in the area using a ground reference point of within five feet of the structure. In the event this method could not verify the finding, the Company employed Power Survey's verification procedure, which allows for using a ground reference point of within 100 feet of the structure.

C. Mobile Testing Results by City

1. Albany

Testing began in Albany on September 13, 2010 and was completed on September 17, 2010 with the following results:

a. Total stray voltage findings = 217
b. Stray voltage findings at 4.4v and below = 139 (64%)
c. Stray voltage findings at 4.5v and above = 78 (36%)
d. Miles scanned = 218
e. National Grid structures scanned = 4,786

Events/Hits		
	2009	2010
Albany	**101**	**217**
115% increase from 2009 to 2010		
93% of events in 2010 were found on street lights		

2. Niagara Falls

Testing began in Niagara Falls on July 12, 2010 and was completed on July 13, 2010 with the following results:

a. Total stray voltage findings = 11
b. Stray voltage findings at 4.4v and below = 11 (100%)
c. Stray voltage findings at 4.5v and above = 0
d. Miles scanned = 38
e. National Grid structures scanned = 1,369

Events/Hits		
	2009	2010
Niagara Falls	**54**	**11**
80% decrease from 2009 to 2010		
82% of events in 2010 were found on street lights		

3. Buffalo

National Grid conducted two separate mobile scans of Buffalo in 2010. The first began on June 7, 2010 and was completed on August 12, 2010 with the following results:

a. Total stray voltage findings = 931
b. Stray voltage findings at 4.4v and below = 656 (70%)
c. Stray voltage findings at 4.5v and above = 275 (30%)
d. Miles scanned = 1,382
e. National Grid structures scanned = 27,941

The second mobile scan began on August 30, 2010 and was completed on October 28, 2010 with the following results:

a. Total stray voltage findings = 837
b. Stray voltage findings at 4.4v and below = 625 (75%)
c. Stray voltage findings at 4.5v and above = 212 (25%)
d. Miles scanned[1] = 1,235
e. National Grid structures scanned[2] = 27,985

[1] Variances in mileages are directly attributable to the same crews performing both scans and optimizing their routes during the second scan resulting in less overlap.
[2] Variances in scanned structures are attributable to unscannable assets due to inaccessible roadways due to construction, road blocks, and private roads.

Events/Hits			
	2009	2010-Scan 1	2010-Scan 2
Buffalo	**2678**	**931**	**837**
65% decrease from 2009 to 2010 Scan 1			
10% decrease from Scan 1 to Scan 2			
Approx 97% of events were found on street lights (Scans 1 & 2)			

A majority of the 2010 findings were below 4.5v in Albany (64%), Niagara Falls (100%), and Buffalo (70% in Scan 1 and 75% in Scan 2). Both Niagara Falls and Buffalo experienced a decrease in findings in 2010 when compared to 2009.

D. Mobile Testing Repair/Mitigation Efforts

As of November 12, 2010, National Grid completed 99.89% of the total repairs in Buffalo (Scan 1) and Niagara Falls and 100% in Albany. As of December 12, 2010, National Grid completed 99.88% of the total repairs in Buffalo (Scan 2).

A summary table illustrating repair status by region can be found in Appendices A and B.

E. Mobile Testing Program Costs

As of November 5, 2010, actual costs have amounted to $4,776,577. A summary of these costs can be found in Appendix C. This is not the final cost amount, as the Company is continuing to repair the events found in Buffalo (Scans 1 and 2) and Niagara Falls.

F. Mobile and Manual Testing Program Comparison

It costs the Company on average 12 times more to conduct mobile testing (per mile cost) when compared to manual testing (per unit cost) in Albany, Niagara Falls, and Buffalo in 2010.

	Albany		**Niagara Falls**		**Buffalo Scan 1**		**Buffalo Scan 2**	
2010 Estimated Costs	**Manual[3]**	**Mobile**	**Manual**	**Mobile**	**Manual**	**Mobile**	**Manual**	**Mobile**
Non-Streetlighting Eqp.	$8,134	$48,000	$1,865	$40,000	$43,621	$1,100,000	$43,850	$1,045,000
Metallic Streetlighting Eqp.	$2,764		$1,538		$22,166		$21,936	
Delta	Δ $37,102		Δ $36,598		Δ $1,034,213		Δ $979,214	

[3] The manual estimated costs are based on the per unit cost of conducting a manual elevated voltage test in Albany, Niagara Falls, and Buffalo and the number of facilities scanned during the mobile testing in 2010. The numbers reflect what it would have cost the Company had it performed manual testing in these cities in 2010.

G. Buffalo University Stray Voltage Study

National Grid believes more research needs to be done on stray voltage for the betterment of public safety, society as a whole, and the industry. National Grid has recently begun working with the University at Buffalo's School of Engineering and Applied Sciences (Energy Systems Institute). This effort will build upon the considerable body of information established by the Electric Power Research Institute ("EPRI") and stray voltage investigations by National Grid's engineering personnel.

The initial findings from the study are:

- Lighting circuits have become unbalanced and do not match original design specifications.
- Wiring has significantly degraded over time.
- Various street light circuits were implemented at different times utilizing different technologies.
- Older installations utilize the lead sheath of the supply cable as the neutral wire causing a portion of the return current to leak in the soil.

There is also concern regarding the public misconception regarding elevated voltage (stray voltage). More needs to be done to differentiate and educate on the two classifications of elevated voltages, both contact and stray.

Appendix A
Mobile Testing & Repair Summary - Scan 1

NY Stray Voltage Mobile Testing Summary Report - Scan 1
11/12/2010

	Buffalo/Niagara Falls	Albany	*Grand Total*
Testing Summary			
Total Number of Events	942	217	**1,159**
At or Above 4.5 Volts	275	78	**353**
Below 4.5 Volts	667	139	**806**
Total NGRID Owned Events (streetlights)	910	208	**1,118**
At or Above 4.5 Volts	265	75	**340**
Below 4.5 Volts	645	133	**778**
Total Private Owned Events	32	9	**41**
At or Above 4.5 Volts	10	3	**13**
Below 4.5 Volts	22	6	**28**
Survey Percent Complete by City			
Buffalo	100.00%		**100.00%**
Niagara Falls	100.00%		**100.00%**
Syracuse *(no 2010 scanning requirement)*			**0.00%**
Utica *(no 2010 scanning requirement)*			**0.00%**
Albany		100.00%	**100.00%**
Schenectady *(no 2010 scanning requirement)*			**0.00%**
Total Miles To Be Scanned	1,420	218	**1,638**

NY Stray Voltage Mobile Testing Repair Summary Report - Scan 1
11/12/2010

	Buffalo/Niagara Falls	Albany	*Grand Total*
Repair Summary			
NGRID Repairs			
Required	910	208	**1,118**
Completed	910	208	**1,118**
Pending (All repairs)	0	0	**0**
Pending (De-energized streetlights)	0	0	**0**
Exceeding 45 Days	0	2	**2**
Percent Complete	100.00%	100.00%	**100.00%**
TOH Repairs	88	1	**89**
TOH Complete	88	0	**88**
TOH Pending	0	1	**1**
TOH Exceeding 90 Days	0	0	**0**
TOH Percent Complete	100.00%	100.00%	**98.88%**
Private Repairs			
Required	32	9	**41**
Completed	31	9	**40**
Pending	1	0	**1**
Exceeding 45 Days	0	0	**0**
Percent Complete	96.88%	100.00%	**97.56%**
Total Repairs Pending	1	0	**1**
Total Repairs Complete	941	217	**1,158**
Total Repairs Percent Complete	99.89%	100.00%	**99.91%**

Appendix B
Mobile Testing & Repair Summary - Scan 2

NY Stray Voltage Mobile Testing Summary Report - Scan 2 12/10/2010		
	Buffalo/Niagara Falls	***Grand Total***
Testing Summary		
Total Number of Events	837	**837**
At or Above 4.5 Volts	213	**213**
Below 4.5 Volts	624	**624**
Total NGRID Owned Events (streetlights)	804	**804**
At or Above 4.5 Volts	196	**196**
Below 4.5 Volts	608	**608**
Total Private Owned Events	33	**33**
At or Above 4.5 Volts	17	**17**
Below 4.5 Volts	16	**16**
Survey Percent Complete by City		
Buffalo	100.00%	**100.00%**
Niagara Falls		**0.00%**
Syracuse *(no 2010 scanning requirement)*		**0.00%**
Utica *(no 2010 scanning requirement)*		**0.00%**
Albany		**0.00%**
Schenectady *(no 2010 scanning requirement)*		**0.00%**
Total Miles To Be Scanned	1,235	**1,235**

NY Stray Voltage Mobile Testing Repair Summary Report - Scan 2 12/10/2010		
	Buffalo/Niagara Falls	***Grand Total***
Repair Summary		
NGRID Repairs		
Required	804	**804**
Completed	804	**804**
Pending (All repairs)	0	**0**
Pending (De-energized streetlights)	0	**0**
Exceeding 45 Days	0	**0**
Percent Complete	100.00%	**100.00%**
TOH Repairs	195	**195**
TOH Complete	13	**13**
TOH Pending	182	**182**
TOH Exceeding 90 Days	0	**0**
TOH Percent Complete	6.67%	**0.00%**
Private Repairs		
Required	33	**33**
Completed	32	**32**
Pending	1	**1**
Exceeding 45 Days	0	**0**
Percent Complete	96.97%	**0.00%**
Total Repairs Pending	1	**1**
Total Repairs Complete	836	**836**
Total Repairs Percent Complete	99.88%	**99.88%**

Appendix C

Financial Detail (As of December 31, 2010)

		Estimated				Completed			REPAIRS			INSPECTIONS		
City	Actual Miles	Event Rate	Repairs	Mobile Inspection Cost	Events found	Miles	Repairs	Event Rate	Actuals	Act$/ Repair	% Cmpl	Actuals	Act$/ mile	% Cmpl
1st Buffalo Scan	1382	0.674	931	$ 1,100,000	931	1382	931	0.67	$ 3,983,825	$ 2,106	94%	$ 2,470,841	$ 860	100%
2nd Buffalo Scan	1235	0.64	790	$ 1,045,000	837	1235	733	0.68						100%
Niagara Falls	38	0.29	11	$ 40,000	11	38	11	0.29			100%			100%
Albany	218	1	218	$ 48,000	217	218	217	1.00			100%			100%
	2873		1951	$ 2,233,000	1996	2873	1892	0.69	$ 3,983,825	$ 2,106		$ 2,470,841	$ 860	
									TOTAL Actuals				$6,454,665	

Appendix D

Summary of Energized Objects - Mobile Testing - City of Albany

nationalgrid	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box	0	0	0	0	0	0	0
Manhole	0	0	0	0	0	0	0
Padmount Switchgear	0	0	0	0	0	0	0
Padmount Transformer	0	0	0	0	0	0	0
Vault – Cover/Door	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	136	74	3	213	213	0	0
Metal Street Light Pole	130	69	3	202	202	0	0
Traffic Signal Pole	3	2	0	5	5	0	0
Control Box	3	3	0	6	6	0	0
Pedestrian Crossing Pole	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	3	1	0	4	4	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	3	1	0	4	4	0	0
Totals	139	75	3	217	217	0	0

*includes railing

**including but not limited to manhole cover, sewer cover, no parking sign, parking meter, private sign, stop sign, storm grate.

Appendix E

Summary of Energized Objects - Mobile Testing - City of Niagara Falls

nationalgrid	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box	0	0	0	0	0	0	0
Manhole	0	0	0	0	0	0	0
Padmount Switchgear	0	0	0	0	0	0	0
Padmount Transformer	0	0	0	0	0	0	0
Vault – Cover/Door	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	9	0	0	9	9	0	0
Metal Street Light Pole	9	0	0	9	9	0	0
Traffic Signal Pole	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Pedestrian Crossing Pole	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	2	0	0	2	2	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	2	0	0	2	2	0	0
Totals	11	0	0	11	11	0	0

*includes railing

**including but not limited to manhole cover, sewer cover, no parking sign, parking meter, private sign, stop sign, storm grate.

Appendix F

Summary of Energized Objects - Mobile Testing - City of Buffalo - Scan 1

nationalgrid	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box	0	0	0	0	0	0	0
Manhole	0	0	0	0	0	0	0
Padmount Switchgear	0	0	0	0	0	0	0
Padmount Transformer	0	0	0	0	0	0	0
Vault – Cover/Door	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	647	264	10	921	916	0	5
Metal Street Light Pole	635	254	10	899	894	0	5
Traffic Signal Pole	12	9	0	21	21	0	0
Control Box	0	1	0	1	1	0	0
Pedestrian Crossing Pole	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	9	0	1	10	9	1	0
Sidewalk	1	0	0	1	1	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	2	0	1	3	2	1	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	6	0	0	6	6	0	0
Totals	656	264	11	931	925	1	5

*includes railing
**including but not limited to manhole cover, sewer cover, no parking sign, parking meter, private sign, stop sign, storm grate.

Appendix G

Summary of Energized Objects - Mobile Testing - City of Buffalo - Scan 2

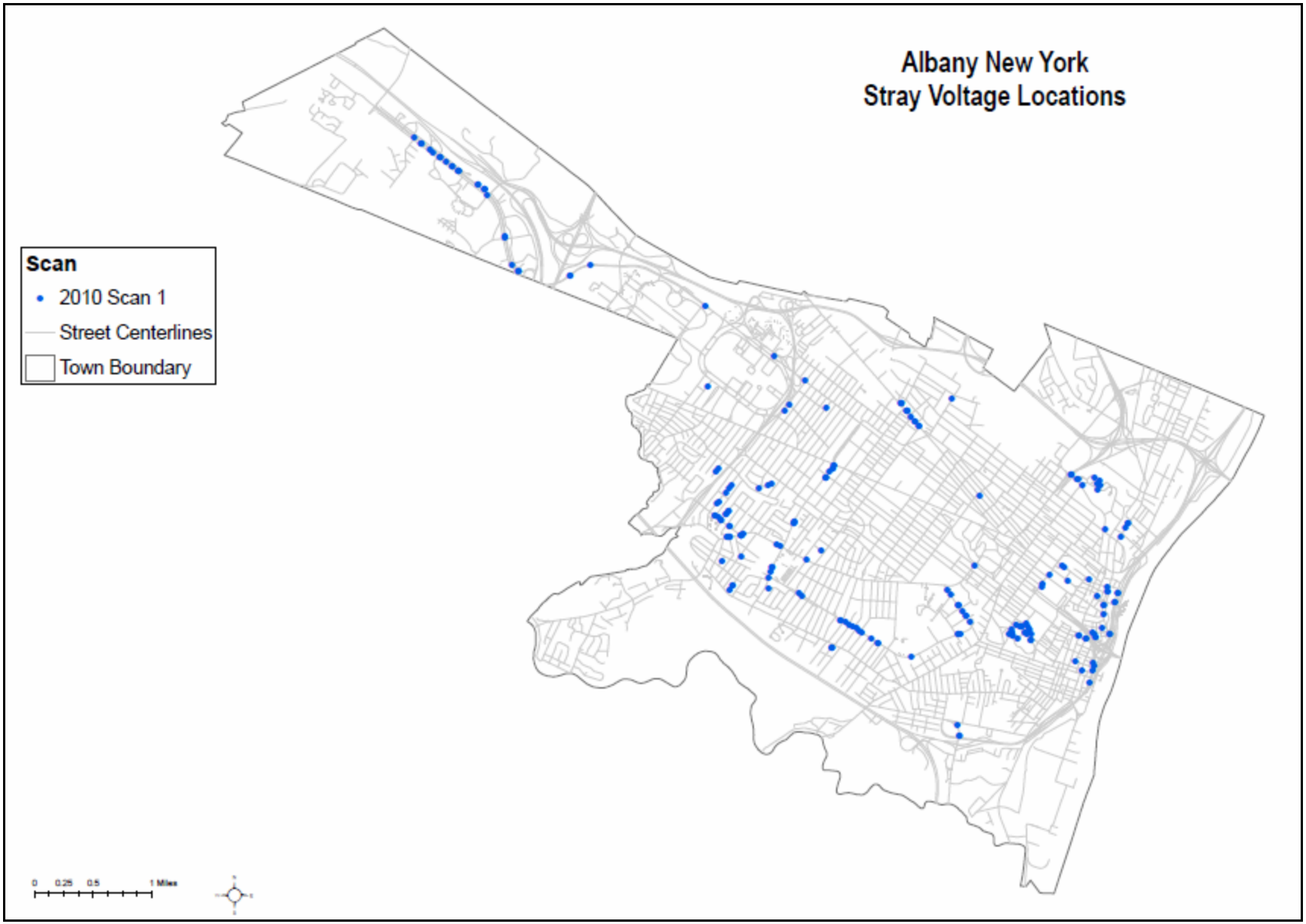
nationalgrid

	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box	0	0	0	0	0	0	0
Manhole	0	0	0	0	0	0	0
Padmount Switchgear	0	0	0	0	0	0	0
Padmount Transformer	0	0	0	0	0	0	0
Vault – Cover/Door	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	618	196	10	824	656	1	5
Metal Street Light Pole	606	185	10	801	635	1	5
Traffic Signal Pole	9	11	0	20	19	0	0
Control Box	3	0	0	3	2	0	0
Pedestrian Crossing Pole	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	7	4	2	13	8	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	1	0	0	1	1	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	6	4	2	12	7	0	0
Totals	625	200	12	837	664	1	5

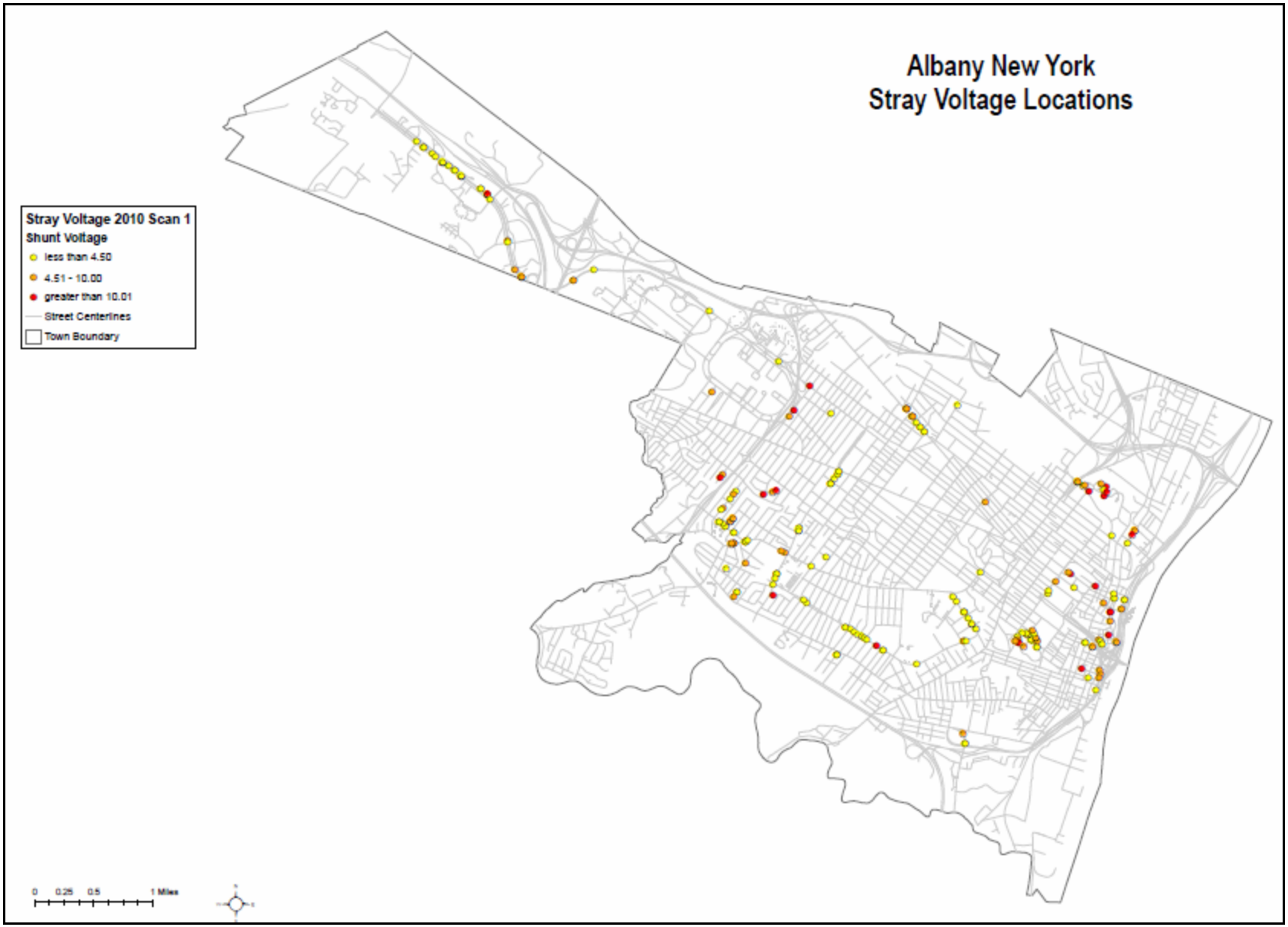
*includes railing

**including but not limited to manhole cover, sewer cover, no parking sign, parking meter, private sign, stop sign, storm grate.

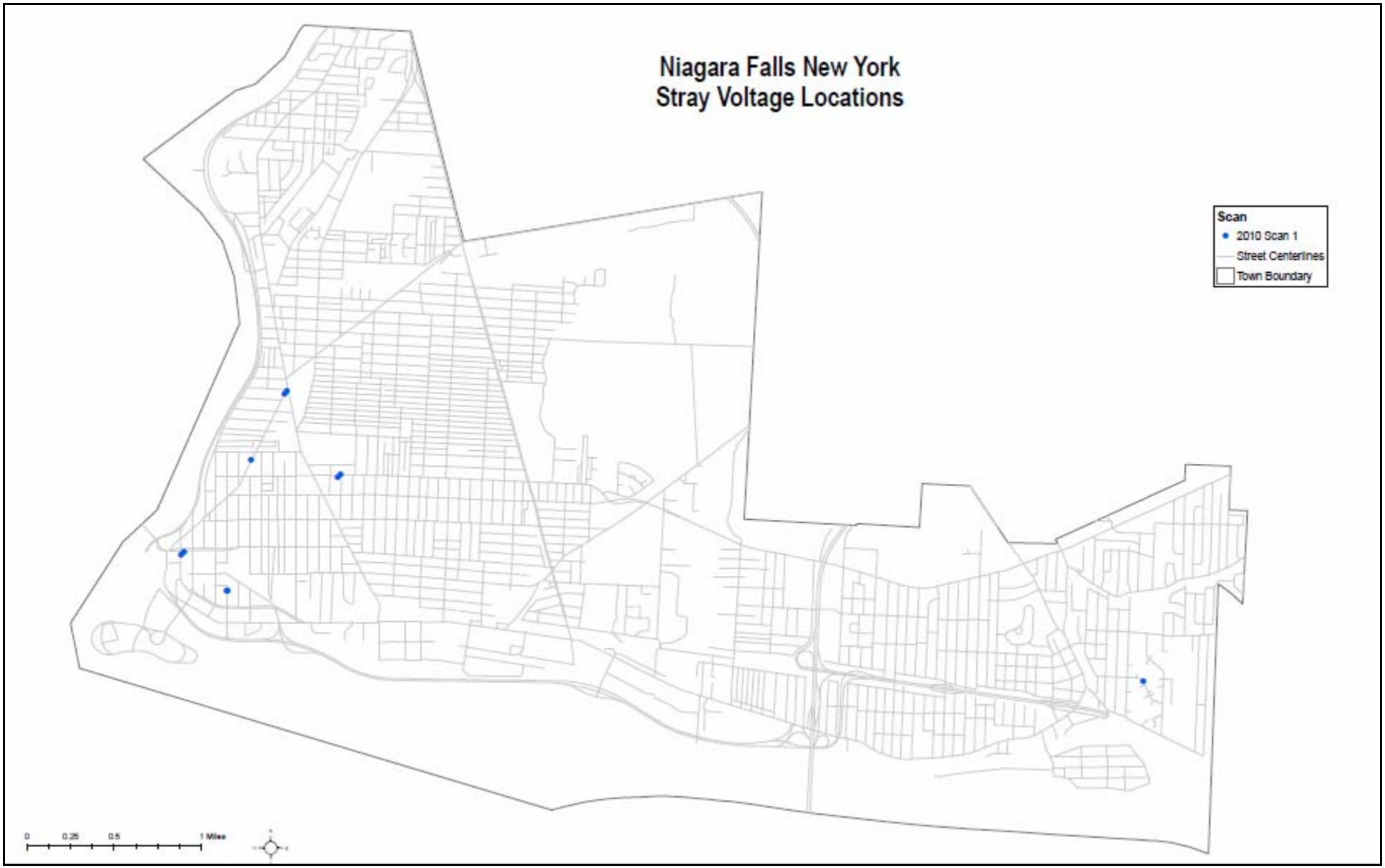
Appendix H
Mobile Testing - Albany Findings - 2010 Scan



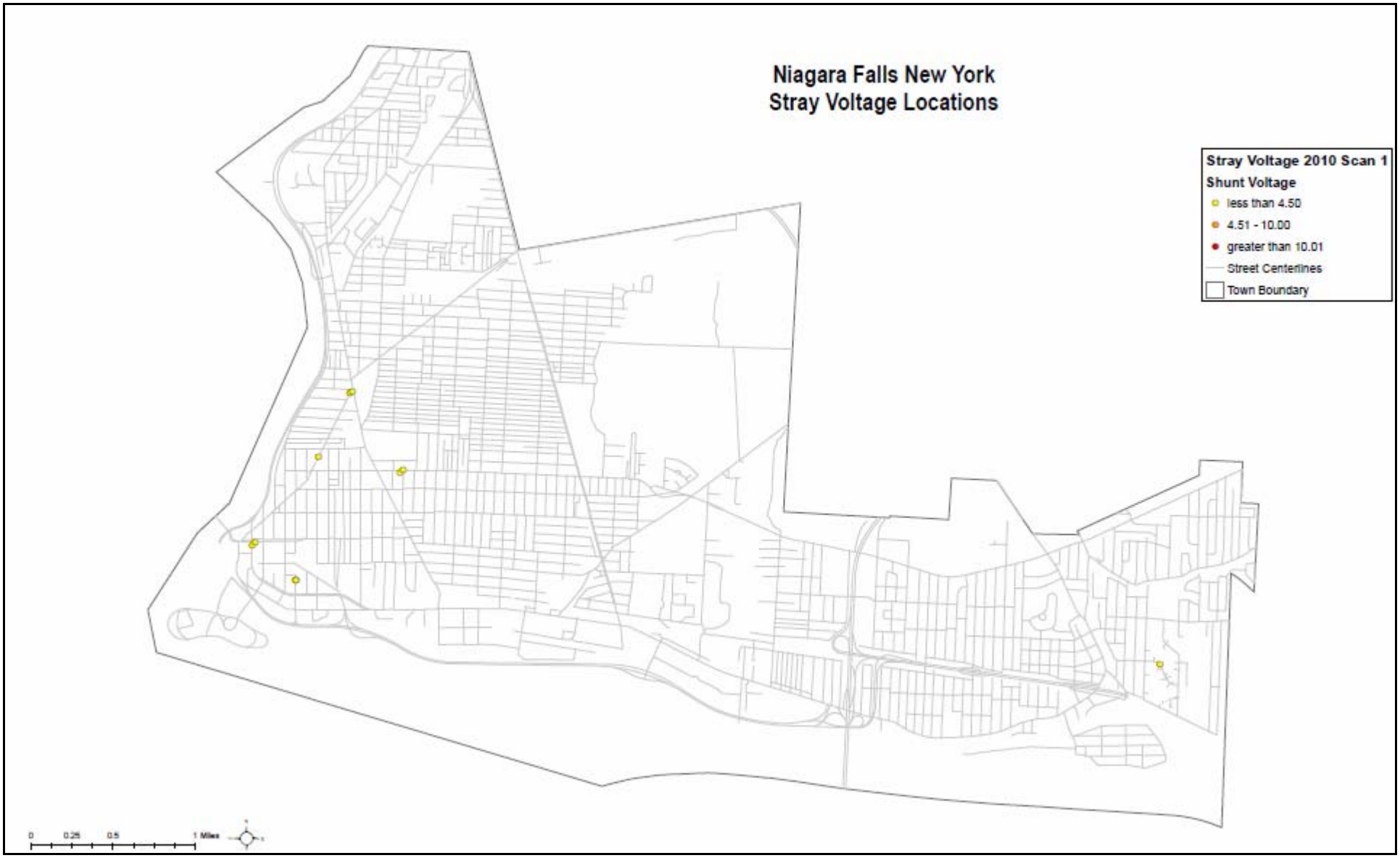
Appendix I
Mobile Testing - Albany Voltage Levels - 2010



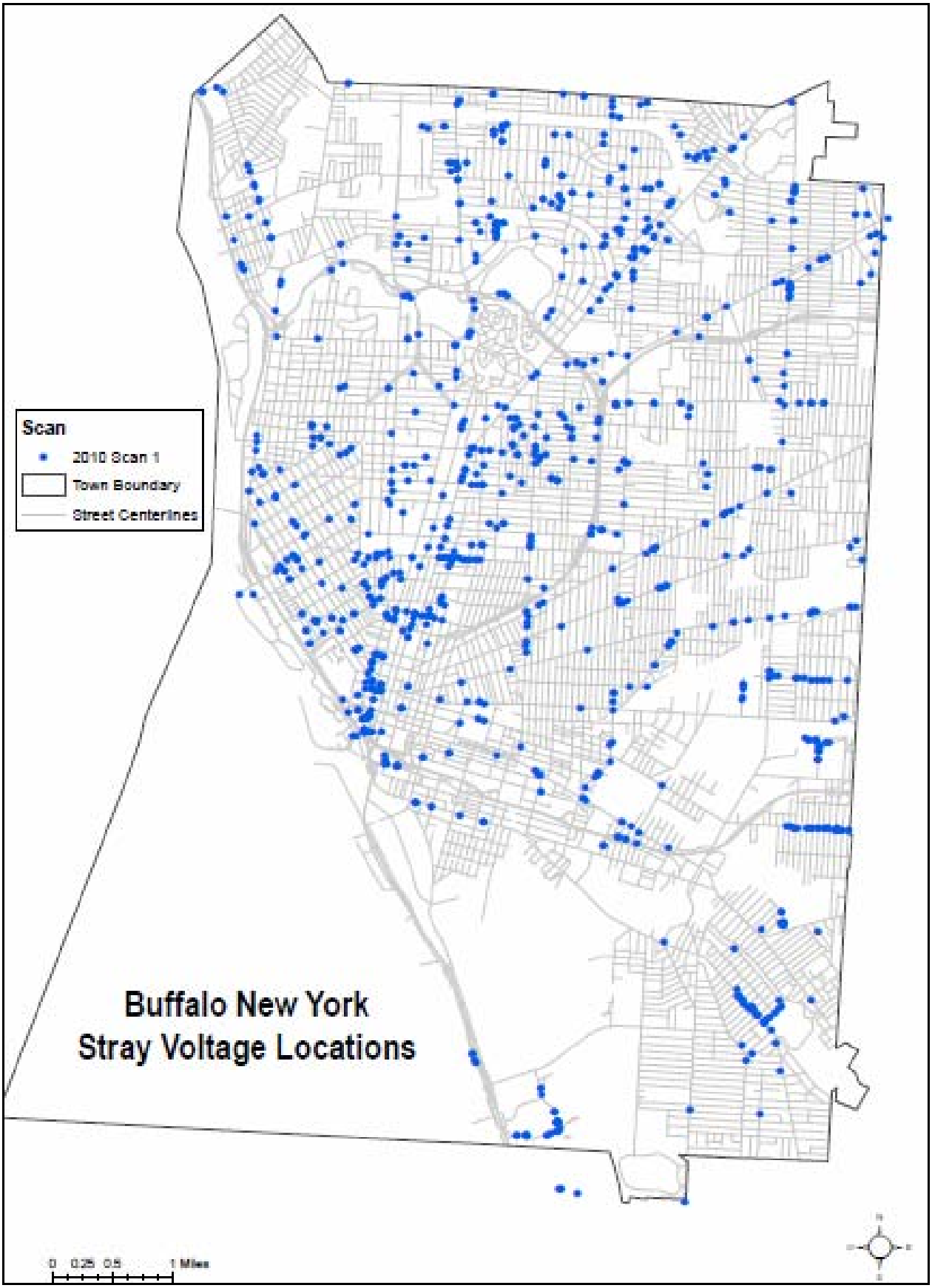
Appendix J
Mobile Testing - Niagara Falls Findings - 2010 Scan



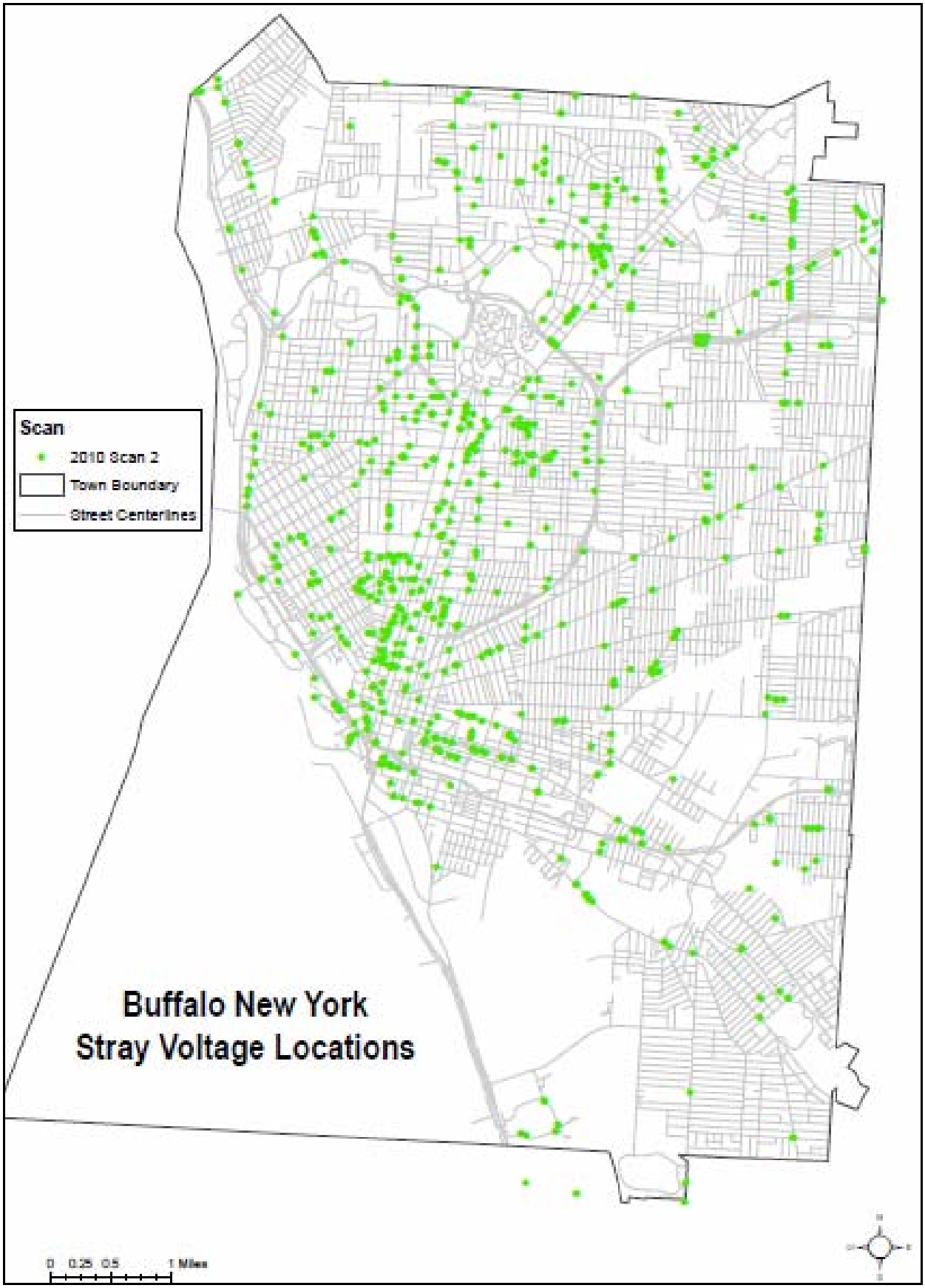
Appendix K
Mobile Testing - Niagara Falls Voltage Levels - 2010



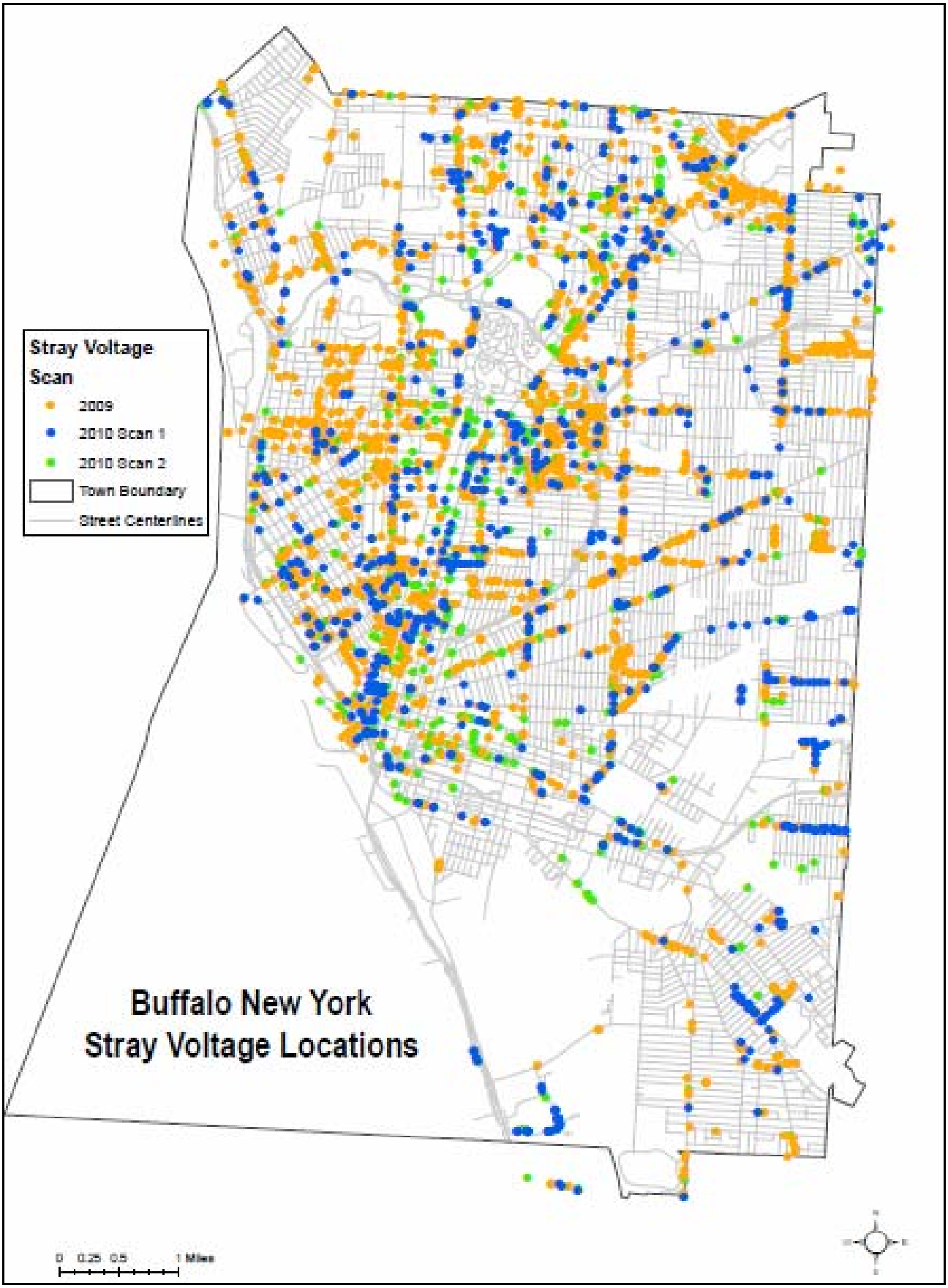
Appendix L
Mobile Testing - Buffalo Findings – 2010 Scan 1



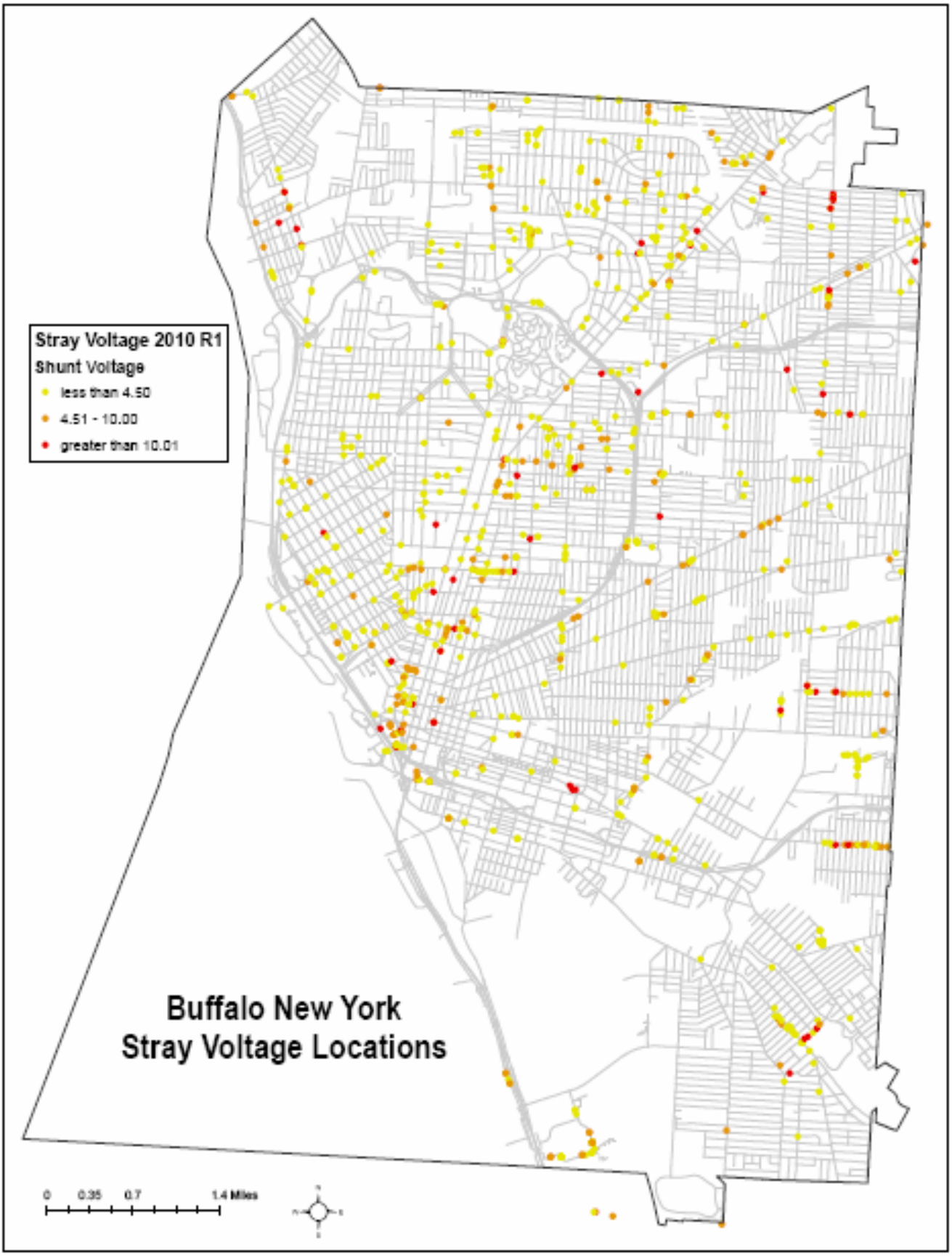
Appendix M
Mobile Testing - Buffalo Findings – 2010 Scan 2



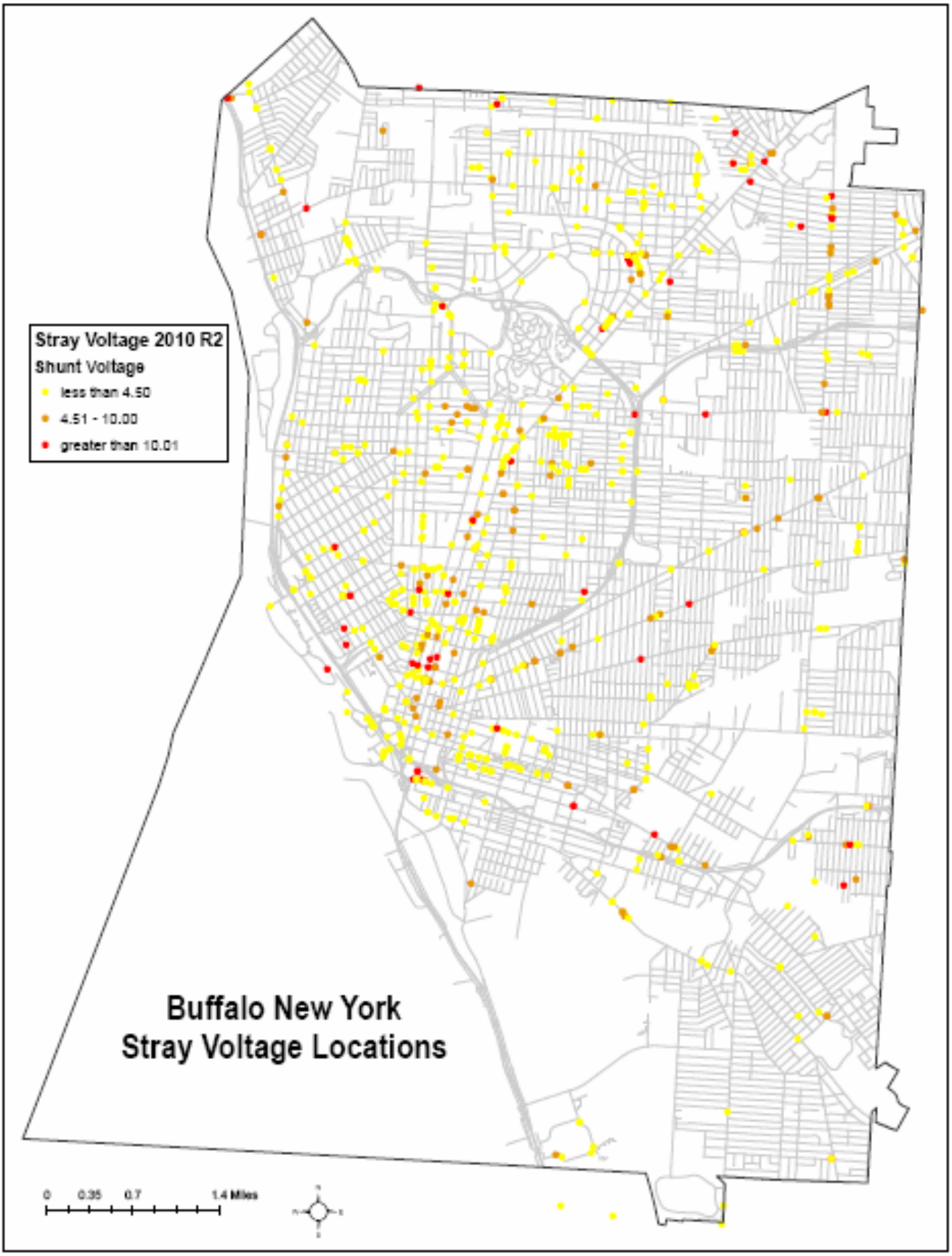
Appendix N
Mobile Testing - Buffalo Findings – All Scans (2009, 2010 Scan 1 & 2010 Scan 2)



Appendix O
Mobile Testing - Buffalo Voltage Levels–2010 Scan 1



Appendix P
Mobile Testing - Buffalo Voltage Levels –2010 Scan 2



Appendix 9

GENERAL INFORMATION:

The purpose of this procedure is to outline the requirements for the annual elevated equipment voltage testing on National Grid Facilities in New York as required by the New York Public Service Commission's "Electric Safety Standards" issued on January 5, 2005 and the New York Public Service Commission's "Order Adopting Changes to Electric Safety Standards issued and effective on December 15, 2008. Additionally the Massachusetts Department of Telecommunications and Energy provided a series of recommendations on December 9, 2005 that have been included in this procedure.

This procedure also outlines corporate requirements for elevated equipment voltage testing in New Hampshire and Rhode Island. The variance in requirements between New York, Massachusetts, New Hampshire, and Rhode Island is based on sound utility practice versus regulatory requirements.

APPLICABILITY

This procedure applies to all personnel involved with or responsible for the testing of facilities designated by this EOP for elevated equipment voltage.

DEFINITIONS:

Stray Voltage – As defined by NYPSC the term "Stray Voltage" means voltage conditions on electric facilities that should not ordinarily exist.

Stray Voltage Testing – The process of checking an electric facility for stray voltage using a device capable of reliably detecting and audibly and/or visually signaling voltages in the range of 6 to 600 volts.

Proximity Detection Unit – A low voltage hand held detector used to test exposed metallic surfaces and conductors for the presence of low voltage from 6V to 600V.

Elevated Equipment Voltage Inspector – The individual performing the elevated equipment voltage inspection.

Handheld Computer - An electronic Data recording device that is used in the field to create a record of conditions found.

Elevated Equipment Voltage – An A.C. rms voltage difference between utility equipment and the earth, or to nearby grounded facilities that exceeds the lowest perceptible voltage levels for humans.

Finding – Any confirmed voltage reading on an electric facility or streetlight greater than or equal to 1V measured using a volt meter and a 500 ohm shunt resistor.

Mitigation – Corrective actions performed by the utility to address the stray voltage finding.

PROGRAM ADMINISTRATOR:

Distribution Engineering Services

SCOPE:

I. FACILITIES WHERE ELEVATED EQUIPMENT VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – NEW YORK

A. Street Lights and Municipally Owned Facilities

1. Company owned metallic street lighting standards are required to be tested for elevated equipment voltage annually. This test is to be performed while the light is operating.
2. Municipally owned street light systems that National Grid directly provides energy to must be tested for elevated equipment voltage annually. National Grid will complete this testing unless assurances of the completion of required testing and transfer of such test data are made by the appropriate municipality. This test is to be performed while the light is operating.
3. Municipal owned metallic traffic signal standards and accessible devices are to be tested annually for elevated equipment voltage by National Grid.
4. All street lights identified on public thoroughfares regardless of ownership are to be tested annually.
5. All street lights under a maintenance contract are to be tested annually.

6. Exceptions not requiring elevated equipment voltage testing: private lighting, park associations, parking lots, fiberglass (or other non-conductive) street light standards, and locations where street light standards are not publicly accessible, such as facilities located in the center of highways that cannot be accessed without stopping traffic or creating potentially hazardous situations for the worker and/or public.

B. National Grid Substation Fences
   1. Metallic fencing surrounding substations with National Grid Facilities shall be tested for elevated equipment voltage annually. This fencing can be customer owned for customer stations, if a National Grid facility is part of the station.

C. Overhead Distribution Facilities
   1. Towers and/or metallic poles with distribution facilities shall be tested annually for elevated equipment voltage.
   2. The following equipment on wood distribution poles requires annual elevated equipment voltage testing:
      a. Metallic riser guard or conduit (company or non-company).
      b. Uncovered or uninsulated down ground (company or non-company).
      c. Down guy (company or non-company).
      d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole within reach from the ground.
   3. Exceptions: Customer meters and customer meter poles are excluded.

D. Overhead Transmission Facilities
   1. Towers and/or metallic poles with transmission facilities shall be tested annually for elevated equipment voltage.
   2. The following equipment on wood transmission poles or structures require annual elevated equipment voltage testing:

      a. Metallic riser guard or conduit (company or non-company).
      b. Uncovered or uninsulated down ground (company or non-company).
      c. Down guy (company or non-company).
      d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole or structure within reach from the ground.

E. Underground Facilities
   1. Annual elevated equipment voltage testing is required on all of the following equipment where accessible to the public.
   2. All metallic manhole covers, vault covers and grates, junction box covers, handhole covers, pad mount transformers, and switchgear.
   3. Annual mobile stray voltage detection survey for underground distribution facilities located in cities with population of at least 50,000 (Albany, Schenectady, Syracuse, Utica, Buffalo, Niagara Falls) (based on the 2000 census) where overhead facilities will not interfere with the mobile testing.
   4. Exceptions: Non-metallic concrete or fiberglass pads or handholes are not required to be tested.

F. Daily Job Site Test Requirements
   1. Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for elevated equipment voltage at the end of the work day or the completion of the assignment. **This testing requirement is considered good utility practice and does not require specific documentation**.

2. Exceptions:
    a. Substation fencing will not require elevated equipment voltage testing unless scheduled as part of the inspection program or if work was done on the fencing.
    b. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

G. Exemptions
1. A completely fenced in area where access is denied to the general public and where access is only achieved by climbing a fence. Good judgment is required by the tester in these scenarios.

II. FACILITIES WHERE ELEVATED EQUIPMENT VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – NEW HAMSHIRE AND RHODE ISLAND

A. Company Owned Street Lights
1. Testing will be performed during each outage investigation notification and the data will be recorded for each instance.

B. Overhead Distribution Facilities
1. Wood distribution poles require testing to be completed on metallic risers in conjunction with the distribution patrol program covered by NG-USA EOP D004.
2. Documentation is only required on metallic risers found to be at an elevated voltage requiring repair. Testing data is not required for a facility that is found to be operating as designed.

C. Underground Facilities
1. Testing for elevated equipment voltage shall be done while completing scheduled inspections of underground equipment covered by NG-USA EOP UG006, Underground Inspection and Maintenance. The following items are to be tested on a five year cycle, padmount transformers, switchgears, and metallic handhole covers.
2. Testing for elevated equipment voltage shall be completed on underground facilities while completing working inspections covered by NG-USA EOP UG006. The metallic items to be tested are manholes covers, vault covers, handhole covers, splice box covers, junction box covers, padmount transformers, switchgear, and submersible equipment covers.

D. Daily Job Site Test Requirements
1. Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for elevated equipment voltage at the end of the work day or the completion of the assignment. **This testing requirement is considered good utility practice and does not require specific documentation**.
    a. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

F. Exemptions
1. A completely fenced in area where access is denied to the general public and where access is only achieved by climbing a fence. Good judgment is required by the tester in these scenarios.

III. FACILITIES WHERE ELEVATED EQUIPMENT VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – MASSACHUSETTS

A. Company Owned Street Lights
1. Company owned metallic street lighting standards are required to be tested for elevated equipment voltage on a five year cycle.

2. Exceptions: Testing shall not be completed at locations where street light standards are not publicly accessible, such as facilities located in the center of highways that cannot be accessed without stopping traffic or creating potentially hazardous situations for the worker and/or public.

B. Overhead Distribution Facilities
1. Wood distribution poles require testing to be completed as noted below in conjunction with the distribution patrol program covered by NG-USA EOP D004.
2. The following equipment on wood distribution poles requires annual elevated equipment voltage testing:
    a. Metallic riser guard or conduit (company or non-company).
    b. Uncovered or uninsulated down ground (company or non-company).
    c. Down guy (company or non-company).
    d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole within reach from the ground

C. Underground Facilities
1. Elevated equipment voltage testing is required on all of the following equipment where accessible to the public on a five year cycle.
    a. All metallic manhole covers, vault covers and grates, junction box covers, handhole covers, pad mount transformers, secondary pedestals, and switchgear.
2. Exceptions: Non-metallic concrete or fiberglass pads or handholes are not required to be tested.

D. Daily Job Site Test Requirements
1. Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for elevated equipment voltage at the end of the work day or the completion of the assignment. **This testing requirement is considered good utility practice and does not require specific documentation**.
    a. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

F. Exemptions
1. A completely fenced in area where access is denied to the general public and where access is only achieved by climbing a fence. Good judgment is required by the tester in these scenarios.

IV. TEST EQUIPMENT

A. A hand held device (proximity detection unit) that is capable of detecting voltage from 6 volts to 600 volts.
B. A portable AC digital high impedance volt meter must have the ability to take readings with and without an input load impedance of 500 ohms.
C. The handheld devices utilized must be certified by an independent test laboratory as being able to reliably detect voltages of 6 – 600 volts. The following units has been certified:

1. HD Electric model LV-S-5 (5-600 volts).
2. Fluke 85
3. Fluke 87
4. Fluke 170 series or equivalent
5. Fluke 175
6. Fluke 177
7. Fluke 179
8. Fluke 187
9. Fluke 189

V. TEST PROCEDURE

A. Job Briefing

1. At minimum, the following information must be communicated to all personnel at the beginning of each shift for elevated equipment voltage testing:

    a. Structures are never to be touched with a bare hand while performing the tests, only the voltage detector or meter probe is to be used to make contact with the facilities.
    b. Appropriate PPE must be worn.
    c. Each individual needs to be aware of his/her surroundings at all times.
    d. Make sure to observe all traffic before entering a street, either at intersections or any other point.
    e. Traffic safety vest (DOT Compliant Class II) is to be worn at all times when exposed to traffic. Be aware that when bending down, the visibility benefits of the traffic safety vest are diminished.
    f. Obey all traffic control devices.
    g. When working in the street, face oncoming traffic whenever possible.

B. Measurements for voltages will be performed in accordance with the following:

1. Initial measurements for the presence of voltage shall be made using a certified proximity detection unit as noted in the testing equipment certified equipment list in Section IV C.
    a. To verify the proper operation of the proximity detector, follow operating instructions for the particular certified unit being utilized, this is to be done daily.
    b. After verification that the detection unit is working, approach the area/equipment to be tested. The proximity detector will illuminate prior to touching the area/equipment being tested if voltage is present. If the proximity detector does not illuminate in close proximity to the area/equipment touch the area/equipment to be tested with the probe of the unit.

2. If this test detects voltage, repeat the test with the portable AC voltmeter:

    a. Measurements with a portable AC voltmeter shall be taken on clean bare metallic surface (structure, ground wire, etc.)
    b. When using a portable AC voltmeter, connection shall be made to suitable neutral or ground source with the common (black) lead.

        i. In locations where the neutral or ground point is at a distance in excess of the voltmeter lead length, the connection to the neutral/ground shall be made with up to 25’ of # 16 stranded copper lead wire (covered), the other end of which shall be securely connected to the negative (black) probe of the meter. When using such “extension leads” appropriate care shall be taken in the placement of such leads so as to not create a physical hazard to workers, pedestrian or vehicular traffic.
        ii. In locations where a system ground is not available, or the existing ground registered voltage upon the proximity test, a metal rod shall be firmly embedded into the earth to a depth of no less than 6” to create a ground reference point for the measurement to be taken. The reference point should be as close as practicable to the facility being tested to simulate an elevated equipment voltage situation (3’ to 4’.) On occasion longer leads may be necessary to find undisturbed earth (up to 25’.)

c. The "live" meter probe lead shall then be placed into contact with the structure under inspection.
   i. Install a 500 ohm input load impedance on the volt meter. Measure the voltage and record this voltage in the database for the site.

VI. CORRECTIVE ACTION REQUIREMENTS FOR ELEVATED VOLTAGE FINDINGS

A. If an elevated equipment voltage condition is found and verified by the Test Procedure in Section V, the site is to be guarded until made safe by Company personnel or if municipally owned, made safe by the owner or company. Guarded for the purposes of this EOP is defined as guarded by a person or a protective barrier that prevents public contact if the elevated equipment voltage found is greater than 1 volts. **If the voltage measures less than 1 volts and is found to be consistent with system operation design (no visual evidence of a problem upon review) no further action is required.** If the voltage measures greater than 1 volts and less than 4.5 volts it can either be guarded in person or by a protective barrier that prevents public contact. If the voltage measurement is greater than 4.5 volts it must be guarded by an elevated equipment voltage inspector or a Company employee that has been trained to stand by on energized facilities If the voltage measures greater than 8 volts immediate response is required using the notification in section C below.

B. In the event of a elevated voltage finding on an electric facility or streetlight during the stray voltage Test Procedure, all publicly accessible structures and sidewalks within a minimum 30 foot radius of the electric facility or streetlight must be tested for stray voltage for New York..

C. The following notification process for personnel to respond shall be utilized.

1. Notification by location:
   a. New York: contact Systems Operations Dispatch 1-877-716-4996
   b. Bay State West and North & Granite: Westboro Control Center 508-389-9032.
   c. Bay State South, and Ocean State: Lincoln Control Center 401-335-6075.
2. Inform the operator that this is an elevated equipment voltage call, giving inspector name, company (if not National Grid), unique ID, address where problem is identified, facility number, circuit number , ownership, type of equipment, voltage found and whether they are physically guarding or leaving the site after flagging and installing a protective barrier. National Grid personnel or designee will be assigned to respond.

D. Temporary repairs may be used to correct the elevated equipment voltage thereby removing the need to guard the site.

E. Except as noted in VI. F, permanent repairs to the equipment shall be made within 45 days of the occurrence.

F. If permanent repairs can not be made within 45 days due to extraordinary circumstances, the company shall periodically perform site visits to monitor the condition of the temporary repair. For New York, all exceptions must be identified and justified in the annual reporting of the program to the NYPSC.

G. The Stray Voltage Tester/Elevated Equipment Voltage Inspector may detect a minimal voltage level that is attributable to the design of the facility and not the result of an improper condition, no corrective action is required in this instance.

H. The individuals conducting the elevated equipment voltage tests on street light standards shall have a supply of "Angel guards" available for installation if the cover is missing or wires are found to be exposed to the public at the time of testing. Angel guards shall only be installed after the testing of the

street light standard is complete and 1) there is no indication of elevated equipment voltage above 1 volts, or 2) repairs have been completed to correct the elevated equipment voltage.

I. The elevated equipment voltage inspector shall report any potentially hazardous conditions found on National Grid facilities seen visually during the survey process.

J. Customer Owned Equipment

1. Where the Company finds elevated equipment voltage above 1 volts and identifies its source as customer-owned equipment, the Company shall guard the site and notify the customer or a responsible person, as appropriate, that a potentially hazardous situation exists. The Company shall advise the customer or responsible person that the cause of the elevated equipment voltage must be immediately remedied.
2. Company personnel are encouraged to work with the customer to determine and rectify the problem. If the customer agrees to accept the Company's assistance, the Company may charge a reasonable cost for this effort.
3. The Company may temporarily remove a customer's meter or take such other actions as are appropriate and necessary to protect the public.

VII. DATABASE REQUIREMENTS

A. The database in use shall be easily searchable for information and reporting.

B. Information fields required to be completed for facilities:

1. Survey Date
2. Region
3. District
4. Contractor
5. GIS ID/Asset # (Unique ID)
6. Facility Type
7. Owner
8. Feeder/Circuit
9. Line #
10. Tax District
11. Pole/Structure/Equipment ID
12. Street Name
13. Inspectors Name
14. GPS Taken
15. Pre-load Match
16. Elevated Equipment Voltage Test Required
17. Voltage Found Y/N
18. Voltage Measurement
19. Type of Equipment (See Appendix A)
20. Immediate Action Taken
21. Person Notified
22. Permanent Repair Date
23. Type of Repair
24. Person Responsible for repair (Employee ID)

VIII. NEW YORK ANNUAL REPORTING AND CERTIFICATION REQUIREMENTS

A. Each Regional program supervisor shall provide certification to the program manager that the Region they supervise has complied with the elevated equipment voltage testing and inspection program as ordered by the PSC.

B. The program manager shall provide certification to the Vice President Distribution Network Strategy and the Senior Vice President of Distribution Network Strategy that the organization has complied with the elevated equipment voltage testing and inspection program as ordered by the PSC.

C. Written certification of the completion and results of every elevated equipment voltage test and inspection shall be completed, as well as a certification that all unsafe conditions identified have been remediated by appropriate company personnel.

D. The President or officer with direct responsibility for overseeing the elevated equipment voltage testing and inspection shall provide an annual certification to the NYPSC that the Company has tested all of its publicly accessible conductive surface electric facilities and all street lights, as well as completed all required inspections.

E. The President or officer with direct responsibility for overseeing facility inspections shall provide an annual certification to the Commission that the utility is in compliance with its inspection program and has inspected the requisite number of electric facilities. Additionally, at the end of the five-year inspection cycle, the officer shall certify that all of the utility's electric facilities have been inspected at least once.

F. The annual reporting and certification is required by February 15 of each year. In addition to certifications, it shall address the following:
   1. Details the results of stray voltage test results and inspections conducted over the 12-month period ending December 31 of the prior calendar year. (A separate report will be required for inspections from November 1 – December 31, 2008 to account for transition to calendar year reporting.)
   2. Addresses the performance mechanism contained in Section 10 of the PSC Order Adopting Changes to Electric Safety Standard effective December 15, 2008 (December 15, 2008 Order).
   3. Contain certification describe in C, D, and E of this section.
   4. Contain a breakdown of the voltage findings in a tabular format as detailed in Attachment 1 of the December 15, 2008 Order; for all findings that result in a reading of 1 V or more after completion of mitigation efforts, a detail report of company efforts shall be provided.
   5. Contain a breakdown of the shock reports received from the public as detailed in Attachment 2 of the December 15, 2008 Order.
   6. Discussion of the analysis undertaken on the causes of the stray voltage within the Company's electric system, the conclusions drawn there from, the preventative and remedial measures identified, and the Company's plan to implement those measures.
   7. Description of the priority levels used to guage the severity of a deficiency, including repair timeframes, and details the requirements for training personnel to properly identify and categorize the deficiencies.
   8. Contain a breakdown of facilities to be inspected, unique inspection conducted per year, and the cumulative number of unique inspections conducted to meet the five year requirement.
   9. Contain a breakdown of the deficiencies found, permanent repair actions taken by year, whether a repair was completed within the required timeframe, and the number of deficiencies awaiting repair. This information should be provided on a yearly basis by priority level and by equipment groupings as detailed in Attachment 3 of the December 15, 2008 Order.
   10. Contain a review and analysis of the inspection results. Identifying areas of concern along with remedial actions or future plans to alleviate inadequacies in current program assets.

11. Description of the quality assurance program along with the results from quality assurance activities conducted during the year.
12. Any additional information that is pertinent to the issues addressed by the safety standards should also be included.

F. The Company is required by the December 15, 2008 Order to have independence in the quality assurance program required by the order. The management and personnel performing the quality assurance activities shall be separate from those performing the required stray voltage testing and inspection activities.

G. The Company shall maintain its written certification and other documentary proof of its testing at its' Albany, Buffalo, and Syracuse office facilities. These documents shall be made available to the public for review upon request.

IX. MASSACHUSETTS REPORTING REQUIREMENTS

A. National Grid shall submit an annual report that includes the following:
1. Annual reports that list inspection and testing data, including number of inspections conducted by equipment type.
2. Number of elevated equipment voltage events detected by inspection personnel versus call-ins or notification by third parties.
3. Variance reports on current year inspection targets.
4. Elevated equipment voltage events detected on equipment that is not included in elevated equipment voltage equipment inspection schedules (which will enable the DTE to determine if the company is inspecting and testing the correct equipment).
5. Number of exceptional or non-routine events that required reporting to OSHA or other government organizations due to injuries or other substantive impacts.

RESPONSIBILITIES:

1. Distribution Engineering Services
   A. Update program as necessary.
   B. Provide field support and training upon request.
   C. Act as liaison with existing database vendor when required.

2. Inspections
   A. Ensure the elevated equipment voltage program as outlined in this EOP is implemented properly and timely.
   B. Ensure that the program as outlined in the EOP is completed each year.
   C. Provide qualified personnel to complete elevated equipment voltage testing.
   D. Ensure all elevated equipment voltage testers have been trained.

3. C&MS Management
   A. When requested by Field Operations/Distribution Network Strategy obtain, schedule and manage contractors to perform elevated equipment voltage testing.
   B. Ensure all elevated equipment voltage testers have been trained.
   C. Manage contractual terms and conditions including all change orders and resource requirements.
   D. Establish a process for the delivery of work, collection of data, invoice verification and payment, and reporting to local management and Distribution Network Strategy.
   E. Manage any established support processes such as back office support or data entry clerks.

4. Elevated Equipment Voltage Inspector
   A. Demonstrate the ability and proficiency to perform elevated equipment voltage testing per this EOP.
   B. Demonstrate the ability to become proficient in the use of the appropriate database.
   C. Possess the ability to do walking patrols, collect information, edit data, and guard unsafe facilities.
   D. Attend elevated equipment voltage training program.

5. T&D Technical Training
   A. Provide training upon request.

6. Distribution Network Strategy
   A. Provide input into program revisions.
   B. Ensure the elevated equipment voltage program as outlined in this EOP is implemented properly and timely.
   C. Ensure the program as outlined in the EOP is completed each year.
   D. Provide qualified personnel to complete elevated equipment voltage testing.
   E. Ensure all elevated equipment voltage testers have been trained.
   F. Provide program management.

7. Process and Systems
   A. Provide and support database.

REFERENCE:

NYPSC Order 04-M-0159
NYPSC Order Adopting Changes to Electric Safety Standards.
Applicable National Grid Safety Rules & Procedures
Testing Equipment Operation Instructions

TYPE OF EQUIPMENT
APPENDIX A

TYPE	CODE	EQUIPMENT DESCRIPTION
Distribution	910	Pole
	911	Regulator
	912	Sectionalizer
	913	Recloser
	914	Ground
	915	Guy
	916	Riser
	917	Switch Handle Mechanical Operated
	929	Distribution – Other (use comments)
Transmission	930	Pole
	931	Tower
	932	Guy
	933	Ground
	934	Riser
	935	Switch Hand Mechanical Operator
	949	Transmission – Other (use comments)
Underground	950	Handhole
	951	Manhole
	952	Switchgear
	953	Transformer
	954	Vault – Cover/Door
	969	Underground – Other (use comments)
Street Light	970	Handhole
	971	Standard
	979	Street light – Other (use comments)
Customer Street Light/Other	980	Handhole
	981	Standard
	989	Customer SL/Other – Other (use comments)
Traffic Control	990	Handhole
	991	Standard
	992	Control Box
	993	Pedestrian Crossing Pole
	999	Traffic control – Other (use comments)

NG-USA EOP G016

“Elevated Equipment Voltage Testing”

08/17/09

Revisions made throughout document.

Appendix 10

GENERAL INFORMATION:

The purpose of this procedure is to outline the requirements for the patrol and maintenance activities associated with National Grid Distribution feeders. The Distribution Maintenance Program was designed to provide for a patrol and subsequent maintenance of each distribution feeder once every five years. The patrols are conducted by a Distribution Inspector identifying all required maintenance on a Windows based hand held computer. The maintenance items identified through this patrol are separated into four priority levels 1, 2, 3, and 4. The problem codes identified default to the appropriate priority level. The default priority level can be adjusted by the individual performing the inspection based on actual field conditions. These priority levels are defined as follows:

Level 1- An identified facility/component or tree condition that must be repaired/replaced within 1 week.

Level 2 - Identified facility/component condition that must be repaired/replaced within 1 year.

Level 3 – Identified facility/component condition that must be repaired/replaced within 3 years.

Level 4 – This priority category is to collect inventory information on actual field conditions to be used by Investment Strategy and Work Planning.

All Level 1 priority conditions identified in the field shall be called in by the Distribution Inspector as follows:

1. Notification by location:
   a. New York: contact System Operations Dispatch 1-877-716-4996.
   b. NE North: Westboro Control Center 1-508-389-9032.
   c. NE South: Lincoln Control Center 1-401-335-6075.

2. Detailed information provided to the regional notification location:
   a. Identify yourself as a Company Distribution Inspector and your work reporting area.
   b. Details of the Level 1 Priority Condition:
      i. Problem found.
      ii. District, Feeder No., Line No., Tax District and Pole No.
      iii. Street address and any additional information that would assist in finding the location of the problem.
      iv. If you are standing by or have secured the location.
3. Notification to area Inspections Supervisor for follow-up.

APPLICABILITY

This procedure applies to all personnel involved with or responsible for the inspection and repair of Overhead (OH) Distribution facilities, Underground Residential Developments (URDs) and Underground Commercial Developments (UCDs).

DEFINITIONS

Patrol - A walking/vehicle assessment of National Grid distribution facilities for the purpose of determining the condition of the facility and it's associated components.

Hand Held Computer – A Windows based data recording device that is used in the field to create a record of conditions found.

Desktop Computer – A personal computer that is connected to the National Grid network that is used to download the Hand Held Computer and retrieve the information in the form of reports.

Distribution Inspector – An employee that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities.

PROGRAM ADMINISTRATOR:

Distribution Engineering Services

SCOPE:

Distribution Maintenance

I. Distribution Patrol
II. Equipment To Be Inspected and Maintenance Codes
III. Distribution Maintenance Database
IV. Maintenance Schedule
V. Completion of Maintenance Codes
VI. Responsibilities

I. DISTRIBUTION PATROL

Distribution Patrols are conducted by a Distribution Inspector that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities. Distribution patrols are scheduled in such a manner that each distribution feeder is examined in the field once every five (5) years. In NY, the patrols shall be completed by December 31 due to regulatory reporting. In NE the patrols shall be completed by March 31. The most current Distribution Patrol schedule can be found in the Distribution Maintenance Program data base (RPT 1310 Feeder Patrol Status). New Distribution Feeders added to the system will be incorporated through our Geographic Information System (GIS) system and added to the appropriate inspection cycle. If the Distribution Inspector finds unmapped facilities from the information supplied from GIS, the inspector shall add the information into the Windows based hand held computer for maintenance tracking purposes. NG-USA EOP G011, Preparation and Distribution of Electric Facilities Records, identifies the correct procedure for updating GIS records, if needed.

Distribution Patrol data is recorded by the Distribution Inspector on a Windows based hand held computer and downloaded to the Distribution Maintenance Program. The Distribution Inspector shall also complete maintenance code 118, stencil installed and maintenance code 220, guy wire marker, maintenance code 660, switchgear missing nomenclature, maintenance code 681, transformer missing nomenclature, and maintenance code 745, enclosure missing nomenclature if found deficient upon inspection while at the site. Maintenance Codes are shown on the Distribution Field Survey Worksheet (Exhibit 1). The Distribution Field Survey Worksheet can be used by the field to record maintenance items and is used for informational purposes only. The latest distribution maintenance codes are downloaded to the Hand Held Computer each time there is a change that affects the maintenance code table contained in the Distribution Maintenance Database. Printed copies of the latest maintenance code tables may be obtained by running a report on the look up tables from the Distribution Maintenance Database.

The Windows based hand held computer is to be used as the primary vehicle for recording maintenance problems in the field. There may be times where it is not practicable to use the hand held computer. In these cases, the person performing the inspection should record the information on the Distribution Field Survey Worksheet (Exhibit 1). Once complete, the Distribution Field Survey Worksheet information must be input into the Distribution Maintenance Database by the inspector, clerk, or supervisor or their designee.

II. EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

- Wood Pole Mounted Street Light
- Poles
- Crossarms
- Insulators
- Primary
- Transformers
- Capacitor
- Regulator
- Sectionalizer
- Recloser
- Switches
- Ground
- Guy
- Anchor
- Secondary
- Service
- ROW
- GIS
- Spacer Cable
- Cutout
- Risers
- Switchgear
- Padmount Transformer
- Enclosures

DISTRIBUTION FIELD SURVEY WORKSHEET

nationalgrid

REGION	DISTRICT	EMPLOYEE ID	DATE
FEEDER	TAX DISTRICT/TOWN	MAP #	
LINE # / ROUTE #	POLE #/SUFFIX #		
LOCATION			
# MAIN LINE CATV ATTACHMENT 1 2 3 4 5	# MAINE LINE TELEPHONE ATTACHMENT 1 2 3 4 5	STREET LIGHT ATTACHED ☐ Yes ☐ No	

WOOD POLE MOUNTED STREET LIGHT	P/Q
098 1,2 (NR) ☐ Street Light Hazard Cond.	/
099 2 (NR) ☐ Not Bonded	/
100 4 (NR) ☐ Not Bonded to Standards	/
POLE	
101 4 (R) ☐ Osmose Priority Pole	/
102 4 (R) ☐ Osmose Reject Pole	/
103 4 (NR) ☐ Down Ground & Rod Present	/
106 3 (NR) ☐ Dbl Wood-NG Trnsf Req'd	/
107 4 (NR) ☐ Dbl Wood-Tel Trnsf Req'd	/
108 4 (NR) ☐ Dbl Wood-CATV Trnsf Req'd	/
110 1,2 (R) ☐ Broken/severely damaged	/
111 1,2,3,4 (RP) ☐ Visual Rotting Grd Line	/
113 3 (NR) ☐ CuNap Treated Bthmark Yr	/
114 2,3,4 (R) ☐ Woodpecker Holes	/
115 1,2,3 (NR) ☐ Riser Guard Req'd	/
116 1,2,3,4 (RP) ☐ Visual Rotting Pole Top	/
117 1,2,3 (NR) ☐ Leaning Pole	/
118 P (NR) ☐ Stencil / Correction Req'd	/
119 4 (NR) ☐ Bird's Nest	/
CROSSARM	
120 1,2,3 (R) ☐ Damage Arm	/
121 1,2,3 (NR) ☐ Loose/Defective Pins	/
122 3 (NR) ☐ Wooden Pine 13.2kv	/
123 1,2,3 (R) ☐ Loose Brace, Hrdwr	/
124 1,2,3 (R) ☐ Damage Dbl Crossarm	/
125 1,2,3 (R) ☐ Damage Alley Arm	/
126 4 (NR) ☐ Xarm Wood Brace Req'd/BIL	/
127 1,2 (R) ☐ Primary On Arm	/
INSULATOR	
130 1,2,3 (R) ☐ Broken/Cracked/Flashed	/
131 1,2,3 (R) ☐ Floating	/
132 3 (NR) ☐ I7 Aluminum Capped	/
133 3 (R) ☐ Non-Standard Voltage	/
134 3,4 (NR) ☐ AL Cap Assoc w/Switch/Fuse	/
135 4 (R) ☐ Covered Wire on Porcelain	/
PRIMARY	
140 1,2 (R) ☐ Insuff. Grnd Clearance	/
141 1,2,3 ☐ Damaged Cond/Brkn Strands	/
142 1, F (NR) ☐ Limbs on Primary	/
145 1,2,3 (R) ☐ Dmg'd Stirups/Connector	/
146 2,3,4 (R) ☐ Improper Sag	/
147 3 (R) ☐ LA Missing Transition	/
148 3 (R) ☐ LA Missing End of Line	/
149 3 (R) ☐ LA Blown	/
TRANSFORMER	
150 1,2 (NR) ☐ Oil Weeping	/
151 1,2,3 (R) ☐ Bushings Broken/Cracked	/
152 2 (R) ☐ Missing Ground Wire	/
153 3 (R) ☐ LA Blown/Missing/Improper	/
155 4 (R) ☐ Animal guards required	/
156 3 (NR) ☐ Non Std Install of Gap	/
157 2 (R) ☐ Improper/Missing Bond	/
CAPACITOR	
160 1,2 (NR) ☐ Oil Weeping	/
161 1,2 (R) ☐ Bulging	/
162 1,2,3 (R) ☐ Bushings Broken/Cracked	/
163 2 (NR) ☐ Missing Ground Wire	/
164 2 (NR) ☐ Blown Fuse	/
165 3 (NR) ☐ Improper/Missing Bond	/
166 3 (R) ☐ Animal Guard Missing	/
167 3 (R) ☐ LA Blown/Missing/Improper	/
168 4 (NR) ☐ Control Cab Heigh/Ground	/
REGULATOR	
170 1,2 (NR) ☐ Oil Weeping	/
171 1,2,3 (R) ☐ Bushings Broken/Cracked	/
172 2 (R) ☐ Missing Ground Wire	/

REGULATOR	P/Q
174 4 (NR) ☐ Control Cab Height/Ground	/
175 3 (R) ☐ Improper/Missing Bond	/
176 3 (R) ☐ Animal Guard Missing	/
177 3 (R) ☐ LA Blown/Missing/Improper	/
SECTIONALIZER	
180 1,2 (NR) ☐ Oil Weeping	/
181 1,2,3 (R) ☐ Bushings Broken/Cracked	/
182 2 (R) ☐ Missing Ground Wire	/
183 4 (NR) ☐ Control Cab Height/Ground	/
184 3 (R) ☐ Improper/Missing Bond	/
185 3 (R) ☐ Animal Guard Missing	/
186 3 (R) ☐ LA Blown/Missing/Improper	/
RECLOSER	
190 1,2 (NR) ☐ Oil Weeping	/
191 1,2,3 (R) ☐ Bushings Broken/Cracked	/
192 2 (R) ☐ Missing Ground Wire	/
193 4 (NR) ☐ Control Cab Height/Ground	/
194 3 (R) ☐ Improper/Missing Bond	/
195 3 (R) ☐ Animal Guard Missing	/
196 2,3 (R) ☐ LA Blown/Missing/Improper	/
SWITCH	
203 1,2,3 (R) ☐ Gang Oper'd Defective	/
204 1,2,3 (R) ☐ Single Phase Defective	/
205 3 (R) ☐ Improper/Missing Bond	/
207 3,4 (R) ☐ LA Blown/Missing/Improper	/
208 2 (NR) ☐ Handle Not Bonded	/
GROUND	
210 2 (R) ☐ Wire Broken/Loose	/
211 2 (R) ☐ Hazard Condition	/
212 3 (NR) ☐ Guard Req'd	/
213 3 (NR) ☐ Non Standard	/
214 3 (NR) ☐ Not Bonded to Neutral	/
GUY	
220 P (NR) ☐ Guy Wire Marker	/
221 2 (NR) ☐ Not in Compliance w/Code	/
222 3 (NR) ☐ Excessive Slack	/
223 1,2,3 (R) ☐ Broken Wire	/
225 4 (NR) ☐ Guy not Bonded/Isolated per Standards	/
ANCHOR	
226 1,2,3 (NR) ☐ Req'd - Jt. Owned	/
227 1,2,3 (NR) ☐ Req'd - Sole NG	/
SECONDARY	
231 1,F (NR) ☐ Limb on Secondary	/
232 1,2,3 (NR) ☐ Improper Sag	/
234 1,2,3 (NR) ☐ Floating	/
SERVICE	
240 1,2,3 (NR) ☐ Ins. Loose from House	/
241 1,F (NR) ☐ Limb on Service	/
243 4 (NR) ☐ Non Std/Unsecured	/
ROW	
250 F (NR) ☐ Brush/Tree/Washout	/
GIS	
260 4 (NR) ☐ Map Doesn't Match Field	/
261 4 (NR) ☐ Pole/Line Numbering Error	/
262 4 (NR) ☐ Equip/Hardware/Missing	/
263 4 (NR) ☐ Equip Removed in Field, Remove From GIS	/
269 4I (NR) ☐ Other GPS/GIS Errors	/
SPACER CABLE	
270 1,2,3 (R) ☐ Damaged/Missing Spacer	/
271 1,2,3 (R) ☐ Bracket Damage	/
272 3 (R) ☐ Bracket Not Bonded	/
273 3 (R) ☐ Messenger Not Bonded	/
274 3 (R) ☐ Messenger Guard Missing	/
276 3 (R) ☐ Uncovered Splice	/

CUTOUT	P/Q
280 1,2 (R) ☐ Defective Cutout	/
281 3 (R) ☐ Potted Porcelain	/
282 4 (NR) ☐ Banded Porcelain	/
283 4 (NR) ☐ Enclosed	/
284 4 (NR) ☐ Non Porcelain	/
285 4 (NR) ☐ Hybrid	/
286 4 (R) ☐ SpurTap Not Fused	/
289 4 (NR) ☐ Other	/
RISER	
290 1,2,3 (NR) ☐ Improp Cable Supp/Term	/
291 2 (R) ☐ Improper/Missing Bond	/
292 3 (R) ☐ Animal Guard Missing	/
293 2,3 (R) ☐ LA Blown/Missing/Improper	/
INFRARED	
400 2 (R) ☐ Problem - Switch	/
401 2 (R) ☐ Problem - Cutout	/
402 2 (R) ☐ Problem - Splice	/
403 2 (R) ☐ Problem - Other	/
HANDHOLES	
600 2 (NR) ☐ Broken/Damaged/Unsecured	/
602 P (NR) ☐ Missing Nomenclature	/
603 1 (R) ☐ Secondary Needs Repair	/
604 4 (NR) ☐ Other (use comments)	/
SWITCHGEAR	
651 1,2,3, (R) ☐ Barrier Brkn/Dmgd/Unsec	/
652 1,2,3,4 (NR) ☐ Base Broken/Damaged	/
654 2 (R) ☐ Cable Not Bonded	/
656 2 (R) ☐ Door Broken/Damaged	/
657 F (NR) ☐ Excessive Vegetation	/
659 2 (R) ☐ Missing Ground	/
660 P (NR) ☐ Missing Nomenclature	/
661 4 (NR) ☐ Other	/
662 4 (NR) ☐ Rusted/Paint Peeling	/
PAD TRANSFORMER	
672 1,2,3 (R) ☐ Bushing Broken/Cracked	/
673 1,2,3 (R) ☐ Door Broken/Damaged	/
675 1,2,3 (R) ☐ Elbows/Terminator/ Tracking/Burned	/
676 F (NR) ☐ Excessive Vegetation	/
680 2 (R) ☐ Missing Ground	/
681 P (NR) ☐ Missing Nomenclature	/
682 4 (NR) ☐ Mud/Debris	/
684 1,2 (NR) ☐ Oil Weeping	/
685 1,2,3,4 (NR) ☐ Pad Broken/Damaged	/
686 4 (NR) ☐ Protection (Ballards)	/
687 4 (NR) ☐ Rusted/Paint Peeling	/
ENCLOSURES	
740 1,2,3,4 (R) ☐ Base Broken/Cracked	/
741 1,2,3,P (R) ☐ Door Brkn/Dmgd/Unsec	/
742 1,2,3 (R) ☐ Elbows Tracking/Burned	/
743 F (NR) ☐ Excessive Vegetation	/
744 2 (NR) ☐ Missing Ground	/
745 P (NR) ☐ Missing Nomenclature	/
746 4 (NR) ☐ Rusted/Paint Peeling	/
POLE INSPECTION	
801 1,2,3,4 (NR) ☐ Identified Priority Pole	/
802 1,2,3,4 (NR) ☐ Identified Reject Pole	/
803 4 (NR) ☐ Excessive Checking	/
804 4 (NR) ☐ Climbing Inspection	/

KEY

P/Q = Priority / Quantity
NR = Maint. Code May Not Direct Affect Reliability
R = Maint. Code May Affect Reliability
RP = Maint. Code May Affect Reilability and Has Specific Program to Place to Address

Comments:

NG0236 (07.09)

III. DISTRIBUTION MAINTENANCE DATA BASE

The Distribution Maintenance database consists of information collected in the field down loaded from the Windows based hand held computer and data gathered from other sources entered from the desktop computer. The Windows based hand held computer can be down loaded to any National Grid desk top computer that is connected to the network by an employee that has been authorized to perform this function. The Distribution Maintenance database is used by various departments throughout National Grid to generate maintenance reports and cost estimates.

The Distribution Maintenance database contains information to be used by Asset Strategy and Investment Planning to track maintenance codes that may affect reliability (R), affect reliability that have a specific program in place to address (RP), or may not directly affect reliability (NR).

IV. MAINTENANCE SCHEDULE

Maintenance activities are scheduled by priority Levels. All "Level 1 Priority" conditions identified must be repaired/corrected within 1 week. All "Level 2 Priority" conditions identified must be repaired/corrected within 1 year. All "Level 3 Priority" conditions must be repaired within 3 years. Level 4 Priority is for inventory purposes only.

Once the Distribution Feeder is completed in the Distribution Maintenance Database or 21 days have elapsed since the inspection, the Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS. Expense maintenance work goes straight to scheduling while the capital work goes to Distribution Design. Level 1 Priority maintenance codes are communicated by the Distribution Inspector directly to the field operations group for the area where the feeder is located.

V. COMPLETION OF MAINTENANCE CODES

The completion of Level 1 priority maintenance codes is performed by the field operations Supervisor or their designee. Level 2 and Level 3 priority maintenance codes are completed in the Distribution Maintenance database once the 699 requirement is completed in STORMS for the work request associated with the maintenance code.

ALL MAINTENANCE WORK IS TO BE COMPLETED PER NATIONAL GRID DISTRIBUTION STANDARDS.

ALL MAINTENANCE WORK PREFORMED THAT WAS IDENTIFIED ON THE WORK ORDER OR DISCOVERED DURING THE REPLACEMENT/REPAIR/CORRECTION OF THE ORGINAL MAINTENANCE PROBLEM MUST BE LISTED ON THE DATABASE AND THEN CLOSED OUT WHEN COMPLETE

VI. RESPONSIBILITIES:

Distribution Engineering Services

1. Update EOP as necessary.

Customer Operations

1. Ensure the work generated by the Distribution Maintenance Program and assigned by Asset Strategy and Investment Planning is completed in the appropriate time frame.
2. Request assistance from CMS when necessary to complete work assigned in the appropriate time frame.

Contract Management Services

1. At the request of Customer Operations obtain, schedule and manage contractors to perform inspections and required maintenance.
2. Provide input into program revisions.

Distribution Inspector

1. Demonstrate the ability to identify maintenance concerns and the aptitude to become proficient in the use of a hand held computer and desktop computer.
2. Demonstrate the understanding and requirements of this NG-USA EOP D004.
3. Possess the ability to do walking patrols, collect information on a hand held, download to a desk top computer, edit data, provide requested information/reports/work tickets to supervision, and track/close out work completed in the database system.

Distribution Asset Strategy

1. Select problem codes/circuits to be scheduled for maintenance repair work using data collected through Distribution Maintenance Program.
2. Approve changes to the maintenance code table.
3. Select circuits to be patrolled for a running five-year cycle.
4. Provide input into program revisions.

Inspections

1. Ensure circuits scheduled for patrol are completed each year.
2. Provide qualified personnel as inspectors to provide consistent and accurate identified maintenance concerns/problems.
3. Provide program management.
4. Report System Maintenance progress monthly by Division.

Process and Systems

1. Provide and support database.

T&D Technical Training

1. Provide training upon request

REFERENCE:

Applicable National Grid Safety Rules and Procedures
NY PSC Order 04-M-0159
NY PSC Order Order Adopting Changes to Electric Safety Standard, December 2008
Elevated Equipment Voltage Testing NG USA EOP-G016
Underground Inspection NG USA EOP-UG006
Massachusetts DTE Directive 12/9/05

NG-USA EOP D004

“Distribution Line Patrol and Maintenance”

08/17/09

Additional codes and priority categories added on Distribution Field Survey Worksheet.

Appendix 11

GENERAL INFORMATION:

The purpose of this procedure is to outline the requirements for the patrol and maintenance activities associated with National Grid's underground transmission and distribution facilities.
The variance in inspection procedures in New York, Massachusetts, New Hampshire, and Rhode Island service territories is due to the requirements of New York Public Service Order 04-M-0159 and the Massachusetts Department of Telecommunications and Energy recommendations of December 9 2005, which is incremental to National Grid in New York and Massachusetts.

This program is designed for the patrol and designated maintenance of underground facilities on a five year schedule. The Inspector will record all required maintenance on an approved National Grid database.

The underground distribution facility maintenance items identified through this patrol are separated into four priority levels 1, 2, 3, and 4. The problem codes identified default to the appropriate priority level. The default priority level can be adjusted by the individual performing the inspection based on actual field conditions. These priority Levels are defined as follows:

Level 1- An identified facility/component or tree condition that must be repaired/replaced within 1 week.

Level 2 - Identified facility/component condition that must be repaired/replaced within 1 year.

Level 3 – Identified facility/component condition that must be repaired/replaced within 3 years.

Level 4 – This priority category is to collect inventory information on actual field conditions to be used by Investment Strategy and Work Planning.

All Level 1 priority conditions identified in the field shall be called in by the Underground Inspector as follows:

1. Notification by location:
    a. New York: contact System Operations Dispatch 1-877-716-4996.
    b. Bay State West and North & Granite: Westboro Control Center 1-508-389-9032.
    c. Bay State South, and Ocean State: Lincoln Control Center 1-401-335-6075.

2. Detailed information provided to the regional notification location:
    a. Identify yourself as a Company Underground Inspector and your work reporting area.
    b. Details of the Level 1 Priority Condition:
        i. Problem found.
        ii. District, Circuit/Feeder No., Line No., Tax District and Manhole/vault No.
        iii. Street address and any additional information that would assist in finding the location of the problem.
        iv. If you are standing by or have secured the location.

APPLICABILITY:

This procedure applies to all personnel involved with or responsible for the inspection or maintenance of underground transmission and distribution facilities.

DEFINITIONS:

Desktop Computer: A personal computer that is connected to the National Grid network and used to download the Hand Held device and retrieve the information in the form of reports.

Elevated Equipment Voltage Test: An A.C. rms voltage difference between utility equipment and the earth, or to nearby grounded facilities that exceeds the highest perceptible voltage levels for humans.

Hand Held Computer: An electronic data recording device that is used in the field to create a record of conditions found.

Hand-Hole: An enclosure identified for use in underground systems, provided with an open or closed bottom, and sized to allow personnel to reach into, but not enter, for the purpose of installing, operating, or maintaining equipment or wiring or both.

Infrared Inspection: An inspection conducted to detect abnormal heating conditions associated with separable connectors. An infrared inspection is required before work begins in an enclosed space, enclosure, padmounted transformer or padmounted switchgear.

Inspector: A qualified worker who can identify deficiencies or non-standard construction conditions on National Grid facilities.

Manhole: An enclosure identified for use in underground systems, provided with an open or closed bottom, and sized to allow personnel to enter, for the purpose of installing, operating, or maintaining equipment or wiring or both.

Patrol: An assessment of National Grid facilities for the purpose of determining the condition of the facility and any associated components.

Secondary Splice Box: An enclosure identified for use in underground systems. A secondary splice box may be required where the customer's number of secondary cables exceeds the maximum allowed amount on the transformer.

Service Box: See Hand-hole

Submersible Equipment: Electric equipment such as transformers and switches that, are generally located within a Hand-hole, Manhole, or Vault.

URD: Underground Residential Distribution

UCD: Underground Commercial Distribution

Underground Distribution Facilities: Manholes, vaults, hand-holes and service boxes, padmounted equipment and the components and equipment contained in these structures. (See GENERAL INFORMATION above).

User: An individual who the program administrator has authorized to use the inspection reporting program.

Vault: An enclosure, above or below ground, which personnel may enter and which is used for the purpose of installing, operating, or maintaining equipment or wiring or both.

PROGRAM ADMINISTRATOR:

Distribution Engineering Services

SCOPE:

Underground Transmission and Distribution Facility Maintenance

I. Patrols
II. Equipment to be Inspected and Maintenance Codes
III. Maintenance database
IV. Maintenance Schedule
V. Completion of Maintenance Codes
VI. Responsibilities

I. PATROLS

1. New York

Inspection of underground equipment will be scheduled in such a manner that each underground facility will be examined once every five years. These patrols shall be completed by December 31st of the schedule year.

One-fifth of all underground utility components should be inspected each year. URD and UCD facilities shall be inspected on the existing overhead distribution circuit schedule. Additionally all riser poles are inspected in accordance with the Transmission and Distribution Overhead Inspection Programs, NG-USA EOP T007 and NG-USA EOP D004. Customer owned manholes and vaults that enclose National Grid equipment shall require the inspection of these National Grid facilities.

The Inspection group is responsible to create the patrol schedule for their respective Regions for the remainder of underground facilities. The Inspector uses a Windows based hand held computer to record region, district, employee ID, feeder number, structure ID number, GPS location, tax zone, line number, comments and maintenance problem codes. The Inspector while patrolling shall also complete the following maintenance codes if found deficient upon inspection: 602 – Handhole missing nomenclature, 617 – manhole missing nomenclature, 639 - network transformer- missing nomenclature, 660 – switchgear missing nomenclature, 681 – transformer missing nomenclature, and 707 – vaults improper nomenclature. The Inspector will input the code into the Windows based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site. If the Inspector finds unmapped facilities from the information supplied from the Geographic Information System (GIS), refer to NG-USA EOP G011, Preparation and Distribution of Electric Facilities Records, for required procedure for corrections.

2. New Hampshire and Rhode Island

Inspection of designated underground equipment will be scheduled in such a manner that each designated Underground Facility will be examined once every five years. These patrols shall be completed by March 31h of the fiscal year.

One-fifth of all metallic handholes, padmount transformers and switchgear shall be inspected annually. The metallic handhole covers shall be opened for a visual inspection. An external visual inspection shall be completed on the padmount transformers and switchgear. Additionally all separable components in the

metallic handholes are to be inspected by infrared. Refer to NG-USA EOP UG001 for infrared procedure. A "Level 1 Priority" shall be assigned to a temperature gradient greater than 20º, although it is recognized that consideration must be taken as to whether a customer outage will occur at this time and the negative impact the outage could have on the customer. This may require scheduling an outage with the customer within one week to satisfy this requirement. A "Level 2 Priority" shall be assigned to a temperature gradient between 10º and 20º. A "Level 3 Priority" shall be assigned to a temperature gradient less than 10º. Additionally, an elevated equipment voltage test shall be completed at each location, refer to NG-USA EOP-G016.

A working inspection on underground facilities is required for all manholes, vaults, handholes, splice boxes, junction boxes, padmount transformers, switchgear and submersible equipment, each time a crew performs work at one of these facilities. The format for data collected shall follow this EOP. All separable components in these facilities are to be inspected by infrared. Additionally an elevated equipment voltage test shall be completed at each location, refer to NG-USA EOP-G016.

All transmission riser poles are inspected in accordance with the Transmission NG-USA EOP-T007.

The Inspection group is responsible to create the patrol schedule for their respective Regions for the designated underground facilities. The Inspector uses a hand held computer to record region, district, employee ID, feeder number, structure ID number, GPS location, line number, comments and maintenance problem codes. The Inspector, while patrolling or crew while inspecting, shall also complete the following maintenance codes if found deficient upon inspection, 602 – Handhole missing nomenclature, 617 – manhole missing nomenclature, 639 - network transformer- missing nomenclature, 660 – switchgear missing nomenclature, 681 – transformer missing nomenclature, and 707 – vaults improper nomenclature. The Inspector will input the code into the Windows based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site. If the Inspector finds unmapped facilities from the information supplied from GIS, refer to NG-USA EOP G011, Preparation and Distribution of Electric Facilities Records, for required procedure for corrections. Crews performing working inspections are to follow the same protocol for inspections by using either a handheld data entry unit or paper inspection logs requiring data entry by clerical support.

3. Massachusetts

Inspection of designated underground equipment will be scheduled in such a manner that each designated Underground Facility will be examined once every five years. These patrols shall be completed by March 31 of the fiscal year.

One-fifth of all manholes, vaults, metallic handholes, padmount transformers and switchgear shall be inspected annually. The metallic handhole covers shall be opened for a visual inspection. Manholes and vaults shall be opened and entered for inspection. An external visual inspection shall be completed on the padmount transformers and switchgear. Additionally all separable components in the metallic handholes, manholes, and vaults are to be inspected by infrared. Refer to NG-USA EOP UG001 for infrared procedure. A "Level 1 Priority" shall be assigned to a temperature gradient greater than 20º, although it is recognized that consideration must be taken as to whether a customer outage will occur at this time and the negative impact the outage could have on the customer. This may require scheduling an outage with the customer within one week to satisfy this requirement. A "Level 2 Priority" shall be assigned to a temperature gradient between 10º and 20º. A "Level 3 Priority" shall be assigned to a temperature gradient less than 10º. Additionally, an elevated equipment voltage test shall be completed at each location, refer to NG-USA EOP-G016.

A working inspection on underground facilities is required for all manholes, vaults, splice boxes, junction boxes, padmount transformers, switchgear and submersible equipment, each time a crew performs work at one of these facilities. The format for data collected shall follow this EOP. All separable components in these facilities are to be inspected by infrared. Additionally an elevated equipment voltage test shall be completed at each location, refer to NG-USA EOP-G016.

All transmission riser poles are inspected in accordance with the Transmission NG-USA EOP-T007.

The Inspection group responsible to create the patrol schedule for their respective Regions for the designated underground facilities. The Inspector uses a hand held computer to record region, district, employee ID, feeder number, structure ID number, GPS location, line number, comments and maintenance problem codes. The Inspector, while patrolling or crew while inspecting, shall also complete the following maintenance codes if found deficient upon inspection, 602 – Handhole missing nomenclature, 617 – manhole missing nomenclature, 639 - network transformer- missing nomenclature, 660 – switchgear missing nomenclature, 681 – transformer missing nomenclature, and 707 – vaults improper nomenclature. The Inspector will input the code into the Windows based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site. If the Inspector finds unmapped facilities from the information supplied from GIS, refer to NG-USA EOP G011, Preparation and Distribution of Electric Facilities Records, for required procedure for corrections. Crews performing working inspections are to follow the same protocol for inspections by using either a handheld data entry unit or paper inspection logs requiring data entry by clerical support.

II. EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

This EOP requires the visual inspection of the following facilities as designated above for New York, New Hampshire, Rhodes Island or Massachusetts, which require opening, and may require pumping on some items to assure a proper inspection:

- Manholes
- Vaults
- Handholes – non-fiberglass
- Splice boxes – non-fiberglass
- Junction boxes – non-fiberglass
- Pad mount transformers
- Pad mount switchgears
- Submersible equipment
- Handholes – fiberglass do not require opening
- Splice boxes – fiberglass do not require opening
- Junction boxes – fiberglass do not require opening

.

Maintenance Codes are shown on the Underground Field Survey Worksheet (Table 1). The Underground Field Survey Worksheet can be used by the field to record maintenance items and is used for informational purposes only. The latest transmission maintenance codes are downloaded to the Hand Held Computer each time there is a change that affects the maintenance code table contained in the Underground Maintenance Database. Printed copies of the latest maintenance code tables may be obtained by running a report on the look up tables from the Underground Maintenance Database.

INSPECTION PROGRAM AND MAINTENANCE CODES
TABLE 1

UNDERGROUND FIELD SURVEY WORKSHEET		
DATE:	INSPECTOR NAME:	EMPLOYEE ID
DIVISION	DISTRICT	FEEDER:

TOWN:	STREET:	POLE, MANHOLE, VAULT #	SUFFIX #

Handhole		Manhole		Net Protect		Net XFMR's		Switchgear		Transformer			
Vault		Trench		Submersible		Pull Box		Other		Equipment #			

MANHOLES, HANDHOLES, VAULT STRUCTURES
Water (in hole) Yes No

EV Test Required: Yes No Voltage Action Taken: Repaired De-energized
EV Found Voltage: Yes No

Gas Monitor Readings		Alarm Setting
Lower Explosive Limit (LEL)		10% or above
Oxygen (0_2)		% below 19.5, above
Carbon Monoxide (CO)		33 ppm
Hydrogen Sulfide (H_2S)		10 ppm

GIS	P/Q
260 **4** (NR) GIS map doesn't match field	/
261 **4** (NR) GIs Pole/line numbering in error on GIS	/
262 **4** (NR) GIS equip/hardware missing in GIS	/
263 **4** (NR) GIS equip removed in field, remove from GIS	/
269 **4** (NR) GIS Other GPS/GIS Errors	/
HANDHOLES	
600 **2** (NR) Broken/damaged/unsecured	/
602 **P** (NR) Missing nomenclature	/
603 **1** (R) Secondary needs repair	/
604 **4** (NR) Other (use comments)	/
MANHOLE	
610 **2** (NR) Ground rods missing	/
611 **2** (R) Cable/Joint leaking	/
612 **2** (NR) Cables bonded/grid defective	/
614 1,2,3,**4** (NR) Cracked/broken	/
615 **3** (R) Fire proofing	/
616 **4** (NR) Improper grade	/
617 **P** (NR) Missing nomenclature	/
620 **2** (NR) Rerack	/
621 1,2,**3**,4 (NR) Ring/cover repair/replace	/
622 1,**4** (NR) Roof condition – use comments	/
623 1,**4** (NR) Chimney Condition – comments	/
624 **4** (NR) Manhole needs cleaning	/
625 **1** (R) Secondary needs repair	/
626 4 (NR) No Holes in Manhole Cover	/
NETWORK PROTECTOR	
630 **2** (R) Barriers broken/damage	/
632 **1** (R) Oil leak	/
633 **2** (NR) Worn/damaged gasket	/
NETWORK TRANSFORMER	
635 **2** (R) Bushing Broken/cracked	/
637 **2** (R) Low oil	/
638 **1** (NR) Missing ground	/
639 **P** (NR) Missing nomenclature	/
642 1, **2** (R) Oil Weeping	/
643 **4** (NR) Rusted/paint peel	/
SWITCHGEAR	
651 1,**2**,3 (R) Barrier broken/damaged/unsecure	/
652 1,2,**3** (NR) Base broken/damaged	/
654 **2** (R) Cable not bonded	/
656 1,**2**,3 (R) Door Broken/Damaged	/

SWITCHGEAR	P/Q
657 **F** (NR) Excessive vegetation	/
659 **2** (R) Missing ground	/
660 **P** (NR) Missing nomenclature	/
661 **4** (NR) Other	/
662 **4** (NR) Rusted/Paint Peeling	/
TRANSFORMER	
672 1,2,**3** (R) Bushing Broken/Cracked	/
673 1,**2**,3 (R) Door Broken/damaged/unsecure	/
675 1,2,**3** (R) Elbows/tracking/burned	/
676 **F** (NR) Excessive vegetation	/
680 **1** (R) Missing Ground	/
681 **P** (NR) Missing nomenclature	/
682 **4** (NR) Mud/debris	/
684 1,**2** (NR) Oil Weeping	/
685 1,2,**3**,4 (NR) Pad broken/damaged	/
686 **4** (NR) Protection (ballards) damage	/
687 **4** (NR) Rusted/Paint peeling	/
688 1,**2** (NR) Pad Pushed Off Base	/
TRENCH	
690 **1** (R) Exposed Cable	/
692 **4** (NR) Path – Sunken	/
VAULTS	
700 **2** (NR) Cable missing bond	/
702 1,2,3,**4** (NR) Cracked/broken	/
703 1,2,**4** (NR) Damaged/broken cover	/
704 1,2,**4** (NR) Damaged/broken door	/
705 1,**2**,4 (NR) Damaged/broken ladder	/
706 1,2,**3**,4,P (NR) Improper grade	/
707 4,**P** (NR) Improper nomenclature	/
708 **4** (NR) Light not working	/
712 **4** (NR) Sump pump broken	/
713 **1** (R) Secondary needs repair	/
SUBMERSIBLE EQUIPMENT	
720 1,2,3,**4** (R) Excess Corrosion	/
721 1,2,3,**4** (R) Physical damage	/
722 1,**2** (R) Leaking	/
ANODES	
730 **3** (R) Missing	/
731 **3** (NR) Need replacement	/

KEY
PQ = Priority Quantity
NR = Maint.Code May Not Directly Affect Reliab.
R = Maint. Code May Affect Reliability
RP = Maint. Code May Affect Reliab. and Has Specific Program to Place to Address

Comments:

NG-0244 7/09

III. MAINTENANCE DATABASE

The Maintenance database consists of data downloaded from the Windows based hand held and data entered from the desktop computer. The Windows based hand held used in the field, can be downloaded to any National Grid desk top computer that is connected to the network and the inspector is logged on as a valid user of the UG Maintenance program. The National Grid desktop computer is also used to generate various reports and work tickets depending on the user's need. These reports are utilized to schedule and accomplish distribution maintenance work.

IV. MAINTENANCE SCHEDULE

Maintenance activities are scheduled by priority Levels. All "Level 1 Priority" conditions identified must be repaired/corrected within 1 week. All "Level 2 Priority" conditions identified must be repaired/corrected within 1 year. All "Level 3 Priority" conditions must be repaired within 3 years. Level 4 Priority is for inventory purposes only.

Once the Underground Circuit/Feeder is completed in the Underground Maintenance Database, the Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS. Expense maintenance work goes straight to scheduling while the capital work goes to Underground Engineering. Level 1 Priority maintenance codes are communicated by the Underground Inspector directly to the field operations group for the area where the feeder is located.

V. COMPLETION OF MAINTENANCE CODES

The completion of Level 1 priority maintenance codes is performed by the field operations Supervisor or their designee. Level 2 and Level 3 priority maintenance codes are completed in the Underground Maintenance database once the 699 requirement is completed in STORMS for the work request associated with the maintenance code.

ALL MAINTENANCE WORK IS TO BE COMPLETED PER NATIONAL GRID UNDERGROUND CONSTRUCTION STANDARDS.

VI. RESPONSIBILITIES:

Distribution Engineering Services

1. Update program as necessary.

Customer Operations

1. Ensure the Underground Maintenance Program as outlined in this EOP is implemented properly and timely.
2. Select circuits to be patrolled for a running five-year cycle and ensure that the circuits scheduled for patrol are completed each year.
3. Provide qualified personnel as the inspectors, to provide consistent and accurate identified maintenance concerns/problems.
4. Ensure program is completed annually as required.

Underground Inspector

1. Demonstrate the ability to identify maintenance concerns and the aptitude to become proficient in the use of a hand held computer and desktop computer.
2. Demonstrate the understanding and requirements of this EOP.
3. Possess the ability to do walking patrols, collect information on a hand held, download to a desk top computer, edit data, provide requested information/reports/work tickets to supervision, and track/close out work completed in the database.

Contract Management Services

1. At the request of Customer Operations/Distribution Network Strategy obtain, schedule and manage contractors to perform inspections and perform required maintenance.
2. Ensure the Underground Maintenance Program as outlined in this EOP is implemented properly and timely.
3. Provide inspectors where applicable.
4. Ensure inspectors are trained.
5. Provide program management.
6. Ensure program is completed annually as required.

Asset Strategy and Policy

1. Provide input into program revisions.
2. Provide program management.
3. Ensure program is completed annually as required.
4. Ensure the Underground Maintenance Program as outlined in this EOP is implemented properly and timely.

Process and Systems

1. Provide and support database.

T&D Technical Training

1. Provide training upon request.

REFERENCE:

NY PSC Order 04-M-0159
NY PSC Order Order Adopting Changes to Electric Safety Standard, December 2008
Applicable National Grid Safety Rules and Procedures
Distribution Line Patrol and Maintenance NG-USA EOP D004
Elevated Equipment Voltage Testing NG USA EOP-G016
Transmission Line Patrol and Maintenance NG USA EOP – T007
Massachusetts DTE Directive 12/9/05

NG-USA EOP UG006

“Underground Inspection and Maintenance”

08/17/09

Changed levels from ABC to 1234 and added Underground Field Survey Worksheet.

Appendix 12

Ground Based Visual Inspection

Revision History

Version	Date	Revision	Author	Reviewer	Approver
1.0	02/02/2010	Initial	J.M.McGrath		M.S.Browne
2.0	01/07/2011	Code changes, corrections	J.M.McGrath		M.S.Browne
2.1	2/3/2011	Code changes, warning sign revision, changed wood pole evaluation methodology	J.M.McGrath		M.S.Browne

Note: This document supersedes EOP T007 – Transmission Line Patrol and GL 06.01.118 – Visual Inspection of Transmission Line Assets

Table of Contents

FORWARD

1.0 General

1.1 The purpose of this procedure is to outline the requirements for the visual Inspection from ground level of National Grid US transmission circuits.

1.2 All applicable safety and environmental rules must be followed when executing these Inspections. Inspectors shall be aware of hazards that may be encountered.

1.3 Inspectors shall be notified by TLOME for all changes to this document and are to be trained yearly on this procedure. New Inspectors shall be trained on this document prior to performing this inspection.

1.4 This procedure is associated with Specification SP.06.01.601.000, Transmission Line Inspection and Maintenance.

2.0 Administration

2.1 Maintenance of this document is the responsibility of Transmission Line Operations and Maintenance Engineering (TLOME).

2.2 Specific planned work performed under this procedure will be coordinated by TLOME via a Work Plan document to be released prior to the start of each fiscal year.

3.0 Application

3.1 This document applies to all overhead line assets managed by National Grid US Transmission as defined by Transmission Group Procedure 12 (TGP 12) and applies to anyone performing Inspection and Maintenance activities on these assets. It is expected that this procedure be executed by Qualified Personnel as determined by training specific to the task performed.

4.0 References

4.1 Transmission Line Inspection and Maintenance Specification, SP.06.01.601.000

4.2 Transmission Line Switch Inspection Procedure, PR.06.01.601.008

4.3 Transmission Wood Pole Inspection and Treatment Procedure, PR.06.01.601.005

4.4 Transmission Steel Structure Foundation/Footer Inspection and Repair SP.06.01.601.004

4.5 National Grid Employee Safety Handbook

5.0 Definitions

5.1 Ground Based Visual Inspection – An Inspection performed from a stationary ground position. Movement along the line between Inspection points may be by vehicle or foot

5.2 Hand Held Computer – A data recording device that is used in the field to create a record of conditions found for the purposes of communicating this data to a Maintenance Management System

5.3 Inspection – A careful viewing of assets to find defects and other problems that require Maintenance or monitoring

5.4 Inspection and Maintenance Program – National Grid's planned program for Inspecting and Maintaining its transmission lines.

5.5 Inspector – Qualified Personnel who identify defects via a specific type of Inspection

5.6 Maintenance – Work to correct defects or other problems. This work is often generated through the Inspection process

5.7 Maintenance Management System (MMS) – A computer application that schedules and tracks Inspections and/or Maintenance work

5.8 National Grid Representative – National Grid personnel designated as the point of contact for a contracted inspector

5.9 Pocket – A void in a pole resulting from damage, weathering or decay. This may lower the strength of the pole.

5.10 Qualified Personnel – Personnel trained to safely perform a specific Inspection.

5.11 Work Plan – A document published each fiscal year that, among other things, lists all Inspection and Maintenance scheduled for the year.

6.0 Follow Up Prioritization

6.1 Assets are to be assessed as follows:

- All assets are to be graded based on worst critical member/location or discrete area, i.e. the weakest link of the asset.
- Each steel structure, pole or member is to be graded according to Sections 10 and 11 of this procedure, using scales found in Appendix B, for engineering reference.
- Each concrete foundation is to be graded according to Section 12 of this procedure, using scales found in Appendix C, for engineering reference.
- Switches shall be inspected according to Procedure Section 21. Defects shall be assigned a Maintenance Priority Level of 1 to 4 per Appendix I.
- All other assets shall be inspected according to the applicable section and defects found shall be assigned a Maintenance Priority Level of 1 to 4 in accordance with Appendices D-I.

6.2 Once reported, defects shall be repaired or addressed as follows per Transmission Line Inspection and Maintenance Specification, SP.06.01.601.000:

- Level 1 – Address within 1 week*
- Level 2 – Address within 6 months**
- Level 3 – Address within 3 years**
- Level 4 – Monitor condition or use for studies

* Time period starts on the day the problem is found
**Time period starts when the defect is entered into Computapole

6.3 Any exceptions to the grading guide below shall only be made with approval of TLOME. Any changes to levels already entered into Computapole shall only be made with approval of TLOME.

6.4 All Level 1 conditions shall be reported no later than two hours after discovery as follows:

- New York – Contact Transmission Control Center @ (315) 460-2110
- New England – Contact Transmission Control Center @ (800) 423-6029

- Indicate problem found
- Indicate circuit and structure number
- Indicate street address and any additional information that would assist in identifying the location
- Indicate if you are standing by or have safely secured the location
- Indicate whether someone from In House Construction or Engineering is required for evaluation (immediate or not)

6.5 In cases where, in the judgment of the inspector, a serious safety issue may exist, the Inspector may be required to stand by a defect until other personnel arrive. This may be by the decision of the inspector or other groups. It is extremely important that the Inspector keep themselves and others a safe distance away from any hazards that are encountered. In such cases, the Safety group or National Grid Representative may also be advised.

7.0 Documentation

7.1 Information gathered from the Ground Based Visual Inspection shall be documented in the Computapole Maintenance Management System via the Hand Held Computer. If the computer isn't available, information can be temporarily documented on the Transmission Field Survey Worksheet in Appendix A.

8.0 Other Inspections

8.1 This document may be utilized in conjunction with other Inspections and condition assessments such as engineering walk-downs etc. by personnel not typically engaged in Inspections. If any defects are found that are considered Level 1, it is expected that Section 6 above shall be followed. All Level 1 and 2 defects found shall also be reported to the following:

- Manager of TLOME, via phone or email, as soon as possible.

8.2 It is strongly encouraged that Level 1 and 2 defects found be evaluated by personnel from In House Construction or Transmission Inspections as soon as possible. This may not be necessary if the Inspection is being performed by someone with sufficient knowledge of transmission line construction that can fully understand the impact of the defect.

9.0 Responsibilities

9.1 Transmission Line O&M Engineering

- Create the transmission line portion of the Work Plan outlining the circuits that are to be inspected and otherwise addressed according to this specification in a given fiscal year.
- Provide guidance and support for the execution of the Inspection and Maintenance Program
- Approve exceptions as noted above

9.2 System Delivery

- Ensure the Inspection Program as outlined in the Fiscal Year Work Plan is safely executed according to this specification and its associated procedures in a timely manner.
- Repair problems found during Inspection

9.3 Transmission Inspections

- Provide National Grid Representative when contractors are used
- Be qualified to perform specific Inspections and identify defects.
- Be qualified to perform applicable basic Maintenance such as the installation of guy guards and stenciling.
- Follow all applicable National Grid US Safety Rules.
- Demonstrate the understanding and requirements of this specification and all related procedures and guidelines.

9.4 Transmission Investment Management

- Track performance of Work Plan completion
- Track performance of Maintenance within assigned priority level time frames

9.5 Transmission Network Asset Strategy

- Provide input into program revisions.

PROCEDURE

10.0 General

10.1 All assets must be physically visited and visually inspected so that all potential defects can be identified. Exceptions must have approval from the appropriate department manager and be documented in the Maintenance Management System.

10.2 The intent of this procedure is to visit assets in order as they physically exist in the field and apply the appropriate Inspection to each asset. To conform to the current Maintenance Management System input process, the steps in this procedure are arranged so as to line up numerically with the Computapole Maintenance priority codes.

10.3 All elements of this procedure are intended to be performed from ground level. Tools to facilitate a clear, close up view of assets, such as binoculars or scopes, should be used where necessary.

10.4 Some Computapole codes do not apply to this Inspection and are not included in this procedure. A complete list of Computapole codes including valid levels and STORMS qualifiers is in Appendix J.

11.0 Inspect Steel Condition

11.1 Grading Reference:

- Appendix B - Steel Evaluation Categories (1-6 Rating)

11.2 Inspection Note:

- Grade all steel collectively. The overall tower rating shall be assigned as the visual rating of the worst 5% of members on the tower or discrete area on the steel pole, or the visual rating of the worst critical members, e.g. tower legs and insulator attachment points, whichever is worse.
- Structures rated as 4 or worse will require additional review, so additional photos and notes should be taken to assist in structure evaluation.
- At the discretion of the Inspector, any structure may be classified as 6 “Very Severe Deterioration” due to special circumstances. The reason for this must be reported in the Inspection report.

11.3 Visually inspect for the following:

- Steel condition
- Weathering steel for excessive corrosion of joints. Report any excessive corrosion of weathering steel joints to Transmission Line O&M Engineering.

12.0 Inspect Steel Grillage Foundation

12.1 Grading Reference:

- Appendix B - Steel Evaluation Categories (1-6 Rating)

12.2 Visually inspect for the following:

- Steel condition above grade

13.0 Inspect Concrete Foundation

13.1 Grading Reference:
- Appendix C - Concrete Evaluation (1-5 Rating)

13.2 Inspection Note:
- At the Inspector's discretion, any structure foundation may be classified as 5: Very Severe Deterioration. The reason for this must be given in the Inspection report.

13.3 Visually inspect for the following:
- Poor workmanship, including honeycombing
- Cracking, including pattern or solitary cracks
- Disintegration and deterioration of concrete
- Distortion/movement resulting in change in alignment of structure components
- Seepage – movement of water/fluids through pores
- Spalling – development of fragments
- Delamination
- Degradation of steel/concrete interface
- Excessive corrosion of reinforcement
- Condition of anchor bolts. Ensure all hardware present and tight.

14.0 Inspect Wood Poles and Structures - Overall

14.1 Grading Reference:
- Appendix D (Maintenance Priority Level 1-4 Rating)

14.2 Sound pole, visually inspect for the following and grade using the indicated code (note – unless an immediate risk of failure exists, poles with visual rotting and/or hollow sound should be classified as a Level 4 and scheduled for a Wood Pole Inspection):
- Code 510 - Broken
- Code 511 - Visual rotting/hollow sounding pole
- Code 512 - Leaning
- Code 513 - Replace single arm
- Code 514 - Replace double arm
- Code 515 - Repair brace
- Code 516 - Replace brace
- Code 517 - Replace anchor
- Code 518 - Install anchor
- Code 519 – Repair/replace guy wire
- Code 521 - Tighten guy wire
- Code 522 - Replace guy shield
- Code 524 - Guy bonding
- Code 525 - Lightning damage
- Code 526 - Woodpecker damage
- Code 527 - Insects
- Code 528 - Aerial number missing

15.0 Inspect Wood Poles – Individual

15.1 Grading Reference:
- Appendix E (Maintenance Priority Level 1-4 Rating)

15.2 Note: A C-Truss repair is not considered a temporary repair. However, if a pole with a C-Truss is significantly deteriorated, it shall be graded as if no C-Truss was installed.

15.3 Identify via badge left after Wood Pole Groundline Inspection. Use only Level 4 and are meant to be a documentation of pole labeling that results from the Wood Pole Groundline Inspection:
- Code 901 - Identified priority pole
- Code 902 - Identified reject pole
- Code 903 - Excessive checking
- Code 904 - Climbing inspection required
- Code 905 - No inspection tag

16.0 Inspect Steel Poles and Structures

16.1 Grading Reference:
- Appendix F (Maintenance Priority Level 1-4 Rating)

16.2 Visually inspect for the following and grade using the indicated code:
- Code 531 - Broken legs
- Code 532 - Aerial number missing
- Code 534 - Loose or missing bolts/hardware
- Code 535 - Anti climb equipment damaged/missing
- Code 536 - Vegetation on tower
- Code 537 - Structure damage
- Code 538 - Tower needs straightening
- Code 539 - Arms damaged

17.0 Inspect Conductor

17.1 Grading Reference:
- Appendix G (Maintenance Priority Level 1-4 Rating)

17.2 Note: TLOME may revise levels for conductor damage based on factors such as mechanical and electrical loading.

17.3 Visually inspect for the following and grade using the indicated code:
- Code 541 - Conductor condition overall
- Code 542 - Static wire condition overall
- Code 543 - Ground wire condition overall
- Code 544 - Sleeve/splice/connector condition
- Code 546 - Clearance issues

18.0 Inspect Insulators/Hardware

18.1 Grading Reference:
- Appendix G (Maintenance Priority Level 1-4 Rating)

18.2 Note – Where multiple strings of insulators are encountered, each string shall be evaluated on its own.

18.3 Visually inspect for the following and grade using the indicated code:
- Code 551 - Insulator damage
- Code 552 - Insulators out of plumb
- Code 553 - Hardware loose or damaged
- Code 555 - Lightning arrestor issues

19.0 Inspect Foundation – General

19.1 Grading Reference:
- Appendix H (Maintenance Priority Level 1-4 Rating)

19.2 Visually inspect for the following and grade using the indicated code:
- Code 563 - Erosion

20.0 Inspect Right of Way

20.1 Grading Reference:
- Appendix I (Maintenance Priority Level 1-4 Rating)
- All Code 574 – Danger Trees rated as an "F"

20.2 Visually inspect for the following and grade using the indicated code:
- Code 571 - Erosion
- Code 572 - Encroachments
- Code 573 - Debris
- Code 574 - Danger trees
- Code 575 - Broken gates
- Code 576 - Oil/Gas/Hazmat leak

21.0 Inspect Miscellaneous

21.1 Grading Reference:
- Appendix I (Maintenance Priority Level 1-4 Rating)

21.2 Visually inspect for the following and grade using the indicated code:
- Code 581 - Structure not marked – ground level
- Code 582 - Switch damaged (see below)
- Code 583 - Switch ground damaged (see below)
- Code 584 - Install warning sign
- Code 585 - Replace warning sign
- Code 586 - Remove steps
- Code 587 - Add dirt and tamp
- Code 589 - Bird Nest
- Code 590 - Excessive bird perching

22.0 Inspect Switch – Visual Inspection

22.1 Grading Reference:
- Appendix I (Maintenance Priority Level 1-4 Rating)

22.2 Inspection Note:
- This inspection can be performed from the ground with the switch in service. Refer to the Line Switch Inspection Procedure, PR06.01.601.008 for further

information. Since one code is used for most of this inspection, note problem details.

22.3 Visually inspect for the following and grade using the indicated code:

- Code 582 Noise – Arcing and other abnormal noise, if energized. If disconnect switches are making unusual noises while energized, leave the area immediately and contact the appropriate control center.
- Code 582 Insulators – Surface contamination, tracing, damaged porcelain
- Code 582 Primary Connections – Discoloration of or heat rising from connections (overheating), cracks, visibly loose connections
- Code 582 Live Parts – Blades properly turned into jaws (horizontal), damaged or misaligned arcing horns, damaged, misaligned or missing parts
- Code 582 Load break interrupters – Damage or deterioration
- Code 582 Operating mechanism – Properly locked, operating pipe for breakage, bending, phase to phase linkage for breakage, bending, manual operating mechanism for damage, deterioration or missing parts
- Code 583 Operating mechanism properly grounded

23.0 Document GIS Data Issues

23.1 Grading Reference:

- Appendix I (Maintenance Priority Level 1-4 Rating)

23.2 Document all mismatches between the GIS and the field as follows:

- Code 760 - GIS map mismatch
- Code 761 - GIS – equipment stencil mismatch
- Code 762 - GIS – equipment/hardware missing
- Code 763 - GIS – equipment removed in field
- Code 769 - GIS – other GPS/GIS errors

24.0 Engineering-Specific Inspection

24.1 This section contains additional guidelines for Inspections related to engineering activities and is not to be included in the regular Ground Based Visual Inspection. The guidelines presented below shall be used by engineers completing and interpreting field Inspections as part of preliminary engineering as specified in SP.06.01.101 “Transmission Engineering and Design Services”.

24.2 The sum total of the guidance provided in sections 9 through 23 shall be used in completing engineering analysis of lines.

24.3 Notes on Priority Codes

- Priority 1 – Reserved for immediate and substantial threats to public safety and/or system reliability. These should generally be very rare
- Priority 2 – Items which require repair due to a near term risk of failure, the repairs should not wait for the normal two-year project life cycle
- Priority 3 – Repairs are required, but a more deliberate approach can be taken over a two-year period

- Priority 4 – Repairs should be completed if the work is incidental to another project, but the item can wait for the next Inspection cycle for further assessment

24.4 The following features or defects shall be determined and documented:

- Asset Information
  - Structure Number
  - Circuit
  - Tower/Pole ID# including circuit according to National Grid nomenclature
  - Tower/Pole Location in Latitude/Longitude format
  - Tower/Pole Groundline elevation
  - Structure location (City/Town and State)
- Visual Inspection
  - Year Installed
  - Tower/Pole Height
  - Structure Height
  - Structure Type
  - Structure Description (painted/galvanized/weathered/foundation)
  - Structure condition(s) and overall rating
  - Presence of steel distress or deterioration
  - Concrete foundation condition(s) and overall rating
  - Presence of concrete foundation distress or deterioration
  - Concrete foundation surface mapping diagram
  - Mechanical or fire damage
  - Broken hardware such as insulators or adversely impacted structural components such as foundations
  - Adjacent roads, railroads, parks, and other areas considered frequently accessible by the general public
  - Any unusual conditions or safety hazards
  - Digital photographs
  - Field sketches of foundation condition

25.0 Temporary Repairs

25.1 Some defects encountered may have been repaired temporarily. These defects shall be inspected monthly by Transmission Inspections, until a permanent repair is completed.

25.2 If an Inspector encounters a temporary repair, the defect shall still be reported with a note indicating a temporary repair.

Appendix A – Transmission Field Survey Worksheet

TRANSMISSION FIELD SURVEY WORKSHEET

Patrolled Circuit/No.	Unique ID	Pole/Tower No.	Voltage	District
Additional Circuit/No.	Unique ID			
Area	Between _____ Rd. And _____ Rd.	Date	Employee ID	
TYPE	☐ A) Single ☐B) H. Frame ☐C) 3 Pole ☐D) 4 Pole ☐E) 5 Pole ☐F) 6 Pole ☐G) Flex-Tower ☐H) Square-Tower ☐I) Hairpin ☐J) Other			
MATERIAL	☐ A) Wood (fill in information for each pole, i.e., 2 pole, 3 pole, 4 pole, etc.) Height _____ Class _____ Year Set _____ Manufacturer _____ Year Last Treated _____ Treatment ☐A) External ☐B) Internal ☐C) Both ☐D) Other ☐E) Unknown ☐F) None ☐ B) Steel ☐ C) Lattice			
CONFIGURATION	☐Deadend ☐Tangent ☐Switch Structure ☐Davit Arm ☐Stand Off ☐Other			
STEEL/LATTICE CONDITION	(Circle One) 1 2 3 4 5 6	FOUNDATION: STEEL CONCRETE	(Circle One) 1 2 3 4 5 6 1 2 3 4 5	

POLE * *Enter Sub No. if a Multiple Structure	Sub. No.	Priority Qty
510 1, **2** (R) ☐Broken		/
511 1,4 (RP) ☐Visual Rotting		/
512 1,2,3,**4** (R) ☐Leaning		/
513 1,2,**3** (R) ☐Replace Single Arms		/
514 1,2,**3** (R) ☐Replace Double Arm		/
515 1,2,**3** (R) ☐Repair Braces		/
516 1,2,**3** (R) ☐Replace Braces		/
517 1,**2** (R) ☐Replace Anchor		/
518 1,2,**3**,4 (R) ☐Install Anchor		/
519 1,2,**3** (R) ☐Repair/Replace Guy Wire		/
521 2,**3** (R) ☐Tighten Guy Wire		/
522 **P** (NR) ☐Replace/Install Guy Shield		/
524 **4** (R) ☐Guy Not Bonded		/
525 1,2,**3**,4 (RP) ☐Lightning Damage		/
526 2,**3**,4 (RP) ☐Woodpecker Damage		
527 2,4 (RP) ☐Insects		
528 **4 (NR)** ☐Aerial Number Missing		/
TOWER		
531 1,**2** (R) ☐Tower Legs Broken		/
532 **4** (NR) ☐Aerial Numbers Missing		/
534 1,2,**3** (R) ☐Loose Bolts/Hard		/
535 **4** (NR) ☐Repair Anti-Climb		/
536 **F** (R) ☐Vegetation On Tower		/
537 1,2,**3** (R) ☐Structure Damage		/
538 1,2,**3**,4 (R) ☐Straighten Tower		/
539 1,2,**3**,4 (R) ☐Arms Damaged		/
POLE INSPECTION		
901 **4** (RP) ☐Identified Priority Pole		/
902 **4** (RP) ☐Identified Reject Pole		/
903 **4** (RP) ☐Excess Checking		/
904 **4** (RP) ☐Climbing Inspection Req'd		
905 **4** (RP) ☐No Inspection Tag		/

CONDUCTOR ** **Enter Circuit No. if More Than Circuit on Pole	Circuit No.	Priority Qty
541 1,2,**3** (R) ☐Conductor		/
542 1,2,**3** (R) ☐Static		/
543 1,2,**3** (R) ☐Ground Wire		/
544 1,2,**3** (R) ☐Sleeve/Conn.		/
546 1,**4** (NR) ☐Under 25 Ft.		/
LINE HARDWARE		
551 1,2,**3**,4 (R) ☐Insulators/Dam		/
552 **4** (R) ☐Insulator Plumb		/
553 1,2,**3**,4 (R) ☐Hardware Dam		/
555 **2** (R) ☐Lightning Arrestor		/
FOUNDATION – GENERAL		
563 1,2,**3**,4 (R) ☐Erosion		/
RIGHT OF WAY		
571 1,2,**4** (NR) ☐Erosion		/
572 **4** (NR) ☐Encroachments		/
573 **4** (NR) ☐Debris		/
574 **F** (R) ☐Danger Tree		/
575 **4** (NR) ☐Gate Broke		/
576 **4** (NR) ☐Oil/Gas Leak		/
MISCELLANEOUS		
581 4,P (NR) ☐Stencil/Line/ Struct No. Ground level		/
582 1,2,**3**,4 (R) ☐Switch Damaged		/
583 **2** (R) ☐Damaged Ground		/
584 **4**,**P** (NR) ☐Install/Replace Warning Sign		/
586 **4** (NR) ☐Remove Steps		/
587 **3**,4 (R) ☐Add Dirt & Tamp		/
589 1,**3**,4 (R) ☐Bird Nest		/
590 **4** (R) ☐Bird Perching		/
GIS		
760 **4** (NR) ☐GIS Map Doesn't Match Field		/
761 **4** (NR) ☐GIS Equip. Stenciling In Error		/
762 **4** (NR) ☐GIS Equip/Hardware Missing		/
763 **4** (NR) ☐GIS Equip. Removed In Field Remove from GIS		/
769 **4** (NR) ☐GIS Other GPS/GIS Errors		/

NR=Maint. Code may not directly affect reliab.
R=Maint. Code may affect reliability.
RP = Maintenance Code may affect and has specific program in place to address.

Comments on rear of sheet

NG0237 (12/09)

Appendix B – Steel Evaluation Categories

Visual Rating 6 – Very Severe Deterioration
Perforated Element – severe physical damage

Visual Rating 5 – Significant Pitting
Significant pitting – loss of section clearly visible, edges feathered/thinned

Visual Rating 4 – Light Pitting
Some very light edge roughening. Loss of greater majority of coating and zinc layers. Corroded surface would dominate surface preparation – remedial action using wire brush, scraper and brushed paint not sufficient to give greatly increase life

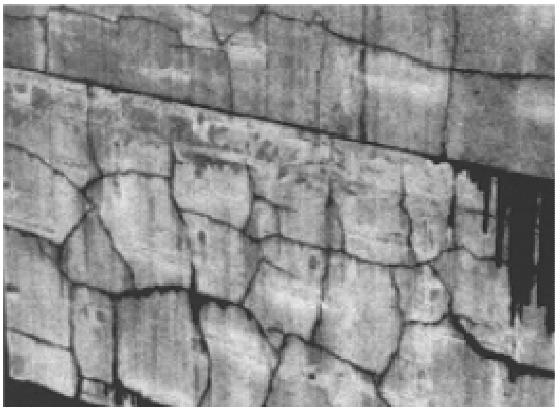
Visual Rating 3 – Light Corrosion
Very light surface corrosion, majority of coating intact

Visual Rating 2 – Intact
Paint coating over all surface – overcoat may not be intact and some very small areas (<1%) of light corrosion may be present. Galvanizing intact except for some very small areas (<1%) of light corrosion

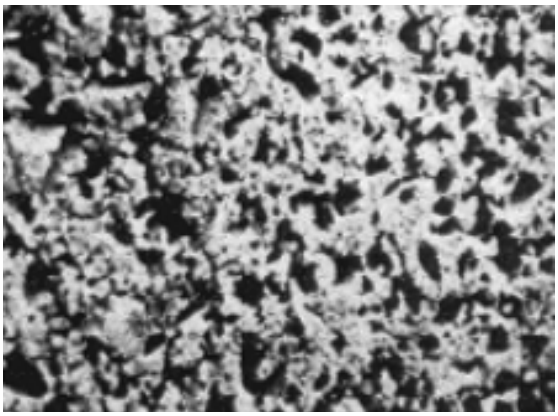
Visual Rating 1 – Serviceable
Fully painted – overcoat and undercoat intact
Fully galvanized – coating intact

Appendix C – Concrete Evaluation Categories/Rating Matrix

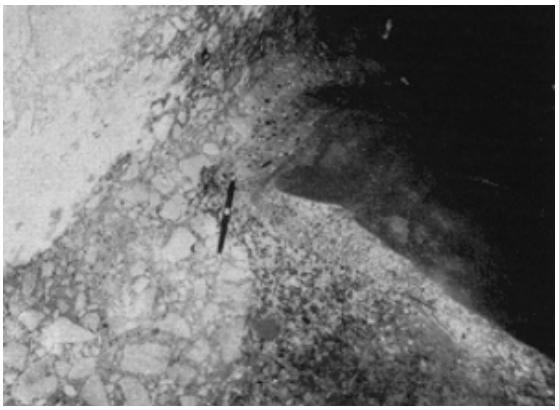
Honeycombing
Construction faults, poor workmanship



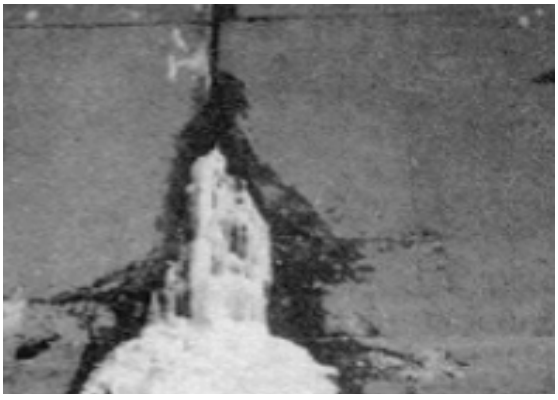
Pattern Cracking



Disintegration
Deterioration of concrete into small fragments



Erosion/Abrasion



Seepage
Movement of water or other fluids through pores

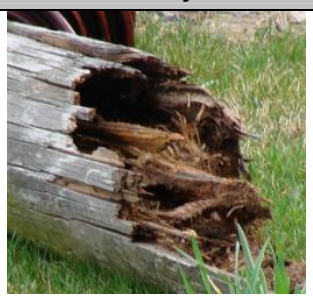
Spalling
Development of fragments

Distortion or Movement
Change in alignment of the components of a structure

Delamination
Degradation of steel/concrete interface

		Overall Foundation Rating				
		Very Severe Deterioration 5	**Severe Deterioration 4**	**Medium Deterioration 3**	**Light Deterioration 2**	**Serviceable 1**
Concrete Foundation Condition Categories	**Cracking**	Wide cracks (over 0.08" width)	Medium Cracks (between 0.04" and 0.08" width)	Fine Cracks (0.04" width)	Negligible	Negligible
	Disintegration	Very Severe Disintegration (loss of mortar and coarse aggregate at a depth greater than 0.8")	Severe Disintegration (loss or mortar between 0.4" and 0.8" around coarse aggregate)	Medium Disintegration (loss of surface mortar between 0.2" and 0.4" and exposure of coarse aggregate)	Light Disintegration (no exposure of coarse aggregate)	Negligible
	Spalling	Large spall (greater than 0.8" in depth and greater than 6" in any dimension)	Small spall (not greater than 0.8" in depth or greater than 6" in any dimension)	Negligible	Negligible	Negligible

Appendix D – Wood Poles and Structures Evaluation

Typical Pole Defects		
Bark Inclusion	**Checking (Solitary)**	**Checking (Around Periphery of Pole)**
		
The growth of the main stem around a dead branch	The separation of fibers parallel to the grain and extending towards the center of the pole	Multiple checks around entire pole circumference
Cross Break	**Mechanical Damage**	**Split**
		
The separation of fibers perpendicular or at an angle to the grain	Transportation and erection damage due to machinery such as chainsaws or cranes	The cracking of a pole due to mechanical connections or the intersection of checks
Dead Streak	**Decay**	**Decay Knot**
The growth of the main stem around the dead wood	 The softening of the pole due to fungal growth	Knots which have decayed and can extend towards the center of the pole
Pocket		
A Solitary Check, a series of checks at one location, or area of decay at the surface of the wood pole		

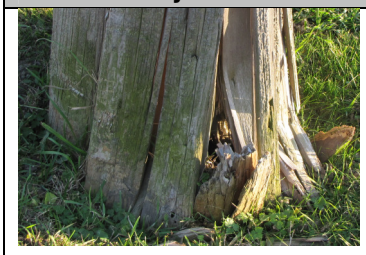
510 Pole – Broken

- Used when pole is broken due to impact, stress etc.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Damage poses significant risk of imminent failure	 Damage is not an immediate threat to the integrity of the network or to public safety	N/A	N/A

511 Pole – Visual Rotting

- Used for physical damage which compromises the strength and/or integrity of the pole (checking, dead streak, bark inclusion, cross break, decay, burning, hollow sounding pole)

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
 Damage poses significant risk of imminent failure	N/A	N/A	 All Others

512 Pole – Leaning

- Used when pole/structure is out of plumb(excludes raked angle structures which are intentionally out of plumb due to line angle)

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Leaning pole which in Inspector's judgment poses immediate and substantial threat to public safety and/or system reliability	Pole top deflection in Inspector's judgment poses a near-term risk to structure integrity	 Slope > 2" per 10' pole height	All other leaning poles

513 Pole – Replace Single Arm

• Used for damaged single arms. Arm refers to any horizontal member extending out from the main structure generally to support the conductor.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Arm damage poses immediate and substantial threat to public safety and/or system reliability	Substantial damage to cross section of arm causing the arm to deflect – failure may occur under non-extreme loading	 Appreciable damage – failure may occur under extreme loading	N/A

514 Pole – Replace Double Arm

• Used for damaged double arms.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Arm damage poses immediate and substantial threat to public safety and/or system reliability	Substantial damage to cross section of arm causing the arm to deflect – failure may occur under non-extreme loading	Appreciable damage – failure may occur under extreme loading	N/A

515 Pole – Repair Braces

• Used for damage to braces. Braces refer to intermediate members that connect parts of the structure.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Brace damage poses immediate and substantial threat to public safety and/or system reliability	Substantial damage to cross section of brace causing the arm to deflect – failure may occur under non-extreme loading	Appreciable damage – failure may occur under extreme loading	N/A

516 Pole – Replace Braces

• Used for damage to braces or missing braces. Braces refer to intermediate members that connect parts of the structure.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Brace damage or lack of brace poses immediate and substantial threat to public safety and/or system reliability	Substantial damage to cross section of brace or lack of brace causing the arm to deflect – failure may occur under non-extreme loading	Appreciable damage – failure may occur under extreme loading	N/A

517 Pole – Replace Anchor

- Used for damage to anchor rod or head or pull out of the anchor

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Guy failure poses immediate and substantial threat to public safety and/or system reliability	Anchor rod has corroded substantially or is broken, or anchor has pulled out and is no longer functioning as a structural member, or a guy should be present but is not	Appreciable damage – failure may occur under extreme loading	Superficial damage – but will not fail in 5 years

518 Pole – Install Anchor

- Used when necessary anchor is missing

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Damage poses immediate and substantial threat to public safety and/or system reliability	Damage is not an immediate threat to the integrity of the network or to public safety	N/A	N/A

519 Pole – Repair/Replace Guy Wire

- Used when a guy wire or its associated hardware, included fiberglass or wood rods, are in need of repair or replacement

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Guy failure poses immediate and substantial threat to public safety and/or system reliability	Guy is broken or seriously compromised (e.g. broken strands)	Guy is currently structurally sound, but has been compromised by corrosion, damage, etc.	N/A

521 Pole – Tighten Guy Wire

- Used when a guy wire has gone slack, as from anchor pull out, structure movement, etc.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	Slack guy is causing excessive structure deflection or overstress of other guys	 Slack guy is not causing excessive structure deflection or overstress of other guys or the structure	N/A

522 Pole – Replace Guy Shield

- Used when guy shield is damaged. Inspector should install a new one.

All Priority Level "P" Perform

524 Pole – Guy Not Bonded

- Used when guy bond is inadequate or missing

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Guy not bonded

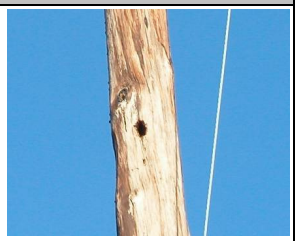
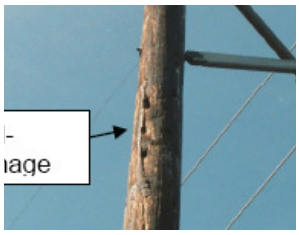
525 Pole – Lightning Damage

- Used when pole is damaged due to lightning.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Damage in Inspector's judgment poses immediate and substantial threat to public safety and/or system reliability	Non-serviceable Damage	 Serviceable Damage	Superficial Damage

526 Pole – Woodpecker Damage

- Used when pole is damaged by woodpeckers creating nests in pole

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	 Several Large (>5") Diameter Holes	 Single Large (>5") Diameter Holes	 Several Small (<5") Diameter Holes

527 Pole – Insects • Used when pole is damaged by insects			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
Damage poses significant risk of imminent failure	N/A	N/A	All other noticeable damage
528 Pole – Aerial Number Missing • Used when aerial numbers are not installed where required			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
N/A	N/A	N/A	Aerial numbers are required at all road crossing, all structures ending in zero, and the first and last structures of a line.

Appendix E – Individual Wood Pole Evaluation

901 Osmose – Identified Priority Pole

- Used to document pole identified as a priority reject on Wood Pole Groundline Inspection

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All

902 Osmose – Identified Reject Pole

- Used to document pole identified as a reject on Wood Pole Groundline Inspection

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All

903 Osmose – Inspect Excessive Check (not reject)

- Used to document pole identified as having excessive checking on Wood Pole Ground Line Inspection

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All

904 Osmose – Climbing Inspection Required (not reject)

- Used to document pole identified as needing a climbing inspection on Wood Pole Ground Line Inspection

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All

905 Osmose – No Inspection Tag

- Used to document pole that has no evidence of prior Wood Pole Inspections. Not required for poles under 10 years old.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All

Appendix F – Steel Poles and Structures Evaluation

531 Tower – Tower Legs Broken

- Used when tower legs are broken

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Leg damage which in Inspector's judgment poses immediate and substantial threat to public safety and/or system reliability	Leg damage which in Inspector's judgment poses a near-term risk to structure integrity	N/A	N/A

532 Tower – Aerial Number Missing

- Used when aerial numbers are not installed where required

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Aerial numbers are required at all road crossing, all structures ending in zero, and the first and last structures of a line.

534 Tower – Loose Bolts/Hardware

- Used loose or missing connections on hardware

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Missing connections on members in judgment of Inspector pose an immediate and substantial threat to public safety and/or system reliability	Missing connections	 Loose Connections	N/A

535 Tower – Repair Anti-Climb

- Used to repair anti-climb device

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Anti-climbing device needs repair

536 Tower – Vegetation on Tower

- Used when vegetation needs to be cleared from tower

All Priority Level "F" - Forestry

537 Tower – Structure Damage • Used for broken, bent or missing members on tower			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
 Damage in judgment of Inspector poses and immediate and substantial threat to public safety and/or system reliability	 Broken or nearly broken members	 Damage/Excessive bending on minor members	N/A
538 Tower – Straighten Tower • Used when tower is out of alignment			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
Leaning tower in judgment of Inspector poses immediate and substantial threat to public safety and/or system reliability	Substantial deflection, near-term risk to structural stability	Appreciable deflection, ability of tower to sustain extreme loading conditions may be compromised	Aesthetic only
539 Tower – Arms Damaged • Used when the arms on a tower are damaged			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
Damaged arms in Inspector's judgment pose an immediate and substantial threat to public safety and/or system reliability	Arm damage poses a risk of failure under routine loading e.g. a near term risk of failure	Arm damage poses a risk of failure under heavy loading	Superficial damage only

Appendix G – Conductor and Line Hardware Evaluation

541 Conductor – Bird Caging (Add comment – Bird Caging)

- Used to rate conductor bird caging.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	 Bird Caging

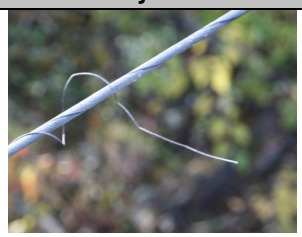
541 Conductor – Broken (Add comment – Broken Conductor)

- Used to rate conductor damage.
- Note: TLOME may revise priority levels based on an engineering evaluation of factors such as mechanical and electrical loading.

230kV and Above

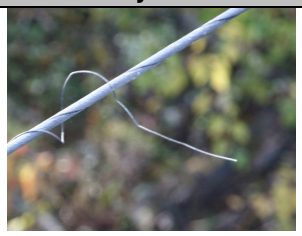
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
 Any broken conductors	N/A	N/A	N/A

115kV and Below

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
 Significant percentage of broken strands	 Small percentage of broken strands	N/A	N/A

542 Conductor – Static

- Used to rate static wire damage.
- Note: TLOME may revise priority levels based on an engineering evaluation of factors such as mechanical and electrical loading.

230kV and Above			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
 Any broken conductors	N/A	N/A	N/A
115kV and Below			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
 Significant percentage of broken strands	 Small percentage of broken strands	Exterior damage which does not pose a near-term threat	N/A

543 Conductor – Ground Wire • Used for any damage to the ground leads on the structure			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
Ground wire damage in judgment of Inspector poses an immediate and substantial threat to public safety and/or system reliability; this includes a loose ground wire near the top of the pole which may be a risk to contact the conductor	Ground wire missing or disconnected/broken on 3 or more adjacent structures	Ground wire missing or disconnected/broken on isolated structures only, or ground wire is loose near the base of the pole where there is no risk of contacting the conductor	N/A
544 Conductor – Sleeve/Connector • Used for damage to splices or connectors on the shield/static wire or conductors			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
Failure in judgment of Inspector poses an immediate and substantial threat to public safety and/or system reliability	Visible physical damage to connector/splice/conductor	Visible corrosion at splice/connector	N/A
546 Conductor – Under 25 Feet • Used for substandard clearances and conductors with excessive sag.			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
Conductor poses significant risk of danger to the public	N/A	N/A	General Guidelines by Voltage: • 69kV – 115kV 25 ft • 230kV – 345kV 30 ft Clearances must meet requirements of latest National Electric Safety Code, as well as local requirements (e.g. MA CMR

551 Line Hardware – Insulator Damage

- Used for chipped or broken insulators.
- Insulators that are physically separated are always Level 1

NOTE: A chipped or cracked insulator (porcelain damage does not reach more than ½ way to the center of the insulator) may not be counted as a damaged insulator if damage is not severe. This is up to the inspector's discretion.

Number of Insulators in String	Number of Damaged Insulators per String			
	Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Any	Any Physical Separation	N/A	N/A	N/A
5	2 or more	1	N/A	N/A
6	2 or more	1	N/A	N/A
7	3 or more	2	1	N/A
8	3 or more	2	1	N/A
9	3 or more	2	1	N/A
10	4 or more	3	2	1
11	4 or more	3	2	1
12	4 or more	3	2	1
13	4 or more	3	2	1
14	5 or more	3 or 4	2	1
15	5 or more	4	2 or 3	1
16	5 or more	4	2 or 3	1
17	6 or more	4 or 5	2 or 3	1
18	6 or more	4 or 5	2 or 3	1
19	6 or more	4 or 5	3	2 or less
20	6 or more	5	3 or 4	2 or less
21	7 or more	5 or 6	3 or 4	2 or less

Broken Insulators		Separated Insulators	
			

552 Line Hardware – Insulator Plumb

- Used for insulators unintentionally out of plumb

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
N/A	N/A	N/A	Usually a sign of high amplitude conductor movement, galloping.

553 Line Hardware – Hardware Damage • Used for any damage to other line hardware			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
Hardware damage in Inspector's judgment poses and immediate and substantial risk to public safety and/or system reliability	Structural Hardware damage which poses a near-term risk to structural integrity	Structural Hardware damage, e.g. damaged connections	Cosmetic Damage
555 Line Hardware – Lightning Arrestor • Used when a lightning arrestor is damaged or has failed			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
N/A	Arrestor has failed. Lightning arrestors fail by disconnecting and falling away from the conductor	N/A	N/A

Appendix H – Foundation Evaluation

563 Foundation – Erosion • Used for any erosion around foundations			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
Erosion in Inspector's judgment poses and immediate and substantial risk to public safety and/or system reliability	Erosion is compromising structural integrity	Structure not yet at risk, but erosion appears to be progressing at a significant rate	Small erosion, may eventually become significant

Appendix I – ROW/Misc./Switch/GIS Evaluation

571 Right of Way – Erosion

- Used for any overall erosion in ROW

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Erosion exposes counterpoise and presents a significant danger to public and/or vehicular traffic	Erosion exposes counterpoise and presents a danger to public	N/A	Any other ROW erosion, i.e. washed out road or culverts

572 Right of Way - Encroachments

- Used for any unapproved use of ROW or things too close to lines

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	 Any encroachments

573 Right of Way – Debris

- Used for any debris in ROW

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Any debris in ROW blocking access

574 Right of Way – Danger Tree

- Used for any danger trees adjacent to lines

REPORT ALL TO TRANSMISSION FORESTRY

Voltage	Vertical or Lateral Clearance	
23 – 46kV	4’ or less	**All Priority Level “F” - Forestry**
69kV	6’ or less	
115kV	10’ or less	
230kV	14’ or less	
345kV	18’ or less	

575 Right of Way – Gate Broken

- Used for broken ROW gates

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Broken gate

576 Right of Way – Oil/Gas Leak

- Used for any oil, gas leaks or other foreign substances in ROW. Notify System Delivery immediately

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Oil/gas found in ROW

581 Misc – Stencil Line/Structure Number at Ground

• Used when line/structure number is missing. Inspector to stencil structure

Priority Level 1	Priority Level 2	Priority Level P	Priority Level 4
N/A	N/A	Inspector stencils number	Inspector cannot stencil number

581 Misc – Stencil Line/Structure Number at Ground

• Used when line/structure number is missing. Inspector to stencil structure.

All Priority Level "P" - Perform

582 Misc – Switch Damaged

• Used when switch is damaged

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Visible arcing is present or condition could result in immediate failure.	Switch may fail, burning and other evidence of arcing	Switch may not be able to be operated, but likely won't fail and put the line out of service	Insignificant damage

583 Misc – Damaged Switch Ground

• Used for damaged switch grounds

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	Ground grid is exposed or lead is damaged	N/A	N/A

584 Misc – Install/Replace Warning Sign

• Used for damaged or missing warning signs. Warning signs required on both sides of all structures (2 signs total).

Priority Level 1	Priority Level 2	Priority Level P	Priority Level 4
N/A	Install warning signs at all structures that are adjacent to roads, regularly traveled pedestrian thoroughfares, or places where persons frequently gather (such as schools or public playgrounds)	Sign installed/replaced by Inspector	Install/replace signs at a low risk location where public interaction is not likely.

585 Misc – Replace Signs

• Used for missing aerial structure signs. Aerial circuit and structure ID is required on all structures at road crossings, the first and last structures of a line, and all structures ending in zero.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Install/replace signs

586 Misc – Remove Steps

• Steps must be removed at least 10' from the ground line

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Remove steps

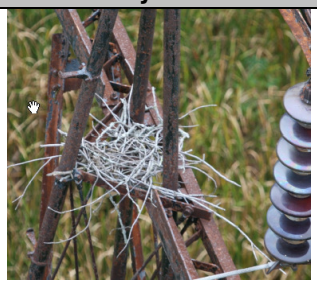
587 Misc – Add Dirt and Tamp

- Used on poles when fill dirt is insufficient

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	Structure may be weakened by absence of tamped dirt around base	 Dirt and tamping required around base of pole

589 Misc – Bird Nest

- Used when bird nests are found on line

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
 Bird nest in Inspector's judgment poses and immediate and substantial risk to public safety and/or system reliability	N/A	 Limited risk of bird contact but nest should be removed	No risk of contact such as very small nests or those at bottom of structure

589 Misc – Bird Perching

- Used when bird perching could lead to problems

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	 Birds perching on line or evidence of bird perching on line

760 GIS – Map Does Not Match Field

- Used when GIS map does not match field

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Note error

761 GIS – Equipment Stenciling in Error in GIS			
• Used when equipment labels do not match GIS			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
N/A	N/A	N/A	Note error
762 GIS – Equipment/Hardware Missing in GIS			
• Used when equipment is missing on GIS			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
N/A	N/A	N/A	Note error
763 GIS – Equipment Removed in Field, Remove from GIS			
• Used when equipment has been removed in field but not on GIS			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
N/A	N/A	N/A	Note error

769 GIS – Other GPS/GIS Errors			
• Used for all other GIS errors			
Priority Level 1	**Priority Level 2**	**Priority Level 3**	**Priority Level 4**
N/A	N/A	N/A	Note error

Appendix J – Complete List of Computapole Codes

Code	Description	CAP/EXP	Default Level	Valid Levels
501	OSMOSE - Identified priority pole	C	3	2
502	OSMOSE - Identified reject pole	C	3	3
503	OSMOSE - Insp excessive check (not rej)	C	4	4
504	OSMOSE - Climbing Insp re'q (not rej)	C	4	4
901	OSMOSE - Identified priority pole	E	4	4
902	OSMOSE - Identified reject pole	E	4	4
903	OSMOSE - Insp excessive check (not rej)	E	4	4
904	OSMOSE - Climbing Insp re'q (not rej)	E	4	4
510	POLE - Broken	C	2	12
511	POLE - Visual Rotting	C	3	14
512	POLE - Leaning	E	4	1234
513	POLE - Replace Single Arms	C	3	123
514	POLE - Replace Double Arms	C	3	123
515	POLE - Repair Braces	E	3	123
516	POLE - Replace Braces	E	3	123
517	POLE - Replace Anchor	E	2	12
518	POLE - Install Anchor	C	3	1234
519	POLE - Repair/Replace Guy Wire	E	3	123
521	POLE - Tighten Guy Wire	E	3	23
522	POLE - Replace/Install Guy Shield	E	P	P
524	POLE - Guy Not Bonded	E	4	4
525	POLE - Lightning Damage	C	3	1234
526	POLE - Woodpecker Damage	E	3	234
527	POLE - Insects	E	3	14
528	POLE - Aerial Number Missing	E	4	4
531	TOWER - Tower Legs Broken	E	2	12
532	TOWER - Aerial number Missing	E	4	4
534	TOWER - Loose Bolts/Hard	E	3	123
535	TOWER - Repair Anti-Climb	E	4	4
536	TOWER - Vegetation on Tower	E	F	F
537	TOWER - Structure Damage	E	3	123
538	TOWER - Straighten Tower	E	3	1234
539	TOWER - Arms Damaged	E	3	1234
540	CONDUCTOR - Infrared Problem	E	3	123
541	CONDUCTOR - Conductor	E	3	123
542	CONDUCTOR - Static	E	3	123
543	CONDUCTOR - Ground Wire	E	3	123
544	CONDUCTOR - Sleeve/Conn	E	3	123
546	CONDUCTOR - Under 25 ft	E	4	14
547	Infrared Problem Identified	E	2	124
552	LINE HDW - Insulator Plumb	E	4	4
553	LINE HDW - Hardware Dam	E	3	1234
555	LINE HDW - Lightning Arrestor	C	2	2
556	LINE HDW - Infrared Problem	C	3	123
563	FOUNDATION - Erosion	E	3	1234
571	RIGHT OF WAY - Erosion	E	4	124
572	RIGHT OF WAY - Encroachments	E	4	4
573	RIGHT OF WAY - Debris	E	4	4
574	RIGHT OF WAY - Danger Tree	E	F	F
575	RIGHT OF WAY - Gate Broke	E	4	4

Code	Description	CAP/EXP	Default Level	Valid Levels
576	RIGHT OF WAY - Oil/Gas Leak	E	4	4
581	MISC - Stencil Lin/Struct num at ground	E	P	4,P
582	MISC - Switch Damaged	E	3	1234
583	MISC - Damaged Switch Ground	E	2	2
584	MISC - Install/Replace Warning Sign	E	4	4P
585	MISC - Replace Signs	E	4	4
586	MISC - Remove Steps	E	4	4
587	MISC - Add Dirt and Tamp	E	3	34
588	Switch - Infrared Problem	E	3	123
589	MISC - Bird Nest	E	3	134
590	MISC - Bird Perching	E	4	4
760	GIS - Map Doesn't Match Field	E	4	4
761	GIS - Equip. Stenciling In Error	E	4	4
762	GIS - Equip/Hardware Missing	E	4	4
764	GIS - Equip. Removed In Field Remove from GIS	E	4	4
769	GIS - Other GPS/GIS Errors	E	4	4

Notes

1. All Level 1 codes do not enter STORMS. The expectation is that the situation will be reported immediately, work complete within a week and a confirming work order used to track costs.
2. All Level 2 and 3 codes pass through STORMS and Design
3. All Level P codes imply that work was done by the inspector to correct defect
4. All Level F codes go to Forestry
5. All Level 4 codes are for notation only, they do not enter STORMS
6. All codes marked "E" are expense
7. All codes marked "C" are capex

Appendix 13

INTRODUCTION

The purpose of this procedure is to outline the requirements for the inspection cycle for Street Light Standard installations owned by National Grid.

The inspection shall include identifying and reporting the physical condition of street lighting equipment on street lighting standards. Street lights attached to wood poles are inspected as part of the Overhead Distribution Inspection Patrol covered by NG-USA EOP D004.

All street lighting equipment will be inspected for physical damage, potentially hazardous conditions or obvious deterioration.

Inspections will be recorded on a Windows® based hand held computer. The maintenance items identified during this inspection will be separated into four priority levels 1, 2, 3, and 4. The problem codes identified default to the appropriate level. The default level can be adjusted by the individual performing the inspection based on actual field conditions.
These priority levels are defined as follows:

Level 1- An identified facility/component or tree condition that must be repaired/replaced within 1 week.

Level 2 - Identified facility/component condition that must be repaired/replaced within 1 year.

Level 3 – Identified facility/component condition that must be repaired/replaced within 3 years.

Level 4 – This priority category is to collect inventory information on actual field conditions to be used by Investment Strategy and Work Planning.

All Level 1 priority conditions identified in the field shall be called in by the Inspector as follows:

1. Notification by location:
   a. New York: contact System Operations Dispatch 1-877-716-4996.
   b. NE North: Westboro Control Center 1-508-389-9032.
   c. NE South: Lincoln Control Center 1-401-335-6075.

2. Detailed information provided to the regional notification location:
   a. Identify yourself as a Company Inspector and your work reporting area.
   b. Details of the Level 1 Priority Condition:
      i. Problem found.
      ii. District, Feeder No., Line No., Tax District and Pole No.
      iii. Street address and any additional information that would assist in finding the location of the problem.
      iv. If you are standing by or have secured the location.
3. Notification to area Inspections Supervisor for follow-up.

Equipment will be inspected on a five year cycle such that one-fifth of the inspections should be scheduled on an established annual basis.

PURPOSE

This procedure applies to all personnel involved with or responsible for the inspection and maintenance of street lighting standards and associated facilities owned by National Grid.

ACCOUNTABILITY

1. Distribution Engineering Services
   A. Update program as necessary
   B. Provide field support and training as requested.

2. Customer Operations
   A. Provide qualified personnel as the distribution inspectors, to provide consistent and accurate ` data or to contact Contract Management Services for contracting where applicable.

3. Distribution Inspector
   A. Demonstrate the ability to identify maintenance items and the aptitude to become proficient in the use of a hand held computer and desktop computer.
   B. Demonstrate the understanding and requirements of this National Grid EOP.
   C. Possess the ability to do patrols, collect information on a hand held, down load to a desktop computer, edit data, provide requested information/reports/work tickets to supervision, and track/close out work completed in the database.
      Provide qualified personnel to inspect where applicable.
   D. Ensure all inspectors have been trained.

4. Contract Management Services
   A. At the request of Customer Operations/Distribution Network Strategy obtain, schedule and manage contractors to perform inspections and perform required maintenance.

5. Network Asset Strategy
   A. Provide input into program revisions.
   B. Ensure the program as outlined in this EOP is completed each year.
   C. To develop and/or revise a five-year inspection schedule of all facilities covered by this EOP.
   D. Develop Outdoor Lighting Asset Strategy

6. Process and Systems
   A. Provide and support database.

COORDINATION

Not Applicable

REFERENCES

Applicable National Grid Safety Rules and Procedures
NY PSC Order 04-M-0159
NY PSC Order Order Adopting Changes to Electric Safety Standard, December 2008
Elevated Equipment Voltage NG-USA EOP G016

DEFINITIONS

Patrol: A walking assessment of distribution facilities for the purpose of determining the condition of the facility and it's associated components.

Hand Held Computer: A portable, self-contained electronic data recording device used to create a record of conditions found in the field.

Inspector: A qualified employee or contractor who can identify deficiencies, or non-standard construction conditions, on the Company's street light facilities.

Valid User: An individual who has been authorized to use the Street Lighting Maintenance Program by the Program Administrator.

Street Light Standard: A metallic or fiberglass shaft and arm assembly which supports street lighting luminaire(s) and associated wiring.

TRAINING

T&D Technical Training - Provide training upon request.

DOCUMENT CONTENTS

Table of Contents

1.0 STREET LIGHT PATROLS

Street Lighting inspections will be performed as patrols and are conducted by a street light qualified worker. The patrols are scheduled in such a manner that street lighting facilities are inspected once every five years. The Outdoor Lighting group is responsible for creating and/or revising this schedule for the respective geographic areas. The Distribution Inspector uses a Windows® based hand held computer to record employee ID, region, district, street lighting installation standard number, GPS location, Priority Level 1, 2, 3 and 4 maintenance items, and comments. The listing of these maintenance items are shown in Table I. Any new facilities added to the system will be incorporated through our Customer Service System – Outdoor Lighting (CSS-OL) database and added to the appropriate inspection cycle. The street light standards inspections scheduled for the year shall be completed by December 31st. The inspector shall place the CSS-OL street light standard number on the facility if not found numbered during the patrol.

2.0 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

2.1 Luminaires

2.2 Arms

2.3 Standards

2.4 Foundations

2.5 Conductor

TABLE I

PRIORITY 1, 2 and 3 MAINTENANCE ITEMS FOR OUTDOOR LIGHTING

Category	CODE	Default Priority	Description
Luminaire	300	2	Light "ON" Day
	301	2	Replace Lens
	302	4	Clean
	303	4	Paint
	304	4	Replace Wattage Label
	305	1	Wires Exposed
	306	2	Damaged - Replace
	307	4	Missing
	308	4	Other - Comments
Arm	320	2	Damaged - Replace
	321	4	Damaged - Repair
	322	4	Rust - Paint
	323	4	Other - Comments
Standard	330	2	Structure Damage - Replace
	331	4	Damaged/Leaning - Repair
	332	4	Paint/Maintenance
	333	1	Access Cover - Replace
	334	4	Bad Wiring - Repair
	335	4	Stencil Required
	336	2	Temporary Overhead *
	337	2	Ground - Repair
	338	4	Knockdown/Missing
	339	4	Other - Comments
Foundation	350	4	Damaged/Leaning - Repair
	351	4	Anchor Bolts Damaged
	352	4	Elevated - Repair
	353	4	Other - Comments

Note: The default priority of Level 4 for missing luminaries and street light standards is utilized for informational use only. If the street light standard is missing or missing a luminaire, the item shall be reviewed with records, if found to be a required and an active asset it shall be changed to a Level 1 priority.

***Refer to EOP NG-EOP G029 (Tracking Temporary Repairs to Electric System) for tracking and reporting of temporary repairs.**

3.0 STREET LIGHT MAINTENANCE DATABASE/REPORTS

The Street Light Maintenance Data Base consists of records downloaded from the hand held computers and information entered from the desktop computers. The records can be downloaded to the database through any desktop computer that is connected to the network and the inspector is logged on as a valid user of the Street Light Standard Inspection program. The desktop computer is also used to generate various reports and work tickets, depending on the user's need. These reports/work tickets are utilized to schedule and accomplish distribution maintenance work.

4.0 MAINTENANCE SCHEDULE

Maintenance activities are scheduled by priority Levels. All "Level 1 Priority" conditions identified must be repaired/corrected within 1 week. All "Level 2 Priority" conditions identified must be repaired/corrected within 1 year. All "Level 3 Priority" conditions must be repaired within 3 years. Level 4 Priority is for inventory purposes only.

Once the Street Light Patrol is completed in the Street Light Maintenance Database or 21 days have elapsed since the inspection, the Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS. Expense maintenance work goes straight to scheduling while the capital work goes to Distribution Design. Level 1 Priority maintenance codes are communicated by the Distribution Inspector directly to the field operations group for the area where the feeder is located.

5.0 COMPLETION

The completion of Level 1 priority maintenance codes is performed by the field operations Supervisor or their designee. Level 2 and Level 3 priority maintenance codes are tracked in the Street Light Maintenance database and placed into the Customer Service System – Outdoor Lighting (CSS-OL) database. CSS-OL database automatically initiates a STORMS order. CSS-OL database is updated once the associated STORMS orders are complete for the work request associated with the maintenance code from the Street Light Database.

ALL MAINTENANCE WORK IS TO BE COMPLETED PER NATIONAL GRID DISTRIBUTION STANDARDS.

ALL MAINTENANCE WORK PREFORMED THAT WAS IDENTIFIED ON THE WORK ORDER OR DISCOVERED DURING THE REPLACEMENT/REPAIR/CORRECTION OF THE ORGINAL MAINTENANCE PROBLEM MUST BE LISTED ON THE DATABASE AND THEN CLOSED OUT WHEN COMPLETE

6.0 REVISION HISTORY

Version	Date	Description of Revision
1.0	02/16/10	This document supercedes document dated 07/25/05.

Appendix 14

REFERENCE:

NG-USA EOP G003 Shock and/or Neutral-to-Earth Voltage Complaint
National Grid Employee Safety Handbook

GENERAL INFORMATION:

This procedure describes the initial requirements for investigating and reporting on a customer's shock complaint. A shock complaint is defined as a call from a customer that states a person has received a shock. Upon investigation of a shock complaint, the Operating Company field personnel must determine if the shock is a result of faulty customer equipment, a neutral-to-earth voltage associated with the Company's distribution system, or an external DC voltage source. Regardless of the source, a shock complaint is considered an emergency and shall be dispatched as soon as possible. The appropriate Dispatch or Control Center shall be notified of all shock incidents by the field, and communications shall be completed as required per National Grid EOP G009.

All work will be performed in accordance with National Grid's Employee Safety Handbook.

SCOPE:

This procedure defines the process for performing shock voltage investigations:

I. General Requirements
II. Procedure
III. Responsibility
IV. Training
V. Equipment
VI. Exhibits

APPLICABILITY:

This procedure shall apply whenever the Company receives a call from a customer stating that a person has received a shock.

DEFINITIONS:

Shock Voltage – Voltage between two points that is high enough to be perceptible to people.

I. GENERAL REQUIREMENTS:

The individual conducting the investigation is responsible for contacting the person that received the shock and determine where and how the shock was received, eliminate the hazard, and secure all other pertinent information; such as severity of the shock, was burn sustained, was medical aid required or received?

If it is determined that the shock may have resulted from a neutral-to-earth potential difference**,** the investigation shall be referred to the Engineering Laboratory in NE or the Energy Services Meter & Test Supervisor in NY**.** A completed copy of form #NG0024 (Exhibit 1) shall be forwarded as outlined in the following procedure.

NOTE 1: The individual conducting the investigation shall make no statements in reference to a claim nor shall they indicate that a claim is expected.

NOTE 2: See NG-USA EOP G003 for the definition of Neutral to Earth/Stray Voltage.

NOTE 3: A copy of any Farmstead Shock Complaint shall be forwarded to the Engineering Laboratory in NE or the Energy Services Meter and Test Supervisor in NY.

II. PROCEDURE:

The individual conducting the investigating of a shock complaint shall be guided by the following:

A. Make first test check with Elwood Voltage Tester or approved equivalent, in accordance with the National Grid Employee Safety Handbook (rubber gloves and sleeves). Should this test indicate abnormally high voltages(s), take necessary steps to de-energize the service and notify the supervisor or dispatcher.

B. On the basis that Step A did not indicate abnormally high voltage(s), connect an AC voltmeter at the same location and observe the readings. Leave the voltmeter connected at this location.

1. Check for proper bonding. If additional bonding is required, assist or advise the customer accordingly.

2. Open the customer's main entrance switch(s) and observe the voltmeter.

3. If the voltage drops to zero, a problem exists in the customer's equipment.

   NOTE: Plugs shall not be reversed nor shall polarity be reversed to clear this type of trouble.

   When the problem is found to be in the customer's equipment the customer shall be informed to contact a licensed electrician to check out the internal wiring and appliances. The individual conducting the investigation will note same on his/her report and leave a "Warning Notice" tag, form #NG0023 (Exhibit 2) with the customer.

4. If the voltage does not drop to zero, each customer on the same secondary shall be disconnected in the same manner. Any other customers in close proximity and with a common water supply may also have to be checked. In each case, the voltmeter should remain connected at the original complainant's premise.

C. After each of the above steps has been thoroughly completed and the voltage is still present, it will be necessary to determine if the condition is the result of a neutral-to-earth AC source or a DC voltage. Connect an AC-DC multi-range voltmeter (FLUKE MODEL 87 or equivalent with 5000 Ohm Shunt resistor) at the original premises to determine if the voltage source is AC or DC. These readings shall be recorded on form #NG0024 and submitted to the Engineering Laboratory in NE or the Energy Services Meter and Test Department in NY.

1. If the measured voltage is a DC voltage contact the local telephone company.

2. If the measured voltage is AC voltage, then further investigation of the distribution system will be performed by Engineering Laboratory in NE or the Energy Services Meter and Test Department in NY.

III. RESPONSIBILITY:

A. Distribution Engineering Services
1. Update EOP as necessary.

B. T&D Technical Training
1. Provide personnel with training upon request.

C. Em ployee
1. Demonstrate an understanding of the procedure.
2. Comply with the requirements of this procedure.

D. Engineering Laboratory in NE or the Energy Services Meter and Test Department in NY
1. Lead further investigation
2. Report on findings to internal operations department and to customer

IV. TRAINING:

Provided by T&D Technical Services as needed

V. EQUIPMENT:

The following tools are necessary to perform a shock voltage investigation:
A. Elwood Voltage Tester or equivalent
B. Digital Multimeter such as the Fluke Model 87

VI. EXHIBITS:

Exhibit 1 – "Shock and/or Neutral-to-Earth Voltage Complaint Investigation Report" Form #NG0024
Exhibit 2 – "Warning Notice" Form #NG0023

EXHIBIT 1
"Shock and/or Neutral-to-Earth Voltage Complaint Investigation Report" (Form #NG0024)

SHOCK AND/OR NEUTRAL TO EARTH VOLTAGE COMPLAINT INVESTIGATION REPORT

nationalgrid

Customers's Name		Phone
Street, Road, Etc.	Circuit	Pole or Enclosure
City, Town, Village		

TEST LOCATION SKETCH

VOLTAGE READINGS

CIRCUIT CONFIGURATION	A.C. Volts		D.C. Volts		CORRECTIVE ACTION
	As Found	As Left	As Found	As Left	
Normal					
Meter Removed					

REMARKS

DATE:	BY:

NG0024 (11.06)

EXHIBIT 2
"Warning Notice" Form #NG0023

WARNING NOTICE

TO OUR CUSTOMER

M _____

_____

In response to your request we have inspected your electrical installation and found the cause of your service failure to be as follows:

_____ Short in _____

_____ Defective _____

_____ Overloaded Branch Circuit

_____ General Overload

_____ Over-fused Branch Circuits

_____ _____

_____

NOTE: Replacing of blown fuses will not correct the trouble listed above.

We recommend that you call your:

_____ Electrical Contractor

_____ Appliance Repairman

to make the necessary repairs.

nationalgrid

SERVICE REP _____

DATE _____

NG0023(01.06)

NG-USA EOP G004

“Shock Complaints”

02/01/07

Changes throughout document.

Appendix 15

VISUAL AND OPERATIONAL (V&O) INSPECTION

1. INTRODUCTION

Substation Inspection or Visual and Operational (V&O) Inspection of each Substation and Switchyard is a key element in the National Grid USA preventive maintenance program. V&O Inspections are performed with the apparatus in service and are designed to detect abnormal conditions before the apparatus is damaged or a customer outage occurs. Data collected during the V&O Inspection is one of the elements used by AIMMS to prioritize individual apparatus for complete and diagnostic inspections.

2. SCHEDULE

Each transmission and distribution substation and switchyard will have a V&O Inspection at least bimonthly.

3. PROBLEMS AND DISCREPANCIES

3.1 Severe Trouble shall be reported to the responsible Control Center and the person in charge of the substation immediately.

1) The employee shall secure the area and warn unauthorized people to stay clear of the danger.

2) A severe trouble condition is a situation that is hazardous to the system operation and/or National Grid employees or the public.

3.2 Problems and discrepancies found should be repaired during the V&O Inspection whenever possible.

3.3 Problems and discrepancies not corrected during the V&O Inspection shall be recorded on the Inspection Card (Apparatus Inspections) or as a note in the PDA (Station V&O Inspections).

1) The Supervisor reviewing the inspection shall generate follow-up work orders to document the required work.

4. V&O GUIDELINES

4.1 To provide uniform and effective V&O Inspections throughout National Grid, the Substation Maintenance Standards and Procedures Books should be referenced for detailed information on the inspection of each type of apparatus.

1) Some of the typical items to be checked include: air, hydraulic and gas pressures, operation counters, oil levels and temperatures, and visual condition.

4.2 The station should be inspected for cracked or broken line terminators, bus supports and post insulators, heat discolored wire and wire terminations and blown surge arresters. All fuses and disconnects should be checked for proper seating and heat discoloration.

4.3 Alarm and communication radios operation should be verified. The telephones should be checked for proper operation.

4.4 Station Service secondary supplies should be checked alive and transfer switches checked for correct position.

4.5 Structures and foundations should be inspected for deterioration, damage and paint condition.

4.6 Substation security measures must be checked for proper operation and signs of unauthorized entry. This includes: fencing, gates, warning signs, entry alarms, locks and chains.

4.7 General substation housekeeping should also be taken care of.

5. Record of Revisions

Revision	Changes
05/23/2007	Document Added - Documentum Version # to headers Added - File name to footer
08-20-2007	Problems And Discrepancies Added - Section

VISUAL AND OPERATIONAL (V&O) INSPECTION

INTRODUCTION

This procedure describes the methods used to perform Visual and Operational (V&O) Inspections of electrical substations used in the transmission and distribution of electricity.

PURPOSE

V&O Inspections, are performed with the apparatus in service, and are used to:

- Verify the security of fences, gates etc. that prevent entry of the public, and provide a legal record of their inspection.
- Detect any hazards to company employees or the public.
- Verify that animal protection measures are present and in good condition.
- Detect abnormal conditions before the apparatus is damaged or a customer outage occurs.
- Collect data (counter readings, fault operations etc.) used to prioritize individual apparatus inspections.
- Collect data (regulator travels, load readings, relay targets etc.) used for system operation purposes.

ACCOUNTABILITY

Substation and other Supervisors supervising inspection and maintenance activities.

Substation and other Workers performing inspection and maintenance activities.

REFERENCES

National Grid USA Safety Handbook

SMS 400.13.1 Oil Leak Reporting Procedure

SMS 400.08.1 Trouble Reporting Procedure

EP-14 Oil Filled Electrical Equipment Management

Manufacturer's Installation, Operating, and Maintenance manuals for the specific equipment to be inspected.

Manufacturer's operating manuals for the specific test equipment to be used.

PROCEDURE CONTENTS

Table of Contents

1. Test Equipment Required.

1.1 Digital Multi-meter, IEC 1010-1 Cat. IV
  1) Spare battery

1.2 Recloser Battery test meter with load test feature.
  a) For Form 3 Recloser battery tests.

2. Materials Required.

2.1 PDA with National Grid V&O software installed.
2.2 Clipboard
2.3 Binoculars
2.4 Flashlight
2.5 Magnet for resetting drag hands
2.6 Additional items listed in Appendix A

3. Initial Substation Entry

3.1 Personal Protective Equipment.
  1) Minimum requirement is ANSI Z41/EH rated safety footwear, hard hat and safety glasses.

3.2 Vehicles entering substation.
  1) Lower and/or insure antennas will maintain minimum approach distances to energized conductors and apparatus.
  2) Use extreme caution when maneuvering to avoid hitting apparatus or violating Minimum Approach Distances.

4. Inspect Yard

4.1 Perform a quick initial inspection for:

1) Alarms.
2) Cut or removed ground grid or ground grid connections.
3) Obvious damage.
4) Security of gates, fence and locks.
5) Unusual noises.

5. Notify the System Operator

5.1 Inform them you are in the Station for a V&O Inspection and that you will be testing alarms.

5.2 Ask System Operator if any equipment has been tagged out or relays blocked.

6. Reporting and Correcting Problems and Discrepancies

6.1 Severe Trouble shall be reported to the responsible Control Center and the person in charge of the substation immediately.

1) The employee shall secure the area and warn unauthorized people to stay clear of the danger.
2) A severe trouble condition is a situation that is hazardous to the system operation and/or National Grid employees or the public.
   a) See Trouble Reporting Appendix at the end of this document for additional information on trouble reporting.

6.2 See the section Oil Leak Reporting for information on reporting oil leaks.

6.3 Document all paint and preservation problems.

1) Rust, corrosion, or fading to the point where primer, or bare metal shows.

6.4 Problems and discrepancies found should be repaired during the V&O Inspection whenever possible.

6.5 Problems and discrepancies not corrected during the V&O Inspection shall be recorded on the Inspection Card (Apparatus Inspections) or as a note in the PDA (Station V&O Inspections).

1) The Supervisor reviewing the inspection shall generate follow-up work orders to document the required work.

6.6 Record findings in the PDA if listed in the PDA “round”.

1) Record other readings or problems as Notes in the PDA
2) If performing an apparatus inspection record the V&O Inspection portion in the V&O section of the Inspection Card.

7. Control House

7.1 Check control house door locks working and in good condition.

7.2 Station Log Book

1) Enter the date, time and employee names that are performing the V&O Inspection.
2) Check the Station Log Book for abnormal conditions that can be corrected during the V&O Inspection.
   a) After the V&O Inspection, record all abnormal problems found in the Log Book, with red pen, and whether they were corrected or not.

7.3 SPCC – SPCC locations only.

1) Verify SPCC Plan is available at the substation.
2) Verify SPCC notification list posted.
3) Check oil spill containment kits complete and in good condition.

7.4 Control Panels

1) Indicating Lights
   a) Check that the indicating lights on the control board are working.
   b) Check the available stock of spare bulbs; restock as necessary.
   c) Inspect rear of Control boards for any signs of overheating, burned wiring, moisture, etc.

7.5 Noises - Listen for any unusual noises from relays, modules, RAPRs, timer circuits etc.

7.6 Relay targets and alarms.

1) Record targets and alarms on the V&O Report and in the station log book.
   a) List the apparatus affected indicating circuit designation, phase and type of relay or alarm,
2) Reset and report relay targets and alarms to the System Operator and your supervisor.

7.7 Reclosing Relays

1) Check that reclosing relays are in service.
   a) Record any reclosing relays that are off and tagged.
   b) Report any reclosing relays that are off and not tagged to the System Operator.
2) Verify mechanical reclosing relays are in the start or zero position.

7.8 Ground Trip Switches (cutouts)

1) Check that all ground trip relays are in service (ON).
   a) Record any ground trip switches that are off and tagged.
   b) Report any ground trip switches that are off and not tagged to the System Operator.

7.9 Bus Transfer Schemes

1) Check both buses alive (load ammeters, bus voltmeters bus alive lights).
2) Check timers reset
3) Check that the sequence timers in normal position
4) Check transfer scheme auto
   a) Record any auto transfer switches that are manual or off and tagged.
   b) Report any auto transfer switches that are manual or off and not tagged to the System Operator.
5) Check tie breakers properly setup (setup varies by station scheme).

7.10 High Side Transfer Schemes

1) Check both lines alive (load ammeters, line alive lights).
2) Check timers reset
3) Check that the sequence timers in normal position
4) Check transfer scheme auto
   a) Record any auto transfer switches that are manual or off, and tagged.
   b) Report any auto transfer switches that are manual or off, and not tagged to the System Operator.
5) Check air break/circuit breaker/circuit switcher status (open or closed).

7.11 Annunciator and Alarm Test Switches

1) Annunciator panel
   a) Move toggle switches, that are not tagged, to the TEST position to check lights. This will send an alarm to the Control Center.
   b) To clear trouble condition, turn the toggle switch to the reset position, then back to ON.
   c) Check with supervisor before testing any switches that are in the off position.
   d) Verify the System Operator received the alarms.
2) Test Switches
   a) If the alarm light is on perform steps b) through f).
   b) Verify the System Operator received the alarm.
   c) Open knife blades one by one and leave open until the light goes out and the alarm clears.
   d) Close the knife switches opened one at a time, checking for alarm indications.
   e) When the alarm light comes on reopen the last switch closed and continue closing the rest. This will find multiple alarms, if present.
   f) Operating the knife switches does not reset this type of alarm system. The light only stays out when the trouble condition has cleared.

3) Repair of alarm conditions.
   a) Alarm conditions should be corrected during the V&O Inspection.
   b) If the alarm condition can not be corrected during the V&O:

      The alarm should be cleared by opening the test twitch or turning the annunciator switch to OFF.

      The switch should be tagged with the date, reason and inspectors name.

      Both the System Operator and your supervisor should be notified that the alarm condition exists and the alarm point is off.

7.12 Radio Alarms
   1) Inspect condition of radio system for damage, and proper operation.
   2) If individual alarms have not been sent to the System Operator send a test alarm to from the radio cabinet.
      a) Verify the System Operator received the alarm.
   3) Make sure cabinet door is closed so the receiver voice communication is disabled.

7.13 Tags and Clearance and Control switching forms and Supplies
   1) Check the stock of Clearance and Control Tags.
      a) Restock as necessary.
   2) Check the stock of Ground Device Identification Tickets (GDIT).
      a) Restock as necessary.
   3) Check the stock of Filed Switching Order Pads
      a) Restock as necessary.
   4) Check that pens (red and blue/black) and pencils are available.
      a) Restock as necessary.

7.14 Control House Heating and Lighting
   1) Test control house lighting.
      a) Replace any defective bulbs, or ballasts or sockets.
   2) Test emergency lighting.
      a) Replace batteries if needed
   3) Inspect heaters, fans and thermostats for proper operation. Make sure fans are not broken or bound up and they are in good working order.

7.15 Station Service and Transfer Switch
   1) Check transfer switch on preferred supply
   2) Check transfer switch for damage or overheating.
   3) Test and record preferred and alternate secondary voltages at transfer panel.

7.16 Check AC supply panels for:
   1) Tripped circuit breakers.
   2) Circuit breakers in the proper position.

7.17 Check DC Circuit Breaker of Fuse Panel
   1) Check DC supply panels for:
      a) Tripped circuit breakers or blown fuses.
      b) Circuit breakers in the proper position.

7.18 Protective Grounds
1) Check that grounds in station are in sets of 3 and that they are hung up properly.
2) Check that the phase end and ground clamps are in good working order.
3) Lubricate as required.
4) Inspect for the cracked or cut insulation and broken conductor strands.
5) Replace or repair damaged protective grounds. Do not leave damaged grounds at the station.

7.19 Switch Sticks
1) Inspect Switch Sticks and Grounding Sticks for current dielectric test date.
   a) Send out of date sticks to lab for testing or;
   b) Test locally using approved methods, test equipment and competent, trained personnel.
2) Inspect Switch Sticks and Grounding Sticks for surface contamination, damage and proper operation.
   a) Clean if necessary
3) Insure Switching and Grounding Sticks are stored properly.

7.20 Fire Equipment
1) Inspect fire extinguishers to be properly secured and in their marked locations.
2) Update inspection cards.
3) Record out of date fire extinguishers on the V&O and record for future replacement.
4) Discharged fire extinguishers shall be reported to the appropriate supervisor for recharging.
5) Discharged or partially discharged fire extinguisher shall be removed from the substation.

7.21 Phone Lists
1) Verify local and regional System Operator phone numbers are posted and correct.
2) Verify that the emergency telephone list is posted and clearly visible at each telephone location.

7.22 Cleanliness and General Condition -
1) Clean control house floors and sanitary facilities, empty wastebaskets and dust as necessary.
2) Inspect control house for water leaks.
3) Check for signs of animal entry into control house.

7.23 Turn on yard lights, so they can be checked during the Yard Inspection.

8. Yard Inspection

8.1 Unusual Noises
1) Be alert for arcing, gurgling and pinging noises which could indicate imminent and violent equipment failure.

8.2 Walk the fence and inspect:
1) Barbed wire - Strands to be intact and tight.
2) Fence fabric - Holes or breaks in the chain link.

3) Fence Ties - Loose or missing fence tie wires.
4) Fence Erosion - Signs of erosion or digging under the fence.
   a) Space below fence should be less than 3 inches.
5) Grounding - Ground conductor and connections secure and connected at every other fence post. Posts on both sides of gates should be grounded.
6) Fence Posts – Sound, not rusted through at ground level and not been raised by frost.

8.3 Gates
1) Test gates for proper operation.
   a) Gates should swing easily out of the way.
2) When closed, the gates should by chained tightly, or locked, with minimal space.
3) Verify locking chains, hardware and locks present and in good condition.

8.4 Check for proper “Danger High Voltage” warning signs:
1) Every 50 feet along perimeter of fence.
2) On gates and on non-hinged side of gate. (see National Grid Standard #0105)

8.5 Substation yard security problems shall be corrected or reported immediately to supervisor.

8.6 Vandalism related problems should be specifically recorded as such, and reported to supervisor.

8.7 Yard Lights
1) Check all yard lights working. (Yard lights should have been turned on during control house inspection.)
2) Repair broken bulbs, glass fixtures, spot light heads, or other lighting that needs attention.
   a) If work cannot be completed safely and while maintaining safe work clearances or if special equipment such as a bucket truck is needed, note on the V&O report.

8.8 Vegetation
1) Check for any growth of trees or vegetation in fence and gate areas that animals or people could used to climb over the fence.
   a) Cut or record for the Arborist to have removed.
2) Record vegetation growth within the substation that requires spraying or removal.

8.9 Bus and structure.
1) Record missing or damaged animal protection devices.
2) Inspect insulators for:
   a) Broken, chipped or damaged skirts.
   b) Carbon tracking or flash over.
   c) Surface contamination (dirt, rust, salt spray etc.).
   d) Broken or damaged insulators should be recorded on V&O Report.
3) Broken porcelain should be picked up off the ground.
4) Visually inspect current and voltage transformers for damage or signs of overheating.
5) Visually inspect arresters for:
   a) Blown or damaged arresters
   b) Surface contamination

6) Visually inspect potheads and cable terminators for:
   a) Damage and leaking compound.
   b) Surface contamination
7) Report unusual noises immediately and record them on the V&O Report.

8.10 Structure and apparatus ground connections
1) Inspect for any cut, broken or missing ground connections to apparatus, structures and guy wires.
2) Inspect static wires and record any problems.
3) Visually Inspect Station Service Transformers for:
   a) Evidence of oil leaks on transformer tank, and on the ground.
   b) Bushing damage or surface contamination.
   c) Damaged or improperly closed primary fuses.
   d) Output Voltage if not previously measured at station service transfer switch.

8.11 Inspect equipment and structure foundations.
1) Large cracks.
2) Settling (not level).
3) Deterioration (large areas of surface erosion, stone showing).

8.12 Inspect Cableways

8.13 Damage, missing or broken cover sections and deterioration.

8.14 Inspect buildings junction boxes, structures etc. for overall paint condition
   a) Record items needing attention.

8.15 Clean up substation yard.
1) Remove broken porcelain, debris, and trash
2) If area requires major clean up or crushed stone requires leveling, note on V&O Report.
3) If equipment or materials are intentionally stored in the yard insure that they are neatly placed and not a hazard to personal. Barricade area if necessary.
   a) Storage should be in compliance with SMS 499.10.1 Substation Work Area Identification Procedure.

9. Oil Leak Reporting

9.1 Oil filled apparatus must be inspected for any signs of leaks.
1) The oil leak status shall be recorded for each piece of oil filled apparatus that has an oil leak screen in the PDA.
2) Leaks from small apparatus that do not have an oil leak screen in the PDA should be recorded in a PDA notes screen.

9.2 Oil Leak Status Codes
1) Oil leaks are categorized as follows:
   a) Unknown – Unknown is used to indicate that no information has been entered in AIMMS for this equipment.
   b) Clean - Apparatus is dry and shows no evidence of oil leaks.

c) Repaired – A leak is found and repaired, note the repairs made.
d) Weep - Anytime the external surface of a piece of apparatus is wet with oil. Note the location and, if possible, cause of the leak.
e) Leak - Oil is running off or about to run off the external surface of containers or electrical apparatus. Required Action

9.3 Leaks categorized as Leak require immediate action to stop the leak or contain the released oil.

9.4 All leaks require creation of a Leak Report Work Order.

1) When the supervisor reviews the V&O inspection work order round screen all leak status changes and notes will show up as exceptions.
2) The Supervisor will then create a Leak Report Work order (Type LR) in Work Order Tracking or Quick Reporting.

9.5 Leaks from PCB Equipment

1) If a leak is discovered from equipment classified as over 500 ppm PCB cleanup must begin within 48 hours (40 CFR 761.30(a)(1)(x).
2) The inspection records must also include:
   a) The location of the leak;
   b) The estimate of fluid released;
   c) The date and description of any cleanup, containment, repair or replacement;
   d) The results of any containment (for example, was containment successful or not).
   e) The daily inspection results required for uncorrected, active leaks (refer to Environmental Procedure EP-14).
   f) The records must be available for inspection by the EPA and must be maintained for at least three years after disposal of the equipment.

10. Apparatus Inspections

Refer to the V&O Inspection sections of the following SMS's for apparatus inspections.

Circuit Breakers

SMP 401.01.2 – Air Magnetic Circuit Breaker Maintenance Procedure
SMP 401.02.2 – Oil Circuit Breaker Maintenance Procedure
SMP 401.03.2 – Vacuum Circuit Breaker Maintenance Procedure
SMP 401.04.2 – Air Blast Circuit Breaker Maintenance Procedure5
SMP 401.05.2 – Two Pressure Gas Circuit Breaker Maintenance Procedure
SMP 401.06.2 – Gas Puffer Circuit Breaker Maintenance Procedure
SMP 401.07.2 – Station Recloser Maintenance Procedure
SMP 401.08.2 – Vacuum Switch Maintenance Procedure

Transformers

SMP 402.01.2 – Power – 15 MVA and above Maintenance Procedure
SMP 402.02.2 – Power – Below 15 MVA Maintenance Procedure
SMP 402.03.2 – Dry Type Transformer Maintenance Procedure

Instrument Transformers
- SMP 403.01.2 – Currents, Potentials and Metering Maintenance Procedure Voltage Regulators
- SMP 404.01.2 – Step Voltage Regulator Maintenance Procedure
- SMP 404.02.2 – Induction Voltage Regulator Procedure

Emergency Generators
- SMP 405.01.2 – Emergency Generators Maintenance Procedure

Batteries & Chargers
- SMP 406.01.2 – Lead/Acid Battery Maintenance Procedure
- SMP 406.03.2 – Static Changers Maintenance Procedure

Sensing Devices
- SMP 407.01.2 – Bushing Potential Device Maintenance Procedure
- SMP 407.02.2 – Coupling Capacitors and CCVTs Maintenance Procedure
- SMP 407.03.2 – Wave Trap Maintenance Procedure
- SMP 407.04.2 – Resistive Coupled Potential Device Maintenance Procedure

Capacitors
- SMP 408.01.2 – Station Capacitor below 69kV Maintenance Procedure

Disconnect Switches
- SMP 409.01.2 – Disconnect Switches Maintenance Procedure
- SMP 409.02.2 – Circuit Switchers Maintenance Procedure
- SMP 409.03.2 – High Speed Grounding Switch Maintenance Procedure
- SMP 409.04.2 – Gas Insulated Disconnect Switch Maintenance Procedure
- SMP 409.05.2 – Gas Insulated Ground Switch Maintenance Procedure

Load Tap Changer
- SMP 412.01.2 – Load Tap Changer Maintenance Procedure

Reactors
- SMP 413.01.2 – Dry Type Reactor Maintenance Procedure
- SMP 413.02.2 – Oil Filled Reactor Maintenance Standard

Metal Clad Bus and Switchgear
- SMP 417.02.2 – Metal Clad Bus, Switchgear and Substation Maintenance Procedure

Surge Arresters
- SMP 419.01.2 – Surge Arrester Maintenance Procedure

Network Protectors
- SMP 421.03.2 – Network Transformers and Protectors Maintenance Procedure

11. Final Checklist

11.1 Turnoff yard lights
11.2 Verify all abnormal conditions found are entered in station log book.
11.3 Call the System Operator and notify them that the V&O Inspection has been completed and you will be leaving the station.
    a) Report any abnormal conditions, alarms or relay targets found.
11.4 Turn control house lights off and lock doors.
11.5 Re-arm security alarms.
11.6 Close and securely lock gate.
11.7 Turn in completed V&O Inspection Report to supervisor.
11.8 Return PDA to cradle and upload Station Inspection “round”.

12. Appendix A. - Additional Materials

Not all of the listed items will be required in all areas. It is suggested that the items required for a particular area be stocked in the vehicle used for V&O Inspections or a large container that can be taken when inspections are to be done.

12.1 Cleaning Supplies
    1) Broom and dust pan
    2) Rags
    3) Trash bags
12.2 Repair and Maintenance
    1) Shovel
    2) Ladder
    3) Electrical tape
    4) Small hand tools
12.3 Personal Protective Equipment
    1) Acid resistant gloves
    2) Face Shield and Apron
12.4 Station Supplies
    1) Spare Station Log Books
    2) System Operator (phone number) cards
    3) Spare operations counter cards
    4) Pen, pencils and erasers (red pencil for trouble)
    5) Clearance and Control Tags
        a) Red Tags
        b) Non-Reclose Assurance (NRA) Tags
        c) Hold Tags
        d) Station Control (SCT) Tags
        e) Worker Placards
    6) Ground Device Identification Tickets (GDIT)
    7) Clearance and Control Switching forms

12.5 Security Supplies
- 1) Spare Padlocks Locks:
  - a) Long shank 5105873
  - b) Short shank 5105872
- 2) Chain for gates
- 3) Fence tie wire
- 4) Fence fabric
- 5) Warning signs 0810029

12.6 Indicating Lamps and Lenses:
- 1) Switchboard. LED (Red) S/C 5100183
- 2) Lens Cap (Red) S/C 5695322
- 3) Switchboard. LED (Green) S/C 5100184
- 4) Lens Cap (Green) S/C 5695321
- 5) Switchboard. LED (Amber & White) S/C 5100185
- 6) Lens Cap (Amber) S/C 5695320
- 7) Lens Cap (White) S/C 5100186
- 8) Switchboard Lamp 24EX S/C 5844590
- 9) Switchboard Lamp 145 Volt, 15W S/C 5841410
- 10) Indicating Bulb type 49 S/C 5843078
- 11) Indicating Bulb type 47 S/C 5843100
- 12) 18 Volt Miniature 0.11A Automotive S/C 5843110
- 13) Indicating 35V, .06A S/C 5843132
- 14) Indicating type 43A S/C 5843250
- 15) Switchboard Lamp 24X S/C 5844610
- 16) Switchboard Lamp 55C S/C 5844630
- 17) Indicating Lamp 120 P.S.B. S/C 5841359
- 18) (for V.S.A. Reclosers)

12.7 Incandescent Lamps:
- 1) Incandescent Lamp 75 Watt S/C 5841739
- 2) Incandescent Lamp 100 Watt S/C 5841840
- 3) Incandescent Lamp 135 Watt S/C 5842001
- 4) Incandescent Lamp 200 Watt S/C 5842150
- 5) Mogul Base Lamp 500 Watt S/C 5842390Flood lamp PAR 38 100 Watt S/C 5842045
- 6) Fluorescent Lamps:
- 7) 8 FT Single Pin Lamp 75 Watt S/C 5841050
- 8) 4 FT Bi - Pin Lamp 40 Watt S/C 5840950
- 9) 4 FT Single Pin Lamp 40 Watt S/C 5840940
- 10) 8 FT Recessed Pin Lamp 105 Watt S/C 5841130

12.8 Spare emergency light batteries
12.9 Spare fuses
12.10 Recloser control and trip fuses
    a) Reclosers often use time delay fuses that are similar in appearance to AGC types. If the wrong type fuse is installed it will blow after a couple of operations.
2) Cartridge fuses
    a) 5A
    b) 10A
    c) 15A
    d) 20A
    e) 30 A
3) AGC Fuses
    a) 2 A slow blow and instantaneous
    b) 5A slow blow and instantaneous
    c) 10A slow blow and instantaneous
    d) 20A slow blow and instantaneous
12.11 Spare nitrogen bottles
12.12 Battery Supplies
    a) 5 Gallon distilled water and battery filler S/C 5599778
    b) Battery NO SMOKING Signs S/C 5483448
    c) Extra hydrometer S/C 5474448
    d) Extra thermometer S/C 487304
    e) Baking Soda
    f) Spare eyewash bottles S/C 5890600
    g) Nylon brush to clean battery posts
    h) Battery grease
12.13 Spare recloser batteries

13. Appendix B – Trouble Reporting

13.1 Trouble

1) The term trouble is defined as any condition which occurs on the equipment that has or could affect the ability of that equipment to perform its required function.

13.2 Severe Trouble

1) A severe trouble condition is a situation that is immediately hazardous to the system operation and/or personnel. These troubles are immediately reported to the System Operator and to the person in charge of the substation. The employee shall secure the area and warn unauthorized people to stay clear of the danger.
2) Examples of Severe Trouble
   a) Dead station battery
   b) Blown bushings or cable terminator
   c) Downed live lines
   d) Multiple broken support insulators
   e) Electrical fires
   f) Grounds cut in station
   g) Loss of station service power
   h) Broken pole or structure
   i) Blown by pass/shunt arresters on regulators
   j) Low oil levels
   k) Unusually noises

13.3 Not Immediately Fixable Trouble

1) These troubles are reported to the System Operator and the person in charge of the substation. They shall also be noted on the V&O form and station logbook in red and scheduled for repair at a later date.

13.4 Examples of Not Immediately Fixable Trouble

   a) Surge Arrester blown
   b) Broken operating rods on disconnects
   c) Damaged bus support insulators

13.5 Fixable Trouble

1) Fixable items should be repaired as they are discovered during the V&O Inspection. This insures that the station is maintained in the best possible operating condition and prevents unnecessary return trips. The items fixed should be noted on the V&O Report and in the station logbook.
2) Examples of Fixable Trouble
   a) Low Battery electrolyte
   b) Replacing blown lamps
   c) Changing filters
   d) Installing missing covers

e) Installing signs
f) Repairing holes in fence
g) Installing new locks
h) Cleaning and repairing oil leaks
i) Tightening compressor belts
j) Changing recloser batteries
k) Replacing control fuses
l) Changing nitrogen bottles
m) Changing Silica Gel turned pink or white
n) Cleaning and repairing leaks

14. Record of Revisions

Revision	Changes
08/20/2007	Reporting Changed – Section name to Reporting and Correcting Problems and Discrepancies Revised – Section extensively revised Materials Required Removed - Substation V&O Inspection Report form, Inspection Report from last V&O Inspection, Substation V&O Checklist form.
09/30/2007	Switch Sticks Added - or; Test locally using approved methods, test equipment and competent, trained personnel.

Appendix 16

INTRODUCTION

The purpose of this procedure is to outline the steps to be taken when a temporary repair is made to the electric system to restore service or maintain public safety until a permanent repair can be made. Every effort should be made to make permanent repairs within 90 days. For those rare exceptions when permanent repairs are not made within 90 days, special reporting and periodic site visits are required to monitor the temporary repairs until the permanent repairs are completed.

PURPOSE

This procedure applies to all personnel who are responsible for initiating temporary repairs along with employees who are responsible for designing, planning, scheduling and construction of permanent repairs made at locations where temporary repairs were made to restore service or maintain public safety.

ACCOUNTABILITY

1. Distribution Engineering Services
    A. Update procedure as necessary.
2. Customer Operations
    A. Ensure the components of the procedure are implemented.
    B. Ensure workers are trained in this procedure.
    C. Provide revision input as necessary.
3. Workers
    A. Demonstrate the understanding of the procedure.
    B. Comply with the requirements of the procedure.
4. Inspections
    A. Ensure components of this procedure are implemented.
    B. Track temporary repairs identified by Inspections
    C. Provide periodic inspections of temporary repairs greater than 90 days.
    D. Compile and submit report to PSC.

COORDINATION

Not Applicable

REFERENCES

State of New York Public Service Commission Order 04-M-0159
State of New York Public Service Commission Order 04-M-0159 Adopting Changes to Electric Safety Standards Effective December 15, 2008.

DEFINITIONS

Confirming Work Request: Any emergency work completed in the field, does not require scheduling and is not billable to a 3rd party.

Level 9: This priority category is used when a temporary repair is identified in the field by Inspections.

Non-confirming Work Request: Any emergency work not completed in the field, requires scheduling and is not billable to a 3rd party.

Permanent Repair: Repaired in accordance with National Grid Standards.

Property Damage Claim: Billable emergency work.

TRAINING

Provided by appropriate National Grid training program.

DOCUMENT CONTENTS

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1.0 TEMPORARY REPAIRS MADE BY OPERATIONS

Temporary repairs that are made by operations to restore service or maintain public safety until permanent repairs can be made; are recorded by Distribution Support Services utilizing a pre-formatted form that will require all pertinent information needed in order for the Temporary Repair to be entered into the Maintenance Database. The form will then be e-mailed to a 'group' mailbox that the Inspections Department Administrative staff will be authorized to access. Information from the attached form will be used by the admins to enter the Temporary Repair into the Maintenance Database with the appropriate maintenance code, and assigned a priority of Level 9. The Level 9 would indicate that this a temporary repair that should be completed within 90 days. Maintenance codes assigned a Level 9 will be downloaded from the maintenance database nightly into STORMS. Level 9 codes associated with a maintenance item will be assigned directly to Scheduling to be scheduled within 20 business days. Level 9 codes that require design will be downloaded from maintenance database and placed in the work queue for the Distribution Design Supervisor or Engineering Supervisor for the appropriate area. Scheduling will have 20 business days to schedule the Level 9 work request to the field for completion.

2.0 TEMPORARY REPAIRS DISCOVERED BY INSPECTIONS

Temporary repairs located by Inspections during an inspection are to be recorded in the Maintenance Database with the appropriate maintenance code and with an assigned priority Level 9. The Level 9 would indicate that this a temporary repair that should be completed within 90 days. Maintenance codes assigned a Level 9 will be downloaded from the maintenance database nightly into STORMS. Level 9 codes associated with a maintenance item will be assigned directly to Scheduling to be scheduled within 20 business days. Level 9 codes that require design will be downloaded from maintenance database and placed in the work queue for the Distribution Design Supervisor or Engineering Supervisor for the appropriate area. Scheduling will have 20 business days to schedule the Level 9 work request to the field for completion.

3.0 TEMPORARY OVERHEAD REPAIRS (TOH)

Temporary overhead repairs (TOH) are utilized by operations to restore service while the underground cable that generally serves the facilities is being repaired. TOH's that meet National Grid Overhead Standards for construction would not be considered a temporary repair that would need to be tracked under this procedure. TOH's not meeting National Grid Overhead Standards for construction are required to be tracked under this procedure as a temporary repair and follow the process outlined in paragraph 1 above.

4.0 TEMPORARY REPAIRS NOT COMPLETED WITHIN 90 DAYS

Every effort should be made to complete temporary repairs within 90 days. In extraordinary circumstances, which may include major storms, where repairs may extend beyond 90 days (exceptions), the company shall periodically perform site visits to monitor the condition of the temporary repairs. The company shall also report these exceptions as part of the reporting requirements outlined in the State of New York Public Service Commission Order 04-M-0159 Adopting Changes to Electric Safety Standards Effective December 15, 2008.

The Inspections group is responsible for tracking all temporary repairs that extend beyond 90 days. The initial periodic inspection should take place after 90 days and every 45 days until the permanent repair is made. The Inspection supervisor should run a report from the maintenance database for open Level 9 codes. The periodic inspection time frame lines up with the periodic inspection requirements for the elevated voltage findings requirements and could be run at the same intervals.

It is strongly encouraged that these temporary repairs be completed as soon as practicable to limit the burden of tracking these repairs.

5.0 NYS PUBLIC SERVICE COMMISSION REPORTING

Temporary repairs that are beyond 90 days must be identified and justified as part of the reporting requirements of the PSC Orders referenced below. The 90 days time period commences on the day the temporary repair was made or the day the temporary repair was located. Inspections will be responsible for consolidating the temporary repair information from operations and from the maintenance database in order to prepare the report that will be submitted to the PSC. The report will identify the temporary repairs that exceeded 90 days, the periodic site visit information and the justification for the repair taking longer than 90 days. Inspections shall file the report by February 15 each year.

6.0 REVISION HISTORY

Version	Date	Description of Revision
1.0	05/07/10	This is a new document.

Appendix 17

Appendix 17

Asset Management Summary of Audit Report

AUDIT CATEGORY (X)	
Technical	
Supplier / Subcontractor	
QA / Other	X
Environmental	
H&S	

AUDITOR(S): Craig Allen

AUDITEE(S): Transmission Line Inspection and Maintenance Program – Annual Audit required by NYS PSC Case No. 04-M-0159

AUDIT NUMBER: n/a
AUDIT OF: T Line Inspection and Maintenance per NYS PSC
AUDIT DATE: 5/13–12/30/2010

AUDIT CARRIED OUT AT: NY Transmission Right-of-way field sites and Syracuse Headquarters.

ACTIVITY/SYSTEM AUDITED : Transmission Line Inspection and Maintenance Program – Annual Audit required by NYS PSC Case No. 04-M-0159

AUDIT SUMMARY: The purpose of this audit is to demonstrate compliance by National Grid's Transmission Line of Business with the requirements of the New York State Public Service Commission Case 04-M-0159 noted in the December 12, 2008 order. In Appendix A, Section 5, entitled, Quality Assurance, specific details are delineated as shown below:

"*Each utility shall develop a quality assurance program to ensure timely and proper compliance with these safety standards. The quality assurance program shall be independent of the stray voltage testing and visual inspection programs. The management and personnel performing quality assurance activities shall be separate from those performing the required stray voltage testing and inspections.*

...(a) with regard to inspections, the quality assurance program should ensure that inspections are being performed on all facilities and that deficiencies are being properly identified and categorized for repair. The program should also verify that permanent repairs are made and the timeliness of the repairs."

This audit report summarizes the steps taken by the Transmission Investment Management (TIM) group annually to monitor and review the process used and the field results obtained by both the NY Inspection Group as well as the Transmission Work Delivery organization. It should be noted that the TIM group is part of the larger Transmission Asset Management organization and is managed separately from both the NY Inspection group and the Transmission Maintenance Delivery organization. This audit review specifically included NY transmission line assets from 115kV and above.

CONCLUSIONS:

- **Grade: Satisfactory**
- **Action Items (add table rows as required):**

Number	Deficiency	Action Required	Priority	Assigned to	Due Date
1	Found six (6) Computapole records missing for T Line assets.	NY Inspections to research and make the appropriate updates for the 6 missing records in Computapole.	H	Terry Weller of NY Inspections	Completed on 11/05/10
2	Inaccuracies in selecting maintenance codes and priority levels.	NY Inspections to review Maintenance Procedure Document #PR 06.01.601.001 with all Transmission Inspectors at start up training event for CY 2011 work.	M	Terry Weller of NY Inspections.	Completed on 01/12/2011 by Terry Weller and James McGrath.
3	Inaccuracies in selecting maintenance codes and priority levels.	Transmission Maintenance Mgmt to schedule WO#8649632 for repair prior to summer lightening season.	H	Nick Gibson of Transmission Maintenance Management	6/1/2011

OBSERVATIONS / BEST PRACTICE / PROCESS IMPROVEMENTS / LEARNING POINTS:

Quality Assurance (QA) Process:
Step One of the annual QA process is a review of the Transmission Line data within the Inspection program (Computapole) database. The transmission line data is reviewed for accuracy in two ways. The data for each line is reviewed to ensure that the Foot Patrol Complete field is complete showing when the line was last inspected, and secondly, the Foot Patrol Schedule field is reviewed to check that the next scheduled inspection is set for five years out from the last patrol date to ensure future scheduling accuracies. Any issues identified by the auditor are then reviewed and corrected in the Computapole database by the NY Inspection group based on research performed by their division personnel.

Step Two of the annual QA process involves a field review of a sample of inspection findings prior to actual field correction in order to audit the maintenance code selection and priority code assignment done by the NY Inspection field personnel. The sample sites are selected randomly throughout the year from the Computapole database to ensure a good representation of that calendar year's inspection data. These sites are then field reviewed by the auditor. The field findings are reviewed against the current version of the Maintenance Procedure document, PR:06.01.601.001, Ground Based Visual Inspection. Any questionable findings are also reviewed with the Transmission Line Operations Maintenance Engineering (TLOME) group to determine if the inspector and/or the inspection system have set the appropriate Maintenance Code and Priority Levels. Chronic misinterpretations are addressed as an action item and reviewed either at an inspector training exercise held by the NY Inspection group at the beginning of each inspection year or through distribution of a communication to all inspectors.

Step Three, much like Step Two, involves a field review of a sample of inspection findings but in this case after they have been reported as repaired in the field. The sample sites are also selected randomly throughout the year from the Computapole database. These sites are then field reviewed by the auditor for repair completeness and appropriateness. Any questionable findings are reviewed with the TLOME group to confirm the auditor's findings. Any misreported completion findings are reviewed with the Maintenance Delivery organization to determine the root cause for the error and are re-entered into the Computapole database with the appropriate Priority code for future field action. Chronic process failures found through the audit are addressed as an action item and assigned to either the Maintenance Delivery organization or the TLOME group depending on the cause.

Step Four includes the monthly review of Level 1, 2, 3 and 9 (temporary repair) response timeliness. Each month the Work Delivery organization provides metrics on the number of records identified, completed, open and overdue for each level of finding. For the Transmission Line of Business, Level 1 is to be completed in 1 week, Level 2 in 6 months, Level 3 in 3 years and Level 9 used for temporary repairs is targeted for repair in 90 days. Although the NYS PSC revised the Level 2 timeframe from 6 months to 1 year in December of 2008, it was decided by Transmission Asset Management organization to stay with the shorter requirement. The metrics provided by Maintenance Delivery are reviewed by the TIM group and published in the Monthly Transmission Maintenance Report which is reviewed in detail at the monthly Operations Performance Group (OPG) meeting. At the OPG meeting action items for updates on overdue inspection response cases regarding such issues as outage scheduling, permitting, material acquisition, etc. are assigned. Below is a section from the report showing the metrics reported monthly at the OPG meeting.

Follow - up Work	Year to Date Identified (FY11 only)	Year to Date Complete (FY11 only)	Year to Date Open (ALL)	Year to Date Overdue (ALL)
Transmission Line Infrared Level 1 (1 wk):	7	7	0	0
Transmission Priority Level 1 (1 wk):	1	1	0	0
Transmission Priority Level 9 (90 days):	4	2	2	2
Transmission Priority Level 2 (6 mths):	97	39	74	0
Transmission Prioirty Level 3 (3 yrs) :	404	170	1689	0

Reporting the Results: The results of the quality assurance audits as described in the four stages above are incorporated into a (this) final audit report. As mentioned above to ensure that the auditor's findings are accurate all are reviewed by TLOME and by the Maintenance Delivery group. That review process also sets the appropriate action items for any non-compliant findings. Next, a draft version of the audit report and action items is reviewed within Transmission Asset Management. A final version of this audit report is then published and reviewed at the OPG meeting to ensure the appropriate level of attention to the findings and action items. Action items are monitored for timely and accurate completion by the Transmission Investment Management group through a formal tracking database. The audit report is included as part of the Annual PSC Stray Voltage Testing and Inspection report to the NYS PSC.

Calendar Year 2010 Findings:

1. Step One – Computapole Data
   a. All Transmission lines with overhead conductor were found to be contained in the Computapole database. Of the six hundred-fifty-five records there were six (0.9%) found to have erroneous or missing Foot Patrol data. Those were corrected as shown in the table below in red and updated in the Computapole database.

      ACTION ITEM: NY Inspections to research and determine the appropriate update for the six inaccurate records. Assigned to: Terry Weller, NY Inspections. Due Date: Completed 11/05/10.

Corrected Computapole Data:

Region	Circ #	From	To	KV	Miles	Spans	Circ ID #	FP Sch	FP Cmpt	Audit Check
56	4	BOONVILLE	ROME	115	0.1	591	T4040	2010	10/19/2010	Yes
56	5	TAP	MADISON	115	0.5	440	T4060·A0277	2010	10/19/2010	Yes
60	16	LGE	GREENBUSH	115	4.6	315	T5960	2012	08/29/2007	Yes
62	2	Watkins Road	Inghams	115	1.4	472	T2800	2012	08/21/2007	Yes
62	3	Valley	Inghams	115	1.4	237	T4270	2012	08/21/2007	Yes
62	10	TAP	Church St.	115	1.7	29	T5390·A0027	2011	05/16/2006	Yes

2. Step Two – Inspection Review – Maintenance Codes and Priority Levels
   a. A sample size of sixteen sites was reviewed in the field. Three items were assigned the wrong Maintenance code however had the correct issues listed in the Comments field. In addition, three of the sixteen reviewed were found to have been assigned the wrong Priority Level code. Two were given too high of a Priority code, rated Level 2 or 3 when 3 or 4 was appropriate – both insulator damage findings. The other one was given too low of a Priority code, Level 3 when Level 2 should have been selected. In this case ground wires had been cut on 5 adjacent structures but were only assigned a Level 3.

      ACTION ITEM: NY Inspections to review the following portions of the Transmission Line Maintenance Procedure – Ground Based Foot Patrols, Doc # PR 06.01.601.001 at the next inspector training exercise:
      Appendix H, Conductor and Line Hardware Evaluation:
      - Maintenance Code 543 section
      - Maintenance Code 551 section

      Assigned to: Terry Weller, NY Inspections Due Date: Completed 1/12/2011

      ACTION ITEM: Schedule WO#8649632 (Volney-Clay, strs #121, 122, 123, 127, 128, 129, 130) cut ground wires) for repair before summer lightening season. Design and environmental check are complete. Job is currently in scheduling stage.
      Assigned to: Nick Gibson, Transmission Maintenance Mgmt. Due Date: 6/1/2011

3. Step Three – Field Completions
   a. A sample size of twenty-four sites was reviewed in the field. On all reviewed sites the work was found to have been completed appropriately in the field and the records in Computapole were also accurate and complete.

4. Step Four – Inspection Response Timeliness (1/1/10 thru 11/30/10)
   a. The monthly reporting of Level 1 response times shows that with only one exception, all Level 1 Foot Patrol and Infrared findings were completed within one week as required by Doc # PR 06.01.601.001. The one exception was completed one day late due to an outage scheduling conflict.

   b. Metrics on Level 2 findings show that overdue instances range from none for eight of the eleven sample months, to one in October of 2010 and a high of two in September of 2010. Note that none of the Level 2 findings reached an overdue status based on the PSC 1- year response definition.

   c. Metrics on Level 3 findings show that there were no overdue Level 3 priorities within the eleven sample months.

2010 was the first year of formal tracking of temporary repairs found or made in the field. The company developed a process for managing the temporary repairs as Level 9s through the Computapole application. Metrics on Level 9 findings show that there have ranged from no overdue records for six of the eleven sample months to three months with two and a high of three overdue records during the two months of July and August of 2010. Maintenance Delivery personnel have been monitoring the overdue sites as required by the PSC order as evidenced by dated digital photos provided to the auditor.

Signatures of: AUTHOR – Craig M. Allen **PROCESS OWNERS –**	**Date: 12/30/2010**

CIRCULATION: R. Cox, N. Gibson, L. Iacona, J. McGrath, T. Sullivan, S. Klisiewicz, T. Dahill	

Appendix 18

CERTIFICATION
[STRAY VOLTAGE TESTING]

COMMONWEALTH OF MASSACHUSETTS)
) ss.:
COUNTY OF MIDDLESEX)

Christopher Root, on this 15th day of February 2011, certifies as follows:

1. I am the Senior Vice President, Operations of National Grid (the "Company"), and in that capacity I make this certification for the annual period ending December 31st, 2010 based on my knowledge of the testing program adopted by the Company in accordance with the Public Service Commission's Orders issued and effective January 5, 2005, July 21, 2005, December 15, 2008, and July 21, 2010 in Case 04-M-0159 (collectively the "Orders"), including the Quality Assurance Program filed by the Company with the Commission.

2. In accordance with the requirement of the orders, the Company developed a program designed to test (i) all of the publicly accessible electric facilities owned by the Company ("Facilities") and (ii) all streetlights located in public thoroughfares in the Company's service territory ("Streetlights"), as identified through a good faith effort by the Company for stray voltage (the "Stray Voltage Testing Program").

3. I am responsible for overseeing the Company's Stray Voltage Testing Program and in that capacity I have monitored the Company's Stray Voltage Testing Program during the twelve months ended December 31st, 2010 (the "Twelve-Month Period").

4. I hereby certify that, to the best of my knowledge, information, and belief the Company has implemented and completed its Stray Voltage Testing Program for the Twelve Month Period. Except for untested structures that are identified as temporarily inaccessible in the Company's Annual Report, submitted herewith, the Company is unaware of any Facilities or Streetlights that were not tested during the Twelve-Month Period.

5. I make this certification subject to the condition and acknowledgement that it is reasonably possible that, notwithstanding the Company's good faith implementation and completion of the Stray Voltage Testing Program, there may be Facilities and Streetlights that, inadvertently, may not have been tested or were not discovered or known after reasonable review of Company records and reasonable visual inspection of the areas of the service territory where Facilities and Streetlights were known to exist or reasonably expected to be found.

Christopher E. Root

Christopher E. Root

Sworn to before me on this 15th day of February, 2011

Notary Public: Gifty A. Bentum-Eshun

GIFTY A. BENTUM-ESHUN
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
May 23, 2014

CERTIFICATION
[FACILITY INSPECTIONS]

COMMONWEALTH OF MASSACHUSETTS)
) ss.:
COUNTY OF MIDDLESEX)

Christopher Root, on this 15th day of February 2011, certifies as follows:

1. I am the Senior Vice President, Operations of National Grid (the "Company"), and in that capacity I make this certification for the annual period ending December 31st, 2010 based on my knowledge of the inspection program adopted by the Company in accordance with the Public Service Commission's Orders issued and effective January 5, 2005, July 21, 2005, December 15, 2008, and July 21, 2010 in Case 04-M-0159 (collectively the "Orders"), including the Quality Assurance Program filed by the Company with the Commission.

2. The Company has an inspection program that is designed to inspect all of its electric facilities on a five-year inspection cycle, as identified through a good faith effort by the Company ("Facilities"), in accordance with the requirements of the Orders (the "Facility Inspection Program").

3. I am responsible for overseeing the Company's Facility Inspection Program and in that capacity I have monitored the program during the twelve months ended December 31st, 2010 (the "Twelve-Month Period").

4. I hereby certify that, to the best of my knowledge, information, and belief the Company has implemented and completed its Facility Inspection Program to inspect approximately 20 % of its Facilities during calendar year 2010, in order to comply with the five-year inspection cycle required under the Orders.

Christopher E. Root

Sworn to before me on this 15th day of February, 2011

Notary Public: Gifty A. Bentum-Eshun

GIFTY A. BENTUM-ESHUN
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
May 23, 2014