

February 12, 2010

VIA OVERNIGHT AND ELECTRONIC MAIL

Honorable Jaclyn A. Brillling, Secretary
State of New York
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 – 2009 ANNUAL REPORT

Dear Secretary Brillling:

Enclosed please find Niagara Mohawk Power Corporation's d/b/a National Grid *Elevated Voltage Testing and Facility Inspection 2009 Annual Report* submitted in the above-referenced matter. Also included are the original certifications required by the Order.

The report has been e-filed this afternoon in the Commission's Document and Matter Management System.

Kindly acknowledge receipt of this filing by date-stamping as received the enclosed duplicate copy of this letter and returning it in the enclosed, self-addressed envelope provided for your convenience.

Thank you for your time and attention.

Respectfully submitted,

Patric R. O'Brien

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Enclosures

cc: Christian Bonvin (via overnight mail)
Robert Visalli (via overnight mail)
Denise Gerbsch (via overnight mail)

**STATE OF NEW YORK
PUBLIC SERVICE COMMISSION**

CASE 04-M-0159

**Niagara Mohawk Power Corporation
d/b/a National Grid**

Elevated Voltage Testing and Facility Inspection

2009 Annual Report

Report on the results of stray voltage testing and facility inspections
for the 12-month period ended December 31, 2009

February 12, 2010

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I. Background

The New York State Public Service Commission's ("PSC" or "Commission") Electric Safety Standards order issued on January 5, 2005 (Case 04-M-0159), with subsequent revisions issued on July 21, 2005 and December 15, 2008 (collectively referred to herein as the "Safety Standards" or "Order"), requires electric utilities in New York State to test annually for stray voltage all of their publicly accessible transmission and distribution facilities that are capable of conducting electricity, 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 and facility inspection programs conducted for the 12-month period ended December 31, 2009.

II. Company Overview

National Grid is an investor owned utility that provides electric service to approximately 1,500,000 customers in a service area of approximately 24,700 square miles within 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 distribution system, underground system, streetlight system, transmission system, and substations.

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 1,200,000 poles. Stray voltage testing of the distribution system is currently performed by contractors. Facility inspections of the distribution system are currently performed by an internal workforce.

National Grid's distribution and transmission underground system is made up of approximately 153,919 manholes, hand-holes, vaults, URD pad mounted transformers, switchgear, et cetera. Fiberglass hand holes are exempt from stray voltage testing under the Safety Standards.¹ The stray voltage testing of the underground system is currently performed by contractors. The facility inspections of the underground system are currently performed by an internal workforce.

National Grid's streetlight system contains approximately 84,000 underground fed metallic streetlight standards and municipally-owned lights and traffic control devices. Overhead fed streetlights on wooden poles are not counted within the streetlight program. Stray voltage testing of overhead fed lights is done as part of the distribution 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

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

Company-owned facilities take place during the day and are performed by an external workforce.

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 a combination of contractors and internal workforce. 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 computer to perform stray voltage tests 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.

There are 917 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 917 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, 2009, National Grid conducted stray voltage testing of 100% of its publicly accessible transmission and distribution facilities capable of conducting electricity and 100% of all Company and non-Company owned metallic streetlights and traffic signals. National Grid also tested all publicly accessible third party facilities that were located in close proximity to National Grid system components where stray voltage findings were detected.

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 utility-owned facility were immediately safeguarded and/or mitigated. All permanent repairs were made within 45 days.
- 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 transmission and distribution system were visited. Of the 1,535,924 facilities visited, 406,927 did not require stray voltage testing

because these are wood 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. In addition, National Grid visited and tested 1,674 customer owned street lights and 33,553 traffic controls for the presence of stray voltage.

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 are approached only under urgent circumstances. The performance of stray voltage testing 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, exit and entrance highway ramps. The performance of stray voltage testing would constitute an unacceptable risk to the employee.

As required by the Safety Standards, National Grid performed 3,229 miles of mobile testing system scans between January 1, 2009 and December 31, 2009. A summary of the results of the mobile testing scans is contained in Appendix 6. Please note that Appendix 6 is the original mobile scan report submitted to Staff, with the exception of Appendix E (Financial Detail) and the Summary of Energized Objects – Mobile Testing attachment, which have been updated. Appendix E has been updated to reflect financial data as of February 1, 2010, and the Summary of Energized Objects documents have been updated to reflect current mitigation efforts.

IV. Facility Inspection Program

The Safety Standards require National Grid to visually inspect approximately 20% of its facilities annually, resulting in a fifth year inspection goal of all facilities to be inspected. The year ended December 31, 2009 was the fifth year of the inspection program.

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

In addition, National Grid also performs the following:

- Aerial Infrared – Helicopter based thermographic imaging of connections and equipment.
- Tower Footing – Embedded support structure that supports a transmission tower.
- 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, in accordance with EOP-T007 (a copy of which is attached as Appendix 10).

National Grid's 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 Electric Operating Procedure ("EOP"). 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:

- 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.
- 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.
- 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.
- 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.

² Substation inspections are more complex than those performed on other facilities and differ in variety of ways, including: inspection schedule; system by which inspection data is captured; work prioritization (supervisory review determines work to be completed versus Levels I-IV); et. cetera. Substation inspection procedure and protocols are contained in NG-USA EOP 400.06.1 entitled "Substation V&O Inspection Standard" and NG-USA EOP 400.06.2 entitled "Substation V&O Inspection Procedure" (copies of which are attached as Appendix 13).

In accordance with the Safety Standards, when the Company performs a temporary repair or locates one during an inspection, the Company strives 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, and 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 4.

National Grid provides classroom and field training to personnel inspecting facilities per the Company's 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 1,535,924 individual facilities that require testing for the presence of stray voltage and facility inspection. These facilities are broken down into the following five main categories:

- a. Distribution Overhead – National Grid has approximately 1,247,590 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 use wooden 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 99,797 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 57,106 metal pole streetlights and approximately 33,553 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 street lights 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 917 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 96,961 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, 2009.

In addition, in compliance with the Safety Standards, National Grid met the fifth-year performance target for inspection of 100% of its electric facilities for the five-year period ended December 31, 2009.

The results are summarized in the tables below.

Stray Voltage Testing Results

Elevated Voltage Testing Annual Summary			
Program	Total Units	Units Completed	% Completed
Distribution	1,247,590	1,247,590	100
Underground	99,797	99,797	100
Streetlights*	90,659	90,659	100
Transmission	96,961	96,961	100
Substation	917	917	100

*Note that streetlights include traffic controls but exclude fiberglass standards.

Facility Inspection Program Results

Category	PSC Order Requirement	Actual Cumulative Inspected as of 2009
Overhead Distribution	100%	112%
Overhead Transmission	100%	135%
Underground	100%	122%
Pad-mounted Transformers	100%	105%
Streetlight	100%	135%

5-Year Inspection Performance Summary

Overhead Distribution Facilities

Inspection Year	Number of Overhead Distribution Structures Inspected	% of Overall System Inspected (Cumulative)
2005	286,741	23%
2006	295,849	47%
2007	272,649	69%
2008	278,137	91%
2009	268,957	112%

Note: National Grid's inspections process has remained consistent throughout the five-year cycle. Our numbers reflect a targeted inspection program. Duplicate inspections have been accounted for.

Overhead Transmission Facilities

Inspection Year	Number of Overhead Transmission Facilities Inspected	% of Overall System Inspected (Cumulative)
2005	29,257	30%
2006	22,587	54%
2007	25,230	80%
2008	23,922	104%
2009	29,556	135%

Note: National Grid's inspections process has remained consistent throughout the five-year cycle. Our numbers reflect a targeted inspection program. Duplicate inspections have been accounted for.

Underground Facilities

Inspection Year	Number of Underground Facilities Inspected	% of Overall System Inspected (Cumulative)
2005	9,810	13%
2006	16,611	34%
2007	12,201	49%
2008	17,412	72%
2009	39,863	122%

Note: National Grid's inspections process has remained consistent throughout the five-year cycle. Our numbers reflect a targeted inspection program. Duplicate inspections have been accounted for.

Pad-mount Transformers

Inspection Year	Number of Pad-mounted Transformers Inspected	% of Overall System Inspected (Cumulative)
2005	6,298	10%
2006	22,715	44%
2007	9,822	58%
2008	16,587	83%
2009	14,697	105%

Note: National Grid's inspections process has remained consistent throughout the five-year cycle. Our numbers reflect a targeted inspection program. We had a targeted program and we accounted for duplicate inspections.

Streetlights

Inspection Year	Number of Streetlights Inspected	% of Overall System Inspected (Cumulative)
2005	29,607	52%
2006	4,995	61%
2007	27,162	108%
2008	*1	108%
2009	15,369	135%

Note: National Grid's inspections process has remained consistent throughout the five-year cycle. Our numbers reflect a targeted inspection program. We had a targeted program and we accounted for duplicate inspections.

*National Grid set an internal goal of zero streetlight inspections for the 2008 cycle because the overall five year program was ahead of schedule and because of resource and funding issues. The remaining streetlight inspections were completed during the 2009 cycle.

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 streetlights, and
- Inspected the requisite number of electric facilities.

The certifications are attached as Appendix 14 to this report.

VIII. Analysis of Causes of Findings and Stray Voltage

The Safety Standards require the electric utilities to perform an inventory of all stray voltage findings and report on the number of 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. It has been established that 0% of the findings identified in this year’s testing effort were normal to the operating system.

National Grid identified 558 instances of stray voltage through its stray voltage testing program in 2009. 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 (349) of stray voltage conditions identified were on streetlights. The ground connection dominated the causes. This may be attributed to a more rigorous test, which requires the tester to find bare metal by removing paint and rust.

There were two classes of findings: (1) findings due to potentially hazardous stray voltage; and (2) findings normal to the operating system. The following table contains a breakdown of the causes of stray voltage findings identified through the Company’s 2009 manual testing effort. National Grid has repaired and/or mitigated all the Level I findings that were determined to be hazardous.

Structure Type	Cause of Stray Voltage	Stray Voltages Found
Distribution	Info Missing	2
Distribution	Cable & Ground	2
Distribution	Down Ground	49
Distribution	Equipment – Other	12
Distribution	Ground Connection	22
Distribution	Guy	46
Distribution	Insulator	1
Distribution	Neutral	2
Distribution	None Required	33
Distribution	Service Wire	1
Distribution	Customer Problem	4
Underground	None Required	2
Underground	Poor Insulation	1
Street Lights – Traffic Signals	Info Missing	1
Street Lights – Traffic Signals	Cable & Ground	9
Street Lights – Traffic Signals	Cable Feed	2
Street Lights – Traffic Signals	Equipment – Other	5
Street Lights – Traffic Signals	Ground Connection	267
Street Lights – Traffic Signals	Luminaire Change	10
Street Lights – Traffic Signals	Neutral	33
Street Lights – Traffic Signals	None Required	8
Street Lights – Traffic Signals	Photo Eye	2
Street Lights – Traffic Signals	Remade All Connections	9
Street Lights – Traffic Signals	Service Wire	2
Street Lights – Traffic Signals	Customer Problem	1
Transmission	Cable & Ground	1
Transmission	Down Ground	19
Transmission	Equipment – Other	1
Transmission	Ground Connection	3
Transmission	Guy	6
Transmission	None Required	2
		558

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.

A summary of the results of the mobile testing scans is contained in Appendix 6.

IX. Analysis of Inspection Results

Overhead Distribution Structures

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
268,957	154,750	62%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	253	0.08%
2	18,375	5%
3	53,454	16%
4	268,913	79%
Total:	340,995	100%

Overhead Transmission Facilities

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
29,556	7,152	24%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	15	0.2%
2	144	2%
3	2,073	24%
4	6,328	74%
Total:	8,560	100%

Underground Facilities

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
39,863	9,810	25%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	68	0.5%
2	1,538	12%
3	320	3%
4	10,687	85%
Total:	12,613	100%

Pad-mount Transformers

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
14,697	3,116	21%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	20	0.02%
2	349	3%
3	1,627	12%
4	11,163	85%
Total:	13,159	100%

Streetlights

Table of Locations with Deficiencies

Locations Inspected	Locations w/ Deficiencies	% Locations w/ Deficiencies
15,369	10,028	65%

Breakdown of Locations with Deficiencies

Priority Rating	Number of Deficiencies	% Deficiencies Found
1	1	0.00%
2	309	1%
3	4,047	14%
4	24,193	85%
Total:	28,550	100%

In 2009, National Grid identified an overall total of 403,877 deficiencies:

- Priority Rating 1 Total = 357, or 0.1% of the overall total.
- Priority Rating 2 Total = 20,715, or 5% of the overall total.
- Priority Rating 3 Total = 61,521, or 15% of the overall total.
- Priority Rating 4 Total = 321,284 (inventory), or 80% of the overall total.

X. Quality Assurance

As required by the Safety Standards, National Grid has adopted a quality control/quality assurance program to ensure the integrity of the data developed during testing and inspection. Quality control/quality assurance definitions from National Grid's program are as follows:

Quality Control – A process of self-auditing to measure and control the accuracy of elevated voltage testing.

Quality Assurance – Independent auditing of the quality control process to give confidence in its thoroughness and accuracy.

In addition, during 2009, National Grid's Transmission Investment Management ("TIM") group performed an independent quality assurance audit of the transmission facility inspections to monitor and review the process used and the field results obtained by both the inspection department as well as the transmission work delivery organization. It should be noted that the TIM group is part of the Company's larger transmission asset management organization and is managed separately from National Grid's inspection department, the transmission work delivery organization, and the quality assurance and compliance group.

A. Quality Control Audit Program - Facility Inspections

National Grid's inspections department performed quality control audits on approximately 2,370 distribution, transmission, and sub-transmission assets inspected during 2009. National Grid designed the quality control program 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 quality control 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, he or she would continue to only be audited on the monthly cycle.
- b. **Additional random samples are required** – if an inspector fails to achieve 95% compliancy, he or she would continue to be audited on a weekly basis until the 95% compliancy is reached.

National Grid determined that an audit was passing only if there was an exact correlation between the result of the inspection and those of the audit. The exact combination of maintenance codes, levels, and quantities were examined during the audit.

The 2009 quality control audits achieved an overall compliancy of 97%.

B. Quality Assurance Audit Program – Facility Inspections

National Grid enlisted the support of a vendor to gather data for the PSC mandated quality assurance program, upon which National Grid performed subsequent analysis. The quality assurance program and vendor operated under the direction of the National Grid Operations Performance function.

The quality assurance methodology involved performing an additional quality assurance inspection of a randomly-selected sample of previously inspected assets with the intent of verifying previously identified maintenance codes, capturing "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 the entire population of inspection data based on an analysis of the results of the sample.

For this year of quality assurance program, National Grid used the following parameters:

- The number (population) of assets inspected during the inspection year:
 - Distribution: 282,868 assets (locations)
 - Transmission: 9,620
 - Sub-transmission: 19,685
- The sample size for the quality assurance inspection:
 - Distribution: 1,217 assets (locations)
 - Transmission: 111
 - Sub-Transmission: 217

Analysis of Inspections

Analysis of the quality assurance program data is intended to understand the nature and magnitude of "defects" as applicable to the inspection program results. A "defect" was tallied when the quality assurance 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 quality assurance 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 table indicates the quality assurance program "defects" found:

Asset Category	QA Inspection Locations	"Defects" Found	"Defects" as % of QA Inspection Locations	99% Confidence Level*
Distribution	1217	Level 1 = 0 Level 2 = 23 Level 3 = 14 Total = 37	3.04%	1.77% - 4.31%
Transmission	217	Level 1 = 0 Level 2 = 1 Level 3 = 0 Total = 1	0.46%	0.0% - 1.72%

Sub-Transmission	111	Level 1 = 0 Level 2 = 0 Level 3 = 0 Total = 0	0.0%	0.0% to 2.43%
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* 99% Confidence Level is interpreted as meaning that for the number of quality assurance 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 282,868 distribution assets that comprise the entire 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 4.31% of asset locations, which correlates with a greater than 95.69% 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 quality assurance inspection results.

Based on quality assurance survey results and the sample size and population of asset locations, it can be interpreted with at least 99% confidence that the rate of accuracy for inspections is the following:

- Distribution: greater than 95.69%
- Transmission: greater than 98.28%
- Sub-Transmission: greater than 97.57%

Therefore, it is the conclusion that National Grid's inspections program is delivering greater than 95% accuracy of inspection results.

Analysis of Repairs

National Grid's quality assurance program noted instances where repairs were observed to have taken place as evidenced by the lack of a previously identified Computapole code. For instance, if the original inspection noted that a pole required replacement, and the quality assurance inspector observed a new pole, the pole-related code was indicated as being repaired.

All of the locations observed during the quality assurance inspection had been originally inspected within nine months prior to the quality assurance inspection, therefore no Level 2 (one year) or Level 3 (three years) repairs were required within that time frame, however many locations were repaired. In addition, one Level 1 condition was observed and handled according to the Level 1 reporting procedure:

Asset Category	QA Inspection Computapole Codes Observed	QA Inspection Repairs Observed	% Overdue for Repair
Distribution	Level 1 = 1* Level 2 = 81 Level 3 = 174 Total = 256	Level 1 = 0 Level 2 = 20 Level 3 = 20 Total = 40	0%
Transmission	Level 1 = 0 Level 2 = 0 Level 3 = 8 Total = 8	Level 1 = n/a Level 2 = n/a Level 3 = 0 Total = 0	0%
Sub-Transmission	Level 1 = 0 Level 2 = 0 Level 3 = 5 Total = 5	Level 1 = n/a Level 2 = n/a Level 3 = 0 Total = 0	0%

* Floating conductor found – believed to have occurred between initial inspection and quality assurance inspection. This was handled according to the Level 1 reporting procedure.

Results – Repairs

The newly implemented quality assurance process was performed for assets that were originally 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 quality assurance inspection.

Improvement Opportunities

It is anticipated that the quality assurance program will continue to evolve as more efficient data gathering approaches are evaluated and implemented. Aspects under consideration for potential improvement include a modified process for gathering quality assurance inspection data as closer in time to the original inspection data, as well as an improved method for assessing timeliness of repaired assets.

C. Independent Transmission Facility Inspection Audit

Audit Summary

The purpose of this audit is to demonstrate compliance by National Grid's transmission line of business with the requirements of the December 12, 2008 order. Appendix A, § 5 of the Order, entitled, Quality Assurance, states:

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 TIM group annually to monitor and review the process used and the field results obtained by both the New York 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 New York inspection group and the transmission work delivery organization. This audit review specifically included NY transmission line assets from 115kV and above.

Quality Assurance Process

Step One of the annual quality assurance process is a review of the transmission line data within the inspection program (Computapole) database. The transmission line data is reviewed for completeness in three ways. First, the line listing is compared against the line listing maintained by the transmission network operations group to ensure that all transmission lines (115kV and above) with overhead conductor are included in the database. Second, the data for each line is reviewed to ensure that the Foot Patrol Complete field is complete showing when the line was last inspected. Third, 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 TIM group are then reviewed and corrected in the Computapole database by the New York inspection group based on research performed by their division personnel.

Step Two of the annual quality assurance process involves a field review of a sample of inspection findings prior to field correction in order to review the maintenance code selection and priority code assignment done by the New York inspection field personnel. The sample is pulled in the September/October timeframe to include the majority of that calendar year's inspection data. The population of the current year's inspection findings that have not yet been completed in the field is copied from the Computapole database and numbered in a sequential manner. A random number generator is then used to select a sample size of around ten percent knowing that not all locations may be accessible to the auditor. These sites are then field reviewed by the auditor who takes photos of each finding. The field findings and photos are reviewed against the current version of the EOP document, NG-USA EOP T007, Transmission Line Patrol – 23kV-345kV, and also reviewed with the transmission line operations and maintenance engineering group to

determine if the inspector and/or the inspection system have set the appropriate maintenance code and priority level on these sample sites. Any misidentified inspection findings are corrected in the Computapole database. Chronic misinterpretations are addressed as an action item and reviewed either at an inspector training exercise held by the New York 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 that have been reported as repaired in the field. The sample is pulled in the September/October timeframe to include a good percentage of the current year's work yet still allowing the time necessary to perform the audit. Again the records of completed work are copied from the Computapole database, numbered in sequential order and selected by random number generator to create a sample size of approximately 25 percent knowing that not all the sites may be accessible to the auditor. These sites are then field reviewed by the auditor who takes photos of each finding. The field findings and photos are reviewed with the transmission line operations and maintenance engineering group to confirm the auditor's findings. Any misreported completion findings are reviewed with the work 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 work delivery organization or the transmission line operations and maintenance engineering group depending on the cause.

Step Four includes the monthly review of Level 1 and 2 response timeliness. Beginning in April of 2010, Level 3 response times will also be tracked. 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 one week, Level 2 in six months and Level 3 in three years. Although the NYS PSC revised the Level 2 timeframe from six months to one year, National Grid's transmission asset management organization decided to stay with the shorter requirement. The metrics provided by the work delivery organization are reviewed by the TIM group and published in the Monthly Transmission Maintenance Report, which is reviewed in detail at the monthly Transmission Operating Committee ("TOC") meeting. From the TOC meeting may come action items for updates on overdue inspection response cases regarding such things as outage scheduling, permitting, material, et. cetera. Below is a section from the report showing the metrics reported monthly to the TOC.

Item Description	Year to Date Identified (FY10 only)	Year to Date Complete (FY10 only)	Year to Date Open (ALL)	Level 2 Year to Date Overdue (ALL)
Transmission Priority Level 1	0	0	0	
Transmission Priority Level 2 - PSC Yr	40	25	31	1
Transmission Line Infrared Level 1	12	12	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 results are reviewed by the transmission line operations and maintenance engineering organizations and by the work delivery group. That review process also sets the appropriate action items for any non-compliant findings. Next the draft version of the audit report and action items are reviewed within transmission asset management. A final version of this audit report is then published and reviewed at the TOC 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 action item tracking database. The audit report is included as part of the Annual PSC Stray Voltage Testing and Inspection report to the NYS PSC.

Findings

1. Step One – Computapole Data

- a. All in-service transmission lines with overhead conductor were found to be contained in the Computapole database. Of the 655 records, there were 17 (2.6%) found to have erroneous or missing foot patrol complete or foot patrol schedule data fields. Those were corrected as shown below in red and updated in the Computapole database.

ACTION ITEM: The New York inspections group will research and determine the appropriate update for the seventeen inaccurate records. Assigned to: Terry Weller, NY Inspections. Due Date: Completed 11/15/09.

Region	Ch #	From	To	KV	Dir Id#	FP Cmt	FP sch	Finding Comments	Correction Action
62	18	INDECK	SPER	115	T9950	01/02/2007	2012	Need 5 year scheduling	Schedule dated to pushed out to 2012
57	2	TAP	PORT DRUM COHEN	115	T3060 A0902	10/31/2007	2012	Need 5 year scheduling	Schedule dated to pushed out to 2012
48	149	G-B #149	Station SA Tap	115	T1200 X0001	03/18/2009	2014	Need 5 year scheduling	Schedule dated to pushed out to 2014
54	5	COFFREEN	LIGHTHOUSE HILL	115	T2120		57	Duplicate, Delete???	Duplicate deleted
54	7	LIGHTHOUSE HILL	CLAY	115	T3320	11/03/2009	2009		Completed 11/03/09
54	888	From	To	115	T2630 K75.5			Appears to be error, Delete???	Erroneous entry - deleted
57	3	COLTON	MALONE	115	T3170	04/26/2007		Tap to Allen's Falls done 2/2/07	Completed as A0213 and A0716
57	3	EF-T #3	Switch X1K3 Tap	115	T3090 X0002	06/03/2009	2009	Main line done 6/3/09	Completed on mainline inspection, computapole updated
57	1	Boonville	Porter	115	T4020	11/10/2005	2010	Reg 56 portion done 11/10/05	Not in Region 57, completed 11/10/05, scheduled for 2010 reg 56
57	2	Boonville	Porter	115	T4030	11/10/2005	2010	Reg 56 portion done 11/10/05	Not in Region 57, completed 11/10/05, scheduled for 2010 reg 56
57	3	Boonville	Rome	115	T4060	11/10/2005	2010	Reg 56 portion done 11/10/05	Not in Region 57, completed 11/10/05, scheduled for 2010 reg 56
60	16	LGE	GREENBUSH	115	T5960	01/15/2007	2010		Done as circuit A0430
60	2	S-R #2	Bolton Tap	115	T5760 A3952		2014	Duplicate, Listed in 62, Delete???	Completed in Region 62, delete in reg 60
62	10	TAP	Church St.	115	T5390 A0027	05/24/2006	2011	Mainline in 62 done 5/24/06	Done as part of mainline
62	3	Valley	Inghams	115	T4270	06/21/2007			Completed in Region 56 - on-line line
62	2	Waldins Road	Inghams	115	T2800	06/21/2007			Completed in Region 56 - on-line line
62	18	Marheim/Oppenheim T	Florida/Duanesberg T	345	T4130	06/10/2009	2010		Completed as circuit T4070 and T5360

2. Step Two – Inspection Review – Maintenance Codes and Priority Level

- a. A sample size of 15 sites (8.2%) was reviewed in the field. Only one item had been assigned the wrong maintenance code. However, eight of the 15 reviewed were found to have been assigned the wrong priority level code. Three were given too high a code, rated Level 3, and should have only been given a Level 4. The other five were given too low a priority code, Level 3, when they should have been given a Level 2 code. Clearly seven of the eight errors were caused by either a failure to reference the Insulator

Guidance Table IIIA in EOP T007 or the misinterpretation of the reference table by the inspector.

ACTION ITEM: The transmission line operations and maintenance engineering group will revise and publish the Transmission Line Maintenance Procedure – Ground Based Foot Patrols, Doc # PR 06.01.601.001 to better define the insulator damage specifics and the corresponding priority levels to be assigned by the field inspector. Assigned to: James McGrath, transmission line operations and maintenance engineering group. Due Date: Completed 1/14/10.

ACTION ITEM: The New York inspections group to review Appendix H – Conductor and Line Hardware Evaluation, Section 551 Line Hardware – Insulator Damage guidance table on page 29 in the Transmission Line Maintenance Procedure – Ground Based Foot Patrols, Doc # PR 06.01.601.001 at the next inspector training exercise and ensure that all inspectors have a copy for field reference. Assigned to: Terry Weller, New York inspections. Due Date: 2/26/10

3. Step Three – Field Completions

- a. A sample size of 15 sites (25.4%) was reviewed in the field. Two of the items were found to be incomplete. One, a Level 2 repair of a broken brace, found on Structure # 63 of the retired Beck – Lockport 115kV, Olin Tap was noted as completed due to a misunderstanding of the need to complete the work on the tap due to its “retired in place” status. The second, a Level 2 repair of a bird-caged segment of conductor north of Structure #229 on the Spier – Rotterdam 115kV, had no apparent reason for the erroneous completion entry into Computapole. Both items will be re-entered into Computapole with the appropriate priority level assigned.

ACTION ITEM: The work delivery group will enter the two incomplete inspection findings back into Computapole for the appropriate response action. Assigned to: Nick Gibson, TIM. Due Date: 02/15/10

ACTION ITEM: The work delivery group will ensure through communication to all maintenance supervision that all exceptions to the true field completion of inspection items must be approved by the transmission line operations and maintenance engineering group. Assigned to: Nick Gibson, work delivery group. Due Date: 02/15/10.

4. Step Four – Inspection Response Timeliness

- a. The monthly reporting of Level 1 response times shows that all Level 1 foot patrol and infrared findings have been completed within one week as required by EOP T007. Metrics on Level 2 findings show that overdue

instances range from one in September of 2009 to a high of five in October. Recall that overdue for transmission Level 2 findings are any item not corrected within six months of the initial inspection date. There was also one item overdue by more than 12 months – the current PSC definition. The work delivery group reports that the overdue item is the result of the misinterpretation of the infrared temperature above “reference temperature,” as described in Section V of EOP T007. There it states that any equipment found to be between 0 and 20 degrees above the reference table should be monitored for change and addressed accordingly. The item in question was found to have a temperature of 20.3 degrees centigrade above reference temperature which is actually just within the Level 2 priority range for temperature differences. The work delivery field force for that area thought it was below that category and was only monitoring the situation. A field repair has now been completed as a reaction to this audit finding.

ACTION ITEM: The work delivery group will closeout work order # 5680114 in STORMS and Computapole to reflect field completion of this one item overdue by more than 12 months. Assigned to: Nick Gibson, work delivery group. Due Date: Completed 12/10/09.

D. Quality Assurance Audit Program – Stray Voltage Testing

During 2009, National Grid continued to enlist the support of vendors to perform its stray voltage testing. The vendors were required to perform quality control audits at a rate of five to ten percent of the preloaded assets.

National Grid also enlisted the support of a vendor to gather data for the stray voltage testing quality assurance program, upon which National Grid performed subsequent analysis. The stray voltage quality assurance program and vendor operated under the direction of the operations performance function. The quality assurance testing was performed from a randomly-selected sample of previously quality control vendor tested assets at a rate of five percent of the total quality control tests.

For both the quality control and quality assurance testing, both the quality control and quality assurance must achieve a minimum confidence level of 95% for distribution, underground, transmission, sub-transmission, and traffic signals and 98% for streetlights with the intent of verifying that each asset that was tested had a “testable object.” In other words, in order for the quality assurance/quality control test to have “passed,” it must confirm that all assets that had a “testable object” were tested.

Results

During 2009, National Grid performed quality assurance testing on 3,792 assets. The results yielded 55 failures for a 1.45% failure rate. The overall compliancy achieved for the quality assurance testing program was 98.55%

E. Improvement Opportunities

Based on the results of the quality assurance testing, National Grid determined that the testers had the most difficulty identifying guy wires and anchors as a testable object. These concerns were addressed with the appropriate vendor for follow-up tester training and guidance.

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: Mobile Testing Report

Appendix 7: NG-USA EOP G016 Elevated Equipment Voltage Testing

Appendix 8: NG-USA EOP D004 Distribution Line Patrol and Maintenance

Appendix 9: NG-USA EOP UG006 Underground Inspection and Maintenance

**Appendix 10: NG-USA EOP T007 Transmission Line Patrol and Maintenance
23kV – 345kV**

Appendix 11: NG-USA EOP G017 Street Light Standard Inspection Program

Appendix 12: NG-USA EOP G004 Shock Complaints

**Appendix 13: NG-USA SMS 400.06.1 Substation V&O Inspection Standard and
SMP 400.06.2 Substation Inspection Procedure**

Appendix 14: Certifications

Appendix 1

Stray Voltage Testing Summary

National Grid Data as of December 31, 2009	Total System Units Requiring Testing	Units Completed	Percent Completed	Units with Voltage Found ($\geq 1.0v$)	Percent of Units Tested with Voltage ($\geq 1.0v$)	Units Classified as Inaccessible
Distribution Facilities	1,247,590	1,247,590	100%	178	0.014%	10,246
Underground Facilities	99,797	99,797	100%	3	0.003%	1,438
Street Lights / Traffic Signals	90,659	90,659	100%	350	0.386%	1,188
Substation Fences	917	917	100%			
Transmission	96,961	96,961	100%	39	0.04%	3,775
TOTAL	1,535,924	1,535,924	100%	570	0.04%	16,647

Appendix 2

Summary of Energized Objects (Manual Testing)

National Grid Data as of December 31, 2009	Initial Readings				Readings after Mitigation		
	1V to 4.4V	4.5V to 24.9V	25V and Over	Totals	Less than 1 V	1V to 4.4V	4.5 V and Over
Distribution Facilities	131	42	5	178	174	0	0
Pole	4	5	0	9	9	0	0
Ground	48	19	0	67	66	0	0
Guy	69	7	0	76	75	0	0
Riser	8	8	2	18	18	0	0
Other	18	24	3	45	43	0	0
Underground Facilities	1	2	0	3	3	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	1	2	0	3	3	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	141	191	18	350	349	0	0
Metal Street Light Pole	135	188	17	340	337	0	0
Traffic Signal Pole	0	1	0	1	0	0	0
Control Box	0	0	1	1	0	0	0
Pedestrian Crossing Pole	0	0	0	0	0	0	0
Other - NOT LISTED	11	84	8	103	92	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	36	2	1	39	32	0	0
Lattice Tower	0	1	0	1	1	0	0
Pole	1	0	0	1	1	0	0
Ground	28	0	0	28	21	0	0
Guy	0	0	0	0	0	0	0
Other	7	1	1	9	9	0	0
Miscellaneous Facilities	0	0	0	0	0	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	0	0	0	0	0	0	0
Totals	309	237	24	570	*558	0	0

*The difference between initial items (570) and mitigated items (558) is 12. These 12 items have been de-energized, made safe, and are pending repairs.

Appendix 3

Summary of Shock Reports from the Public

National Grid 2009 1 st Quarter December 1, 2008 – March 31, 2009	Quarterly Update	Yearly Total
I. Total shock calls received:	67	67
Unsubstantiated	20	20
Normally Energized Equipment	7	7
Stray Voltage:		
Person	38	38
Animal	2	2
II. Injuries Sustained/Medical Attention Received	3	3
Person		
Animal	3	3
III. Voltage Source:	40	40
Utility Responsibility		
Issue with primary, joint, or transformer	2	2
Secondary Joint (Crab)		
SL Service Line	1	1
Abandoned SL Service Line		
Defective service line		
Abandoned service line	2	2
OH Secondary	1	1
OH Service	2	2
OH Service neutral	6	6
Pole		1
Riser		1
Other		2
Customer Responsibility		
Contractor damage		
Customer Equipment / Wiring	26	26
Other Utility / Gov't Agency Responsibility		
SL Base Connection		
SL Internal Wiring or Light Fixture		
Overhead Equipment		
IV. Voltage Range:		
1.0V to 4.4V	2	2
4.5V to 24.9V	6	6
25V and above	5	5
Unknown	27	27

National Grid 2009 2 nd Quarter April 1, 2009 – June 30, 2009	Quarterly Update	Yearly Total
I. Total shock calls received:	49	116
Unsubstantiated	16	36
Normally Energized Equipment	13	20
Stray Voltage:		
Person	16	54
Animal	4	6
II. Injuries Sustained/Medical Attention Received		
Person		
Animal		3
III. Voltage Source:		
Utility Responsibility		
Issue with primary, joint, or transformer		2
Secondary Joint (Crab)		
SL Service Line	2	3
Abandoned SL Service Line		
Defective service line	1	1
Abandoned service line		2
OH Secondary		1
OH Service		2
OH Service neutral		6
Pole	1	1
Riser		
Other		
Customer Responsibility		
Contractor damage		
Customer Equipment / Wiring	16	42
Other Utility / Gov't Agency Responsibility		
SL Base Connection		
SL Internal Wiring or Light Fixture		
Overhead Equipment		
IV. Voltage Range:		
1.0V to 4.4V		2
4.5V to 24.9V	1	7
25V and above	7	12
Unknown	12	39

National Grid 2009 3 rd Quarter July 1, 2009 – September 30, 2009	Quarterly Update	Yearly Total
I. Total shock calls received:	74	190
Unsubstantiated	13	49
Normally Energized Equipment	20	40
Stray Voltage:		
Person	40	94
Animal	1	7
II. Injuries Sustained/Medical Attention Received	3	6
Person		
Animal	3	6
III. Voltage Source:	41	101
Utility Responsibility		
Issue with primary, joint, or transformer	4	6
Secondary Joint (Crab)	2	2
SL Service Line	1	4
Abandoned SL Service Line		
Defective service line		1
Abandoned service line		2
OH Secondary		1
OH Service		2
OH Service neutral	3	9
Pole		1
Riser		
Other	4	4
Customer Responsibility		
Contractor damage	1	1
Customer Equipment / Wiring	26	68
Other Utility / Gov't Agency Responsibility		
SL Base Connection		
SL Internal Wiring or Light Fixture		
Overhead Equipment		
IV. Voltage Range:		
1.0V to 4.4V	5	7
4.5V to 24.9V	7	14
25V and above	6	18
Unknown	23	62

National Grid 2009 4 th Quarter October 1, 2009 – December 31, 2009	Quarterly Update	Yearly Total
I. Total shock calls received:	39	229
Unsubstantiated	6	55
Normally Energized Equipment	10	50
Stray Voltage:		
Person	23	117
Animal		7
II. Injuries Sustained/Medical Attention Received	1	7
Person	1	1
Animal		6
III. Voltage Source:	23	124
Utility Responsibility		
Issue with primary, joint, or transformer	2	8
Secondary Joint (Crab)		2
SL Service Line	1	5
Abandoned SL Service Line		
Defective service line	1	2
Abandoned service line		2
OH Secondary		1
OH Service		2
OH Service neutral	2	11
Pole		1
Riser		
Other		4
Customer Responsibility		
Contractor damage	1	2
Customer Equipment / Wiring	14	82
Other Utility / Gov't Agency Responsibility		
SL Base Connection		
SL Internal Wiring or Light Fixture		
Overhead Equipment	2	2
IV. Voltage Range:		
1.0V to 4.4V	2	9
4.5V to 24.9V	2	16
25V and above	4	22
Unknown	15	77

2009 Shock Report by Address

Date Reported	Address	Town	St	Region	DPS Incident #	Comments
12/06/2008	309 North St	Oneida	NY	Mohawk Valley	081207051234	
12/07/2008	9 Colleen Dr	Loudonville	NY	Capital	081207101836	
12/11/2008	1632 Broadway	Rensselaer	NY	Capital	081211080340	
12/11/2008	4186 Delaware Ave	Tonawanda	NY	Frontier	081211053401	
12/12/2008	2764 State Route 9	Ballston Spa	NY	Northeast	081213010220	
12/12/2008	1178 Glenwood Blvd	Schenectady	NY	Capital	081213125706	
12/13/2008	154 Sherman St	Schenectady	NY	Capital		No Incident Report
12/13/2008	267 Hayes Rd	Schuylerville	NY	Northeast		No Incident Report
12/13/2008	105 Apple Ln	Claverack	NY	Capital		No Incident Report
12/13/2008	18 Teresa St	Latham	NY	Capital		No Incident Report
12/15/2008	80 Route 236	Clifton Park	NY	Capital	081215092317	
12/15/2008	9809 Mariaville Rd	Pattersonville	NY	Capital	081215092908	
12/19/2008	1662 Niagara Ave	Niagara Falls	NY	Frontier	081221083809	
12/20/2008	1662 Niagara Ave	Niagara Falls	NY	Frontier		No Incident Report
12/24/2008	18 Axbridge Ln	Delmar	NY	Capital	081225045743	
12/26/2008	19 Wheeler Ave	Cortland	NY	Central		No Incident Report
12/28/2008	37 14th St	Troy	NY	Capital	081228105458	
12/28/2008	3738 W Main Street Rd	Batavia	NY	Genesee	081228013828	
12/29/2008	25 N Main St	Portville	NY	Southwest		No Incident Report
12/31/2008	108 Church Rd	Frankfort	NY	Mohawk Valley	081231093735	
01/06/2009	610 Pond St	Syracuse	NY	Central	090107045738	
01/08/2009	433 Gifford St	Syracuse	NY	Central	090108031752	
01/08/2009	7651 Morgan Rd	Liverpool	NY	Central	090108050102	
01/08/2009	10 116th St	Troy	NY	Capital	090108032128	
01/09/2009	69 Trinity Pl	Albany	NY	Capital	090109115023	
01/09/2009	111 Edson St	Buffalo	NY	Frontier	090109052425	
01/09/2009	164 Royal Ave	Buffalo	NY	Frontier	090109050007	
01/10/2009	5350 State Route 104	Oswego	NY	Oswego	090111020727	
01/12/2009	2979 Oneida St	Sauquoit	NY	Mohawk Valley	090112033850	
01/12/2009	34 Hennepin St	Buffalo	NY	Frontier	090112032323	
01/15/2009	9710 Leroy Pavilion Rd	Pavilion	NY	Genesee	090115035144	
01/16/2009	49 Russell Pyrites Rd	Russell	NY	Northern		No Incident Report
01/22/2009	23865 State Route 180	Dexter	NY	Northern	090122061815	
01/23/2009	1636 Lockport St	Olcott	NY	Frontier	090123073303	
01/23/2009	34 Hennepin St	Buffalo	NY	Frontier		No Incident Report
01/27/2009	110 Davidson Ave	Buffalo	NY	Frontier		No Incident Report

01/27/2009	10 Harper Ter	Carthage	NY	Northern	090127045207	
01/28/2009	Main & W Elm	Oneida	NY	Mohawk Valley	090128025012	
01/29/2009	780 Hatch Rd	West Stockholm	NY	Northern		No Incident Report
01/31/2009	544 Two Mile Creek Rd	Tonawanda	NY	Frontier		No Incident Report
01/31/2009	8787 Larchmont Dr	Brewerton	NY	Central	090131042502	
02/02/2009	32 Church St	Nassau	NY	Capital	090202053123	
02/02/2009	34 Hennepin St *2nd*	Buffalo	NY	Frontier		No Incident Report
02/04/2009	11 5th Ave	Cortland	NY	Central	090204091856	
02/04/2009	921 Main St	Buffalo	NY	Frontier	090204090034	
02/09/2009	21 Gold St	Buffalo	NY	Frontier	090209045712	
02/11/2009	4371 County Route 24	Russell	NY	Northern	090211053433	
02/12/2009	123 Donaldson Rd	Buffalo	NY	Frontier	090212115228	
02/14/2009	10 Schuyler St	Dolgeville	NY	Mohawk Valley	090214060255	
02/14/2009	263 Parker Ave	Buffalo	NY	Frontier	090214061318	
02/16/2009	366 Malloch Rd	Churchville	NY	Genesee		No Incident Report
02/18/2009	4060 Mill Rd	Skaneateles	NY	Central	090218035411	
02/18/2009	75 Bannard Ave	Tonawanda	NY	Frontier	090219045659	
02/24/2009	9 Colleen Dr	Loudonville	NY	Capital		No Incident Report
03/01/2009	722 Plant St	Utica	NY	Mohawk Valley	090302013911	
03/02/2009	10620 State Rte 7	Worcester	NY	Northeast	090303061840	
03/02/2009	109 Dolores S Ter	North Syracuse	NY	Central	090303063436	
03/05/2009	1632 Broadway *2nd*	Rensselaer	NY	Capital		No Incident Report
03/11/2009	622 Tarbell Hill Rd	Moriah	NY	Northeast	090312114719	
03/13/2009	1407 2nd St	Rensselaer	NY	Capital	090313041035	
03/13/2009	50 Hoit Rd	Moir	NY	Northern	090315011345	
03/16/2009	7245 Cadiz Rd	Franklinville	NY	Southwest	090316073323	
03/16/2009	10206 Capron Rd	Lee Center	NY	Mohawk Valley		No Incident Report
03/20/2009	122 Washington St	Utica	NY	Mohawk Valley	090320052100	
03/26/2009	412 Wright Ave	Syracuse	NY	Central	090326052111	
03/28/2009	1046 E Ferry St	Buffalo	NY	Frontier	090329052449	
03/31/2009	6 Smith Bridge Rd	Saratoga Springs	NY	Northeast	090401013609	
04/01/2009	800 McClanathan Ave	Sylvan Beach	NY	Mohawk Valley	090401050542	
04/01/2009	933 Leray St	Watertown	NY	Northern	090401050914	
04/08/2009	319 E 2nd St	Oswego	NY	Central	090408113015	
04/08/2009	6 & 8 Eagle Trace	Amherst	NY	Frontier	090408061942	
04/09/2009	1494 Bame Rd	Castleton	NY	Capital		No Incident Report
04/09/2009	P13 Warren Cemetery Rd	Hoosick Falls	NY	Northeast	090409061047	
04/12/2009	29 Pratt Rd	Whitehall	NY	Northeast	090412085944	
04/13/2009	1108 Bronson St	Watertown	NY	Northern	090413053138	
04/13/2009	8687 State Highway 56	Raymondville	NY	Northern	090415074106	

04/19/2009	105 Broad St	Gloversville	NY	Northeast	090419053836	
04/20/2009	8247 Akron Rd	Lockport	NY	Frontier	090420055208	
04/20/2009	2575 Johnson Rd	Scotia	NY	Capital	090420060221	
04/25/2009	138 Dater Hill Rd	Troy	NY	Capital	090425055836	
04/28/2009	8959 Oswego Rd	Baldwinsville	NY	Central		No Incident Report
04/29/2009	260 Western Ave	Albany	NY	Capital		No Incident Report
05/01/2009	11 Horizon Dr	Saratoga Springs	NY	Northeast		No Incident Report
05/01/2009	66 Union St	Amsterdam	NY	Northeast	090502043503	
05/02/2009	1003 County Route 34	Potsdam	NY	Northern		No Incident Report
05/04/2009	11 Beck St	Fort Plain	NY	Northeast	090504102810	
05/07/2009	9241 Glenwood Dr	Leroy	NY	Genesee	090508061901	
05/11/2009	66 Union St *2nd*	Amsterdam	NY	Northeast	090512025639	
05/12/2009	1137 Jefferson Ave	Utica	NY	Mohawk Valley	090512020051	
05/19/2009	1760 State Route 95	Bombay	NY	Northern	090519100754	
05/20/2009	0 Main Rd	Piseco	NY	Northeast	090520113150	
05/20/2009	14 Ashdown Rd	Ballston Lake	NY	Capital	090520024803	
05/26/2009	94 Harding Ave	Kenmore	NY	Frontier		No Incident Report
05/28/2009	7469 N Main St	Newport	NY	Mohawk Valley	090528022304	
05/30/2009	Newman Rd	Redwood	NY	Northern	090601105741	
05/30/2009	7 Mill Rd	Cossayuna	NY	Northeast		No Incident Report
06/02/2009	675 Brunswick Rd	Troy	NY	Capital	090602054533	
06/04/2009	62 Rolling Brook Dr	Clifton Park	NY	Capital	090604121650	
06/05/2009	34 Lakeside Dr	Bemus Point	NY	Southwest	090605015013	
06/05/2009	3711 E Lake St Trlr 63	Dunkirk	NY	Southwest	090605095437	
06/06/2009	1419 Hillside Rd	Utica	NY	Mohawk Valley	090607060519	
06/07/2009	20 Woodland Path	Queensbury	NY	Northeast	090607080212	
06/08/2009	37 McKinley Way	Wynantskill	NY	Capital	090608065633	
06/08/2009	2124 US Route 9	Schroon Lake	NY	Northeast	090608074338	
06/11/2009	305 Brookfield Rd	Syracuse	NY	Central	090611102045	
06/15/2009	112 Seneca Ave	Baldwinsville	NY	Central	090615094116	
06/15/2009	327 Woodstock Rd	Wast Berne	NY	Capital	090615022247	
06/18/2009	1662 Niagara Ave	Niagara Falls	NY	Frno		No Incident Report
06/18/2009	245 12th St	Schenectady	NY	Capital	090618040759	
06/20/2009	1325 Sycamore St	Buffalo	NY	Frontier	090621053126	
06/22/2009	283 Risley Rd	De Kalb Junction	NY	Northern	090622052218	
06/25/2009	6 Troy View Ln	Williamsville	NY	Frontier		No Incident Report
06/26/2009	Transmission Line #17	Albany	NY	Capital	090626124633	
06/26/2009	3443 Case Rd	Marietta	NY	Central		No Incident Report
06/29/2009	122 Houseman St	Mayfield	NY	Northeast	090629012724	
06/30/2009	3529 Pebble Beach Rd	Lakeville	NY	Genesee		No Incident Report

07/03/2009	25650 County Route 17	Evans Mills	NY	Northern	0907030621459	
07/08/2009	136 Campbell Ave	Yorkville	NY	Mohawk Valley	090709051719	
07/08/2009	20695 Shepard St	Watertown	NY	Northern	090708024244	
07/14/2009	412 Vermont St	Buffalo	NY	Frontier	090714075632	
07/16/2009	844 Mercer St	Albany	NY	Capital	090716125932	
07/19/2009	7274 E Taft Rd	East Syracuse	NY	Central		No Incident Report
07/22/2009	16 Cedar St	Scottsville	NY	Genesee	090722035911	
07/22/2009	2506 Old State Rd	Wadsworth	NY	Genesee		No Incident Report
07/22/2009	135 Weyand Ave	Buffalo	NY	Frontier	090722074457	
07/23/2009	91 Pine Cove Rd	Hague	NY	Northeast	090723091015	
07/23/2009	126 Prospect St	Schoharie	NY	Northeast		No Incident Report
07/23/2009	85 Delaware Ave	Albany	NY	Capital	090723064348	
07/24/2009	8867 W Henrietta Rd	Rush	NY	Genesee	090729070911	
07/26/2009	30 Preston Rd	Buffalo	NY	Frontier	090726011227	
07/28/2009	30 Somerset Dr	Glenmont	NY	Capital	090728011122	
07/29/2009	104 E Corey Rd	Syracuse	NY	Central	090731035200	
07/29/2009	1440 Westwood Ave	North Tonawanda	NY	Frontier	090731033349	
07/30/2009	Liberty St & Nott Terr	Schenectady	NY	Capital	090730113227	
08/01/2009	2433 County Route 6	Fulton	NY	Central	090801111756	
08/03/2009	27 Glenwood Dr	Ballston Lake	NY	Capital	090803092401	
08/03/2009	1 Palm St	Schenectady	NY	Capital	090803094105	
08/03/2009	8456 Colvin Rd	Cattaraugus	NY	Southwest	090803051424	
08/04/2009	21601 Floral Dr	Watertown	NY	Northern	090804102054	
08/05/2009	91 Whitehall Ave	Buffalo	NY	Frontier	090805051700	
08/06/2009	105 Alton St	Syracuse	NY	Central	090806064959	
08/09/2009	8247 Reed Hill Rd	East Otto	NY	Southwest	090810031826	
08/09/2009	48 Wright Rd	Granville	NY	Northeast	090809013743	
08/11/2009	2423 N Shore Rd	Hadley	NY	Northeast	090811051849	
08/12/2009	0 Burch St	Little Falls	NY	Mohawk Valley	090813042750	
08/13/2009	15107 State Route 178	Adams	Ny	Northern	090813012542	
08/13/2009	5 Bristol Ct	Clifton Park	NY	Capital	090813102325	
08/14/2009	8780 W Henrietta Rd	Rush	NY	Genesee	090814042605	
08/14/2009	86 Weiss St	Buffalo	NY	Frontier	090814102206	
08/15/2009	41 Pearl Ave	Lackawanna	NY	Frontier	090816103822	
08/16/2009	9423 Sulphur Springs Rd	Sauquoit	NY	Mohawk Valley	090817032306	
08/18/2009	48 Wright Rd *2nd*	Granville	NY	Northeast	090818095455	
08/18/2009	8780 W Henrietta Rd *2nd*	Rush	NY	Genesee	090818054038	
08/18/2009	133 Farley Rd	Hudson Falls	NY	Northeast	090818065938	
08/18/2009	545 Knickerbocker Rd	Schodack Landing	NY	Capital	090818051929	
08/20/2009	220 Pickford Ave	Kenmoer	NY	Frontier	090820043227	

08/20/2009	232 Sobieski St	Buffalo	NY	Frontier	090820042757	
08/20/2009	81 Thimbleberry Rd	Ballston Spa	NY	Northeast	090820014717	
08/21/2009	200 Dockey Rd	Little Falls	NY	Northeast		No Incident Report
08/22/2009	136 Campbell Ave *2nd*	Yorkville	NY	Mohawk Valley	090822034223	
08/24/2009	48 Wright Rd *3rd*	Granville	NY	Northeast	090825042633	
08/24/2009	0 Rt 26A	Williamstown	NY	Central	090824010400	
08/24/2009	9364 Alexander Rd	Alexander	NY	Genesee	090825043047	
08/24/2009	273 Big Brook Rd	Indian Lake	NY	Northeast	090824032835	
08/25/2009	2285 Barkley St	Argyle	NY	Northeast	090825113629	
08/25/2009	143 Woods Hollow Rd	Gloversville	NY	Northeast	090825113022	
08/26/2009	20 Nelson Ave	Rensselaer	NY	Capital	090826125620	
08/29/2009	21 1/2 Maple Ave	Franklinville	NY	Southwest	090829061511	
09/02/2009	3725 Southside Rd, Barn	Frankfort	NY	Mohawk Valley	090902033256	
09/03/2009	132 State St	Albany	NY	Northeast	090903021738	
09/03/2009	627 Via Ponderosa	Schenectady	NY	Capital		No Incident Report
09/03/2009	114 Weyand Ave	Buffalo	NY	Frontier	090903095231	
09/04/2009	47 Melrose Ave	Albany	NY	Capital	090904045130	
09/04/2009	6763 Bear Ridge Rd	Lockport	NY	Frontier	090904041421	
09/05/2009	206 Herriman St	Syracuse	NY	Central	090905012351	
09/08/2009	900 Rock City Rd	Ballston Spa	NY	Northeast	090908042930	
09/08/2009	218 Miami St	Buffalo	NY	Frontier	090908083251	
09/08/2009	3850 Oran-Gulf Rd	Manlius	NY	Central	090908061241	
09/09/2009	73 Frontenac Ave	Buffalo	NY	Frontier	090910061623	
09/09/2009	9 Care Free Ln	Sauquoit	NY	Mohawk Valley	090909094522	
09/11/2009	9250 Creek Rd	Batavia	NY	Genesee	090911052503	
09/19/2009	5675 Dover Rd	Lake View	NY	Southwest	090919075746 & 090919063811	2 Incident Reports/1 Shock
09/21/2009	119 Columbia St	Hudson	NY	Capital	090921105249	
09/21/2009	232 Sobieski St *2nd*	Buffalo	NY	Frontier	090921094141	
09/21/2009	211 W Bloomfield St	Rome	NY	Mohawk Valley	090921043353	
09/22/2009	510 North St	Chittenango	NY	Central	090922011424	
09/23/2009	79 Bridgeman St	Buffalo	NY	Frontier	090923083854	
09/25/2009	12 Edward St	Valley Falls	NY	Capital	090925043225	
09/25/2009	16 Kaatskill Way	Ballston Spa	NY	Northeast	090925023025	
09/29/2009	315 Northumberland Ave	Buffalo	NY	Frontier	090929081157	
10/01/2009	1025 Hardy Corners Rd	Farmersville Sta	NY	Southwest	091001054246	
10/02/2009	33 Woodward Ave	Angola	NY	Southwest	091002042135	
10/05/2009	3749 Nelson Ave	Woodlawn	NY	Frontier		No Incident Report
10/08/2009	21 Cardinal Dr	Williamsville	NY	Frontier	091008012150	
10/08/2009	130 Edgebrook Estates Cir	Frankfort	NY	Mohawk Valley		No Incident Report
10/10/2009	1369 Philomena Rd	Schenectady	NY	Capital	091010060632	

10/12/2009	201 Willard St	Minoa	NY	Central	091012034638	
10/13/2009	3687 Human Rd	Sanborn	NY	Frontier	091013032858	
10/14/2009	111 Colton Ave	Lackawanna	NY	Frontier		No Incident Report
10/14/2009	157 Forrest Way	Camillus	NY	Central	091014045926	
10/15/2009	103 N 3rd St	Allegany	NY	Southwest	091015032650	
10/15/2009	37045 Rock Beach N Rd	Clayton	NY	Northern	091015050612	
10/15/2009	492 Sixty Six Rd	Hannibal	NY	Central	091015070745	
10/16/2009	1649 Ridge Rd	Queensbury	NY	Northeast		No Incident Report
10/18/2009	S4206 Bayview Rd	Blasdell	NY	Southwest	091018121448	
10/20/2009	303 Given Rd	Edwards	NY	Northern	091020080350	
10/21/2009	179 Lakeview Ave	Syracuse	NY	Central	091021024350	
10/26/2009	1515 Whitney Ave	Niagara Falls	NY	Frontier	091027042907	
10/27/2009	137 State Route 104	Oswego	NY	Central		No Incident Report
10/28/2009	85 Waterview Pkwy	Hamburg	NY	Southwest		No Incident Report
10/28/2009	11444 US Highway 11	North Lawrence	NY	Northern	091028123506	
10/29/2009	107 Tucker Ave	East Syracuse	NY	Central	091029083147	
11/02/2009	6811 Rush Lima Rd	Rush	NY	Genesee	091102114721	
11/06/2009	326 Green St	Syracuse	NY	Central	091106021431	
11/10/2009	5504 Bushart Rd	Oriskany	NY	Mohawk Valley	091110090134	
11/11/2009	5504 Bushart Rd	Oriskany	NY	Mohawk Valley	091112021111	Duplicate of 11/10 report
11/12/2009	5504 Bushart Rd	Oriskany	NY	Mohawk Valley	091113032013	
11/16/2009	23865 State Route 180	Dexter	NY	Northern		No Incident Report
11/16/2009	112 S Orchard St	Watertown	NY	Northern		No Incident Report
11/20/2009	21 1/2 Maple Ave	Franklinville	NY	Southwest	091120052606	
11/20/2009	5504 Bushart Rd	Oriskany	NY	Mohawk Valley	091120112215	
11/23/2009	106 Carlton Rd	Syracuse	NY	Central	091124050612	
11/28/2009	1934 La Salle Ave	Niagara Falls	NY	Frontier	091128014626	
11/30/2009	89 Anuszewski Ln	Greenwich	NY	Northeast	091201052348	
12/02/2009	51 E 9th St	Oswego	NY	Central	091204050323	
12/05/2009	163 Kingsley St	Buffalo	NY	Frontier	091207051530	
12/07/2009	20 Sanders Ave	Scotia	NY	Capital		No Incident Report
12/14/2009	5128 Route 430	Bemus Point	NY	Southwest		No Incident Report
12/15/2009	5775 Linda Dr	Marcy	NY	Mohawk Valley	091215030456	

Appendix 4

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Distribution			
Overhead Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Poles			
Pole Condition			
Number of Deficiencies	14	1561	8629
Repaired in Time Frame	9	227	667
Repaired - Overdue	5	5	0
Not Repaired - Not Due	0	1329	7962
Not Repaired - Overdue			
Grounding System			
Number of Deficiencies	24	2286	12703
Repaired in Time Frame	24	801	1114
Repaired - Overdue			
Not Repaired - Not Due	0	1485	11589
Not Repaired - Overdue			
Anchors/Guy Wire			
Number of Deficiencies	1	4221	2717
Repaired in Time Frame	1	1163	223
Repaired - Overdue			
Not Repaired - Not Due	0	3058	2494
Not Repaired - Overdue			
Cross Arm/Bracing			
Number of Deficiencies	18	594	3136
Repaired in Time Frame	16	181	313
Repaired - Overdue	2	1	0
Not Repaired - Not Due	0	412	2823
Not Repaired - Overdue			
Riser			
Number of Deficiencies	0	1128	852
Repaired in Time Frame	0	225	98
Repaired - Overdue			
Not Repaired - Not Due	0	903	754
Not Repaired - Overdue			
Conductors			
Primary Wire/Broken Ties			

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Distribution			
Overhead Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Number of Deficiencies	78	280	116
Repaired in Time Frame	63	128	8
Repaired - Overdue	15	1	0
Not Repaired - Not Due	0	151	108
Not Repaired - Overdue			
Secondary Wire			
Number of Deficiencies	21	203	844
Repaired in Time Frame	20	73	70
Repaired - Overdue	1	0	0
Not Repaired - Not Due	0	130	774
Not Repaired - Overdue			
Neutral			
Number of Deficiencies			
Repaired in Time Frame			
Repaired - Overdue			
Not Repaired - Not Due			
Not Repaired - Overdue			
Insulators			
Number of Deficiencies	21	273	3609
Repaired in Time Frame	20	97	482
Repaired - Overdue	1	2	0
Not Repaired - Not Due	0	174	3127
Not Repaired - Overdue			
Pole Equipment			
Transformers			
Number of Deficiencies	5	5673	1882
Repaired in Time Frame	4	1283	199
Repaired - Overdue	1	0	0
Not Repaired - Not Due	0	4390	1683
Not Repaired - Overdue			
Cutouts			
Number of Deficiencies	32	137	10019
Repaired in Time Frame	30	74	936

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Distribution

Overhead Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Repaired - Overdue	2	1	0
Not Repaired - Not Due	0	62	9083
Not Repaired - Overdue			
Lightning Arrestors			
Number of Deficiencies	0	2	1678
Repaired in Time Frame	0	0	156
Repaired - Overdue			
Not Repaired - Not Due	0	2	1522
Not Repaired - Overdue			
Other Equipment			
Number of Deficiencies	1	2009	1414
Repaired in Time Frame	1	427	104
Repaired - Overdue			
Not Repaired - Not Due	0	1582	1310
Not Repaired - Overdue			
Miscellaneous			
Trimming Related			
Number of Deficiencies	38	0	5841
Repaired in Time Frame	36	0	349
Repaired - Overdue	2	0	0
Not Repaired - Not Due	0	0	5492
Not Repaired - Overdue			
Other			
Number of Deficiencies	0	8	14
Repaired in Time Frame	0	7	10
Repaired - Overdue			
Not Repaired - Not Due	0	1	4
Not Repaired - Overdue			
Overhead Facilities Total			
Total			
Number of Deficiencies	253	18375	53454
Repaired in Time Frame	224	4686	4729
Repaired - Overdue	29	10	0

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Distribution			
Overhead Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Not Repaired - Not Due	0	13679	48725
Not Repaired - Overdue			

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Transmission			
Transmission Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Towers/Poles			
Steel Towers			
Number of Deficiencies	0	7	85
Repaired in Time Frame	0	4	1
Repaired - Overdue			
Not Repaired - Not Due	0	3	84
Not Repaired - Overdue			
Poles			
Number of Deficiencies	0	55	740
Repaired in Time Frame	0	15	8
Repaired - Overdue	0	1	0
Not Repaired - Not Due	0	39	732
Not Repaired - Overdue			
Anchors/Guy Wire			
Number of Deficiencies	1	9	256
Repaired in Time Frame	1	5	7
Repaired - Overdue			
Not Repaired - Not Due	0	4	249
Not Repaired - Overdue			
Crossarm/Brace			
Number of Deficiencies	3	13	129
Repaired in Time Frame	3	5	5
Repaired - Overdue			
Not Repaired - Not Due	0	6	124
Not Repaired - Overdue	0	*2	0
Grounding System			
Number of Deficiencies	0	3	295
Repaired in Time Frame	0	2	17
Repaired - Overdue			
Not Repaired - Not Due	0	1	278
Not Repaired - Overdue			
Conductors			
Cable			

*Beck Lockport Olin Tap – Broken cross brace closed out in error. Was re-entered as Level II and repaired on 2/9/10.

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Transmission

Transmission Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Number of Deficiencies	4	2	47
Repaired in Time Frame	4	1	2
Repaired - Overdue			
Not Repaired - Not Due	0	*1	45
Not Repaired - Overdue			
Static/Neutral			
Number of Deficiencies	6	2	43
Repaired in Time Frame	6	1	1
Repaired - Overdue			
Not Repaired - Not Due	0	1	42
Not Repaired - Overdue			
Insulators			
Number of Deficiencies	0	22	425
Repaired in Time Frame	0	14	33
Repaired - Overdue			
Not Repaired - Not Due	0	8	392
Not Repaired - Overdue			
Miscellaneous			
Right of Way Condition			
Number of Deficiencies	0	0	31
Repaired in Time Frame	0	0	4
Repaired - Overdue			
Not Repaired - Not Due	0	0	27
Not Repaired - Overdue			
Other			
Number of Deficiencies	1	31	22
Repaired in Time Frame	1	11	0
Repaired - Overdue			
Not Repaired - Not Due	0	20	22
Not Repaired - Overdue			
Transmission Facilities Total			
Total			
Number of Deficiencies	15	144	2073

*Spier Rotterdam – bird caging deficiency has been reclassified as Level 3.

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Transmission			
Transmission Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Repaired in Time Frame	15	58	78
Repaired - Overdue	0	1	0
Not Repaired - Not Due	0	83	1995
Not Repaired - Overdue	0	2	0

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Underground

Underground Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Underground Structures			
Damaged Cover			
Number of Deficiencies	0	9	60
Repaired in Time Frame	0	2	1
Repaired - Overdue			
Not Repaired - Not Due	0	7	59
Not Repaired - Overdue			
Damaged Structure			
Number of Deficiencies	57	585	20
Repaired in Time Frame	51	107	3
Repaired - Overdue	6	0	0
Not Repaired - Not Due	0	478	17
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	0	18	2
Repaired in Time Frame	0	2	0
Repaired - Overdue			
Not Repaired - Not Due	0	16	2
Not Repaired - Overdue			
Conductors			
Primary Cable			
Number of Deficiencies	0	13	0
Repaired in Time Frame			
Repaired - Overdue			
Not Repaired - Not Due	0	13	0
Not Repaired - Overdue			
Secondary Cable			

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Underground			
Underground Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Number of Deficiencies	9	0	0
Repaired in Time Frame	9	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	140	0
Repaired in Time Frame	0	16	0
Repaired - Overdue			
Not Repaired - Not Due	0	124	0
Not Repaired - Overdue			
Miscellaneous			
Other			
Number of Deficiencies	2	773	238
Repaired in Time Frame	2	63	22
Repaired - Overdue			
Not Repaired - Not Due	0	710	216
Not Repaired - Overdue			
Underground Facilities Total			
Total			
Number of Deficiencies	68	1538	320
Repaired in Time Frame	62	190	26
Repaired - Overdue	6	0	0
Not Repaired - Not Due	0	1348	294
Not Repaired - Overdue			

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Pad Mount Transformers			
Pad Mount Transformers	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Pad Mount Transformers			
Damaged Structure			
Number of Deficiencies	6	118	98
Repaired in Time Frame	6	33	5
Repaired - Overdue			
Not Repaired - Not Due	0	85	93
Not Repaired - Overdue			
Damaged Equipment			
Number of Deficiencies	0	0	3
Repaired in Time Frame			
Repaired - Overdue			
Not Repaired - Not Due	0	0	3
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	5	68	0
Repaired in Time Frame	5	22	0
Repaired - Overdue			
Not Repaired - Not Due	0	46	0
Not Repaired - Overdue			
Off Pad			
Number of Deficiencies	9	156	0
Repaired in Time Frame	9	71	0
Repaired - Overdue			
Not Repaired - Not Due	0	85	0
Not Repaired - Overdue			
Lock/Latch/Penta			
Number of Deficiencies			

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Pad Mount Transformers			
Pad Mount Transformers	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Repaired in Time Frame			
Repaired - Overdue			
Not Repaired - Not Due			
Not Repaired - Overdue			
Miscellaneous			
Other			
Number of Deficiencies	0	7	1526
Repaired in Time Frame	0	0	26
Repaired - Overdue			
Not Repaired - Not Due	0	7	1500
Not Repaired - Overdue			
Pad Mount Total			
Total			
Number of Deficiencies	20	349	1627
Repaired in Time Frame	20	126	31
Repaired - Overdue			
Not Repaired - Not Due	0	223	1596
Not Repaired - Overdue			

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Streetlights			
Overhead Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Streetlight			
Base/Standard/Light			
Number of Deficiencies	1	12	1726
Repaired in Time Frame	1	0	1
Repaired - Overdue			
Not Repaired - Not Due	0	0	1725
Not Repaired - Overdue	0	12	0
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	0	63	1765
Repaired in Time Frame	0	0	2
Repaired - Overdue			
Not Repaired - Not Due	0	35	1763
Not Repaired - Overdue	0	28	0
Access Cover			
Number of Deficiencies	0	46	33
Repaired in Time Frame	0	0	24
Repaired - Overdue			
Not Repaired - Not Due	0	25	9
Not Repaired - Overdue	0	21	0
Miscellaneous			
Other			
Number of Deficiencies	0	188	523
Repaired in Time Frame			
Repaired - Overdue			
Not Repaired - Not Due	0	0	523
Not Repaired - Overdue	0	188	0
Streetlight Total			

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Streetlights			
Overhead Facilities	2009		
Priority Level	I	II	III
Repair Expected	Within 1 week	Within 1 year	Within 3 years
Total			
Number of Deficiencies	1	309	4047
Repaired in Time Frame	1	0	27
Repaired - Overdue			
Not Repaired - Not Due	0	60	4020
Not Repaired - Overdue	0	249	0

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Level IV Conditions		
Overhead Facilities	2009	
	Number of Conditions Found	Number of Conditions Repaired
Overhead Facilities		
Pole Condition		
Pole Condition	27322	19627
Grounding System	78710	2
Anchors/Guy Wire	54831	19609
Cross Arm/Bracing	24667	198
Riser		
Conductors		
Primary Wire/Broken Ties	1623	1
Secondary Wire	713	0
Neutral		
Insulators	13264	83
Pole Equipment		
Transformers	29608	239
Cutouts	24877	1
Lightning Arrestors	1241	0
Other Equipment	12037	4
Miscellaneous		
Trimming Related		
Other	20	0
Overhead Facilities Total	268913	39764
Transmission Facilities		
Towers/Poles		
Steel Towers	53	0
Poles	1042	0
Anchors/Guy Wire	917	436
Crossarm/Brace		
Grounding System		
Conductors		
Cable	5	0
Static/Neutral		
Insulators	421	0
Miscellaneous		
Right of Way Condition	463	1

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Level IV Conditions		
Overhead Facilities	2009	
	Number of Conditions Found	Number of Conditions Repaired
Other	3427	2530
Transmission Facilities Total	6328	2967
Underground Facilities		
Underground Structures		
Damaged Cover	32	19
Damaged Structure	402	268
Congested Structure		
Damaged Equipment	230	60
Conductors		
Primary Cable	3	3
Secondary Cable	18	18
Neutral Cable		
Racking Needed	5	5
Miscellaneous		
Other	9997	3645
Underground Facilities Total	10687	4018
Pad Mount Transformers		
Underground Structures		
Damaged Structure	3798	3011
Damaged Equipment		
Damaged Cable		
Oil Leak		
Off Pad		
Lock/Latch/Penta		
Miscellaneous		
Other	7365	7078
Pad Mount Transformer Total	11163	10089
Streetlights		
Streetlight		
Base/Standard/Light	21248	1
Handhole/Service Box		
Service/Internal Wiring	9	0
Access Cover	2860	0

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process -Level IV Conditions		
Overhead Facilities	2009	
	Number of Conditions Found	Number of Conditions Repaired
Miscellaneous		
Other	76	0
Streetlight Total	24193	1
Total Level IV Conditions		
Overall Total	321,284	56,839

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
2009							
	I	Within 1 week	357	322	35	0	0
	II	Within 1 year	20715	5060	11	15393	251
	III	Within 3 years	61521	4891	0	56630	0
	IV	N/A	321284	56839	0	264445	0

Appendix 5

Temporary Repair Exceptions

National Grid has no temporary repair exceptions to report. National Grid field employees have been directed not to create any temporary repairs in the field going forward.

The Company has updated its asset data warehouse, Computapole, to collect/track and repair by the 90-day requirement outlined in the December 15, 2008 PSC “Order Adopting Changes to Electric Safety Standards.”

In addition, National Grid has created a new EOP, *Tracking Temporary Repairs to Electric System*, a copy of which is attached below.

Please note: The temporary repair EOP is in draft form at this time. There are operational and technological impacts that need to be addressed in order to finalize this document (e.g. ensuring field operations can fulfill the requirements of the EOP, completing programming changes to ensure data is captured correctly and can successfully be transmitted to our work management system, et. cetera).

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	TRACKING TEMPORARY REPAIRS TO ELECTRIC SYSTEM	Version 1.0 – 12/09/09

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.

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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.

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I. 1.0 TEMPORARY REPAIRS MADE BY OPERATIONS

(1) 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.

II. 2.0 TEMPORARY REPAIRS DISCOVERED BY INSPECTIONS

(1) 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.

III. 3.0 TEMPORARY OVERHEAD REPAIRS (TOH)

(1) 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.

IV. 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

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(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.

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

V. 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.

VI. REVISION HISTORY

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
1.0	12/09/09	This is a new document



Inspections - 2009 New York Mobile Stray Voltage Testing Project Report January 15, 2010

Background

On December 15, 2008, the New York State Public Service Commission (“Commission”) issued an order requiring the electric utilities, with the exception of Con Edison, to conduct mobile stray voltage testing in appropriate areas of cities with a population of at least 50,000 (based on the results of the 2000 census), during calendar year 2009 to positively identify those areas that can be effectively surveyed. The testing shall continue annually thereafter until further direction from the Commission and will meet the annual requirement under the electric safety standards for those areas.

Niagara Mohawk Power Corporation d/b/a National Grid (“National Grid” or “Company”) utilized the services of Power Survey LLC (“Power Survey”) to perform the mobile testing in the six cities in the Company’s service territory where such testing is required by the order. Those six cities are: Buffalo, Niagara Falls, Syracuse, Utica, Albany, and Schenectady.

The 2009 mobile testing cycle took seven weeks to complete from October 5, 2009 to November 20, 2009. Power Survey scanned a total of 3,229 miles, and found 2,870 energized objects. All repairs to National Grid owned assets are 100 percent complete while privately owned assets are 93.6 percent complete. The overall mitigation effort is 99.62 percent as of January 15, 2010.

Mobile Testing Verification Process

Following discussions with Commission Staff, National Grid and Staff agreed that the Company would verify a stray voltage finding made by the mobile survey by using its own internal testing verification procedure as outlined in Section V of National Grid’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.

Mobile Testing Results by City

1. Buffalo

Buffalo is the largest of the six cities. Power Survey was able to complete the testing in four weeks, using three scanning vehicles for the first two weeks and five scanning vehicles for the remaining two weeks. The results are as follows:

- a. Stray voltage findings at 4.4v and below = 1,816
- b. Stray voltage findings at 4.5v and above = 861
- c. Miles scanned = 1,444
- d. National Grid structures scanned = 28,440

2. Niagara Falls

Testing in Niagara Falls began on November 9th and was completed on November 10th with the following results:

- a. Stray voltage findings at 4.4v and below = 46
- b. Stray voltage findings at 4.5v and above = 8
- c. Miles scanned = 265
- d. National Grid structures scanned = 1,378

3. Syracuse

Testing in Syracuse began on November 2nd and was completed on November 5th with the following results:

- a. Stray voltage findings at 4.4v and below = 6
- b. Stray voltage findings at 4.5v and above = 6
- c. Miles scanned = 611
- d. National Grid structures scanned = 2,818

4. Utica

Testing in Utica began on November 11th and was completed on November 19th with the following results:

- a. Stray voltage findings at 4.4v and below = 5
- b. Stray voltage findings at 4.5v and above = 8
- c. Miles scanned = 321
- d. National Grid structures scanned = 1,349

5. Albany

Testing began in Albany on November 16th and was completed on November 20th with the following results:

- a. Stray voltage findings at 4.4v and below = 55
- b. Stray voltage findings at 4.5v and above = 46
- c. Miles scanned = 396
- d. National Grid structures scanned = 4,778

6. Schenectady

Testing began in Schenectady on November 19th and was completed on November 20th with the following results:

- a. Stray voltage findings at 4.4v and below = 3
- b. Stray voltage findings at 4.5v and above = 10
- c. Miles scanned = 192

d. National Grid structures scanned = 632

Summary tables illustrating test results by region and National Grid structures scanned by city can be found in Appendices A and B.

Mobile Testing Repair/Mitigation Efforts

As of January 4, 2010, all initial repairs to National Grid owned assets were completed within the allotted 45 day deadline. National Grid anticipates that all permanent repairs, to address any temporary overhead repairs, will be completed by April 2010.

There are eleven outstanding initial repairs to privately owned assets. These are all in the City of Buffalo, have been made safe and are currently in the process of being mitigated by the City. A table detailing the pending private repairs is illustrated in Appendix C.

At this time, National Grid is auditing the repairs and compiling and entering the information into a database. National Grid will continue to work with the respective municipalities until all repairs are complete.

A summary table illustrating repair status by region can be found in Appendix D.

Mobile Testing Program Costs

As of January 5, 2010, actual costs have amounted to \$6,118,385. A summary table of these costs can be found in Appendix E. This is not the final cost amount, as the Company is continuing to compile this information.

Appendix A

Mobile Testing Summary Report

NY Stray Voltage Mobile Testing Summary Report				
01/11/2010				
	West	Central	East	Grand Total
Testing Summary				
Total Number of Events	2,731	25	114	2,870
<i>At or Above 4.5 Volts</i>	869	14	56	939
<i>Below 4.5 Volts</i>	1,862	11	58	1,931
Total NGRID Owned Events (streetlights)	2,571	19	108	2,698
<i>At or Above 4.5 Volts</i>	803	9	53	865
<i>Below 4.5 Volts</i>	1,768	10	55	1,833
Total Private Owned Events	160	6	6	172
<i>At or Above 4.5 Volts</i>	66	5	3	74
<i>Below 4.5 Volts</i>	94	1	3	98
Survey Percent Complete by City				
<i>Buffalo</i>	100.00%			100.00%
<i>Niagara Falls</i>	100.00%			100.00%
<i>Syracuse</i>		100.00%		100.00%
<i>Utica</i>		100.00%		100.00%
<i>Albany</i>			100.00%	100.00%
<i>Schenectady</i>			100.00%	100.00%
Total Miles Scanned	1,709	932	588	3,229

Appendix B

Summary of National Grid Structures Scanned

National Grid Structures Scanned							
Structure Type	Albany	Buffalo	Niagara Falls	Schenectady	Syracuse	Utica	Grand Total
Streetlight - Metallic SL Standard	1,032	6,638	455	169	1,007	294	9,595
Streetlight - Steel Pole	1,454	7,009	205	138	256	271	9,333
Streetlight - Traffic Control	401	4,638	276	65	605	99	6,084
Streetlight - Wood Pole	0	1	0	0	0	0	1
Streetlight - Handhole	0	1	15	0	0	0	16
Underground - Handhole	241	5,819	237	21	32	19	6,369
Underground - Junction Box	31	11	2	2	0	0	46
Underground - Manhole	991	3,600	112	184	610	631	6,128
Underground - Switchgear	82	98	10	3	89	8	290
Underground - Padmount Transformer	478	367	51	8	97	22	1,023
Underground - Vault	68	258	15	42	122	5	510
Total National Grid Structures	4,778	28,440	1,378	632	2,818	1,349	39,395

Appendix C

Pending Private Repair Detail

Power Survey EventID	Date Found	District Name	Street	Cross Street	Shunt Voltage	Asset Type	Repair Due Date
535	10/14/2009	Buffalo	Cazenovia St NW Cor	N Legion Dr	8	Traffic Standard	12/21/2009
536	10/14/2009	Buffalo	Cazenovia St SE Cor	N Legion Dr	8.2	Traffic Standard	12/21/2009
1096	10/20/2009	Buffalo	696 Tonawanda St	Progressive Ave	2.3	Traffic Standard	12/29/2009
01971	10/26/2009	Buffalo	3043 Main St	Minnesota Ave	1.5	Other	01/05/2010
02058	10/26/2009	Buffalo	661 - opp Delaware Ave	North St	16.5	Traffic Standard	01/05/2010
02181	10/27/2009	Buffalo	E Meadow Dr		9	Other	01/06/2010
02305	10/27/2009	Buffalo	143 Bidwell Pkwy- NE Cor	Elmwood Ave	4.6	Traffic Standard	01/06/2010
02306	10/27/2009	Buffalo	143 Bidwell Pkwy- NW Cor	Elmwood Ave	4.5	Traffic Standard	01/06/2010
02443	10/28/2009	Buffalo	Rockwell Rd	Elmwood Ave	1.6	Traffic Standard	01/07/2010
2622	10/29/2009	Buffalo	Best St- NW Cor	Ellicott St	4.7	Traffic Standard	01/08/2010
2694	10/29/2009	Buffalo	Bailey Ave - NW Cor	E Amherst St	16	Traffic Standard	01/08/2010

NOTE: The structures listed in the table above have been made safe.

Appendix D

Mobile Testing Repair Summary

NY Stray Voltage Mobile Testing Repair Summary Report				
01/13/2010				
	West	Central	East	Grand Total
Repair Summary				
NGRID Repairs				
Required	2,571	19	108	2,698
Completed	2,571	19	108	2,698
Pending (All repairs)	0	0	0	0
Pending (De-energized streetlights)	0	0	0	0
Exceeding 45 Days	0	0	0	0
Percent Complete	100.00%	100.00%	100.00%	100.00%
TOH Repairs	488	0	11	499
TOH Complete	95	0	0	95
TOH Pending	393	0	11	404
TOH Exceeding 90 Days	0	0	0	0
TOH Percent Complete	19.47%	N/A	0.00%	19.04%
Private Repairs				
Required	160	6	6	172
Completed	149	6	6	161
Pending	11	0	0	11
Exceeding 45 Days	0	0	0	0
Percent Complete	93.13%	100.00%	100.00%	93.60%
Total Repairs Pending	11	0	0	11
Total Repairs Complete	2,720	25	114	2,859
Total Repairs Percent Complete	99.60%	100.00%	100.00%	99.62%

Appendix E**Financial Detail – updated as of February 1, 2010****NY EV Mobile Stray Voltage Dashboard Actuals**

City	Actual Miles	Events found	Completed		Event Rate	REPAIRS			INSPECTIONS		
			Miles	Repairs		Actuals	Act\$/ Repair	% Cmpl	Actuals	Act\$/ mile	% Cmpl
Buffalo	1444	2,677	1444	2666	1.85	\$ 1,986,118	\$ 730	100%	\$2,640,677	\$ 1,829	100%
Niagara Falls	265	54	265	54	0.20	\$ 502,803			\$ 502,803	\$ 1,897	100%
Syracuse	611	12	611	12	0.02	\$ 6,595	\$ 550	100%	\$ 773,701	\$ 1,268	100%
Utica	321	13	321	13	0.04	\$ 13,481	\$ 1,037	100%	\$ 448,733	\$ 1,398	100%
Albany	396	101	396	101	0.26	\$ 53,706	\$ 532	100%	\$ 676,075	\$ 1,707	100%
Schenectady	192	13	192	13	0.07	\$ 10,197	\$ 784	100%	\$ 309,530	\$ 1,612	100%
	3229	2870	3229	2859	0.89	\$ 2,070,098	\$ 724	100%	\$5,351,518	\$ 1,657	100%
As of 02/01/2010 TOTAL Actuals									\$7,421,616		

Summary of Energized Objects (Mobile Testing - Total) - updated

National Grid	Initial Readings				Readings after Mitigation		
	1V to 4.4V	4.5V to 24.9V	25V and Over	Totals	Less than 1 V	1V to 4.4V	4.5 V and Over
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	1,889	845	69	2,803	2,794	0	0
Metal Street Light Pole	1,833	803	65	2,701	2,701	0	0
Traffic Signal Pole	55	40	4	99	90	0	0
Control Box	1	2	0	3	3	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	41	25	1	67	65	0	0
Sidewalk	1	0	0	1	1	0	0
Gate/Fence/Awning*	1	2	0	3	3	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	1	2	0	3	3	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**	38	21	1	60	58	0	0
Totals	1,930	870	70	2,870	***2,859	0	0

*includes railing

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

***There are 11 remaining findings in the city of Buffalo that have not been mitigated to the <1volt threshold. These have been identified as city owned and maintained assets. National Grid has made numerous attempts to contact the city to have these issues resolved and has received no response as of this report.

Summary of Energized Objects (Mobile Testing – City of Buffalo) - updated

National Grid	Initial Readings				Readings after Mitigation		
	1V to 4.4V	4.5V to 24.9V	25V and Over	Totals	Less than 1 V	1V to 4.4V	4.5 V and Over
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	1,782	784	52	2,618	2,609	0	0
Metal Street Light Pole	1,731	748	48	2,527	2,527	0	0
Traffic Signal Pole	51	36	4	91	82	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	34	24	1	59	57	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	1	2	0	3	3	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	1	2	0	3	3	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**	32	20	1	53	51	0	0
Totals	1,816	808	53	2,677	***2,666	0	0

*includes railing

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

*** There are 11 remaining findings in the city of Buffalo that have not been mitigated to the <1volt threshold. These have been identified as city owned and maintained assets. National Grid has made numerous attempts to contact the city to have these issues resolved and has received no response as of this report.

Summary of Energized Objects (Mobile Testing – City of Niagara Falls) - updated

National Grid	Initial Readings				Readings after Mitigation		
	1V to 4.4V	4.5V to 24.9V	25V and Over	Totals	Less than 1 V	1V to 4.4V	4.5 V and Over
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	41	2	5	48	48	0	0
Metal Street Light Pole	37	2	5	44	44	0	0
Traffic Signal Pole	3	0	0	3	3	0	0
Control Box	1	0	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	5	1	0	6	6	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**	5	0	0	6	6	0	0
Totals	46	3	5	54	54	0	0

*includes railing

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

Summary of Energized Objects (Mobile Testing – City of Syracuse)

National Grid	Initial Readings				Readings after Mitigation		
	1V to 4.4V	4.5V to 24.9V	25V and Over	Totals	Less than 1 V	1V to 4.4V	4.5 V and Over
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	5	5	1	11	11	0	0
Metal Street Light Pole	5	3	1	9	9	0	0
Traffic Signal Pole	0	2	0	2	2	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	1	0	0	1	1	0	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	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**	0	0	0	0	0	0	0
Totals	6	5	1	12	12	0	0

*includes railing

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

Summary of Energized Objects (Mobile Testing – City of Utica)

National Grid	Initial Readings				Readings after Mitigation		
	1V to 4.4V	4.5V to 24.9V	25V and Over	Totals	Less than 1 V	1V to 4.4V	4.5 V and Over
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	5	6	2	13	13	0	0
Metal Street Light Pole	5	6	2	13	13	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	0	0	0	0	0	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**	0	0	0	0	0	0	0
Totals	5	6	2	13	13	0	0

*includes railing

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

Summary of Energized Objects (Mobile Testing – City of Albany)

National Grid	Initial Readings				Readings after Mitigation		
	1V to 4.4V	4.5V to 24.9V	25V and Over	Totals	Less than 1 V	1V to 4.4V	4.5 V and Over
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	54	39	7	100	100	0	0
Metal Street Light Pole	52	36	7	95	95	0	0
Traffic Signal Pole	1	2	0	3	3	0	0
Control Box	1	1	0	2	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	1	0	0	1	1	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**	1	0	0	1	1	0	0
Totals	55	39	7	101	101	0	0

*includes railing

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

Summary of Energized Objects (Mobile Testing – City of Schenectady)

National Grid	Initial Readings				Readings after Mitigation		
	1V to 4.4V	4.5V to 24.9V	25V and Over	Totals	Less than 1 V	1V to 4.4V	4.5 V and Over
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	3	8	2	13	13	0	0
Metal Street Light Pole	3	8	2	13	13	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	0	0	0	0	0	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**	0	0	0	0	0	0	0
Totals	3	8	2	13	13	0	0

*includes railing

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

nationalgrid ELECTRIC OPERATING PROCEDURES	Doc No.: NG-USA EOP G016
	Page: Page 1 of 11
	Date: 08/17/09
SUBJECT: Elevated Equipment Voltage Testing	SECTION: General

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.

Supersedes Document Dated: 05/01/06	Authorized By: _____ Director-Distribution Engrg. Services <small>Niagara Mohawk Power Corporation d/b/a National Grid NYSPSC Case 04-M-0159 SVP, Network Strategy Elevated Voltage Testing and Facility Inspection 2009 Annual Report</small>	Approved By: <i>[Signature]</i> February 12, 2010
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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
 - B. Substation Fences
 - C. Overhead Distribution Facilities
 - D. Overhead Transmission Facilities
 - E. Underground Facilities
 - F. Daily Work Areas
 - G. Exemptions
- II. Facilities Where Elevated Equipment Voltage Testing/Documentation is Required – New Hampshire and Rhode Island
 - A. Street Lights
 - B. Overhead Distribution Facilities
 - C. Underground Facilities
 - D. Daily Work Areas
 - E. Exemptions
- III. Facilities Where Elevated Equipment Voltage Testing/Documentation is Required – Massachusetts
 - A. Street Lights
 - B. Overhead Distribution Facilities
 - C. Underground Facilities
 - D. Daily Work Areas
 - E. Exemptions
- IV. Test Equipment
- V. Test Procedure
- VI. Corrective Action Requirements for Elevated Voltage Findings
- VII. Database Requirements
- VIII. Annual Reporting and Certification Requirements
- IX. Responsibility

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 gauge 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:

NYSPSC Order 04-M-0159

NYSPSC 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.

nationalgrid ELECTRIC OPERATING PROCEDURES	Doc No.: NG-USA EOP D004
	Page: 1 of 7
	Date: 08/17/09
SUBJECT: Distribution Line Patrol and Maintenance	SECTION: Distribution/Overhead

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.

Supersedes Document Dated: 05/14/08	Authorized By: Director-Distribution Engrg. Services <small>Niagara Mohawk Power Corporation d/b/a National Grid</small>	Approved By:  SVP Network Strategy <small>NYSPSC Case 04-M-0159</small>
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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	# MAIN LINE TELEPHONE ATTACHMENT	1 2 3 4 5	STREET LIGHT ATTACHED		<input type="checkbox"/> Yes	<input type="checkbox"/> No
WOOD POLE MOUNTED STREET LIGHT	P/Q	REGULATOR	P/Q	CUTOUT			P/Q
098 1,2 (NR) <input type="checkbox"/> Street Light Hazard Cond.	/	174 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	/	280 1,2 (R) <input type="checkbox"/> Defective Cutout			/
099 2 (NR) <input type="checkbox"/> Not Bonded	/	175 3 (R) <input type="checkbox"/> Improper/Missing Bond	/	281 3 (R) <input type="checkbox"/> Potted Porcelain			/
100 4 (NR) <input type="checkbox"/> Not Bonded to Standards	/	176 3 (R) <input type="checkbox"/> Animal Guard Missing	/	282 4 (NR) <input type="checkbox"/> Banded Porcelain			/
POLE		177 3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/	283 4 (NR) <input type="checkbox"/> Enclosed			/
101 4 (R) <input type="checkbox"/> Osmose Priority Pole	/	SECTIONALIZER		284 4 (NR) <input type="checkbox"/> Non Porcelain			/
102 4 (R) <input type="checkbox"/> Osmose Reject Pole	/	180 1,2 (NR) <input type="checkbox"/> Oil Weeping	/	285 4 (NR) <input type="checkbox"/> Hybrid			/
103 4 (NR) <input type="checkbox"/> Down Ground & Rod Present	/	181 1,2,3 (R) <input type="checkbox"/> Bushings Broken/Cracked	/	286 4 (R) <input type="checkbox"/> Spur Tap Not Fused			/
106 3 (NR) <input type="checkbox"/> Dbl Wood-NG Trnsf Req'd	/	182 2 (R) <input type="checkbox"/> Missing Ground Wire	/	289 4 (NR) <input type="checkbox"/> Other			/
107 4 (NR) <input type="checkbox"/> Dbl Wood-Tel Trnsf Req'd	/	183 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	/	RISER			
108 4 (NR) <input type="checkbox"/> Dbl Wood-CATV Trnsf Req'd	/	184 3 (R) <input type="checkbox"/> Improper/Missing Bond	/	290 1,2,3 (NR) <input type="checkbox"/> Improper Cable Supp/Term			/
110 1,2 (R) <input type="checkbox"/> Broken/severely damaged	/	185 3 (R) <input type="checkbox"/> Animal Guard Missing	/	291 2 (R) <input type="checkbox"/> Improper/Missing Bond			/
111 1,2,3,4 (RP) <input type="checkbox"/> Visual Rotting Grd Line	/	186 3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/	292 3 (R) <input type="checkbox"/> Animal Guard Missing			/
113 3 (NR) <input type="checkbox"/> CuNap Treated Bthmark Yr	/	RECLOSER		293 2,3 (R) <input type="checkbox"/> LA Blown/Missing/Improper			/
114 2,3,4 (R) <input type="checkbox"/> Woodpecker Holes	/	190 1,2 (NR) <input type="checkbox"/> Oil Weeping	/	INFRARED			
115 1,2,3 (NR) <input type="checkbox"/> Riser Guard Req'd	/	191 1,2,3 (R) <input type="checkbox"/> Bushings Broken/Cracked	/	400 2 (R) <input type="checkbox"/> Problem - Switch			/
116 1,2,3,4 (RP) <input type="checkbox"/> Visual Rotting Pole Top	/	192 2 (R) <input type="checkbox"/> Missing Ground Wire	/	401 2 (R) <input type="checkbox"/> Problem - Cutout			/
117 1,2,3 (NR) <input type="checkbox"/> Leaning Pole	/	193 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	/	402 2 (R) <input type="checkbox"/> Problem - Splice			/
118 P (NR) <input type="checkbox"/> Stencil / Correction Req'd	/	194 3 (R) <input type="checkbox"/> Improper/Missing Bond	/	403 2 (R) <input type="checkbox"/> Problem - Other			/
119 4 (NR) <input type="checkbox"/> Bird's Nest	/	195 3 (R) <input type="checkbox"/> Animal Guard Missing	/	HANDHOLES			
CROSSARM		196 2,3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/	600 2 (NR) <input type="checkbox"/> Broken/Damaged/Unsecured			/
120 1,2,3 (R) <input type="checkbox"/> Damage Arm	/	SWITCH		602 P (NR) <input type="checkbox"/> Missing Nomenclature			/
121 1,2,3 (NR) <input type="checkbox"/> Loose/Defective Pins	/	203 1,2,3 (R) <input type="checkbox"/> Gang Oper'd Defective	/	603 1 (R) <input type="checkbox"/> Secondary Needs Repair			/
122 3 (NR) <input type="checkbox"/> Wooden Pine 13.2kv	/	204 1,2,3 (R) <input type="checkbox"/> Single Phase Defective	/	604 4 (NR) <input type="checkbox"/> Other (use comments)			/
123 1,2,3 (R) <input type="checkbox"/> Loose Brace, Hrdwr	/	205 3 (R) <input type="checkbox"/> Improper/Missing Bond	/	SWITCHGEAR			
124 1,2,3 (R) <input type="checkbox"/> Damage Dbl Crossarm	/	207 3,4 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/	651 1,2,3 (R) <input type="checkbox"/> Barrier Brkn/Dmgd/Unsec			/
125 1,2,3 (R) <input type="checkbox"/> Damage Alley Arm	/	208 2 (NR) <input type="checkbox"/> Handle Not Bonded	/	652 1,2,3,4 (NR) <input type="checkbox"/> Base Broken/Damaged			/
126 4 (NR) <input type="checkbox"/> Xarm Wood Brace Req'd/BIL	/	GROUND		654 2 (R) <input type="checkbox"/> Cable Not Bonded			/
127 1,2 (R) <input type="checkbox"/> Primary On Arm	/	210 2 (R) <input type="checkbox"/> Wire Broken/Loose	/	656 2 (R) <input type="checkbox"/> Door Broken/Damaged			/
INSULATOR		211 2 (R) <input type="checkbox"/> Hazard Condition	/	657 F (NR) <input type="checkbox"/> Excessive Vegetation			/
130 1,2,3 (R) <input type="checkbox"/> Broken/Cracked/Flashed	/	212 3 (NR) <input type="checkbox"/> Guard Req'd	/	659 2 (R) <input type="checkbox"/> Missing Ground			/
131 1,2,3 (R) <input type="checkbox"/> Floating	/	213 3 (NR) <input type="checkbox"/> Non Standard	/	660 P (NR) <input type="checkbox"/> Missing Nomenclature			/
132 3 (NR) <input type="checkbox"/> I7 Aluminum Capped	/	214 3 (NR) <input type="checkbox"/> Not Bonded to Neutral	/	661 4 (NR) <input type="checkbox"/> Other			/
133 3 (R) <input type="checkbox"/> Non-Standard Voltage	/	GUY		662 4 (NR) <input type="checkbox"/> Rusted/Paint Peeling			/
134 3,4 (NR) <input type="checkbox"/> AL Cap Assoc w/Switch/Fuse	/	220 P (NR) <input type="checkbox"/> Guy Wire Marker	/	PAD TRANSFORMER			
135 4 (R) <input type="checkbox"/> Covered Wire on Porcelain	/	221 2 (NR) <input type="checkbox"/> Not in Compliance w/Code	/	672 1,2,3 (R) <input type="checkbox"/> Bushing Broken/Cracked			/
PRIMARY		222 3 (NR) <input type="checkbox"/> Excessive Slack	/	673 1,2,3 (R) <input type="checkbox"/> Door Broken/Damaged			/
140 1,2 (R) <input type="checkbox"/> Insuff. Grnd Clearance	/	223 1,2,3 (R) <input type="checkbox"/> Broken Wire	/	675 1,2,3 (R) <input type="checkbox"/> Elbows/Terminator/Tracking/Burned			/
141 1,2,3 <input type="checkbox"/> Damaged Cond/Brkn Strands	/	225 4 (NR) <input type="checkbox"/> Guy not Bonded/Isolated per Standards	/	676 F (NR) <input type="checkbox"/> Excessive Vegetation			/
142 1, F (NR) <input type="checkbox"/> Limbs on Primary	/	ANCHOR		680 2 (R) <input type="checkbox"/> Missing Ground			/
145 1,2,3 (R) <input type="checkbox"/> Dmg'd Stairs/Connector	/	226 1,2,3 (NR) <input type="checkbox"/> Req'd - Jt. Owned	/	681 P (NR) <input type="checkbox"/> Missing Nomenclature			/
146 2,3,4 (R) <input type="checkbox"/> Improper Sag	/	227 1,2,3 (NR) <input type="checkbox"/> Req'd - Sole NG	/	682 4 (NR) <input type="checkbox"/> Mud/Debris			/
147 3 (R) <input type="checkbox"/> LA Missing Transition	/	SECONDARY		684 1,2 (NR) <input type="checkbox"/> Oil Weeping			/
148 3 (R) <input type="checkbox"/> LA Missing End of Line	/	231 1,F (NR) <input type="checkbox"/> Limb on Secondary	/	685 1,2,3,4 (NR) <input type="checkbox"/> Pad Broken/Damaged			/
149 3 (R) <input type="checkbox"/> LA Blown	/	232 1,2,3 (NR) <input type="checkbox"/> Improper Sag	/	686 4 (NR) <input type="checkbox"/> Protection (Ballards)			/
TRANSFORMER		234 1,2,3 (NR) <input type="checkbox"/> Floating	/	687 4 (NR) <input type="checkbox"/> Rusted/Paint Peeling			/
150 1,2 (NR) <input type="checkbox"/> Oil Weeping	/	SERVICE		ENCLOSURES			
151 1,2,3 (R) <input type="checkbox"/> Bushings Broken/Cracked	/	240 1,2,3 (NR) <input type="checkbox"/> Ins. Loose from House	/	740 1,2,3,4 (R) <input type="checkbox"/> Base Broken/Cracked			/
152 2 (R) <input type="checkbox"/> Missing Ground Wire	/	241 1,F (NR) <input type="checkbox"/> Limb on Service	/	741 1,2,3,P (R) <input type="checkbox"/> Door Brkn/Dmgd/Unsec			/
153 3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/	243 4 (NR) <input type="checkbox"/> Non Std/Unsecured	/	742 1,2,3 (R) <input type="checkbox"/> Elbows Tracking/Burned			/
155 4 (R) <input type="checkbox"/> Animal guards required	/	ROW		743 F (NR) <input type="checkbox"/> Excessive Vegetation			/
156 3 (NR) <input type="checkbox"/> Non Std Install of Gap	/	250 F (NR) <input type="checkbox"/> Brush/Tree/Washout	/	744 2 (NR) <input type="checkbox"/> Missing Ground			/
157 2 (R) <input type="checkbox"/> Improper/Missing Bond	/	GIS		745 P (NR) <input type="checkbox"/> Missing Nomenclature			/
CAPACITOR		260 4 (NR) <input type="checkbox"/> Map Doesn't Match Field	/	746 4 (NR) <input type="checkbox"/> Rusted/Paint Peeling			/
160 1,2 (NR) <input type="checkbox"/> Oil Weeping	/	261 4 (NR) <input type="checkbox"/> Pole/Line Numbering Error	/	POLE INSPECTION			
161 1,2 (R) <input type="checkbox"/> Bulging	/	262 4 (NR) <input type="checkbox"/> Equip/Hardware/Missing	/	801 1,2,3,4 (NR) <input type="checkbox"/> Identified Priority Pole			/
162 1,2,3 (R) <input type="checkbox"/> Bushings Broken/Cracked	/	263 4 (NR) <input type="checkbox"/> Equip Removed in Field, Remove From GIS	/	802 1,2,3,4 (NR) <input type="checkbox"/> Identified Reject Pole			/
163 2 (NR) <input type="checkbox"/> Missing Ground Wire	/	269 4I (NR) <input type="checkbox"/> Other GPS/GIS Errors	/	803 4 (NR) <input type="checkbox"/> Excessive Checking			/
164 2 (NR) <input type="checkbox"/> Blown Fuse	/	SPACER CABLE		804 4 (NR) <input type="checkbox"/> Climbing Inspection			/
165 3 (NR) <input type="checkbox"/> Improper/Missing Bond	/	270 1,2,3 (R) <input type="checkbox"/> Damaged/Missing Spacer	/	KEY			
166 3 (R) <input type="checkbox"/> Animal Guard Missing	/	271 1,2,3 (R) <input type="checkbox"/> Bracket Damage	/	P/Q = Priority / Quantity			
167 3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/	272 3 (R) <input type="checkbox"/> Bracket Not Bonded	/	NR = Maint. Code May Not Direct Affect Reliability			
168 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	/	273 3 (R) <input type="checkbox"/> Messenger Not Bonded	/	R = Maint. Code May Affect Reliability			
REGULATOR		274 3 (R) <input type="checkbox"/> Messenger Guard Missing	/	RP = Maint. Code May Affect Reliability and Has Specific Program to Place to Address			
170 1,2 (NR) <input type="checkbox"/> Oil Weeping	/	276 3 (R) <input type="checkbox"/> Uncovered Splice	/				
171 1,2,3 (R) <input type="checkbox"/> Bushings Broken/Cracked	/						
172 2 (R) <input type="checkbox"/> Missing Ground Wire	/						
Comments:							

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 PERFORMED THAT WAS IDENTIFIED ON THE WORK ORDER OR DISCOVERED DURING THE REPLACEMENT/REPAIR/CORRECTION OF THE ORIGINAL 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 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.

 ELECTRIC OPERATING PROCEDURES	Doc No.: NG-USA EOP UG006
	Page: Page 1 of 8
	Date: 08/17/09
SUBJECT: Underground Inspection and Maintenance	SECTION: Underground

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.

Supersedes Document Dated: 06/26/08	Authorized By: Director-Distribution Engrg. Services <small>Niagara Mohawk Power Corporation d/b/a National Grid Approved By: NY SPSC Case 04-M-0159 SVP, New York State Annual Report February 12, 2010</small>
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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 31st 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 20°, 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 10° and 20°. A "Level 3 Priority" shall be assigned to a temperature gradient less than 10°. 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 20°, 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 10° and 20°. A "Level 3 Priority" shall be assigned to a temperature gradient less than 10°. 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						EV Test Required: Yes No Voltage Action Taken: Repaired De-energized																				
Water (in hole) Yes No						EV Found Voltage: Yes No																				
<table border="1"> <thead> <tr> <th colspan="2">Gas Monitor Readings</th> <th>Alarm Setting</th> </tr> </thead> <tbody> <tr> <td>Lower Explosive Limit (LEL)</td> <td></td> <td>10% or above</td> </tr> <tr> <td>Oxygen (O₂)</td> <td></td> <td>% below 19.5, above</td> </tr> <tr> <td>Carbon Monoxide (CO)</td> <td></td> <td>33 ppm</td> </tr> <tr> <td>Hydrogen Sulfide (H₂S)</td> <td></td> <td>10 ppm</td> </tr> </tbody> </table>												Gas Monitor Readings		Alarm Setting	Lower Explosive Limit (LEL)		10% or above	Oxygen (O ₂)		% below 19.5, above	Carbon Monoxide (CO)		33 ppm	Hydrogen Sulfide (H ₂ S)		10 ppm
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Hydrogen Sulfide (H ₂ S)		10 ppm																								
GIS				P/Q	SWITCHGEAR				P/Q																	
260 4 (NR) GIS map doesn't match field				/	657 F (NR) Excessive vegetation				/																	
261 4 (NR) GIS Pole/line numbering in error on GIS				/	659 2 (R) Missing ground				/																	
262 4 (NR) GIS equip/hardware missing in GIS				/	660 P (NR) Missing nomenclature				/																	
263 4 (NR) GIS equip removed in field, remove from GIS				/	661 4 (NR) Other				/																	
269 4 (NR) GIS Other GPS/GIS Errors				/	662 4 (NR) Rusted/Paint Peeling				/																	
HANDHOLES					TRANSFORMER																					
600 2 (NR) Broken/damaged/unsecured				/	672 1,2,3 (R) Bushing Broken/Cracked				/																	
602 P (NR) Missing nomenclature				/	673 1,2,3 (R) Door Broken/damaged/unsecure				/																	
603 1 (R) Secondary needs repair				/	675 1,2,3 (R) Elbows/tracking/burned				/																	
604 4 (NR) Other (use comments)				/	676 F (NR) Excessive vegetation				/																	
MANHOLE					680 1 (R) Missing Ground				/																	
610 2 (NR) Ground rods missing				/	681 P (NR) Missing nomenclature				/																	
611 2 (R) Cable/Joint leaking				/	682 4 (NR) Mud/debris				/																	
612 2 (NR) Cables bonded/grid defective				/	684 1,2 (NR) Oil Weeping				/																	
614 1,2,3,4 (NR) Cracked/broken				/	685 1,2,3,4 (NR) Pad broken/damaged				/																	
615 3 (R) Fire proofing				/	686 4 (NR) Protection (ballards) damage				/																	
616 4 (NR) Improper grade				/	687 4 (NR) Rusted/Paint peeling				/																	
617 P (NR) Missing nomenclature				/	688 1,2 (NR) Pad Pushed Off Base				/																	
620 2 (NR) Rerack				/	TRENCH																					
621 1,2,3,4 (NR) Ring/cover repair/replace				/	690 1 (R) Exposed Cable				/																	
622 1,4 (NR) Roof condition – use comments				/	692 4 (NR) Path – Sunken				/																	
623 1,4 (NR) Chimney Condition – comments				/	VAULTS																					
624 4 (NR) Manhole needs cleaning				/	700 2 (NR) Cable missing bond				/																	
625 1 (R) Secondary needs repair				/	702 1,2,3,4 (NR) Cracked/broken				/																	
626 4 (NR) No Holes in Manhole Cover				/	703 1,2,4 (NR) Damaged/broken cover				/																	
NETWORK PROTECTOR					704 1,2,4 (NR) Damaged/broken door				/																	
630 2 (R) Barriers broken/damage				/	705 1,2,4 (NR) Damaged/broken ladder				/																	
632 1 (R) Oil leak				/	706 1,2,3,4,P (NR) Improper grade				/																	
633 2 (NR) Worn/damaged gasket				/	707 4,P (NR) Improper nomenclature				/																	
NETWORK TRANSFORMER					708 4 (NR) Light not working				/																	
635 2 (R) Bushing Broken/cracked				/	712 4 (NR) Sump pump broken				/																	
637 2 (R) Low oil				/	713 1 (R) Secondary needs repair				/																	
638 1 (NR) Missing ground				/	SUBMERSIBLE EQUIPMENT																					
639 P (NR) Missing nomenclature				/	720 1,2,3,4 (R) Excess Corrosion				/																	
642 1, 2 (R) Oil Weeping				/	721 1,2,3,4 (R) Physical damage				/																	
643 4 (NR) Rusted/paint peel				/	722 1,2 (R) Leaking				/																	
SWITCHGEAR					ANODES																					
651 1,2,3 (R) Barrier broken/damaged/unsecure				/	730 3 (R) Missing				/																	
652 1,2,3 (NR) Base broken/damaged				/	731 3 (NR) Need replacement				/																	
654 2 (R) Cable not bonded				/	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																					
656 1,2,3 (R) Door Broken/Damaged				/																						
Comments:																										

Niagara Mohawk Power Corporation d/b/a National Grid
 NYSPSC Case 04-M-0159

Elevated Voltage Testing and Facility Inspection 2009 Annual Report 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 desktop 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 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.

nationalgrid ELECTRIC OPERATING PROCEDURES	Doc No.: NG-USA EOP T007
	Page: 1 of 11
	Date: 08/18/09
SUBJECT: Transmission Line Patrol & Maintenance 23kV-345kV	SECTION: Transmission

GENERAL INFORMATION:

The purpose of this procedure is to outline the requirements for the patrol and maintenance activities associated with National Grid USA Transmission circuits. The Transmission Maintenance Program is designed to address a variety of maintenance activities required to maintain a safe and reliable Transmission System. Due to the diverse service territories, system construction and voltages, National Grid will utilize the following definitions below to designate which maintenance activities in this EOP are completed in the sections discussed.

- Transmission NY 115kV and above
- Sub-transmission NY 23kV up to and including 69kV
- Transmission New England 69kV and above
- Sub-transmission New England 23kV up to and including 46kV

These patrol and maintenance activities include a ground based patrol on a five year cycle, aerial Infrared on an annual and three year cycle, Transmission Tower footing inspection and repair on a twenty year cycle, Transmission Wood Pole Inspection and Treatment on a ten year cycle, general aerial patrols on a one year cycle, Comprehensive Helicopter Inspections as needed, and Transmission Tower Painting on a twenty year basis. Elevated Equipment Voltage testing on Transmission and Sub-transmission facilities is covered by EOP G016.

APPLICABILITY:

This procedure applies to all personnel involved with or responsible for the inspection and repair of Transmission facilities.

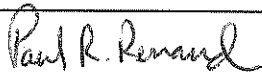
DEFINITIONS:

Ground Based Patrol - A walking/vehicle assessment of National Grid transmission facilities for the purpose of determining the condition of the facility and its 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 Windows based Hand Held device and retrieve the information in the form of reports.

Transmission Inspector – A qualified worker that can identify deficiencies or non-standard construction conditions on National Grid facilities.

Supersedes Document Dated: 05/01/08	Authorized By: Director – Distribution Engineering Services	Approved By:  VP, Transmission Asset Management
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Aerial Infrared – Helicopter based thermographic imaging of connections and equipment.

Tower Footing – Embedded support structure that supports a Transmission tower.

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.

PROGRAM ADMINISTRATOR:

Distribution Engineering Services

SCOPE:

Transmission Maintenance

- I. Ground Based Patrol and Maintenance
- II. Aerial Helicopter Patrol
- III. Tower Footing Inspection and Repair
- IV. Wood Pole Inspection and Treatment
- V. Aerial Helicopter Infrared Patrols
- VI. Comprehensive Helicopter Patrol
- VII. Tower Painting
- VIII. Transmission Maintenance Database
- IX. Maintenance Schedule
- X. Completion of Maintenance Codes
- XI. Responsibilities

I. GROUND BASED PATROL INSPECTION AND MAINTENANCE

Transmission

Sub-transmission

1. Transmission patrols are conducted by a qualified worker that can identify hazards, deficiencies or non-standard construction conditions on National Grid facilities. The patrols are scheduled in such a manner that each transmission circuit is examined in the field once every **five** years. Any new facilities added to the system will be incorporated through our Geographic Information System and added to the appropriate inspection cycle.

The patrols are conducted by a Transmission 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 categories 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 6 months for Transmission and 1 year for Sub-Transmission.

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 Transmission Inspector as follows:

1. Notification by location:
 - a. New York: contact System Operations Dispatch 1-877-716-4996.
 - b. New England: Control Center NE 1-508-389-9032.
2. Detailed information provided to the regional notification location:
 - a. Identify yourself as a Company Transmission Inspector and your work reporting area.
 - b. Details of the Level 1 Priority Condition:
 - i. Problem found.
 - ii. Line Number and Structure Number.
 - 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.

The Transmission patrol schedule/status is created and tracked by report RPT 3100 Circuit Patrol Status. The Inspection Supervisors, T&D Superintendents and Transmission Line Services' management are responsible to create this schedule for their respective areas. The Transmission Inspector uses a Hand Held Computer to inspect scheduled circuits recording area, district, employee ID, circuit, pole number, GPS location, type, material make up, condition of steel/concrete, wood pole inspection year and treatment, specific pole information, maintenance problem codes and comments. The Maintenance Problem code listing is shown on the Transmission Field Survey Worksheet (Exhibit 1). The Transmission 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 Transmission Maintenance Database. Printed copies of the latest maintenance code tables may be obtained by running a report on the look up tables from the Transmission Maintenance Database. The material make up screen will also include prompts for condition information when either steel or lattice is chosen. The condition rating for steel will be on a 1 to 6 scale and concrete condition will be on a 1-5 scale. These scales are as shown:

<u>Steel Condition</u>		<u>Concrete Condition</u>	
1	Serviceable	1	Serviceable
2	Intact	2	Light Deterioration
3	Light Corrosion	3	Medium Deterioration
4	Light Pitting	4	Severe Deterioration
5	Significant Pitting	5	Very Severe Deterioration
6	Very Severe Deterioration		

The Transmission Inspector, while patrolling, shall also complete maintenance codes “522 – Replace/install Guy Shield”, 532 – Tower numbers missing” and “581 Misc.– stencil/line structure number ground level”, if found deficient upon inspection. In addition, in New England the inspector will complete maintenance code 584 Misc. – Install/Replace Warning sign. For these three codes, the Transmission 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.

The Hand Held Computer is to be used as the primary vehicle for recording maintenance problems in the field. There will be times where it is not practicable to use the Windows based hand held computer due to unfamiliarity or access to one (example: line crew finds maintenance problem and needs to document/record). The method to be used to document/record maintenance in these situations shall be the Transmission Field Survey worksheet, Exhibit 1. This worksheet must be entered into the Transmission database through the desk top computer by inspector, clerk, or supervisor.

Date: 08/18/09

Exhibit 1

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	<input type="checkbox"/> A) Single <input type="checkbox"/> B) H. Frame <input type="checkbox"/> C) 3 Pole <input type="checkbox"/> D) 4 Pole <input type="checkbox"/> E) 5 Pole <input type="checkbox"/> F) 6 Pole <input type="checkbox"/> G) Flex-Tower <input type="checkbox"/> H) Square-Tower <input type="checkbox"/> I) Hairpin <input type="checkbox"/> J) Other					
MATERIAL	<input type="checkbox"/> 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 <input type="checkbox"/> A) External <input type="checkbox"/> B) Internal <input type="checkbox"/> C) Both <input type="checkbox"/> D) Other <input type="checkbox"/> E) Unknown <input type="checkbox"/> F) None <input type="checkbox"/> B) Steel <input type="checkbox"/> C) Lattice					
CONFIGURATION	<input type="checkbox"/> Deadend <input type="checkbox"/> Target <input type="checkbox"/> Switch Structure <input type="checkbox"/> Davit Arm <input type="checkbox"/> Stand Off <input type="checkbox"/> Other					
STEEL/LATTICE CONDITION	(Circle One) 1 2 3 4 5 6	FOUNDATION: STEEL CONCRETE		(Circle One) 1 2 3 4 5 6		
POLE *		Sub. No.	Priority Qty	CONDUCTOR **		Priority Qty
*Enter Sub No. if a Multiple Structure				**Enter Circuit No. if More Than Circuit on Pole		
510 1, 2 (R) <input type="checkbox"/> Broken		/		541 1,2,3 (R) <input type="checkbox"/> Conductor		/
511 1,2,3,4 (RP) <input type="checkbox"/> Visual Rotting		/		542 1,2,3 (R) <input type="checkbox"/> Static		/
512 1,2,3,4 (R) <input type="checkbox"/> Leaning		/		543 1,2,3,4 (R) <input type="checkbox"/> Ground Wire		/
513 1,2,3 (R) <input type="checkbox"/> Replace Single Arms		/		544 1,2,3 (R) <input type="checkbox"/> Sleeve/Conn.		/
514 1,2,3 (R) <input type="checkbox"/> Repl Double Arm		/		546 4 (NR) <input type="checkbox"/> Under 25 Ft.		/
515 1,2,3 (R) <input type="checkbox"/> Repair Braces		/		547 1,2 (R) <input type="checkbox"/> Infrared Problem Identified		/
516 1,2,3 (R) <input type="checkbox"/> Replace Braces		/		LINE HARDWARE		
517 1,2 (R) <input type="checkbox"/> Replace Anchor		/		551 2,3,4 (R) <input type="checkbox"/> Insulators/Dam		/
518 1,2,3,4 (R) <input type="checkbox"/> Install Anchor		/		552 4 (NR) <input type="checkbox"/> Insulator Plumb		/
519 1,2,3 (R) <input type="checkbox"/> Repair/Replace Guy Wire		/		553 1,2,3,4 (R) <input type="checkbox"/> Hardware Dam		/
521 2,3 (R) <input type="checkbox"/> Tighten Guy Wire		/		555 2 (R) <input type="checkbox"/> Lightning Arrestor		/
522 P (NR) <input type="checkbox"/> Replace/Install Guy Shield		/		FOUNDATION - GENERAL		
524 4 (R) <input type="checkbox"/> Guy Not Bonded		/		563 1,2,3,4 (R) <input type="checkbox"/> Erosion		/
525 1,2,3,4 (RP) <input type="checkbox"/> Lightning Damage		/		RIGHT OF WAY		
526 2,3,4 (RP) <input type="checkbox"/> Woodpecker Damage		/		571 4 (NR) <input type="checkbox"/> Erosion		/
527 2,3,4 (RP) <input type="checkbox"/> Insects		/		572 4 (NR) <input type="checkbox"/> Encroachments		/
528 4 (NR) <input type="checkbox"/> Aerial Number Missing		/		573 4 (NR) <input type="checkbox"/> Debris		/
TOWER				574 F (R) <input type="checkbox"/> Danger Tree		/
531 1,2 (R) <input type="checkbox"/> Tower Legs Broken		/		575 4 (NR) <input type="checkbox"/> Gate Broke		/
532 4 (NR) <input type="checkbox"/> Aerial Numbers Missing		/		576 4 (NR) <input type="checkbox"/> Oil/Gas Leak		/
534 1,2,3 (R) <input type="checkbox"/> Loose Bolts/Hard		/		MISCELLANEOUS		
535 4 (NR) <input type="checkbox"/> Repair Anti-Climb		/		581 P (NR) <input type="checkbox"/> Stencil/Line/ Structure No. Ground level		/
536 F (R) <input type="checkbox"/> Vegetation On Tower		/		582 1,2,3,4 (R) <input type="checkbox"/> Switch Damaged		/
537 1,2,3 (R) <input type="checkbox"/> Structure Damage		/		583 2 (R) <input type="checkbox"/> Damaged Ground		/
538 1,2,3,4 (R) <input type="checkbox"/> Straighten Tower		/		584 4 P (NR) <input type="checkbox"/> Install/Replace Warning Sign		/
539 1,2,3,4 (R) <input type="checkbox"/> Arms Damaged		/		586 4 (NR) <input type="checkbox"/> Remove Steps		/
POLE INSPECTION				587 3,4 (R) <input type="checkbox"/> Add Dirt & Tamp		/
901 2 (RP) <input type="checkbox"/> Identified Priority Pole		/		GIS		
902 3 (RP) <input type="checkbox"/> Identified Reject Pole		/		760 4 (NR) <input type="checkbox"/> GIS Map Doesn't Match Field		/
903 4 (RP) <input type="checkbox"/> Excess Checking		/		761 4 (NR) <input type="checkbox"/> GIS Equip. Stenciling In Error		/
904 4 (RP) <input type="checkbox"/> Climbing Inspection Req'd		/		762 4 (NR) <input type="checkbox"/> GIS Equip./Hardware Missing		/
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.				763 4 (NR) <input type="checkbox"/> GIS Equip. Removed In Field Remove from GIS		/
				769 4 (NR) <input type="checkbox"/> GIS Other GPS/GIS Errors		/
Comments:						

NG0237 (07/09)

Niagara Mohawk Power Corporation d/b/a National Grid

NYSPSC Case 04-M-0159

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Elevated Voltage Testing and Facility Inspection 2009 Annual Report

February 12, 2010

Appendix 10

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2. EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

- Towers
- Poles
- Crossarms
- Insulators
- Switches
- Reclosers & Sectionalizers
- Conductor
- Grounds
- Guys
- Anchors
- Risers
- Foundations
- ROW

II. AERIAL HELICOPTER PATROL

Transmission

Sub-transmission NY

Aerial Helicopter Patrols shall be done on a one-year cycle providing for a visual examination of all Transmission lines, except in Massachusetts where the requirement is two times per year. This patrol shall be accomplished by a qualified worker recording items such as broken or flashed insulators, leaning structures, broken hardware, tree conditions, ROW problems, and conductor clearance problems. Any item that is observed that might affect the operation, reliability, or safety of the general public must be reported and documented. The use of Exhibit I as a template along with a tape recorder during flight is highly recommended. Conditions/Maintenance problems identified are to be prioritized "Level 1,2,3 or 4" as described in this procedure and must be entered into the database for scheduling and tracking. Additional guidance for tree and insulator problems is shown in Table III and IIIA.

TREE CLEARANCE
(TABLE III)

Level 1

Voltage

Vertical or Lateral Clearance

23-46 kV	4' or less
69 kV	6' or less
115 kV	10' or less
230 kV	14' or less
345 kV	18' or less

INSULATOR GUIDANCE TABLE
(TABLE IIIA)

<i>Number of Insulators in String</i>	<i>Number of Damaged Insulators Per String</i>			
	<i>Level 1</i>	<i>Level 2</i>	<i>Level 3</i>	<i>Level 4</i>
5	2 or more	1		
6	2 or more	1		
7	3 or more	2	1	
8	3 or more	2	1	
9	3 or more	2	1	
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

III. TOWER FOOTING INSPECTION AND REPAIR

Transmission

The tower footing inspection and repair maintenance activity is scheduled for a 20-year cycle. This activity consists of excavating the tower footing a minimum of 24" below grade, cleaning the footer, visual inspection, welding or concrete repair if required, application of a protective coating, backfill and compact soil.

IV. WOOD POLE INSPECTION AND TREATMENT

Transmission

The wood pole inspection and treatment maintenance activity is scheduled for a 10-year cycle. This activity consists of excavating the base of a wood pole 18" below grade, shaving/removal of any decayed wood, measurements of the circumference, drilling, measurements for voids, evaluate pole strength per NESC requirements, treat with preservatives, plug drilled holes, backfill and compact soil and perform an overall visual inspection of the structure.

V. AERIAL HELICOPTER INFRARED PATROLS**Transmission****Sub-transmission NY**

The Aerial Helicopter Infrared Patrol maintenance activity is scheduled for a 3-year cycle for Sub Transmission circuits and annually for Transmission circuits. The Infrared Patrol consists of an aerial viewing of transmission line components through a thermal imaging camera. Transmission components found with a temperature between 1 and 20 degrees Centigrade above the "reference temperature"* should be monitored for change and addressed accordingly. Components found to be greater than 20 degrees Centigrade above the "reference temperature" but less than 40 degrees Centigrade (Level 2) are to be addressed within six months. Transmission components found to be greater than 40 degrees Centigrade above the reference temperature (Level 1) are to be addressed within five days. If system operating conditions do not allow the repair/replacement to be made within the five day period, temporary repairs or load configuration on the circuit can be made and the condition can be reclassified to a Level 2 condition.

Transmission Asset Management may require additional information of Level 2 conditions in order to prioritize repair/replacement. This additional information can be obtained by utilizing a live line micro ohmmeter, such as the SensorLink Corp. Ohmstik. The micro ohmmeter can always be used to verify the location of the component to be repaired/replaced.

Conditions/Maintenance problems identified are to be prioritized "Level 1 or Level 2," as described in this procedure and must be entered into the database for scheduling and tracking under Code 547, Infrared Problem Identified.

*Reference Temperature – Reference Temperature refers to the normal real time operating temperature of the conductor or apparatus, which includes all influences that create this temperature such as load, weather and condition. The thermovision camera must have the capability to accurately detect the temperature differential, in degrees C, between the "hot spot" temperature and the nearest point which reflects the expected reference temperature, so as to identify and prioritize the defects found.

VI. COMPREHENSIVE HELICOPTER PATROL**Transmission**

The Comprehensive Helicopter Patrol maintenance activity is a comprehensive methodical examination of all components comprising the transmission system by helicopter. The patrol is documented on a structure by structure component based in a data format with pictures. Components that are identified as critical carry the same definitions as "Level 1 Priority" work. This type of maintenance activity is conducted on an as needed basis to identify specific problems, reliability issues, or to document condition for planned rebuilds or upgrades.

VII. TOWER PAINTING**Transmission**

The Tower painting maintenance activity consists of applying a protective coating system to steel transmission structures. This activity is usually scheduled on a 20-year basis to extend the service life of the steel or meet specific aerial marking requirements per FAA regulations.

VIII. TRANSMISSION MAINTENANCE DATA BASE

The Transmission Maintenance database consists of information (data) downloaded from the Windows based hand held and information (data) entered from the desktop computer. The Windows based hand held can be down loaded to any National Grid desk top computer that is connected to the network, and is logged on as a valid user of the T&D Maintenance program. The National Grid desktop computer is also used to generate various reports and work tickets depending on the users needs. These reports are utilized to schedule and accomplish transmission maintenance work.

IX. 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 six months for Transmission and one year for Sub-Transmission. All "Level 3 Priority" conditions must be repaired within 3 years. Level 4 Priority is for inventory purposes only.

Once the Transmission Circuit is completed in the Transmission 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 Transmission Engineering for Transmission Circuits and Distribution Design for Sub-Transmission Circuits. Level 1 Priority maintenance codes are communicated by the Transmission Inspector directly to the field operations group for the area where the circuit is located.

The Transmission Maintenance database contains information to be used by Transmission Asset Management and Distribution Network Strategy 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).

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

X. COMPLETION OF MAINTENANCE CODES

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

ALL TRANSMISSION MAINTENANCE WORK IS TO BE COMPLETED PER NATIONAL GRID 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.

XI. RESPONSIBILITIES

Distribution Engineering Services

1. Update program as necessary.

Customer Operations/Transmission Line Services

1. Ensure the Maintenance Program as outlined in this NG-USA EOP T007 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.

Contract Management Services

1. At the request of Customer Operations obtain, schedule and manage contractors to perform inspections and perform required maintenance.
2. Provide qualified personnel to complete inspection where applicable.
3. Ensure the Maintenance Program as outlined in this NG-USA EOP T007 is implemented properly and timely.
4. Report System Maintenance progress monthly to Division and TLS.
5. Provide program management.

Transmission Inspector

1. Demonstrate the ability to identify Transmission 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 T007.
3. Possess the ability to do walking patrols, collect information on a hand held, down load 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.

Transmission Network Asset Strategy

1. Provide input into program revisions.
2. Provide schedule for Tower Footing Inspection, Wood Pole Inspection and Treatment, Aerial Helicopter Infrared Patrols, Comprehensive Helicopter Patrols, and Tower Painting.

Distribution Asset Strategy

1. Provide input into program revisions.
2. Ensure the Maintenance Program as outlined in this NG-USA EOP T007 is implemented properly and timely.
3. Ensure inspectors are trained where applicable.
4. Provide program management.

Process and Systems

1. Provide and support database.

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

T&D Technical Training

1. Provide training upon request.

REFERENCE:

NY PSC Order 04-M-0159

NY PSC Order Adopting Changes to Electric Safety Standard, December 2008

MA General Law #220 CMR 125 Section 20

Applicable National Grid Safety Rules and Procedures

Elevated Equipment Voltage Testing NG-USA EOP G016

NG-USA EOP T007


“Transmission Line Patrol – 23kV-345Kv”

08/18/09

The main revision of this EOP was to update the procedure to reflect the language that was agreed upon with the NY PSC as part of the KeySpan merger. Priority Levels changed from A, B, C to Level 1, 2, 3 and 4.

Level 1 priorities need to be completed within one week. Level 2 priorities need to be completed within six months for Transmission, one year for Sub-Transmission. Level 3 priorities need to be completed within three years. Level 4 priorities are used to collect inventory information. Added a notification process for Inspectors for Level 1 priorities.

Updated Exhibit 1 maintenance codes. Transmission Aerial infrared inspections have been changed to annually from a three-year cycle. Assigned priority levels for items found during the infrared inspections. Removed time reporting section.

 ELECTRIC OPERATING PROCEDURES	Doc No.: NG-USA EOP G017
	Page: Page 1 of 6
	Date: 04/01/06
SUBJECT: Street Light Standard Inspection Program	SECTION: General

REFERENCE:

Applicable National Grid Safety Rules and Procedures
NY PSC Order 04-M-0159
Elevated Equipment Voltage NG-USA EOP G016

GENERAL INFORMATION:

The purpose of this procedure is to outline the requirements for the inspection cycle for Street Light Standard installations owned by National Grid in New York as required by the New York Public Service Commission's "Electric Safety Standards" issued on January 5, 2005. **This procedure specifies the inspection interval and requirements for New York only.**

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 hand held computer. The maintenance items identified during this inspection will be separated into four priority categories A, B, C, and E priority. The problem codes identified default to the appropriate priority. The default priority can be adjusted by the individual performing the inspection based on actual field conditions. These priority categories are defined as follows:

A Priority - An identified facility/component that must be repaired/replaced as soon as practicable.

B Priority – An identified facility/component condition that shall be considered for repair/replacement as the facilities are scheduled for maintenance by Distribution Planning and Engineering. These identified conditions will be corrected as preventive maintenance and or facility life extension.

C Priority – An identified facility/component condition that is being trended and reviewed by Distribution Planning and Engineering that may require replacement through the engineering process (Requires project/Capital expenditures). Non-capital conditions identified under this priority will be corrected at the discretion of field operations.

Supersedes Document Dated: 07/25/05	Authorized By: Director-Distribution Engrg. Services	Niagara Mohawk Power Corporation, d/b/a National Grid Approved By: VP - Engineering Services
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NYSPSC Case 04-M-0159
Elevated Voltage Testing and Facility Inspection 2009 Annual Report

E Priority – An identified facility/component that must be replaced/repared immediately to address public safety or system reliability. The inspector shall notify the appropriate operations department for immediate response and corrective action any time an E priority is found during an inspection.

ALL “A PRIORITY” CONDITIONS IDENTIFIED PRIOR TO NOVEMEBR 1ST MUST BE REPAIRED/CORRECTED BY NOVEMBER 30TH.

ALL “E PRIORITY” CONDITIONS SHALL BE CORRECTED IMMEDIATELY UPON NOTIFICATION.

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

PROGRAM ADMINISTRATOR:

Distribution Engineering Services

APPLICABILITY:

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 in New York.

SCOPE:

- I. Patrols
- II. Equipment to be Inspected and Maintenance Codes
- III. Maintenance Data Base/Reports
- IV. Maintenance
- V. Work Management
- VI. Completion
- VII. Definitions
- VIII. Responsibilities
- IX. Training

I. 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. Street Light Asset Management is responsible for creating this schedule for their respective areas. The Distribution Inspector uses a hand held computer to record employee ID, region, district, street lighting installation standard number, GPS location, Priority A, B, C and E 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 Street Light Inventory Data (OLDS) and added to the appropriate inspection cycle. The street light standards inspections scheduled for the year shall be completed by November 30th. The inspector shall place the street light standard number on the facility if not found numbered during the patrol.

II. EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES:

- Luminaires
- Arms
- Standards
- Foundations
- Conductor

TABLE I

PRIORITY A, B and C MAINTENANCE ITEMS FOR OUTDOOR LIGHTING

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

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

III. MAINTENANCE DATA BASE/REPORTS

The 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.

IV. MAINTENANCE

The maintenance activities are scheduled by priority categories, with the exception of “E Priority” which requires immediate repair. All “A Priority” conditions identified prior to November 1 repaired/corrected by November 30th. The “B Priority” conditions are scheduled based on the reliability of the circuit, and age of facilities. The “B Priority” maintenance is to be performed as selected by Distribution Planning and Engineering and identified in the “Energy Delivery Work Plan”. All “B Priority” maintenance as outlined in the “Energy Delivery Work Plan” must be completed by March 31 of that fiscal year. The “C Priority” maintenance work will be completed as planned and directed by the Distribution Planning and Engineering department and Street Light Asset Management (Capital expenditures) after reviewing annually for trends that would require expenditures. Any “C Priority” work that is not capital expense will be completed at the discretion of the T&D operating department.

V. WORK MANAGEMENT

The time recording of both patrol and maintenance activities is accomplished in the Severn Trent Operating Resource Management System (STORMS).

STORMS requires that the Distribution Inspector/Operations Personnel fill out a daily time sheet. The Distribution Inspector would record their time actually performing the foot patrol inspection of the Distribution system under the DO4025 Activity along with the appropriate work order or a work request if the patrol has been scheduled. Work orders or work request numbers can be obtained from the Operations Supervisor or from the Distribution Planning/Area Resource Coordinator (ARC).

Operations Personnel performing scheduled maintenance on the Distribution System should record their time actually performing maintenance activities under the appropriate work request number set up by their Distribution Planning/ARC in their respective area. Operations Personnel performing maintenance activities that have been not been scheduled should charge the DM4025 activity along with appropriate work order number. STORMS work request numbers are created when the work has been scheduled by Distribution Planning/ARC. Work orders or work request numbers can be obtained from the Operations Supervisor or from the Distribution Planning/ARC.

VI. COMPLETION

The repair/correction of an identified maintenance item must be reported in the database. This reporting can be done through the edit screen found on the desktop computer. Field personnel that perform the repair/correction are required to complete the work order form providing the date completed, and employee ID number. The work order form is returned to the T&D Supervisor who will report the completed maintenance items in the database at their desktop computer, or designate the distribution inspector or a clerk to perform the reporting. Additional maintenance items, not in the database, that may be discovered and completed by personnel must be noted on the work order ticket so they can be recorded as work completed on that specific facility.

ALL MAINTENANCE WORK PERFORMED THAT WAS IDENTIFIED ON THE WORK ORDER OR DISCOVERED DURING THE REPAIR/CORRECTION OF THE ORIGINAL MAINTENANCE ITEM MUST BE LISTED IN THE DATABASE AND THEN REPORTED WHEN COMPLETE.

VIII. 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.

Distribution Inspector – A street light qualified employee who can identify deficiencies, or non-standard construction conditions, on the Company's distribution 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 pole which supports street lighting luminaire(s) and associated wiring.

IX. RESPONSIBILITIES

Distribution Engineering Services

1. Update program as necessary
2. Provide field support and training as requested.
3. Report System Maintenance progress monthly by Region.

Customer Operations

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

Distribution Inspector

1. Demonstrate the ability to identify maintenance items 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 National Grid EOP.
3. 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.

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.

Street Light Asset Management

1. To develop a five-year inspection schedule of all facilities covered by this EOP.

Distribution Network Strategy

1. Provide input into program revisions.
2. Ensure the program as outlined in this EOP is completed each year.
3. Provide qualified personnel to inspect where applicable.
4. Ensure all inspectors have been trained.
5. Provide program management.

Process and Systems

1. Provide and support database.

T&D Technical Training

1. Provide training upon request.


VII. TRAINING

1. Distribution Engineering Services with assistance from the database vendor will provide training on the utilization of handheld computers and the selected database.
2. Distribution Engineering Services along with the training department will provide training for the identification of A, B, C and E maintenance items to the qualified worker who will be performing the inspections.

NG-USA EOP G017
“Street Light Standard Inspection Program”

04/01/06

Minor changes to procedure.

 ELECTRIC OPERATING PROCEDURES	Doc No. NG-USA EOP G004
	Page 1 of 5
	Date 02/01/07
SUBJECT: Shock Complaints	SECTION: General

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.

Supersedes Document Dated 07/01/04	Authorized By: Labs and Testing Services	Niagara Mohawk Power Corporation d/b/a National Grid Elevated Voltage Testing and Facility Inspection 2009 Annual Report Vice President – Engineering Services	Approved By: NYSPSC Case 04-M-0159 February 12, 2010
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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. Employee
 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

[illegible]

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.

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SERVICE REP _____

DATE _____

NG0023(01.06)

NG-USA EOP G004

“Shock Complaints”

02/01/07

Changes throughout document.

nationalgrid	SUBSTATION MAINTENANCE STANDARD	SMS 400.06.1 Version 1.2 Date 08/20/2007 Page 1 of 2
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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.

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- 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

nationalgrid	SUBSTATION MAINTENANCE PROCEDURE	SMP 400.06.2 Version 1.7 Date 09/30/2008 Page 1 of 16
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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.

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PROCEDURE CONTENTS

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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 be 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 use 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 Chargers 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 5842390 Flood 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.

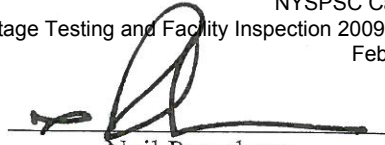
CERTIFICATION
[STRAY VOLTAGE TESTING]

STATE OF NEW YORK)
) ss.:
COUNTY OF ONONDAGA)

Neil Proudman, on this 8th day of February 2010, certifies as follows:

1. I am the Vice President, Construction Delivery of National Grid (the "Company"), and in that capacity I make this Certification for the annual period ending December 31st, 2009 based on my knowledge of the testing program adopted by the Company in accordance the Public Service Commission's Orders issued and effective January 5, July 21, 2005, and December 15, 2008 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 requirements 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, 2009 (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 acknowledgment 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.


Neil Proudman

Sworn to before me this 8th day of February, 2010

Notary Public: Laurie Riley



CERTIFICATION
[FACILITY INSPECTIONS]

STATE OF NEW YORK)
) ss.:
COUNTY OF ONONDAGA)

Neil Proudman, on this 8th day of February 2010, certifies as follows:

1. I am the Vice President, Construction Delivery of National Grid (the "Company"), and in that capacity I make this Certification for the annual period ending December 31st, 2009 based on my knowledge of the inspection program adopted by the Company in accordance the Public Service Commission's Orders issued and effective January 5, July 21, 2005, and December 15, 2008 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, 2009 (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
2009, in order to comply with the five-year inspection cycle
required under the Orders. I further certify that, to the best
of my knowledge, information and belief, the Company has
inspected 100% of its Facilities for the five-year period
ended December 31, 2009.


Neil Proudman

Sworn to before me this 8th day of February, 2010

Notary Public: Laurie E. Riley

