nationalgrid

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VIA OVERNIGHT MAIL

January 14, 2008

Honorable Jaclyn Brilling
Secretary
State of New York
Public Service Commission
Three Empire State Plaza
Albany, NY 12223

RE: Case No. 04-M-0159 – Proceeding on Motion of the Commission to Examine the Safety of Electric Transmission and Distribution Systems

2007 ANNUAL REPORT

Dear Secretary Brilling:

Niagara Mohawk Power Corporation d/b/a National Grid (the "Company") is writing to submit an original and five (5) copies of the Company's 2007 Annual Report for "Elevated Voltage Testing and Facility Inspection" performed in accordance with the New York State Public Service Commission's, January 5, 2005 and July 21, 2005 orders (the "Safety Orders") in the above-referenced proceeding [1] Also included with the 2007 Annual Report are the latest versions of the Company's revised procedures governing the testing and inspection programs, along with signed originals of the certifications required under the Safety Orders

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.

Respectfully submitted,

Jeremy J. Euto

Enclosures
c: Susan Pelkey
Robert Visalli/Denise Gerbsch
Christian Bonvin

[1] Case No. 04-M-0159, *Proceeding on the Motion of the Commission to Examine the Safety of Electric Transmission and Distribution Systems*, "Order Instituting Safety Standards" (issued January 5, 2005); Case No. 04-M-0159, "Order on Petitions for Rehearing and Waiver" (issued July 21, 2005).

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STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE NO. 04-M-0159

National Grid

Elevated Voltage Testing and Facility Inspection

2007 Annual Report

January 15, 2008

Executive Summary

On January 05, 2005, the New York State Public Service Commission issued an order in Case No. 04-M-0159 instituting safety standards for all regulated electric utilities (the "January Order") [1] The January Order directed utilities to annually:

- Test 100% of publicly accessible electrical facilities for the presence of elevated voltage;
- Visually inspect 20% of facilities for defects;
- Implement a quality assurance (QA) process to monitor the program;
- Seek out and test certain municipally owned facilities; and
- Complete the program by November 30th of each year

Targets for Elevated Voltage testing were modified in the Commission's July 21, 2005 Order in Case No 04-M-0159 (the "July Order")[2] to include:

- Test 100% of publicly accessible conventional underground equipment annually;
- Test 100% of publicly accessible streetlight equipment annually;
- Test 100% of municipal owned streetlights and traffic controls annually;
- Test approximately half of their System by Nov 30, 2005 and complete the testing program for the entire system by Aug 31, 2006; and
- Inspect 20% annually, and 100% of all facilities every five years for visual defects [3]

Targets for the Elevated Voltage testing program established in the January Order and July Order (the "Safety Orders") were met by National Grid The elevated voltage testing results are quantified in the table below

Elevated Voltage Testing Annual Summary			
Program	Total Units	Units Completed	% Completed
Distribution	1,291,343	1,291,343	100
Underground	104,229	104,229	100
Streetlights*	82,559	82,559	100
Transmission	106,527	106,527	100
Substation	929	929	100

*Streetlight program includes streetlights, municipal streetlights and traffic controls

[1] Case No. 04-M-0159, *Proceeding on the Motion of the Commission to Examine the Safety of Electric Transmission and Distribution Systems*, "Order Instituting Safety Standards" (issued January 5, 2005).
[2] Case No 04-M-0159, "Order on Petitions for Rehearing and Waiver" (issued July 21, 2005).
[3] Pursuant to the Commission's July Order in Case No 04-M-0159, the specific target for inspections during the third year was 19% (i e , 95% of the annual 20% target) July Order, Appendix A p 6

The same results are qualified to show only those facilities that exhibited voltage in the following table These facilities are represented in units of tests performed in a specific program

EV Facility Testing with Voltage between ...					
Program	1.0 – 4.4 volts	4.5 – 7.9 volts	8.0 – 24.9 volts	25 – 99 volts	> 100 volts
Distribution (Units)	170	13	8	7	0
Underground (units)	4	2	1	1	0
Street Light (Units)	123	32	103	32	0
Transmission (Units)	56	4	2	0	0
Substation (Units)	0	1	0	0	0

- Units are simply a count of tests completed
- Only voltages greater than or equal to 4.5 volts are mitigated

Based upon the large population of voltage tests completed, conclusions drawn include:

- very few elevated voltage conditions are apparent as a percentage of the total system assets;
- elevated voltage conditions found on Street Lights have increased over the testing performed during 2007;
- the majority of those found were below the 4 5 volts threshold. Increases may be largely attributed to training and testing procedure updates (e g., testers actively work to find bare metal by removing paint and rust);
- elevated voltage conditions identified on underground assets are largely attributed to inadequate ground conditions;
- elevated voltage conditions found above the 4 5 volts threshold for transmission assets are largely attributed to inadequate ground conditions;
- modifications to the program should be considered to allow for mobile testing of assets, to remove the transmission assets from the program, and to scale back annual testing requirements for other facility types to be commensurate with inspection requirements, i e , 20% per year on a five year cycle, other than testing requirements for streetlights, which should remain on an annual cycle

Targets for Inspection programs as established by the Safety Orders were met or exceeded The results are quantified below for the third cycle of Facility Inspections

Program	Units / Miles Goal	Units / Miles Completed	% of Goal Completed	YR 3 PSC Goal %*
Distribution	6,542	6,542 (mi)	> 100	19
Underground	8,963	12,262	> 100	19
Streetlights*	11,751	16,427	> 100	19
Transmission	1,780	1,780 (mi)	> 100	19
Substation	929	929	> 100	19

^ Distribution and Transmission are reported in Miles. Underground, Streetlights and substations are reported in Units

- PSC Goal of 19% is based on 3rd year criteria of 95% of annual 20% target.

A three year view of the inspection programs since the 'Safety Orders' were issued is depicted in the next table All inspection programs are ahead of the established goal

Visual Inspections Cumulative			
Program	Units / Miles Completed	% of System Completed	PSC Goal %
Distribution	21,991(mi)	62	54
Underground	57,710	75	54
Streetlights	49,530	77	54
Transmission	6,031 (mi)	69	54
Substation	929	100	54

- Distribution and Transmission are reported in Miles. Underground, Streetlights and Substations are reported in units
- PSC Goal % is based on first year criteria of 17% plus second year criteria of 18% plus 3rd year criteria of 19%

Inspections deficiencies are identified by code and priority. The priorities include: E – Emergency; A – As soon as practical; B- As directed by Distribution Engineering. C – Items being trended by and reviewed by Distribution Engineering

Summary of maintenance code priorities collected during the 2007 Inspection program are identified in the following table

Visual Inspections					
Program	Priority E	Priority A	Priority B	Priority C	Other
Distribution	228	10,153	140,526	27,020	70,357
Underground	3	194	6,302	547	3,066
Streetlights	0	42	6538	13,171	6583
Transmission	3	397	1,105	43	3,014
Substation	1 item identified for Fence and Yard				

The category of 'Other' consists of (F) Forestry codes, (I) Inventory codes and (P) Performance codes for work completed during the actual inspection

Background

The New York State Public Service Commission (the "Commission") issued an Order Instituting Safety Standards in January of 2005 (the January Order) During the investigation of a contact incident in New York City, the Commission deemed there was sufficient justification to move forward with an order requiring all utilities to proactively search for evidence of "stray voltage" Stray voltage for the January Order is defined as voltage conditions on electrical equipment that should not ordinarily exist Based on discussions with the utilities, Department of Public Service Staff ("Staff"), and manufacturers of testing equipment, a level of 4 5 volts was established as a threshold voltage condition above which National Grid would consider the voltage condition stray or elevated. Utilities have historically used the term "stray voltage" in connection with neutral to earth voltage difference For purposes of its internal operations and this report, National Grid uses the term "elevated voltage" ("EV") interchangeably with stray voltage to avoid any such confusion or misunderstanding.

In response to the January Order, National Grid and the other utilities filed plans for implementation and compliance with the order on February 22, 2005. Certain of the utilities also filed requests for waivers and rehearing and/or clarification of the requirements of the January Order The Commission addressed the requests for rehearing and waiver requests in its July 21, 2005 Order (referred to collectively with the January Order as the "Safety Orders")

The plan filed on February 22, 2005 detailed the approach National Grid would take to meet the requirements of the Safety Orders Staff stated that while they would review the plans submitted by the utilities, they did not expect the Commission to formally approve the utilities' plans. Staff indicated that they would notify the utilities of any deficiencies in the plans' compliance with the Safety Orders

The Safety Orders called for EV testing of all publicly accessible facilities within the electric utility system Specifically, if a facility was accessible to the public, within reach of the ground and contained conductive equipment, an EV test was to be performed with a qualified voltage detection device In addition the Safety Orders called upon utilities to:

- visually inspect all facilities over a 5 year period;
- meet record keeping, certification and reporting requirements; and
- adopt the National Electric Safety Code (NESC) as the minimum standard governing utility construction, maintenance and operation.

As part of the reporting requirements the utilities were directed to file an annual report that would include:

- details of the voltage testing program and inspections program conducted over the last twelve months;
- discussion of the performance mechanism described in the Safety Orders;
- certifications regarding program implementation;
- discussion of the analysis undertaken on the causes of elevated voltage with the utility's electric system, the conclusions drawn there from, and the preventative and remedial measures identified, and the utility's plans to implement those measures; and
- all other pertinent information

In its July 21, 2005 Order, the commission further clarified the requirements of the January Order, directing the utilities to:

- test 100% of their publicly accessible conventional underground equipment annually;
- test 100% of their publicly accessible streetlight equipment annually;
- test 100% of municipal owned streetlights and traffic controls annually;
- test approximately half of their System by Nov 30, 2005 and complete the testing program for the entire system by Aug 31, 2006; and
- inspect 20% annually, and 100% of all facilities every five years for visual defects

In response to the Safety Orders, National Grid developed electric operating procedures, created an organization to manage the project, developed a database to house the information collected, purchased testing devices, developed training programs and hired contractors to perform the testing

In order to meet the demands of the Safety Orders a program manager was hired to oversee the project The project was broken down into several key areas These included:

- EV testing for Distribution facilities
- EV testing for Underground facilities
- EV testing for Streetlight facilities
- EV testing for Transmission facilities
- EV testing for Substation fences
- Inspection of Distribution facilities
- Inspection of Underground facilities
- Inspection of Streetlight facilities
- Inspection of Transmission facilities
- Inspection of Substations

Each area of the project was managed with a combination of internal workforce and contractors The Maintenance Inspection & Assessment group was created to manage EV testing work and follow up repairs and to manage the field inspections and subsequent repairs

There are approximately 1 5 million locations to be visited for EV testing in the Company's New York service territory

For inspections, 20% of installed assets are required to be visually inspected annually Recognizing the difficulty for the initial years, the Safety Orders allowed some leeway for the Inspection goal, permitting utilities to complete 85% of the annual 20% goal or 17% of asset inspections in year one and 90% of the annual 20% goal or 18% of asset inspections in year two and 100% of the annual goal or 20% for year three. The National Grid inspection goals for year three of the program included 6,542 miles of distribution, 1,780miles of transmission. 9,379 manhole /hand-hole inspections, and 11,751 streetlight inspections. Year three streetlight inspections were escalated to include the Eastern divisions of NY

The New York Utility group continued to meet to discuss and compare individual testing and inspection programs during 2007 The group met periodically with the Staff to discuss progress and the expectations of Staff regarding the programs, collaborate with Staff for monthly report development. discuss how to interpret requirements of the Safety Orders, and generally review common issues that utilities were experiencing The working group and Staff also held bi-monthly conference calls to discuss emerging issues

The 2007 Annual Report is intended to reflect program status through November 30, 2007 This report is also intended to serve as a comprehensive update to the National Grid programs addressing the Safety Orders. details of which were originally filed with the Commission on February 22. 2005 and again on January 13. 2006.

Overview

National Grid New York service territory covers an enormous geographical area in upstate New York. The franchise covers approximately 24,700 square miles. There are approximately 1,500,000 electric customers within the franchise area. For this program the Company broke the electric system into a variety of subprograms to schedule and track the testing and inspections. The categories included distribution, underground, streetlights & traffic signals, transmission, and substations

The distribution system consists of structures supporting circuits energized at voltages of up to 15kV. This system spans close to 36,000 miles and is made up of approximately 1,300,000 poles. The EV testing is currently performed by contractors. The facility inspections are currently performed by an internal workforce

The underground system is made up of approximately 93,000 metallic manholes, hand-holes, vaults, URD pad mounted transformers, switchgear, etc. Pursuant to the Safety Orders, fiberglass hand holes were exempt from testing [4]. The EV testing of the underground system is currently performed by contractors. The facility inspections of the underground system are currently performed by an internal workforce

The streetlight system contains approximately 80,000 underground fed metallic streetlight standards and municipally owned lights and traffic control devices. Overhead fed street lights on wooden poles are not counted within the street light program. EV testing of the overhead fed lights is contained within the distribution program. For the underground fed metallic streetlight standards EV testing, the tests were performed by contractors at night when the light is operational. The traffic control EV testing takes place in conjunction with the contractors' testing of the overhead and underground systems during the daytime hours. The streetlight facility inspections on Company owned facilities take place during the day and are performed by an internal workforce

The transmission category includes the sub-transmission system for this program. This consists of structures that support circuits energized at voltages of 23kV, 34.5kV, 46kV, 69kV, 115kV, 230kV and 345kV. The transmission system spans the entire state, is approximately 8,900 miles in length and contains approximately 100,000 structures (wood and steel). The EV testing on transmission 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, the database and the internal hand held computer were set up to accept EV tests on transmission while an employee was at the location for a visual inspection or the contractor was at the tower for an EV test

There are 929 substations in the Company's New York system. EV results for substation fences were collected internally by the operating group. The initial dataset established

[4] July Order p. 23

identified 929 Substation locations to be tested of which a number of these are customer owned locations

At the start of this program no database existed within the Company to track EV testing. To implement the program, such a database needed to be developed National Grid utilized a combination of internal employees and services from Computapole to develop the database and a means by which to move the data into the database At the beginning of the project, the Company created a 'Data Document' for contractors to follow for receiving and returning data to National Grid in a consistent process A series of data validations were put in place to perform a basic check on the data before receiving the information back into the database Once the data are received, the supervisors and analysts can run reports against the data

Testing and Inspection

Elevated Voltage Testing

The elevated voltage testing program was segmented into a number of categories. These include: distribution facility testing, underground testing, streetlights & municipally owned facility testing, overhead transmission facility testing, substation fence testing and daily work area testing The details of the Company's elevated voltage testing procedures and protocols are included in the NG EOP – G0016 entitled "Elevated Equipment Voltage Testing," provided in Attachment 1 This EOP has been updated since the original National Grid filing in February 2005 The Company has included the most recent copy in this filing.

Recognizing the enormity of this undertaking, the Company determined that contracting the majority of the EV testing work would be necessary in order to meet the schedule demands of the Safety Orders After a review of contractor proposals, the Company contracted with two companies to perform this work Two contractors were selected due to the large number of variables to get the project started Should a single contractor fail to achieve its objective, the second contractor would be available to increase its role to complete the required testing. Early in 2006 National Grid scaled back to a single contractor due to the confidence built that a single contractor could complete the project by the established deadlines

Test equipment selected for the program was the HD electric company LV-S-5 This unit was the only I E.C category IV rated device available The company acquired 750 devices to be used for the EV testing of the system by the contractors as well as daily testing requirements by the Company's workforce A list of approved multi meters was developed and communicated to the workforce A 470 ohm shunt resistor is also necessary for use with the multi meter. Materials for the shunt resistors were purchased, assembled and tested by the Company's electrical test lab. The shunt resistors were distributed to the workforce along with the HD test equipment in August 2005

The company trained the contractors' primary employees in May 2005. The contractors then hired and trained their employees on the safety requirements and the procedure for

performing the EV testing. Contractors were trained in: Proper use of appropriate Personal Protective Equipment, Work Area Protection, Hazard Communication, First Aid CPR (for multi person crews), Proper use of the certified voltage detection units and multimeters, and Hazardous condition identification During the training, contractors were provided with a review of our electric system in order to accurately convey to their employees what they were looking at and how to code the information

As part of its program development and training, the Company used a 'trigger value' to initiate response when voltage was identified This trigger voltage used was 4.5 volts. This value was derived from the approved voltage test device (HD Electric LV-S-5). The test equipment is designed to trigger or illuminate at 5 volts with a + or – 10% sensitivity range In general, this means the unit could trigger at a value as low as 4.5 volts If a voltage was identified using the HD detector, then a multi-meter with a 470 ohm shunt resistor was used to make an actual measurement Should the voltage collapse below 4 5 volts, then the data was collected and no further action was taken. Should the voltage reading be sustained at 4 5-7 9 volts then the facility was to either be barricaded / flagged / or guarded depending on its location and volume of pedestrian traffic Should the voltage reading exceed 8 0 volts then the facility was guarded until the Company responded to trouble shoot and eliminate the condition

When EV conditions are identified by the contractors, they follow a procedure established to provide assurance that the Company can track the incident and immediately follow up. The procedure requires the contractor to call a centralized dispatch number at National Grid that is staffed 24 hours per day, 365 days per year Pertinent information would be provided to the dispatcher including where the facility was located, what voltage was measured and whether the contractor was required to stand guard The Dispatch center would then provide the various control centers with an order for a qualified crew to respond to each such location The crew would investigate and resolve the hazardous condition If the crew could not make repairs immediately, they would eliminate the hazard and provide sufficient information for follow up by the appropriate group. This information was then entered into the Elevated Voltage database

In light of the magnitude of the undertaking and the amount of data initially generated, the data flow process between the contractors and National Grid required a series of procedural enhancements to work properly The process required the contractors to structure their data in a very specific manner The contractors would perform the testing, collect the data, and post data files to a controlled directory on the National Grid web. The data would have a validation program run against it by a National Grid analyst to ensure that key fields were populated properly After validation, the data was either accepted into the database or it was rejected and returned to the contractor Reasons for rejected data were communicated to the contractors (e.g , data structure, missing data, etc.) This data flow process was established to provide assurance that information was collected and turned over to National Grid in a consistent manner, regardless of the contractor

Distribution

Overview

The company queried its Geographical Information System (GIS) for data related to Overhead Distribution It was determined that, rather than target distribution facilities with conductive equipment within reach of the ground, the contractors would visit 100% of the poles that were publicly accessible The purpose of visiting 100% of the publicly accessible poles was to insure that the Company captured data on poles that had conductive facilities added but not captured in the source database. As of November 30. 2007 the distribution system testing program was 100% completed in the National Grid upstate New York territory

Results

As a consequence of meetings and discussions with Staff, a standard monthly report was established for the New York utilities This monthly report is shared with Staff to provide status information as to the progress for each utility The standard report was developed so results from various utilities could be compared A copy of the Company's report is found in Attachment 7 The results of the Distribution program through November 30. 2007 show testing for 1.291.343 locations completed

The units tested relate to poles on the distribution system. Contractors are required to test anything on and around each pole to provide assurance that the area was clear of any elevated voltages If a pole contained 2 guy wires, a ground wire. a conduit riser and a phone box adjacent to the pole, then the contractor was instructed to test all items and return a single record to National Grid

For the testing completed. the following voltages were found

Distribution Overhead # of Units with Voltage between ...					
	1.0 – 4.4 volts	4.5 – 7.9 volts	8.0 – 24.9 volts	25 – 99 volts	> 100 volts
Cycle 1	262	25	12	22	5
Cycle 2	0	0	1	0	0
Cycle 3	170	13	8	7	0

Note: Transmission, Distribution, Substation Fences and UG only have 2 completed cycles due to the PSC date revisions (relief) in the first year. We only have preloaded years of 2005 and 2007 for these data sources.

When voltage was identified, the contractor captured the specific information on where the voltage was located This breakdown is seen below

Distribution facilities with Voltage between …					
Voltage on …	1.0 – 4.4 volts	4.5 – 7.9 volts	8.0 – 24.9 volts	25 – 99 volts	> 100 volts
Pole	96	10	5	10	1
Ground	123	16	11	5	1
Guy	212	14	7	3	0
Riser	41	1	3	5	0
Other	63	6	1	14	4

-Note that totals of voltages found details (pole, ground, etc) may add up to more than the total facilities within a voltage range. This occurs because voltage may have been found on more than one item on the same pole. For example if a pole was tested and voltage was found on the guy wire and the ground, then both items are reflected in the details but only one location is identified in the Total Facilities line.
-Note that this table contains results from Cycle 1, Cycle 2 and Cycle 3 testing

Of the locations found with voltage, National Grid investigates and mitigates at locations that exceed 4 5 volts The following table describes work performed to respond to locations with voltages found in excess of 4 5 volts

Distribution Facilities Repairs Voltage > 4.5 volts	
Quantity	Work Description
1	Arrester
2	Cable Feed
18	Down Ground
2	Equipment Other
13	Ground Connection
2	Guy
1	Induced
4	Insulator
1	Neutral
5	None Required
12	Procedure
1	Remade Connections
2	Service Wire
8	Customer Problem
72	Total

Note that this table contains results from Cycle 1, Cycle 2 and Cycle 3 testing

The locations identified as 'procedure not properly followed' generally occurred early in the testing program These items should not be interpreted as the result of the Company not responding to an EV incident It is quite the opposite The Company included these locations as EV records even though the Company believes the majority would have shown no voltage had a suitable shunt resistor been used Each of these locations was rechecked with the shunt resistor in place to ensure no real voltage source existed After several procedural changes, use of the shunt resistor is now permitted at all times This

clarification significantly reduced the number of false positive reports of an elevated voltage condition

Underground

Overview

The company queried its Geographical Information System (GIS) for data related to Underground facilities Underground facilities included manholes, hand-holes, vaults, pad mounted transformers, pad mounted switchgear, etc The GIS data were supplemented with paper and electronic maps for the underground transmission system. The Safety Orders set a schedule requiring testing for 100% of publicly accessible conventional underground equipment and priority URD equipment by November 30, 2007

Results

A standard monthly reporting was established for all the New York utilities This monthly report is shared with Staff to provide status information as to the progress for each utility The standard report was developed so the various utilities could be compared A copy of the November 2007 report is found in Attachment 7 Results of the Underground system testing program through November 30, 2007 show a completion of 100% of the underground program for cycle 3 or 104.229 units

A unit relates to manholes, hand holes, vaults, pad mounted equipment, etc. on the underground system Contractors are required to test anything on and around each manhole / hand hole to provide assurance that the area was clear of any elevated voltages

For the testing completed, the following voltages were found.

Underground # Units with Voltage between …					
	1.0 – 4.4 volts	4.5 – 7.9 volts	8.0 – 24.9 volts	25 – 99 volts	> 100 volts
Cycle 1	17	0	1	1	0
Cycle 2	0	0	0	0	0
Cycle 3	4	1	1	1	0

Note: Transmission, Distribution, Substation Fences and UG only have 2 completed cycles due to the PSC date revisions (relief) in the first year We only have preloaded years of 2005 and 2007 for these data sources.

Locations where voltages were found were segmented off to show which equipment the voltage was found on This breakdown is seen below

Underground Facilities with Voltage between …					
Voltage on …	1 0 – 4 4 volts	4 5 – 7 9 volts	8 0 – 24 9 volts	25 – 99 volts	> 100 volts
Hand hole	1	0	2	2	0
Manhole	4	1	1	0	0
Switchgear	0	0	0	0	0
Transformer	1	1	0	1	0
Vault Cover	0	0	0	0	0
Pedestal	0	0	0	0	0
Other	14	0	0	0	0

Note that this table contains results from Cycle 1, Cycle 2 and Cycle 3 testing.

Note that the Other' category in the preceding table is generally made up of codes for equipment that would not exist on the underground system For example if the contractor tested a hand hole and found voltage, the Company may have received a code of guy wire back for that asset Additional data validation checks were added that are intended to prevent these errors in the future

Of the items that were found with voltage, National Grid investigates and mitigates at locations that exceeded 4 5 volts The following table describes work performed to respond to locations on the underground system with voltages found in excess of 4 5 volts

Underground Facilities Repairs Voltage > 4.5 volts	
Quantity	Work Description
2	Ground Connection Repaired

One was due to a faulted cable. with corroded neutral

Streetlights

Overview

This portion of the program included the testing of publicly accessible metallic streetlights and traffic control equipment. During the first cycle of testing (2005). the Company queried its Outdoor Lighting Data System (OLDS) for data related to Streetlight standards that were metallic and an Access database for the Traffic Controls. For the third cycle of testing (2007) the companied utilized the data collected during 2005 and 2006 and supplement with any new installations from the OLDS system. The purpose for using this data was to insure we provided the testing contractors with the maximum number of locations that may require a test The Safety Orders set a schedule for 100% of publicly accessible street light facilities to be tested for elevated voltage by November 30. 2007 In addition to these facilities. the contractors were directed to locate

any other municipally owned streetlights and traffic control structures that may not have been in the original lists

Results

A standard monthly reporting was established for the New York utilities This monthly report is shared with Staff to provide status information as to the progress for each utility The standard report was developed so that results from the various utilities could be compared. A copy of the November 2007 report is found in Attachment 7. The results of the cycle 3 streetlight program through November 30, 2007 shows a completion of 100% of the streetlight /traffic control which equates to 82.559 units

The units tested relates to streetlights and traffic control Contractors are required to test anything on and around each device to provide assurance that the area was clear of any elevated voltages

For the testing completed to date (Cycle 1. Cycle 2 and Cycle 3). the following voltages were found

Streetlight / Traffic Control # Units with Voltage between ...					
	1 0 – 4 4 volts	4 5 – 7 9 volts	8 0 – 24 9 volts	25 – 99 volts	> 100 volts
Cycle 1	223	84	60	12	0
Cycle 2	12	12	21	3	0
Cycle 3	123	32	103	32	0

The results for cycle 3 testing shows a significant increase of elevated voltage conditions identified A majority of these conditions were located in the Western Region (48) and can be interpreted to be a result of:

1- additional testing following the major weather event that took place in Buffalo. October 2006 with the Sarnoff SVD2000 Tester; and
2- training and testing procedure updates (e g . testers actively work to find bare metal by removing paint and rust)

The table below reflects these specific items located in the Western Region

Streetlight / Traffic Control # Units with Voltage between ...					
	1 0 – 4 4 volts	4 5 – 7 9 volts	8 0 – 24 9 volts	25 – 99 volts	> 100 volts
Cycle 3	106	24	86	25	0

Locations where voltages were found were segmented off to show which equipment the voltage was found on. This breakdown is seen below

Streetlight / Traffic Control Facilities with Voltage between ...					
Voltage on	1 0 – 4.4 volts	4 5 – 7 9 volts	8.0 – 24 9 volts	25 – 99 volts	> 100 volts
Pole	354	117	173	45	0
Traffic Signal	1	0	1	1	0
Control Box	2	0	0	0	0
Pedestrian Crossing	0	0	0	0	0
Other	1	11	10	1	0

Note that this table contains results from Cycle 1, Cycle 2 and Cycle 3 testing.

Of the items that were found with voltage, National Grid investigates and mitigates at locations that exceeded 4 5 volts The following table describes work performed to respond to locations on the streetlight system with voltages found in excess of 4 5 volts

Streetlight / Traffic Facilities Repairs Voltage > 4.5 volts	
Quantity	Work Description
22	Cable and Ground
10	Cable Feed
86	Ground Connection
4	Lamp Wiring
13	Luminaire Change
41	Neutral
39	None Required
5	Photo Eye
7	Poor Insulation
1	Procedure Not Followed
50	Remade all Connections
10	Customer Problem

Note that this table contains results from Cycle 1 Cycle 2 and Cycle 3 testing.

Transmission

Overview

The company derived its Transmission and Sub-transmission data from a combination of databases For the purpose of this report all transmission and sub-transmission structures are included under the title 'Transmission Structures' The Safety Orders set a schedule for testing 100% of transmission that is publicly accessible by November 30. 2007

It became apparent early in the testing that the HD Electric I V-S-5 test device would prove to be too cumbersome to use within transmission right of ways The electric field present on / near / under transmission towers caused the device to 'trigger' or illuminate the majority of the time Several attempts were made by HD Electric to design a ground shield for the test device which would eliminate the false positive trigger One of these ground shields did prove to have superior results to eliminating the false positive readings, however by that point in time. the Company had decided to utilize the multi-meter/shunt resistor and retrieve a voltage reading from each structure

Results

Monthly results of the EV testing program are forward to Staff. These results are included in Attachment 7. The results of the transmission program through November 30. 2007 show National Grid completing 100% of the required testing or 106.527 units

The units tested relates to transmission structures Contractors tested anything on (and around) each structure to provide assurance the area was clear of elevated voltages A structure could be made up of a metallic tower or wood pole(s) / guys Some structures contained upwards of 6 poles Each multi pole structure is counted as one item in the testing database

For the testing completed during cycle 1. cycle 2. and cycle 3 the following voltages were found:

Transmission Structures # Units with Voltage between ...					
Totals	1 0 – 4 4 volts	4 5 – 7 9 volts	8.0 – 24 9 volts	25 – 99 volts	> 100 volts
Cycle 1	79	0	0	0	0
Cycle 2	0	0	0	0	0
Cycle 3	55	3	2	0	0

Note: Transmission, Distribution, Substation Fences and UG only have 2 completed cycles due to the PSC date revisions (relief) in the first year. We only have preloaded years of 2005 and 2007 for these data sources.

Locations where voltages were found were segmented off to show which equipment the voltage was found on This breakdown is seen below

Transmission Facilities with Voltage between ...					
Voltage on ...	1 0 – 4 4 volts	4 5 – 7 9 volts	8.0 – 24 9 volts	25 – 99 volts	> 100 volts
Lattice	4	0	0	0	0
Pole	29	0	0	0	0
Ground	98	3	1	0	0
Guy	2	0	0	0	0
Other	13	2	1	0	0

Note that this table contains results from Cycle 1, Cycle 2 and Cycle 3 testing.

Substations

Overview

The substation facilities are made up of 929 locations. The difference reported from 2006 is due to additional customer owned locations provided to the field for testing in the initial dataset Not all of the 929 locations require testing since not all substations have publicly accessible electric facilities (e.g , substations located in brick buildings). The data source for the identification of substation facilities will be the AIMMS (Asset Information Maintenance Management System). The Safety Orders set a schedule for 100% of substation fence testing as of November 30, 2007

Results

Testing was completed in 2007 for all substations Monthly results of the EV testing program are forwarded to Staff These results are included in Attachment 7 The results of the substation program through November 30, 2007 show National Grid a completing 100% of the required testing or 929 units

The units tested relates to a substation facility

Substation # Units with Voltage between …					
	1 0 – 4 4 volts	4 5 – 7 9 volts	8 0 – 24 9 volts	25 – 99 volts	> 100 volts
Cycle 1	16	0	0	0	0
Cycle 2	0	0	0	0	0
Cycle 3	0	1	0	0	0

Locations where voltages were found were segmented off to show what equipment the voltage was found on This breakdown is seen below

Substation Underground Facilities with Voltage between …					
Voltage on …	1 0 – 4 4 volts	4 5 – 7 9 volts	8 0 – 24 9 volts	25 – 99 volts	> 100 volts
Fence	16	1	0	0	0
Other	0	0	0	0	0

Note that this table contains results from Cycle 1, Cycle 2 and Cycle 3 testing.

Inspection Programs

Similar to the EV program, National Grid's inspection program was segmented into five categories: distribution facility inspection; underground facility inspections; streetlights inspections; transmission facility inspections; substation inspections Each program is summarized by its associated Electric Operating Procedure These 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

Distribution

Overview

The distribution inspections program was developed to meet the requirements of the Safety Orders to inspect distribution facilities over a five year period The details for overhead inspection procedures and protocols for distribution overhead facilities are provided in NG-USA EOP D004. entitled "Distribution Line Patrol and Maintenance." provided in Attachment 2

The Distribution Line Patrol and Maintenance program generally consists of patrols conducted by qualified workers that can identify deficiencies or non-standard construction conditions on the facilities The patrols are scheduled in such a manner that each distribution feeder and associated equipment would be examined at least once every five years

Distribution (15 kV and less) facilities requiring inspection include Company electric facilities on overhead structures The database of this equipment is included in GIS and provided in electronic format to the inspector going to the site The inspectors also utilize hardcopy maps for a distribution circuits to assist during field work GPS latitude and longitude coordinates and other basic facility information for each pole are downloaded into Computapole hand held devices The inspector electronically documents inspection of the facility in the Computapole hand held unit Deficiencies that can be captured are summarized in the EOP (Attachment 2) Deficiencies are prioritized to identify how quickly they should be addressed. The priorities include: E – Emergency; A – As soon as practical; B- As directed by Distribution Engineering, C – Items being trended by and reviewed by Distribution Engineering, F – Forestry Issue. I – Inventory items. P – work Performed in the field during the inspections

Results

Progress on the distribution inspection program is measured by miles of distribution circuits inspected Results are reported through the Computapole database as the circuits are completed Annual goals will slightly exceed or fall short of 20% of the Distribution system due to the varying lengths of feeders that are inspected during a year Results of the 2007 program are:

Total Miles Goal	Miles Completed	% Goal Completed
6,542	6,542	100

* Goals established at the start of the inspection year to select circuits based on last inspection date and on requests based on circuit performance

A summary of deficiencies reported by category is attached All codes reported have a 'default' priority that an inspector is allowed to raise or lower based on their evaluation. Each category has a number of different deficiencies that could be identified but are grouped together for this display As described later in this report, the Company is moving to a new system for classifying inspection items on a going forward basis

Cycle 3 2007 data

Distribution Facilities Deficiencies found					
CATEGORY	Priority E	Priority A	Priority B	Priority C	Other
Anchor	0	81	45	22	0
Arrestor	0	0	0	0	0
Capacitor	0	45	626	19	2
Crossarm	0	386	6141	762	4204
Cutout	12	142	26	9	2918
Enclosures	0	0	0	9	1
GIS	0	0	0	12225	273
Ground	10	870	6686	539	10
Guy	1	328	35660	803	13525
Insulator	61	302	3558	28	15
Osmose	0	0	0	190	0
PM Transformer	13	161	159	1794	3448
Pole	2	783	32721	9362	31115
Primary	22	201	2194	140	2425
Recloser	0	3	39	0	0
Regulator	0	6	232	5	0
Riser	1	12	438	1	13
ROW	0	0	0	8	1168
Secondary	17	92	1053	11	5302
Sectionalizer	0	0	25	2	0
Service	14	128	950	50	5468
Spacer Cable	4	9	1044	0	0
Spur Tap	0	0	0	0	21
Streetlights	0	4351	13039	132	1
Switch	0	52	208	6	0
Switchgear	0	3	13	70	264
Transformer	3	1007	40546	835	164
Totals	160	8964	146203	27022	70357

Deficiencies identified as E priority were addressed immediately or made safe and referred for additional follow up 'A Priority' items identified before November 1, 2007 were completed by November 30, 2007

Underground

Overview

The underground inspections program was developed to meet the requirements of the Safety Orders to inspect underground facilities over a five year period The details for

the underground inspection procedures and protocols provided in NG-USA EOP UG006. entitled "Underground Inspection and Maintenance," provided in Attachment 3

The Underground program consists of patrols conducted by qualified workers that can identify deficiencies or non-standard construction conditions on the facilities

Underground electrical facilities requiring inspection include all facilities that are used for housing primary and secondary circuits, but not the conduit systems between facilities[5] For example, two manholes on a street that house primary cable and cable splices would be visually inspected However, the conduit systems connecting the 2 manholes and the cable within that conduit will not be inspected. The source database to provide the information of the location of the underground assets is primarily GIS It is recognized that not all of the underground facilities reside in GIS and therefore underground maps will be used to support this effort

GPS latitude and longitude coordinates and other basic facility information for each location are downloaded into Computapole hand held devices The inspector electronically documents inspection of the facility in the Computapole hand held unit. Types of deficiencies captured are summarized in the EOP (Attachment 3). Deficiencies are prioritized to identify how quickly they should be addressed The priorities include: E – Emergency; A – As soon as practical; B- As directed by Distribution Engineering, C – Items being trended by and reviewed by Distribution Engineering, P – work Performed in the field during the inspections

Results

The underground inspections program is executed and measured in units. A unit inspected could be a manhole, a pad mounted transformer, a hand hole, etc Each unit is tracked in the Computapole database so the Company can measure the number of inspections and the work identified during the inspections The listed goals were established in the Company's February 2005 plan filed in response to the Safety Orders Note that individual year goals are anticipated to slightly exceed or fall short of 20% of the Underground system Some areas with limited underground assets may be scheduled for completion in a single year as opposed to 20% per year (e.g., all Genesee region manholes/hand-holes were scheduled for year 5 of the program).

Total Unit Goal *	Units Completed	% Goal Completed
9,379	12,262	130

* Goals were established in the Feb 2005 submittal outlining National Grid's plan

A summary of deficiencies reported is attached All codes reported have a 'default' priority that an inspector is allowed to raise or lower based on their evaluation Each category has a number of different deficiencies that could be identified but are grouped together for this display

[5] Pursuant to the Commission's July Order, fiberglass hand holes are generally excluded from the underground inspection program

Cycle 3 2007 data

Underground Facilities Deficiencies found (by Priority)					
Category	Priority E	Priority A	Priority B	Priority C	Other
Anodes	0	0	1	20	72
GIS	0	0	3	185	3
Hand holes	3	105	3587	155	1165
Manholes	0	66	2125	26	1741
Network Protector	0	0	4	13	6
Submersible Equip	0	0	1	2	0
Switchgear	0	3	1	10	0
Transformer	0	13	4	111	61
Trench	0	0	0	0	0
Vaults	0	7	72	25	18
Total	3	194	5796	547	3066

Deficiencies identified as E priority were addressed immediately or made safe and referred for additional follow up by Design "A Priority" items identified before November 1, 2007 were completed by November 30, 2007

Streetlights

Overview

The streetlight inspections program was developed to meet the requirements of the Safety Orders to inspect all streetlights over a five year period Streetlights mounted on distribution poles are inspected within the distribution inspection program Therefore this portion of the inspection program only included underground fed lamp standards The details for the streetlight inspection procedures and protocols are provided in NG-USA EOP G0017, entitled "Streetlight Standard Inspection Program," provided in Attachment 5

The Streetlight inspection program consists of daytime patrols conducted by qualified workers that can identify deficiencies or non-standard construction conditions on the facilities The patrols are scheduled in such a manner that all streetlights would be examined at least once every five years Streetlights to be inspected are only those the company owns or maintains Streetlights owned and maintained by others are not included within this inspection program Traffic control equipment that is owned and maintained by others is not included in this inspection program

The source database for this equipment is the Outdoor Lighting Data System (OLDS) An inspection application and handheld were developed specifically for this portion of the Order since none existed previously The data was provided in an electronic format to the inspectors scheduled to inspect the standards The majority of standards did not have GPS latitude and longitude coordinates within the source database The inspector

was instructed to select the appropriate light from the hand held and electronically document deficiencies A summary table of deficiencies is found the EOP (Attachment 5). Deficiencies are prioritized to identify how quickly they should be addressed The priorities include: E – Emergency; A – As soon as practical; B- As directed by Distribution Engineering, C – Items being trended by and reviewed. P – work Performed in the field during the inspections

Results

The streetlight inspection program is executed and measured in units A unit inspected is equivalent to an underground fed streetlight. The streetlight inspections include underground fed streetlights owned or maintained by the Company These lights may include fiberglass light standards (whereas the EV testing program does not include non-conductive fiberglass standards) Each unit is tracked in the Computapole database so the Company can measure the number of inspections and the work identified during the inspections

Total Unit Goal *	Units Completed	% of Goal Completed
11,571	16,427	142

* Goals were established in the Feb 2005 submittal outlining National Grid's plan

A summary of deficiencies reported is attached All codes reported have a 'default' priority that an inspector is allowed to raise or lower based on their evaluation Each category has a number of different deficiencies that could be identified but are grouped together for this display

Cycle 3 2007 Data

Streetlights Facilities Deficiencies found (by Priority)					
Category	Priority E	Priority A	Priority B	Priority C	Other
Arm	0	0	6	1057	0
Foundation	0	3	1206	183	6
Luminaire	0	56	645	6481	115
Pole	1	40	678	29	69
Standard	2	440	4003	5421	6393
Grand Total	3	539	6538	13171	6583

Transmission

Overview

The Transmission overhead inspections program was developed to meet the requirements of the Safety Orders to inspect all transmission facilities over a five year period The details for overhead inspection procedures and protocols for distribution overhead facilities are provided in NG-USA EOP T007. entitled "Transmission Line patrol 23kv-345kv" provided in Attachment 4

The Transmission line patrol program consists of patrols conducted by qualified workers that can identify deficiencies or non-standard construction conditions on the facilities The patrols are scheduled in such a manner that each line and associated equipment would be examined at least once every five years

Transmission electrical facilities requiring inspection include the Company's facilities on overhead structures The database of this equipment is included in Corridor Manager for Transmission assets and in a separate database for the sub-transmission assets. The asset location data is provided in electronic format to the inspector going to the site The inspectors also utilize hardcopy maps to assist during field work GPS latitude and longitude coordinates and other basic facility information for each structure are downloaded into Computapole hand held devices. The inspector electronically documents inspection of the facility in the Computapole hand held unit Deficiencies that can be captured are summarized in the EOP (Attachment 4) Deficiencies are prioritized to identify how quickly they should be addressed. The priorities include: E – Emergency; A – As soon as practical; B- As directed by Distribution Engineering. C – Items being trended by and reviewed by Distribution Engineering. F – Forestry Issue

Results

The transmission inspection program is executed and measured by miles of transmission inspected. Transmission for the purpose of this report includes voltages of 23 kV and above These results are reported through the Computapole database as line inspections are completed

Total Miles Goal*	Miles Completed	% of Goal Completed
1,780	1,780	100

* Goals established at the start of the inspection year to select circuits based on last inspection date and on requests based on circuit performance

A summary of deficiencies reported is attached. All codes reported have a 'default' priority that an inspector is allowed to raise or lower based on their evaluation. Each category has a number of different deficiencies that could be identified but are grouped together for this display

Cycle 3 2007 data

Transmission Facilities Deficiencies found (by Priority)					
Category	Priority E	Priority A	Priority B	Priority C	Other
Conductor	1	181	81	16	0
Foundation	0	4	38	0	0
GIS	0	0	1	250	16
Infrared	1	12	47	1	0
Line HDW	0	32	980	47	567
Misc	0	89	2749	287	1974
Osmose	0	0	11	0	0
Pole	1	80	3395	524	645
ROW	0	0	4	8	751
Tower	0	14	79	15	490
Grand Total	**3**	**412**	**7385**	**1148**	**4443**

Deficiencies identified as E priority were addressed immediately or made safe and referred for additional follow up by Design 'A Priority' items identified before November 1, 2007 were scheduled to be completed by November 30, 2007

Substations

Overview

The Company conducted a Substation inspection program prior to the Safety Orders. Substations are inspected throughout each calendar year The details for the Substation inspection procedures and protocols are provided 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 provided in Attachment 6

Substation inspections are more complex than other facility inspections. The information generated from an inspection is captured in the Asset Information Maintenance Management System (AIMMS) Work orders are created and supervisory review determines what is to be done to correct the work generated Inspection schedules vary based on the type of substation, the criticality of the station, or the type of equipment contained within the substation Inspection schedules may vary with the time of year or condition of the system Substations are generally inspected on a two month schedule. Inspections included in this report only included information related to the security of the substation Items related to the fence condition, the yard condition, lighting, vegetation were included

Results

For the calendar year 2007, 100% of substations were visited for inspections The majority of substations are visited more frequently; however, for the purpose of this program and reporting the Company will only utilize a single inspection per substation

Work orders created, completed or pending are prioritized in a different method than the other programs reported The data provided for the inspections shows:

Total Substations	Inspections Completed	% of Goal Completed
929	929	100

Deficiencies that were reported during the selections of inspections were divided into several categories These included issues with vegetation, fences, lighting and other

Cycle 3 2007 data

Substation Facilities Deficiencies	
Deficiency	Counts
Fence	22
Vegetation	10
Lighting	14
Grading	12
Other	4
Total	**62**

Performance Mechanisms

Performance mechanisms outlined in the Safety Orders established that the Commission:

> "needs to establish metrics against which [the Commission] will measure and determine the utilities' performance and compliance " January Order, p.34

As outlined in the results section of this report, the Safety Orders require the utilities to perform voltage testing on 100% of publicly accessible streetlights and traffic controls, 100% of publicly accessible conventional underground and priority URD, and 100% of the overall electric system in total by November 30, 2007

Elevated Voltage Testing Annual Summary			
Program	**Total Units**	**Units Completed**	**% Completed**
Distribution	1,291,343	1,291,343	100
Underground	104,229	104,229	100
Streetlights*	82,559	82,559	100
Transmission	106,527	106,527	100
Substation	929	929	100

*Note that streetlights include traffic controls but excludes fiberglass standards

As noted in the attached certification, National Grid has implemented the EV testing program for the current year to comply with the requirements of the Safety Orders

The Safety Orders recognized the challenges faced by the utilities in setting up the inspection programs

> The inspection program is more intensive than the testing program, and the utilities' contention that they need time to integrate it into their routine maintenance activities is reasonable Therefore, we will phase-in the performance targets for annual inspections. Doing so, however. does not change the requirement that all facilities be inspected at least once every five years. Starting with this overall requirement, the utilities should inspect at least one-fifth of their facilities each year We therefore base the performance targets on a percentage of the average number of facilities that must be inspected each year The specific targets for purposes of the performance mechanism will be 85%. 90%, and 95% of the one-fifth amount for calendar years 2005. 2006, and 2007, respectively Each year thereafter, the performance target will be 95%. except that in every fifth year, each utility must ensure that it has inspected all of its facilities " January Order. pp 34-35

As outlined in the results section of this report, National Grid's inspection programs contemplated annual inspections on 20% of distribution, 20% of underground. 20% of streetlights. 20% of transmission and 100% of substations It should be noted that inspections performed by circuit will generally push the annual inspection rate slightly higher or lower than 20% due to the varying lengths of circuits When schedules are established the 20% range is used as a guide, however 100% must be patrolled over the 5 year period The PSC Order called for utilities to meet a minimum of 85% of the 20% goal in year one and 90% of the 20% goal in year two and 95% of the 20% goal in year three. This equates to 17%, 18% and 19% of the system respectively. In conversations with Staff. it was determined that measurements of meeting the established goal would be in total and not by individual program.

Also of note, is that the Streetlight Units for inspections is different than streetlight units for EV testing. Streetlight inspections do not include traffic controls or non company owned units, but they do include fiberglass standards (which were excluded from the EV testing program)

Facility Inspections Year 3					
Facilities	Units / Miles Goal	Units / Miles Completed	% of Goal Completed	% of System Completed	% YR 3 PSC Goal
Distribution*	6,542	6,542	100	62	19
Underground	9,379	12,262	130	75	19
Streetlights**	11,751	16,427	140	77	19
Transmission*	1,780	1,780	100	69	19
Substation	929	929	100	100	19

*Transmission and Distribution facilities are reported in Miles. All other facilities are measured in units.
**Note that Streetlights excludes traffic controls exclude municipally owned/maintained standards but includes fiberglass standards

The cumulative total for the inspection program to date are:

Visual Inspections Cumulative for Years 1, 2, & 3			
Program	Units / Miles Completed	% of System Completed	PSC Goal %
Distribution	22,072 (mi)	62	54
Underground	35,741	75	54
Streetlights	49,530	77	54
Transmission	5,596 (mi)	67	54
Substation	929	100	54

Certification

In order to comply with the certification requirements of the Safety Orders, National Grid is submitting certification documents for both the Elevated Voltage Testing program and the Facility Inspection program for the current year The signed certification documents are attached hereto as Attachment 8 The process of certification requires a 'Chain of Command' sign off. This process requires that the Supervisors of the Maintenance Inspection and Assessment group sign a certification that the inspection and the elevated voltage testing programs were performed in accordance with the prescribed procedures The Manager for the Maintenance Inspection and Assessment group then is required to sign off on the final report. This process of upward cascading signatures is to provide assurance to the Vice President of Project and Contract Management that the program was properly implemented and the results are accurate Only the final certification documents are provided in this annual report

Analysis

This section includes information related to EV causes and modifications to the EV programs as the Company moves forward

Distribution Testing

The volume of EV issues greater than 4.5 volts found during distribution testing is considered extremely small The majority of items were either related to ground connections or to procedural issues. Certain procedural issues caused National Grid to react to locations reported to have EV during early testing, where it was subsequently

determined that no voltage existed These procedural issues have been addressed though training and reinforcement with the contractors and employees

Proactively finding the EV conditions related to ground connections should, in part, be achieved as inspectors visually evaluate pole conditions The inspectors have a target of visiting 20% of facilities each year and currently look to identify broken or deteriorated ground conditions To the extent the existing inspections programs have been identifying issues and additional work items, the programs have already helped to keep the number of EV conditions on distribution small

Distribution Facilities Repairs Voltage > 4.5 volts	
Quantity	Work Description
1	Arrester
2	Cable Feed
18	Down Ground
2	Equipment Other
13	Ground Connection
2	Guy
1	Induced
4	Insulator
1	Neutral
5	None Required
12	Procedure
1	Remade Connections
2	Service Wire
8	Customer Problem
72	Total

Note that this table contains results from Cycle 1, Cycle 2 and Cycle 3 testing.

Streetlight Testing

The majority of the EV conditions identified on streetlights were related to poor connections, missing grounds and deficiencies in the cable and luminaries
Although the number of elevated voltage conditions found on Street Lights has increased during 2007 the majority of those found were below the 4.5 volts threshold Increases may be attributed to the training and testing procedure updates which now require the tester to find bare metal by removing paint and rust for a more rigorous test

Streetlight / Traffic Facilities Repairs Voltage > 4.5 volts	
Quantity	Work Description
22	Cable and Ground
10	Cable Feed
86	Ground Connection
4	Lamp Wiring
13	Luminaire Change
41	Neutral
39	None Required
5	Photo Eye
7	Poor Insulation
1	Procedure Not Followed
50	Remade all Connections
10	Customer Problem

Note that this table contains results from Cycle 1, Cycle 2 and Cycle 3 testing.

The following table depicts the results by cycle:

Streetlight / Traffic Facilities Repairs Voltage > 4.5 volts			
Work Description	Cycle 1 Quantity	Cycle 2 Quantity	Cycle 3 Quantity
Cable and Ground	18	0	22
Cable Feed	9	1	0
Ground Connection	41	8	86
Lamp Wiring	2	0	4
Luminaire Change	9	0	13
Neutral	11	23	41
None Required	7	1	39
Photo Eye	5	0	0
Poor Insulation	4	3	0
Procedure Not Followed	1	0	0
Remade all Connections	42	0	50
Customer Problem	7	0	10

Of the streetlight locations identified with elevated voltage conditions during cycle 3, the poor neutral and ground connections dominated the causes, consistent with earlier testing cycles

Transmission Testing

Based on the three years of testing performed to date it is recommended that the transmission system be removed from the elevated voltage testing program There were no hazardous voltage conditions proactively identified on transmission and due to the

extreme difficulty in accessing many of the locations. there is no benefit to the public in performing an annual test on these assets

The Company did pursue a firm to prepare a technical report to assess whether transmission assets are likely to be the source of elevated voltage conditions The report concluded that transmission assets are unlikely to lead to elevated voltage conditions This report further supports the Company's recommended changes to the testing requirements under the Safety Orders A "Draft" Report was shared with DPS staff on December 18th 2007

Transmission Line Neutral-to-Earth Voltage Analysis
The report covering the transmission line analysis was prepared by Quanta Technology's Director of Protection and Automation. Bartosz Wojszczyk. Ph D

The study was authorized by National Grid, Central Hudson Gas and Electric, Rochester Gas and Electric and New York State Electric and Gas to address the following issues: (i) the expected magnitude of voltages; and (ii) the impact of standard mitigation practices

The study determined that unbalanced currents on transmission lines. caused by un-transposed lines and/or un-balanced loads. induce a voltage on parallel lines along the same right-of-way Circulating currents resulting from potential differences do the same These lines could be the static wire. communication facilities, neutrals or other transmission and distribution wires These induced voltages are generally normal and not considered lethal to humans. Thus, it would seem inappropriate to test for these voltage levels on transmission facilities. since the voltages are low level and these facilities (transmission towers, etc) are not normally contacted by the public Also, analysis shows that when these voltages are measured using a 500 ohm resistor to simulate contact with human beings. they collapse to less than 1 volt

Report Conclusions
A normal characteristic of transmission lines is that they induce voltages on nearby conductors. The study, using actual field measurements, points out that the voltage across a 500 ohms resistor will collapse This was confirmed in simulations by adding the contact resistance of the earth to the computer model The study found that the only valid measurement of voltages at the transmission level is with a 500 ohm resistor in parallel to the meter and that the neutral to earth voltage will collapse to something less than a volt. indicating that these voltages do not present a safety issue Based on the findings of this study, testing these facilities does not provide a reasonable return for the significant cost investment For these reasons, the requirement for continued annual testing of transmission facilities should be reevaluated

Substation Testing
There was one elevated voltage condition found on substation fences However. that voltage level was below the 8 volt threshold

Underground Testing
The underground system identified a few instances of elevated voltage during the cycle 3 testing These voltage levels were well below hazardous voltages The testing of these assets could be more efficient and better focused if the requirement was limited to the urban areas and specifically to the secondary hand holes (street lights and building services) Focusing resources on these locations, where experience shows issues are more likely to occur, would increase the likelihood that potential elevated voltage situations are promptly identified and addressed. This change coupled with a mobile testing program, would enhance the elevated voltage program

Database Improvements

Changes initiated over 2006 and 2007 included the standardization of causes for EV conditions; standardized reports for management and Staff; reports and queries to assist supervision in monitoring open elevated voltage orders; addition of audit codes to tie elevated voltage cases to the follow up audit by supervisors and to retain history to compare results of an asset test between cycles; and implementation of data base enhancements to allow other National Grid service territories to store elevated voltage testing results

Changes currently planned for 2008 include implementation of new Line Service Quality Standards. National Grid is finalizing a new line inspection protocol effective with inspections that begin after January 1, 2008 for overhead, underground and transmission systems as outlined in the attached draft versions of NG-USA EOP D004, UG006 and T007 (Attachments 9A – 9C) As with the current program, the new procedures for the Line Quality Standards require a five year inspection program be conducted The annual performance target for inspections under the new program shall be based on the percentage of the average number of electric facilities that must be inspected each year in order to comply with the five-year inspection cycle Niagara Mohawk's inspectors will identify and classify issues into four proposed categories;[6]

i Level 1: Items that must be completed as soon as practical, but no longer than 5 business days
ii Level 2: Items that must be completed within six months
iii Level 3: Items that must be completed within two years

[6] Level 1 is an immediate issue that either requires the inspector to stand-by until a qualified crew/supervisor arrives to resolve the issues or requires resolution as soon as practical, but no longer than 5 business days. Level 2 is an issue that, if left unresolved, has a high probability of failure within six months to 1 year of the feeder inspection. Either the identified work will be completed within six months or a project will be initiated to complete the work as soon as is practical in a timely and efficient manner (e g., pole replacement or addition may require permits or DOT involvement that may require longer than 6 mo. to complete). Level 3 is an issue that has a high probability of failure within 2-5 years of the feeder inspection. Either the identified work will be completed within 2 years, or a project will be initiated to complete the work as soon as is practical in a timely and efficient manner. These issues may require permitting and or significant design/engineering/construction and may need to be budgeted to complete. Level 4 - this information will be used for asset decision making and to aid inspectors during the subsequent inspections

iv Level 4: Items that are recorded for information and planning purposes

Changes related to the new Line Service Quality Standards include moving inspectors' hand held units to a Windows based system. The new equipment is expected to increase consistency between inspections by providing more information to inspectors, including equipment attribute information, mapping and photos of equipment deficiencies

Inspection and Repairs Analysis

Overview

In regard to the Commission's Electric Safety Standards that require electric utilities in New York State to test for stray voltage and perform visual inspections of its facilities At least 60% of National Grid's facilities have been inspected since the Commission's standards were adopted, including inspections performed in 2007

Background

The information gathered and actions taken in response to inspections performed are considered valuable to the Commission's assessment of the effectiveness of the standards As a result, Staff has requested that the 2007 annual report, filed by January 15, 2008, should include information on deficiencies identified and repair work performed over the past three years

The Company's Response to Staff's Requests

In response to the specific requests for information articulated in Staff's December 12, 2007 letter, the Company offers the following:

- Description of the priority levels used to gauge the severity of a deficiency, including repair timeframes;
  - Please see the following National Grid EOPs for priority levels for 2007:

  Attachment 1 - NG USA EOP–G0016 Elevated Equipment Voltage Testing

  Attachment 2 - NG USA EOP-D004 Distribution Line Patrol and Maintenance

  Attachment 3 - NG USA EOP-UG 06 Underground Inspection and Maintenance

  Attachment 4 - NG USA EOP-T007 Transmission Line Patrol and Maintenance 23kV – 345kV

  Attachment 5 - NG USA EOP-G017 Street Light Standard Inspection Program
  - Please see the following National Grid EOPs for priority levels for 2008:

  Attachment 9A - NG USA EOP-D004 Distribution Line Patrol and Maintenance

  Attachment 9B - NG USA EOP-UG 06 Underground Inspection and Maintenance

  Attachment 9C - NG USA EOP-T007 Transmission Line Patrol and Maintenance 23kV – 345kV

- the number of inspections performed per year;
    - Approximately 20% of National Grid System total
- the number of deficiencies identified by the inspection process grouped by the equipment affected (poles, transformers, manholes, etc) for each year;
    - See tables below:
- the number of deficiencies identified by the inspection process grouped by the priority level for repair of the conditions for each year;
    - See tables below
- the number of repairs made per year;
    - See tables below
- the number of repairs that were made within allocated timeframes grouped by the equipment affected for each year;
    - See tables below
- the number of repairs that were made within allocated timeframes grouped by priority level for each year; and
    - See tables below
- an inventory of outstanding repairs by priority level
    - See tables below

Distribution Results

Tables reflecting the repair status for distribution assets for cycle1:

Distribution Inspection Repairs Analysis			
Priority E	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Crossarm	14	0	14
Cutout	1	0	1
Ground	1	0	1
Guy	4	0	4
Insulator	4	0	4
Pole	26	0	26
Primary	8	0	8
ROW	1	0	1
Secondary	1	0	1
Service	6	0	6
Switch	1	0	1
Transformer	6	0	6
Total	73	0	73

Distribution Inspection Repairs Analysis			
Priority A	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Anchors	38	0	38
Capacitor	38	0	38
Crossarm	245	0	245
Culout	62	0	62
Ground	355	0	355
Guy	57	0	57
Insulator	238	0	238
Transformer	5	0	5
Pole	939	0	939
Primary	108	0	108
Recloser	1	0	1
Regulator	2	0	2
Riser	0	0	0
Secondary	53	0	53
Sectionalizer	2	0	2
Service	57	0	57
Space Cable	0	0	0
Street Lights	3025	0	3025
Switch	52	0	52
Switchgear	1	0	1
Transformer	373	0	373
Total	5651	0	5651

Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007. per NG EOP D004

Tables reflecting the repair status for distribution assets for cycle 1 (Continued):

Distribution Inspection Repairs Analysis			
Priority B	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Anchors	0	42	42
Capacitor	1	51	52
Crossarm	93	5265	5358
Cutout	6	343	349
Ground	28	4820	4848
Guy	1146	21098	22244
Insulator	0	1988	1988
Transformer	1	261	262
Pole	406	28343	28749
Primary	98	2161	2259
Recloser	0	1	1
Regulator	0	14	14
Riser	0	6	6
Secondary	164	701	865
Sectionalizer	0	0	0
Service	170	791	961
Space Cable	0	24	24
Street Lights	36	4874	4910
Switch	0	4	4
Switchgear	0	16	16
Transformer	55	2933	2988
Total	2204	73736	75940

Distribution Inspection Repairs Analysis			
Priority C	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Anchor	1	55	56
Capacitor	3	16	19
Crossarm	19	625	644
Cutout	0	4	4
GIS	0	7	7
Ground	1	42	43
Guy	45	6744	6789
Insulator	12	270	282
Osmose	8	334	342
Pole	11947	17379	29326
Primary	77	19210	19287
Secondary	5	107	112
Sectionalizer	1	1	2
Service	2	86	88
Spacer Cable	0	6	6
Spur Tap		10	10
Streetlights	5	584	589
Transformer	5	325	330
Total	12131	45805	57936

Tables reflecting the repair status for distribution assets for cycle 1 (Continued):

Distribution Inspection Repairs Analysis			
Priority Other	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Anchor	0	6	6
Capacitor	0	10	10
Crossarm	25	1	26
Cutout	5	175	180
Ground	37	0	37
Guy	3918	0	3918
Insulator	9	13	22
Pole	15471	2757	18228
Primary	3270	71	3341
Recloser	0	2	2
Regulator	0	5	5
Riser	0	18	18
ROW	340	0	340
Secondary	5332	1	5333
Service	6370	11	6381
Spur Tap	0	147	147
Streetlights	5	3	8
Switch	0	3	3
Transformer	60	1194	1254
Grand Total	34643	4417	39260

Tables reflecting the repair status for distribution assets for cycle 2:

Distribution Inspection Repairs Analysis			
Priority E	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Anchors	0	0	0
Capacitor	0	0	0
Crossarm	38	0	38
Cutout	2	0	2
Enclosures	2	0	2
Ground	4	0	4
Guy	1	0	1
Insulator	98	0	98
PM Transformer	7	0	7
Pole	3	0	3
Primary	14	0	14
Recloser	0	0	0
Regulator	0	0	0
Riser	0	0	0
Secondary	1	0	1
Sectionalizer	0	0	0
Service	7	0	7
Space Cable	0	0	0
Street Lights	0	0	0
Switch	1	0	1
Switchgear	0	0	0
Transformer	0	0	0
Total	178	0	178

Distribution Inspection Repairs Analysis			
Priority A	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Anchors	60	0	60
Capacitor	24	0	24
Crossarm	273	0	273
Cutout	240	0	240
Ground	455	0	455
Guy	487	0	487
Insulator	345	0	345
PM Transformer	169	0	169
Pole	369	0	369
Primary	426	0	426
Recloser	2	0	2
Regulator	3	0	3
Riser	6	0	6
Secondary	84	0	84
Sectionalizer	0	0	0
Service	85	0	85
Space Cable	5	0	5
Street Lights	2836	0	2836
Switch	52	0	52
Switchgear	3	0	3
Transformer	276	0	276
Total	6331	0	6331

Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007 per NG EOP D004

Tables reflecting the repair status for distribution assets for cycle 2 (Continued):

Distribution Inspection Repairs Analysis			
Priority B	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Anchors	0	32	32
Capacitor	77	326	403
Crossarm	168	5996	6164
Cutout	76	145	221
Ground	110	7608	7718
Guy	2028	15729	17757
Insulator	351	2353	2704
PM Transformer	0	163	163
Pole	765	26340	27105
Primary	162	1046	1208
Recloser	3	13	16
Regulator	16	181	197
Riser	0	215	215
Secondary	219	1183	1402
Sectionalizer	1	11	12
Service	178	886	1064
Space Cable	5	395	400
Street Lights	483	7842	8325
Switch	160	150	310
Switchgear	1	12	13
Transformer	2624	17140	19964
Total	7627	87766	95393

Distribution Inspection Repairs Analysis			
Priority C	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Anchor	1	6	7
Capacitor	1	19	20
Crossarm	22	733	755
Cutout	2	4	6
Enclosures	0	9	9
GIS	4811	12221	17032
Ground	8	528	536
Guy	130	377	507
Insulator	13	25	38
Osmose	6	190	196
PM Transformer	4	1787	1791
Pole	1901	9077	10978
Primary	23	136	159
Regulator	0	5	5
Riser	0	1	1
ROW	0	8	8
Secondary	4	11	15
Sectionalizer	0	2	2
Service	5	47	52
Streetlights	32	36	68
Switch	0	6	6
Switchgear	0	70	70
Transformer	16	821	837
Total	6979	26119	33098

Tables reflecting the repair status for distribution assets for cycle 2 (Continued):

Distribution Inspection Repairs Analysis			
Priority Other	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Capacitor	0	12	12
Crossarm	14	1331	1345
Cutout	2688	8639	11327
GIS	118	1	119
Ground	23	0	23
Guy	10250	115	10365
Insulator	11	2	13
PM Transformer	2480	324	2804
Pole	21498	10711	32209
Primary	2340	1075	3415
Regulator	0	3	3
Riser	0	21	21
ROW	721	198	919
Secondary	1708	5368	7076
Service	1911	6380	8291
Spur Tap	14	33	47
Streetlights	3	0	3
Switchgear	37	3	40
Transformer	15	205	220
Grand Total	43831	34421	78252

Tables reflecting the repair status for distribution assets for cycle 3:

Distribution Inspection Repairs Analysis			
Priority E	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Anchors	0	0	0
Capacitor	0	0	0
Crossarm	0	0	0
Cutout	12	0	12
Enclosures	0	0	0
Ground	10	0	10
Guy	1	0	1
Insulator	61	0	61
PM Transformer	13	0	13
Pole	2	0	2
Primary	22	0	22
Recloser	0	0	0
Regulator	0	0	0
Riser	1	0	1
Secondary	17	0	17
Sectionalizer	0	0	0
Service	14	0	14
Space Cable	4	0	4
Street Lights	0	0	0
Switch	0	0	0
Switchgear	0	0	0
Transformer	3	0	3
Total	160	0	160

Distribution Inspection Repairs Analysis			
Priority A	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Anchors	81	0	81
Capacitor	45	0	45
Crossarm	388	0	388
Cutout	142	0	142
Ground	870	0	870
Guy	328	0	328
Insulator	302	0	302
PM Transformer	161	0	161
Pole	783	0	783
Primary	201	0	201
Recloser	3	0	3
Regulator	6	0	6
Riser	12	0	12
Secondary	92	0	92
Sectionalizer	0	0	0
Service	128	0	128
Space Cable	9	0	9
Street Lights	4351	0	4351
Switch	52	0	52
Switchgear	3	0	3
Transformer	1007	0	1007
Total	8964	0	8964

* Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007 per NG EOP D004

Tables reflecting the repair status for distribution assets for cycle 3:

Distribution Inspection Repairs Analysis			
Priority B	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Anchors	1	44	45
Capacitor	2	624	626
Crossarm	134	6007	6141
Cutout	10	16	26
Ground	3	6683	6686
Guy	2026	33534	35560
Insulator	15	3543	3558
PM Transformer	1	158	159
Pole	182	32539	32721
Primary	20	2174	2194
Recloser	0	39	39
Regulator	0	232	232
Riser	1	437	438
Secondary	6	1947	1953
Sectionalizer	0	25	25
Service	1	949	950
Space Cable	1	1043	1044
Street Lights	4	13035	13039
Switch	6	202	208
Switchgear	0	13	13
Transformer	375	40171	40546
Total	2788	143415	146203

Distribution Inspection Repairs Analysis			
Priority C	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Anchor	16	6	22
Capacitor	0	19	19
Crossarm	29	733	762
Cutout	5	4	9
Enclosures	0	9	9
GIS	4	12221	12225
Ground	11	528	539
Guy	426	377	803
Insulator	3	25	28
Osmose	0	190	190
PM Transformer	7	1787	1794
Pole	285	9077	9362
Primary	4	136	140
Regulator	0	5	5
Riser	0	1	1
ROW	0	8	8
Secondary	0	11	11
Sectionalizer	0	2	2
Service	3	47	50
Streetlights	96	36	132
Switch	0	6	6
Switchgear	0	70	70
Transformer	14	821	835
Total	903	26119	27022

Tables reflecting the repair status for distribution assets for cycle 3:

Distribution Inspection Repairs Analysis			
Priority Other	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Capacitor	0	2	2
Crossarm	5	4199	4204
Cutout	304	2614	2918
Enclosures	1	0	1
GIS	273	0	273
Ground	10	0	10
Guy	13525	0	13525
Insulator	4	11	15
PM Transformer	3447	1	3448
Pole	22445	8670	31115
Primary	1050	1375	2425
Riser	0	13	13
ROW	267	901	1168
Secondary	1254	4048	5302
Service	1625	3843	5468
Spur Tap	0	21	21
Streetlights	1	0	1
Switchgear	284	0	284
Transformer	1	163	164
Grand Total	44496	25861	70357

Underground

Tables reflecting the repair status for Underground assets for cycle 1:

Underground Inspection Repairs Analysis			
Priority E	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Manholes	1	0	1
Switchgear	4	0	4
Transformer	1	0	1
Total	6	0	6

Underground Inspection Repairs Analysis			
Priority A	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Handholes	7	0	7
Manholes	31	0	31
Network	4	0	4
Switchgear	4	0	4
Transformer	132	0	132
Trench	3	0	3
Vaults	1	0	1
Total	182	0	182

* Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007 per NG EOP UG006

Tables reflecting the repair status for Underground assets for cycle 1 (Continued):

Underground Inspection Repairs Analysis			
Priority B	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Handholes	2	450	452
Manholes	255	1343	1598
Network	0	7	7
Submersible	0	1	1
Switchgear	0	16	16
Transformer	1	244	245
Trench	0	15	15
Vaults	0	12	12
Grand Total	258	2088	2346

Underground Inspection Repairs Analysis			
Priority C	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Anodes	0	5	5
Handholes	0	115	115
Manholes	2	146	148
Network	1	10	11
Switchgear	0	71	71
Transformer	18	1058	1076
Trench	0	3	3
Vaults	0	6	6
Grand Total	21	1414	1435

Underground Inspection Repairs Analysis			
Priority Other	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Handholes	0	762	762
Manholes	21	1992	2013
Network	5	1	6
Switchgear	2	152	154
Transformer	7	2817	2824
Total	35	5724	5759

Below are the tables reflecting the repair status for Underground assets for cycle 2:

Underground Inspection Repairs Analysis			
Priority E	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Handholes	5	0	5
Transformer	12	0	12
Vaults	1	0	1
Total	18	0	18

Underground Inspection Repairs Analysis			
Priority A	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Handholes	155	0	155
Manholes	72	0	72
Network	7	0	7
Switchgear	3	0	3
Transformer	192	0	193
Trench	9	0	9
Vaults	12	0	12
Total	450	0	450

* Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007 per NG EOP UG006

Tables reflecting the repair status for Underground assets for cycle 2 (Continued):

Underground Inspection Repairs Analysis			
Priority B	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Handholes	7	2964	2971
Manholes	16	2074	2090
Network	0	4	4
Submersible	0	3	3
Switchgear	1	15	16
Transformer	4	224	228
Trench	0	27	27
Vaults	0	128	128
Total	28	5439	5467

Underground Inspection Repairs Analysis			
Priority C	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Anodes	1	22	23
GIS	0	10	10
Handholes	0	644	644
Manholes	0	122	122
Network	1	12	13
Submersible	0	11	11
Switchgear	1	96	97
Transformer	18	3058	3076
Trench	0	4	4
Vaults	0	11	11
Total	21	3990	4011

Underground Inspection Repairs Analysis			
Priority Other	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Handholes		762	762
Manholes	21	1992	2013
Network	5	1	6
Switchgear	2	152	154
Transformer	7	2817	2824
Total	35	5724	5759

Tables reflecting the repair status for Underground assets for cycle 3:

Underground Inspection Repairs Analysis			
Priority E	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Handholes	3	0	3
Total	3	0	3

Underground Inspection Repairs Analysis			
Priority A	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Handholes	97	0	105
Manholes	80	0	66
Switchgear	3	0	3
Transformer	13	0	13
Vaults	7	0	7
Total	200	0	194

*ALL "A PRIORITY" CONDITIONS IDENTIFIED PRIOR TO NOVEMEBR 1ST MUST BE REPAIRED/CORRECTED BY NOVEMBER 30TH, PER NG EOP UG006

Tables reflecting the repair status for Underground assets for cycle 3 (Continued):

Underground Inspection Repairs Analysis			
Priority B	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Anodes	0	1	1
GIS	0	3	3
Handholes	70	3517	3587
Manholes	14	2111	2125
Network	0	4	4
Submersible	0	1	1
Switchgear	0	1	1
Transformer	0	4	4
Vaults	0	72	72
Total	84	5714	5798

Underground Inspection Repairs Analysis			
Priority C	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Anodes	0	20	20
GIS	0	185	185
Handholes	0	155	155
Manholes	0	26	26
Network	0	13	13
Submersible	0	2	2
Switchgear	0	10	10
Transformer	0	111	111
Vaults	0	25	25
Total	0	547	547

Underground Inspection Repairs Analysis			
Priority Other	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Anodes	0	72	72
GIS	0	3	3
Handholes	3	1162	1165
Manholes	5	1736	1741
Network	0	6	6
Transformer	3	58	61
Vaults	0	18	18
Total	11	3055	3066

Transmission

Tables reflecting the repair status for Transmission assets for cycle 1:
No Priority E's for Cycle 1 (2005)

Transmission Inspection Repairs Analysis			
Priority A	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Conductor	77	0	77
Foundation	8	0	8
Line HDW	79	0	79
Misc	944	0	944
Pole	345	0	345
ROW	381	0	381
Tower	627	0	627
Total	2461	0	2461

Transmission Inspection Repairs Analysis			
Priority B	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Conductor	28	97	125
Foundation	8	8	16
Line HDW	67	388	455
Misc	459	1276	1735
Osmose	0	5	5
Pole	288	2046	2334
ROW	35	0	35
Tower	59	176	235
Total	944	3996	4940

'Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007. per NG EOP T007

Transmission Inspection Repairs Analysis			
Priority C	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Conductor	1	182	183
Foundation	0	4	4
Line HDW	6	213	219
Misc	67	3494	3561
Pole	25	1480	1505
ROW	32	0	32
Tower	49	520	569
Total	180	5893	6073

Transmission Inspection Repairs Analysis			
Priority Other	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Conductor	0	2	2
Line HDW	1	17	18
Misc	327	230	557
Pole	19	7	26
ROW	305	0	305
Tower	510	0	510
Total	1162	256	1418

Tables reflecting the repair status for Transmission assets for cycle 2:
No Priority E's for Cycle 2 (2006)

Transmission Inspection Repairs Analysis			
Priority A	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Conductor	103	0	103
Line HDW	6	0	6
Misc	70	0	70
Pole	21	0	21
ROW	1	0	1
Tower	1	0	1
Total	202	0	202

Transmission Inspection Repairs Analysis			
Priority B	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Conductor	9	107	116
Foundation	0	35	35
Line HDW	41	900	941
Misc	51	1832	1883
Osmose	0	64	64
Pole	297	4425	4722
ROW	1	4	5
Tower	2	74	76
Total	401	7441	7842

* Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007 per NG EOP T007

Transmission Inspection Repairs Analysis			
Priority C	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Conductor	3	43	46
Foundation	0	17	17
Line HDW	2	104	106
Misc	17	1805	1822
Osmose	0	6	6
Pole	29	1388	1417
ROW	2	10	12
Tower	1	263	264
Total	54	3636	3690

Transmission Inspection Repairs Analysis			
Priority Other	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Misc	1828	0	1828
Osmose	0	1	1
Pole	473	0	473
ROW	120	1100	1220
Tower	197	479	676
Total	2618	1580	4198

Tables reflecting the repair status for Transmission assets for cycle 3:

Transmission Inspection Repairs Analysis			
Priority E	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Conductor	1	0	1
Infrared	1	0	1
Pole	1	0	1
Total	3	0	3

Transmission Inspection Repairs Analysis			
Priority A	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Conductor	181	0	181
Foundation	4	0	4
Infrared	12	0	12
Line HDW	32	0	32
Misc	89	0	89
Pole	80	0	80
Tower	14	0	14
Total	412	0	412

* Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007 per NG EOP T007

Transmission Inspection Repairs Analysis			
Priority B	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Conductor	0	81	81
Foundation	0	38	38
GIS	0	1	1
Infrared	0	47	47
Line HDW	1	979	980
Misc	10	2739	2749
Osmose	0	11	11
Pole	44	3351	3395
ROW	0	4	4
Tower	0	79	79
Total	55	7330	7385

Transmission Inspection Repairs Analysis			
Priority C	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Conductor	0	16	16
GIS	0	250	250
Infrared	0	1	1
Line HDW	0	47	47
Misc	9	278	287
Pole	3	521	524
ROW	0	8	8
Tower	0	15	15
Total	12	1136	1148

Transmission Inspection Repairs Analysis			
Priority Other	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
GIS	16	0	16
Line HDW	7	560	567
Misc	1969	5	1974
Pole	641	4	645
ROW	53	698	751
Tower	307	183	490
Total	2993	1450	4443

Streetlights

Tables reflecting the repair status for Streetlights assets for cycle 1:
No data return for 2005 cycle 1 priority E

Streetlights Inspection Repairs Analysis			
Priority A	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Luminaire	7	0	7
Standard	44	0	44
Total	51	0	51

Streetlights Inspection Repairs Analysis			
Priority B	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Foundation	0	51	51
Luminaire	2	605	607
Pole	0	483	483
Standard	0	913	913
Total	2	2052	2054

Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007 per NG EOP G017

Streetlights Inspection Repairs Analysis			
Priority C	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Arm	0	1	1
Foundation	0	16	16
Luminaire	0	7705	7705
Standard	1	13126	13127
Total	1	20848	20849

Streetlights Inspection Repairs Analysis			
Priority Other	Cycle 1 (2005)		
Category	Complete	Pending	Total Reported
Standard	239	3183	3422
Luminaire	62	46	108
Pole	1	0	1
Total	302	3229	3531

Below are the tables reflecting the repair status for Streetlights assets for cycle 2:
No Data Retrieved for 2006 cycle 2 Priority A

Streetlights Inspection Repairs Analysis			
Priority E	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Arm	1	0	1
Total	1	0	1

Streetlights Inspection Repairs Analysis			
Priority B	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Arm	0	6	6
Foundation	0	1210	1210
Luminaire	0	761	761
Pole	0	726	726
Standard	4	4097	4101
Total	4	6800	6804

Tables reflecting the repair status for Streetlights assets for cycle 2 (Continued):

Streetlights Inspection Repairs Analysis			
Priority C	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Arm	0	14	14
Foundation	0	2	2
Luminaire	7	2604	2611
Standard	92	2460	2552
Total	99	5080	5179

Streetlights Inspection Repairs Analysis			
Priority Other	Cycle 2 (2006)		
Category	Complete	Pending	Total Reported
Foundation	0	1	1
Luminaire	4	6	10
Pole	2	0	2
Standard	82	136	218
Total	88	143	231

Tables reflecting the repair status for Streetlights assets for cycle 3:

Streetlights Inspection Repairs Analysis			
Priority E	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Pole	1	0	1
Standard	2	0	2
Total	3	0	3

Streetlights Inspection Repairs Analysis			
Priority A	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Foundation	3	0	3
Luminaire	38	18	56
Pole	9	31	40
Standard	43	397	440
Total	93	446	539

* Under the 2007 Program "A PRIORITY" conditions identified prior to November 1st must be repaired/corrected by November 30, 2007 per NG EOP G017

Streetlights Inspection Repairs Analysis			
Priority B	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Arm	0	6	6
Foundation	0	1206	1206
Luminaire	0	645	645
Pole	0	678	678
Standard	4	3999	4003
Total	4	6534	6538

Streetlights Inspection Repairs Analysis			
Priority C	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Arm	1	1056	1057
Foundation	0	183	183
Luminaire	1	6480	6481
Pole	0	29	29
Standard	2	5419	5421
Total	4	13167	13171

Streetlights Inspection Repairs Analysis			
Priority Other	Cycle 3 (2007)		
Category	Complete	Pending	Total Reported
Foundation	0	6	6
Luminaire	0	115	115
Pole	0	69	69
Standard	14	6379	6393
Total	14	6569	6583

Other Pertinent Information

This section contains information that relates to the Elevated Voltage Testing program and the Inspection program for National Grid. Topics included are updates to the procedures originally filed with the Commission in February 2005 and updated with the January 2006 Annual report, updates to the QA program implemented, a summary of shock calls received by the Company for the period of December 2006 through November 2007, and R&D activities during 2007. The Company is also providing a description of the revised inspection program for 2008 along with the draft EOPs to implement the new program

Procedure Updates

These procedures were reviewed for updates after the January 2006 annual report submittal to the Commission Updates were implemented in order to provide a combined National Grid USA procedure including New York and New England

The Company currently plans on implementing a revised inspection program in 2008 The revised program will include Line Quality Standards, as described above. Drafts of the proposed procedures describing the revised program for 2008 are included with this filing as attachments 9A – 9C. We anticipate final approval of the revised inspection procedures for 2008 shortly The procedures used for the 2007 program are as follows:

Procedure Number	Procedure Description	Date of Rev
NG USA EOP-D004	Distribution Line Patrol and Maintenance	08/01/07
NG USA EOP-UG006	Underground Inspections and Maintenance	02/01/07
NG USA EOP-G017	Street Light Inspections	04/01/06
NG USA EOP-G016	Elevated Equipment Voltage Testing	05/01/06
NG USA EOP T007	Transmission line patrol 23kv-345kv	08/01/07
NG USA SMS 400.06 1	Substation V&O Inspections	08/20/07
NG USA SMP 400.06 2	Substation V&O Inspections	08/20/07

Revised procedures are included with this filing as Attachments 1 through 6 A brief description of the recent changes is listed below:

NG USA EOP – UG006 -
Addition of code #622, 623 and 624

NG USA EOP - D004 –
New organizational title changes along with the addition of maintenance codes associated with URD and UCD installations that were previously contained in UG006

NG USA EOP – T007 –
Codes 760 – 769 added to the Transmission Field Survey Worksheet

NG USA SMS – 400 06 01

Added Documentum Version number to headers and the file name to footer Also added a Problem & Discrepancies Section

NG USA SMP – 400.06.02
Removed "verified check lists posted" – New England only Updated section name to "Reporting and Correcting Problems and Discrepancies" Revised material required section and removed Substation V&O Inspection Report form, Report from last V&O Inspection and Inspection Substation V&O Checklist form

Quality Assurance

Overview

Quality Assurance programs are required under the Safety Orders and have been developed to assure the integrity of the data developed during inspection and testing. It is the accuracy, thoroughness and integrity of the data that is sought; *not* what the data convey The data characterize the condition of the assets. Having confidence in the data provides assurance that the actual condition of the assets (as provided by the data) is accurately known

Statistical principles attest to the fact that the accuracy and thoroughness of inspections and tests (i.e , the "population") can be estimated by assessing the accuracy/thoroughness of a limited, randomly chosen subset (i.e , "sample") of such inspections/tests.

The Company implemented a Quality Assurance program that is typically used in manufacturing to assess the quality of continuous product streams. This "model" fits well with the EV Test and Inspection initiatives which are generally year-round efforts

Results

Quality Assurance statistics for EV Testing and Asset Inspections are treated separately being that the EV effort has generated a considerable amount of data and the respective compliance rating is very high

Elevated Voltage Testing:

Three Hundred, Eighty (380) audits were conducted (i e tests repeated) and the level of compliance rating was determined to be very high

Asset Inspections:

Seven hundred, Ten (710) Inspection audits were conducted:

- 518 on Distribution
- 15 on Underground
- 177 on Transmission

With the exception of Distribution, audits have yielded favorable compliance ratings. For Distribution Inspections, compliance rating for Critical Codes is 94 5% and 74% considering all Codes

QC – Quality Control Program
(Implemented for 2008 performed by the contractor)

A quality control (Q/C) program will be implemented with the following elements:

- A random Q/C file generated by the contractor weekly for 5 – 10% of each Testers tests
- The Q/C testing should be completed prior to the transmission of the Testers file to NG and within 5-7 days of the original test
- The entire file including the Q/C data will be transmitted to NG for processing within 5 days of the Q/C completion, but not longer than 30 days from the original test
- NG will set a threshold of 95% compliance, for Distribution, Underground, Transmission, SubTransmission, and Traffic Signals to make original test data valid and accepted into the database for processing. NG will set a threshold of 98% compliant for Streetlighting.
- All Q/C tests that fail shall have a root cause analysis done by the Contractor to determine trends and possible equipment failure, human error, etc

Q/A – Quality Acceptance Program
(Implemented for 2008 performed by National Grid)

A quality acceptance (Q/A) program will be implemented with Q/A for tested assets as well as inaccessible assets performed by National Grid at a rate of 5% of all Q/C tests plus an addition random sample of non Q/C'd tests (volume to be determined)

Independent Assessment of Inaccessible Locations for Cycle 1
National Grid recently completed an audit of the first cycle of EV testing required under the program. The results of this EV testing included a number of inaccessible locations as well as several locations where a GPS signal was reportedly not available. National Grid isolated approximately 20,000 locations that were investigated to further assess the accuracy of the collected data. These locations consisted of 14,987 distribution poles, 1,395 transmission poles and 3,123 underground locations across 14 operating districts in New York State

The requirements of this QA program independent assessment were identified as the following:

1. A quality assessment of the EV Data collected during Cycle 1 of testing. This included:
    - A full quantitative and geographical assessment of the 14,987 distribution poles, 1,395 transmission poles and 3,123 underground locations identified by

National Grid across 14 operating districts in New York. This assessment was focused on the following:

  - Locations previously identified as inaccessible; and
  - Locations previously identified as no-GPS signal available

- Based on the results of this full assessment, a subset of those locations were verified in the field.

Results of Assessment for Inaccessible Locations for Cycle 1

The audit determined that in a majority of cases the assets were clearly marked and reasonably accessible for testing and the GPS coordinates were always available. In most cases the right-of-ways were sufficiently maintained for access. National Grid determined that the inspector(s) in question had not made an adequate effort to test poles off the road.

Conclusion

The assessment demonstrated that the high inaccessible rate was localized to a particular region and particular inspector(s). The findings were reported back to the vender performing the EV testing with a request for immediate corrective actions. The vender developed a re-training program for all inspectors and implemented an internal QA program. Inspectors who falsely reported assets as inaccessible were disciplined or terminated by the vender. For cycle 4 2008, National Grid incorporated a requirement that all venders performing testing or inspections are now required to provide a QA/QC program.

Summary of Electric Shocks

Staff requested that a summary of Electric Shock Reports for the calendar year be included in the annual report. This information has been provided to staff on a monthly basis beginning in March 2006 (Attachment 7A).

Reported shock orders are qualified when a call comes to the Call Center. Once the order type is selected, an order is created and dispatched, based on the day or time, to the appropriate center for response. Once the order is worked, the System Operational Dispatch center is notified for status and follow up to the Commission Staff. Cases are faxed / emailed to the Staff within 24 hours of their occurrence.

The following is a summary of the Electric Shock Reports, received/handled by System Operations Dispatch and reported to the Commission during 2007.

Total shock calls received during 2007 was 219 orders. The following is a break down of orders received:

Voltage Found	139
Unsubstantiated	55
Employee Contact	0

Non-Employee Contact	25

For incidents where medical attention was sought:

Employee	0
Non-Employee	15
Domestic Animal	2

A break down of ownership of the 139 instances of Voltage Found:

National Grid	31
Customer Owned	108

Research and Development

During 2005, 2006 and 2007, the Company researched various products currently available or under development to determine if there would be value for the Elevated Voltage Testing program or for the Facility Inspection programs The following provides a synopsis of these efforts

Sarnoff SVD 2000

During December 2006. National Grid hired Sarnoff to test areas of the Western Division to evaluate the potential for use on locating elevated voltage conditions where the electric system is overhead construction but is located behind the housing (back lot construction). It was thought that this type of construction might provide enough distance from the test equipment to diminish the interference caused by the overhead circuits By using the highly trained Sarnoff employees to monitor the test equipment, we were able to successfully use the equipment The device could not be used to find elevated voltage conditions on metallic equipment directly on wood distribution poles. however, we believe it could be used to successfully replace manual testing of underground fed streetlights. manholes / hand holes, etc where overhead construction is in the back lot

ROAM Technology

National Grid is currently installing Holophane's Remote Operations Asset Management (ROAM) technology at 500 streetlight locations in the Buffalo, NY, area. This technology provides analysis of lamps for on/off, cycling, day-burner, and power to the luminaries. The devices use radio frequency to communicate within the mesh National Grid will also be evaluating this technology for possible additional use as a distribution isolation device based on the service line operation to Street Lighting and the possibility of using ROAM to identify, affect operation, and communicate elevated voltage conditions on streetlights The current pilot will run for 12 months

University outreach

Technology Transfer group met with the University at Buffalo to discuss potential projects to consider for R&D initiatives The university is currently reviewing the initiatives and will develop a more complete proposal

Attachment Summary

Attachment 1 - NG USA EOP–G0016 Elevated Equipment Voltage Testing

Attachment 2 - NG USA EOP-D004 Distribution Line Patrol and Maintenance

Attachment 3 - NG USA EOP-UG006 Underground Inspection and Maintenance

Attachment 4 - NG USA EOP-T007 Transmission Line Patrol and Maintenance 23kV – 345kV

Attachment 5 - NG USA EOP-G017 Street Light Standard Inspection Program

Attachment 6 - NG USA EOP-400.06.1 Substation V&O Inspection Standard and EOP-400.06.2 Substation Inspection Procedure

Attachment 7 - Monthly Reporting to PSC Staff

7A – Reported Shocks for Calendar Year 2007
7B – Visual Inspection Summary for A and E Priorities
7C – Elevated Voltage Testing Results Cycle 3 2007

Attachment 8 - Certifications

Attachment 9 - DRAFT EOPs - Implementation of New Line Service Quality Standards

9A - NG-USA EOP D004
9B - NG-USA EOP UG006
9C - NG-USA EOP T007

ATTACHMENT 1

NG USA EOP – G0016 ELEVATED EQUIPMENT VOLTAGE TESTING

nationalgrid	Doc No.: NG-USA EOP G016
	Page: Page 1 of 11
ELECTRIC OPERATING PROCEDURES	Date: 05/01/06
SUBJECT: Elevated Equipment Voltage Testing	SECTION: General

REFERENCE:

NYPSC Order 04-M-0159
Applicable National Grid Safety Rules & Procedures
Testing Equipment Operation Instructions

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. 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

PROGRAM ADMINISTRATOR:

Distribution Engineering Services

APPLICABILITY

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

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

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.
a All metallic manhole covers, vault covers and grates, junction box covers handhole covers, pad mount transformers, and switchgear.
2 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 8 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 to indicate a minimum of 8 volts and be capable of withstanding a maximum of 1000 volts by an independent laboratory. The portable AC digital voltmeter must be capable of measuring a minimum of 0.1 volt and a maximum of 1000 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.

V CORRECTIVE ACTION REQUIREMENTS

A If an elevated equipment voltage condition is found and verified by the Test Procedure in Section IV, 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 4 5 volts **If the voltage measures less than 4.5 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 4 5 volts and less than 8 volts it can either be guarded in person or by a protective barrier that prevents public contact, contact your supervisor for required action. It is expected that sound judgment shall be utilized in this application. If the voltage measures greater than 8 volts immediate response is required using the notification in section B below

B 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

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

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

E 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

F The Tester/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

G 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 4.5 volts or 2) repairs have been completed to correct the elevated equipment voltage

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

I Customer Owned Equipment

1 Where the Company finds elevated equipment voltage above 4.5 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

VI 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)

VII 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 annual reporting and certification is required by January 15 of each year In addition to certifications, it shall address the following:
1 Analyses of elevated equipment voltage data to show trends or common causes
2 Discussion of performance mechanism, if required.
3 Changes to program implementation due to lessons learned

F 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

VIII 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.

IX RESPONSIBILITY

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

B Field Operations
1 Ensure the elevated equipment voltage program as outlined in this EOP is implemented properly and timely.
2 Ensure that the program as outlined in the EOP is completed each year.
3 Provide qualified personnel to complete elevated equipment voltage testing.
4 Ensure all elevated equipment voltage testers have been trained

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

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

E T&D Technical Training
1 Provide training upon request

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

G Process and Systems
1 Provide and support database.

IX DEFINITIONS:

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

B Proximity Detection Unit – A low voltage hand held detector used to test exposed metallic surfaces and conductors for the presence of low voltage from 8V to 600V

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

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

F 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

X TRAINING:

A Distribution Engineering Services with assistance from the database vendor will provide training on the utilization of handheld computers and the selected database.

B At a minimum, each worker conducting these tests should have knowledge and training in the following areas:

1 Proper use of appropriate Personal Protective Equipment
2. Work Area Protection.
3 Hazard Communication
4 First Aid CPR (This is required only on multi-person crews)
5 The proper use of certified voltage detection units and voltmeters
6 Hazardous condition identification

The attendance of this training shall be documented

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"

05/01/06

Revisions made throughout document

ATTACHMENT 2

NG USA EOP – D004 DISTRIBUTION LINE PATROL AND MAINTENANCE

nationalgrid ELECTRIC OPERATING PROCEDURES	Doc No.: NG-USA EOP D004 Page: 1 of 7 Date: 08/01/07
SUBJECT: Distribution Line Patrol and Maintenance	SECTION: Distribution/ Overhead

REFERENCE:

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

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 hand held computer. The maintenance items identified through this patrol are separated into six priority categories A, B, C, E, F, and I 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 or tree condition 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 feeder is 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.

E Priority – An identified facility/component that must be replaced/repaired immediately to address public safety or system reliability.

All E 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. 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 Distribution Inspection and your work reporting area
   b Details of the E 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

F Priority – An identified forestry condition that should be scheduled as time permits, within the routine right-of-way maintenance and danger tree removal schedules

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

ALL A PRIORITY CONDITIONS IDENTIFIED PRIOR TO NOVEMEBR 1ST MUST BE REPAIRED/CORRECTED BY NOVEMBER 30TH IN THE NEW YORK SERVICE TERRITORY DUE TO REGULATORY REPORTING

ALL A PRIORITY CONDITIONS IDENTIFIED SHALL BE REPAIRED/CORRECTED WITHIN 12 MONTHS OF INSPECTION IN ALL NEW ENGLAND SERVICE TERRITORIES

ALL E PRIORITY CONDITIONS SHALL BE CORRECTED IMMEDIATELY UPON NOTIFICATION

ALL F PRIORITY CONDITIONS IDENTIFIED DURING THE PATROL ARE TRANSMITTED TO THE SYSTEM FORESTRY GROUP ON AN ANNUAL BASIS FOR INCLUSION IN THE RIGHT-OF-WAY MAINTENANCE PROGRAM.

PROGRAM ADMINISTRATOR:

Distribution Engineering Services

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)

SCOPE:

Distribution Maintenance

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

I 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 - An electronic 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

II 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 November 30 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 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 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 and maintenance code 681, transformer missing nomenclature, if found deficient upon inspection while at the site Maintenance Codes are shown on the Distribution Field Survey Worksheet (Exhibit 1)

The 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 Program by the inspector, clerk, or supervisor or their designee.

III 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

REGION	DISTRICT	EMPLOYEE ID
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 Yes or NO

WOOD POLE MOUNTED STREETLIGHT	PQ
098 A (NR) Street light Hazard Cond	/
099 A (NR) Not Bonded	/
100 B (NR) Not Bonded to Standards	/
POLE	
101 I (R) Osmose Priority Pole	/
102 I (R) Osmose Reject Pole	/
103 I (NR) Down Ground & Rod Present	/
106 C (NR) D Bl Wood-NS Tmt Req'd	/
107 I (NR) D Bl Wood-Tel Tmt Req'd	/
108 I (NR) D Bl Wood-CATV Tmt/Req'd	/
110 A (R) Broken	/
111 B (RP) Visual Rotting Grd Line	/
112 B (RP) Excess Checking	/
113 B (NR) Cutlap Treated Bitumark Yr	/
115 B (NR) Riser Guard Req'd	/
116 B (RP) Visual Rotting Pole Top	/
117 C (NR) Leaning Pole	/
118 P (NR) Stencil/Correction Req'd	/
CROSSARM	
120 B (R) Damage Arm	/
121 B (NR) Loose/Defective Pins	/
122 D (NR) Wooden Pins 13.2kv	/
123 B (R) Loose Brace, Hdwe	/
124 B (R) Dmg Del Crossarm	/
125 B (R) Damage Alley Arm	/
126 D (NR) Crossarm Wood Brace Req'd/Blt	/
127 E (R) Primary On Arm	/
INSULATOR	
130 B (R) Broken/Cracked/ Flashed	/
131 A (R) Untied or Floating	/
133 D (R) Non-Standard Voltage	/
134 B (NR) AL Cap Assoc W/Switch/Fuse	/
135 B (R) Covered Wire on Porcelain	/
PRIMARY	
140 A (R) Insuff Grnd Clearance	/
141 A (R) Damaged Cond/Brkn Strands	/
142 F (NR) In Trees	/
145 A (R) Damaged Stirrups/Connector	/
146 B (R) Improper Sag	/
147 B (R) LA Transition or Tap-Blown/ missing/improper	/
148 B R) LA End of Line-blown/mis g'improp	/
TRANSFORMER	
150 A (NR) Oil Weeping	/
151 B (R) Bushings Brk/Cracked	/
152 A (R) Missing Ground Wire	/
153 D (R) LA Blown/Missing/Improper	/
155 D (R) Animal guards required	/
156 B (NR) Non Std Install of Gap	/
157 D (R) Improper/Missing Bond	/
CAPACITOR	
160 A (NR) Oil Weeping	/
161 A (R) Bulging	/
162 D (R) Bushgs Brkn/Cracked	/
163 A (NR) Missing Ground Wire	/
164 A (NR) Blown Fuse	/
165 B (NR) Improper/Missing Bond	/
166 D (R) Animal Guard Missing	/
167 B (R) LA Blown/Missing/Improp	/
168 B (NR) Control Cab height/ground	/
169 I (NR) Out of Service	/

REGULATOR	PQ
170 A (NR) Oil Weeping	/
171 B (R) Bushings Brkn/Crkd	/
172 A (R) Missing Ground Wire	/
174 B (NR) Ctrl Cab Hgnt/Grnd	/
175 B (R) Improper/Missing Bond	/
176 D (R) Animal Guard Missing	/
177 D (R) L.A. Blown/Missing/ Improp	/
SECTIONALIZER	
180 A (NR) Oil Weeping	/
181 B (R) Bushings Brkn/Crkd	/
182 A (R) Missing Grd Wire	/
183 B (NR) Ctrl Cab Hght/Grnd	/
184 B (R) Improper/Missing Bond	/
185 B (R) Animal Guard Missing	/
186 B (R) LA Blown/Missing/ Improp	/
RECLOSER	
190 A (R) Oil Weeping	/
191 B (R) Bushings Brkn/Crk	/
192 A (R) Missing Grd Wire	/
193 B (NR) Ctrl Cab Hght/Grnd	/
194 B (R) Improper/Missing Bond	/
195 B (R) Animal Guard Missing	/
196 B (R) L.A. Blown/Missing/Improp	/
SWITCH	
203 B (R) Gang Oper'd Defective	/
204 B (R) Single Phase Defective	/
205 B (R) Improper/Missing Bond	/
207 B (R) L.A. Blown/Missing/Improp	/
208 A (R/R) Ground Required	/
GROUND	
210 A (R) Wire Broken/Loose	/
211 A (R) Hazard Condition	/
212 B (NR) Guard Req'd	/
213 D (NR) Non Standard	/
214 B (NR) Not bonded to neutral	/
GUY	
220 P (NR) Guy Wire Marker	/
221 A (NR) Guy Insulator Required	/
222 B (NR) Excessive Slack	/
223 A (R) Broken Wire	/
225 B (NR) Non Std Bonding/Install	/
ANCHOR	
226 A (NR) Req'd-Not Owned	/
227 A (NR) Req'd-Sole NS	/
SECONDARY	
231 F (NR) In Trees	/
232 B (NR) Improper Sag	/
234 B (NR) Hearing	/
SERVICE	
240 B (NR) Leans from House	/
241 F (NR) In Trees	/
243 B (NR) Non Std/Unsecured	/
ROW	
250 F (NR) Brush/Trees	/
GIS	
260 I (NR) Map doesn't match field	/
261 I (NR) Pole/line orig error	/
262 I (NR) Equip/hardware miss'g	/
263 I (NR) Equip removed in fld. remove from GIS	/

GIS	PQ
269 I (NR) Other GPS/GIS errors	/
SPACER CABLE	
270 B (R) Damg'd/Missg Spcr	/
271 B (R) Bracket Damage	/
272 B (R) Bracket not bonded	/
273 B (R) Messenger not bonded	/
274 B (R) Messenger guard missg	/
275 B (NR) Cutout bracket not bonded	/
276 B (R) Uncovered Splice	/
CUTOUT	
280 A (R) Defective Cutout	/
281 I (R) Rotted Porcelain	/
282 I (NR) Bonded Porcelain	/
283 I (NR) Enclosed	/
284 I (NR) Non Porcelain	/
289 I (N/R) Other	/
RISER	
290 B (NR) Improp Cable Supp/ Terminate	/
291 B (R) Improper/missing bond	/
292 B (R) Animal Guard Missing	/
293 B (R) L.A. Blown/Missg/Improp	/
SWITCHGEAR	
651 A (R) Barrier brkn/dmg'd/unset	/
652 B (NR) Base broken/damaged	/
654 A (R) Cable not bonded	/
656 A (R) Door broken/damaged	/
657 C (NR) Excessive Vegetation	/
659 A (R) Missing Ground	/
660 A (NR) Missing Nomenclature	/
661 C (NR) Other	/
662 C (NR) Rusted/Paint Peeling	/
PAD TRANSFORMER	
672 B (R) Bushing Broken/Crk'd	/
673 A (R) Door Broken/Dmg'd/	/
675 B (R) Elbows track d/burned	/
676 C (NR) Excessive Vegetation	/
678 A (R) Missing Ground	/
681 A (NR) Missing Nomenclature	/
682 C (NR) Mud/Debris	/
684 A (NR) Oil Weeping	/
685 B (NR) Pad broken/damaged	/
686 B (NR) Protection (bollards)	/
687 C (NR) Rusted/Paint Peeling	/
ENCLOSURES	
740 B (R) Base Broken/Cracked	/
741 A (R) Door Brkn/dmg'd/unset	/
742 B (R) Elbows Tracking/Burned	/
743 C (NR) Excessive Vegetation	/
744 A (NR) Missing Ground	/
745 P (NR) Missing Nomenclature	/
748 C (NR) Rusted/Paint Peeling	/

KEY

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

Comments:

IV DISTRIBUTION MAINTENANCE DATA BASE

The Distribution Maintenance database consists of information collected in the field down loaded from the hand held computer and data gathered from other sources entered from the desktop computer. The 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).

V MAINTENANCE SCHEDULE

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 must be repaired/corrected by November 30th in New York. The "A Priority" conditions that exist in New England service territories shall be scheduled for repair/correction within a rolling 12 month basis The "B Priority" conditions are scheduled based on the reliability of the feeder load served, and reported condition of the facilities. The "B Priority" maintenance is to be performed on feeders selected by Asset Strategy and Investment Planning, 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. The "C Priority" maintenance work will be completed as planned and directed by the Asset Strategy and Investment Planning department (Capital expenditures) after reviewing annually for trends that would require expenditures

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

VI COMPLETION OF MAINTENANCE CODES

The replacement/repair of an identified maintenance problem code after completed in the field must be updated in the database. The completion of the maintenance problem codes can be done through the edit screen found on the desktop computer. Field personnel that perform the work 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 close out the completed maintenance problem codes in the database at their desk top computer or designate the inspector or clerk to close out the maintenance code Additional maintenance problems that maybe 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 PROBLEM MUST BE LISTED ON THE DATABASE AND THEN CLOSED OUT WHEN COMPLETE

VII RESPONSIBILITIES:

Distribution Engineering Services

1 Update EOP as necessary.
2 Provide Customer Operations support as requested

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

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 and Performance

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

Maintenance Inspection and Assessment

1 Ensure circuits scheduled for patrol are completed each year.
2 Provide qualified line 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

NG-USA EOP D004

"Distribution Line Patrol and Maintenance"

08/01/07

New organizational title changes. Added maintenance codes associated with URD and UCD installations that were previously contained in UG006

ATTACHMENT 3

NG USA EOP – UG 006 UNDERGROUND INSPECTION AND MAINTENANCE

nationalgrid	Doc No.: NG-USA EOP UG006
	Page: Page 1 of 9
ELECTRIC OPERATING PROCEDURES	Date: 02/01/07
SUBJECT: Underground Inspection and Maintenance	SECTION: Underground

REFERENCE:

NY PSC Order 04-M-0159
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

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 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 feeder is 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

E Priority - An identified facility/component that must be replaced/repaired 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 E PRIORITY CONDITIONS SHALL BE CORRECTED IMMEDIATELY UPON NOTIFICATION

Supersedes Document Dated: 08/01/06	Authorized By: Director-Dist Engineering Services	Approved By: VP - Engineering Services

ALL "A PRIORITY" CONDITIONS IDENTIFIED PRIOR TO NOVEMEBR 1ST MUST BE REPAIRED/CORRECTED BY NOVEMBER 30TH IN THE NEW YORK SERVICE TERRITORY DUE TO REGULATORY REPORTING

ALL A PRIORITY CONDITIONS IDENTIFIED SHALL BE REPAIRED/CORRECTED WITHIN 12 MONTHS OF INSPECTION IN ALL NEW ENGLAND SERVICE TERRITORIES.

PROGRAM ADMINISTRATOR:

Distribution Engineering Services

APPLICABILITY

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

SCOPE:

Distribution Maintenance

I. Patrols
II. Equipment to be Inspected and Maintenance Codes
III Maintenance database
IV Maintenance
V. Work management
VI. Completion
VII. Definitions
VIII Responsibilities
IX Training

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 November 30th 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 T&D Superintendent's are responsible to create the patrol schedule for their respective Regions for the remainder of underground facilities. The Inspector uses a 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:617 – manhole missing nomenclature, 639 - network transformer-missing nomenclature, 660 – switchgear missing nomenclature, 681 – transformer missing nomenclature, 707 – vaults improper nomenclature. The Inspector will input the code into the 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. An "E 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. An "A Priority" shall be assigned to a temperature gradient between 10° and 20°. A "B 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 T&D Superintendent's are 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. 617 – manhole missing nomenclature, 639 - network transformer- missing nomenclature, 660 – switchgear missing nomenclature, 681 – transformer missing nomenclature, 707 – vaults improper nomenclature. The Inspector will input the code into the 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. An "E 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. An "A Priority" shall be assigned to a temperature gradient between 10° and 20° A "B 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 T&D Superintendent's are 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, 617 - manhole missing nomenclature, 639 - network transformer- missing nomenclature, 660 – switchgear missing nomenclature, 681 – transformer missing nomenclature, 707 – vaults improper nomenclature The Inspector will input the code into the 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 either 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

Table 1 on page 4 details the Inspection Program and Maintenance Codes

INSPECTION PROGRAM AND MAINTENANCE CODES

TABLE I

Maintenance Code	Description	Expense or Capital	Default priority
600	Handhole - Broken/damaged/unsecured	E	B
602	Handhole - Missing nomenclature	E	C
603	Handhole – Primary or Secondary needs repair	E	B
604	Handhole – Other (use comments)	E	B
605	Infrared Inspection – Separable Components	E	B
610	Manhole - Bonded	E	B
611	Manhole - Cable/Joint leaking	E	A
612	Manhole - Cables bonded	E	B
614	Manhole - Cracked/broken	C	B
615	Manhole - Fire proofing	E	C
616	Manhole - Improper grade	E	B
617	Manhole - Missing nomenclature	E	A
620	Manhole - Retack	E	B
621	Manhole - Ring/cover repair/replace	C	B
622	Manhole – Roof Condition	E	B
623	Manhole – Chimney Condition	E	B
624	Manhole - Needs Cleaning	E	B
630	Network Protector - Barriers broken/damaged	E	A
632	Network Protector - Oil leak	E	A
633	Network Protector - Worn/damaged gasket	E	A
635	Network transformer - Bushing Broken/Cracked	E	B
637	Network transformer - Low oil	E	B
638	Network transformer - Missing Ground	E	A
639	Network transformer - Missing nomenclature	E	A
642	Network transformer - Oil Weeping	E	A
643	Network transformer - Rusted/ Paint peel	E	C
651	Switchgear - Barrier broken/damaged/unsecured	E	A
652	Switchgear - Base broken/damaged	C	B
654	Switchgear - Cable Not Bonded	E	A
656	Switchgear - Door Broken/Damaged	E	A
657	Switchgear – Excessive vegetation	E	C
659	Switchgear - Missing ground	E	A
660	Switchgear - Missing Nomenclature	E	A
661	Switchgear – Other	E	C
662	Switchgear - Rusted/Paint peeling	E	C
672	Transformer - Bushing Broken/Cracked	E	B
673	Transformer - Door Broken/damaged/unsecured	E	A
675	Transformer - Elbows tracking/burned	E	B
676	Transformer – Excessive vegetation	E	C
680	Transformer - Missing Ground	E	A
681	Transformer - Missing nomenclature	E	A
682	Transformer - Mud/debris	E	C
684	Transformer - Oil Weeping	E	A
685	Transformer - Pad broken/damaged	E	B
686	Transformer - Protection (ballards) damaged	C	B
687	Transformer - Rusted/ Paint peeling	E	C

690	Trench - Exposed Cable	E	A
692	Trench Path - Sunken	E	B
700	Vault - Cable missing bond	E	A
702	Vault - Cracked/broken	C	B
703	Vault - Damaged/broken cover	E	B
704	Vault - Damaged/broken door	E	B
705	Vault - Damaged/broken ladder	E	A
706	Vault - Improper grade	E	B
707	Vault - Improper nomenclature	E	A
708	Vault - Light not working	E	B
713	Vault - Ventilation failure	E	B
720	Submersible equip. - Excess corrosion	E	C
721	Submersible equip. - Physical damage	E	C
722	Submersible equip - Leaking	E	C
730	Anode - Missing	E	C
731	Anode - Need replacement	C	C

III MAINTENANCE DATABASE

The Maintenance database consists of data downloaded from the hand held and data entered from the desktop computer. The field hand held 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

The maintenance activities are scheduled by priority categories with all "A Priority" conditions identified prior to November 1 repaired/corrected by November 30th in New York. The "A Priority" conditions that exist in New England service territories shall be scheduled for repair/corrected on a rolling 12 month basis. The "B Priority" conditions are scheduled based on the reliability of the circuit, load served, and condition of facilities. The "B Priority" maintenance is to be performed on circuits 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 (Capital expenditures) after reviewing annually for trends that would require expenditures. All "E Priority" conditions shall be responded to immediately upon notification for correction.

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 DO2105 Activity along with the appropriate work order or a work request if the patrol has been scheduled. For Transmission and Sub-transmission facilities the inspector shall utilize activity TO2100. 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 not been scheduled should charge the DM2105 activity along with appropriate work order number. For Transmission and Sub-transmission utilize activity TM2100. 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 replacement/repair of an identified maintenance problem code after completion in the field must be updated in the database. The completion of the maintenance problem codes can be done through the edit screen found on the desktop computer Field personnel that perform the work 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 close out the completed maintenance problem codes in the database at their desk top computer or designate the inspector or clerk to perform the close out. Additional maintenance problems 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 ORGINAL MAINTENANCE PROBLEM MUST BE LISTED ON THE DATABASE AND THEN CLOSED OUT WHEN COMPLETE

VII 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: An underground 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

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

VIII 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. 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

Inspector

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

C&MS

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. Ensure program is completed annually as required

Distribution Network Strategy

1 Provide inspectors where applicable.
2 Provide input into program revisions
3 Provide program management.
4 Ensure program is completed annually as required
5 Ensure inspectors are trained
6. 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

IX 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 employee who will be performing the inspections.

NG-USA EOP UG006

"Underground Inspection and Maintenance"

02/01/07

Addition of code #622, 623 and 624 – Table I

ATTACHMENT 4

NG USA EOP – T007 TRANSMISSION LINE PATROL AND MAINTENANCE
23 kV- 345 kV

nationalgrid ELECTRIC OPERATING PROCEDURES	Doc No.: NG-USA EOP T007 Page: 1 of 10 Date: 08/01/07
SUBJECT: Transmission Line Patrol & Maintenance 23kV-345kV	SECTION: Transmission & Distribution

REFERENCE:

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

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 a 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

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 Maintenance Database
IX Maintenance
X. Time Reporting
XI. Completion
XII. Definitions
XIII Responsibilities
XIV Training

I GROUND BASED PATROL INSPECTION AND MAINTENANCE
Transmission
Sub-transmission

1 Transmission patrols are conducted by a line 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 an Inspector identifying all required maintenance on a hand held computer. The maintenance items identified through this patrol are separated into five priority categories A, B, C, E, F and I 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 or tree condition 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 circuit is scheduled for maintenance by Transmission Asset Management 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 Transmission Asset Management annually 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 in consultation with Transmission Asset Management

E Priority – An identified facility/component that must be replaced/repaired 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

F Priority – An identified forestry condition that should be scheduled as time permits within the routine

right-of-way maintenance and danger tree removal schedules

I Priority - This priority category is to collect inventory information on actual field condition to be used by Investment Strategy and Work Planning

ALL A PRIORITY CONDITIONS IDENTIFIED PRIOR TO NOVEMBER^{1ST} MUST BE REPAIRED/CORRECTED BY NOVEMBER 30TH IN NEW YORK

ALL A PRIORITY CONDITIONS IDENTIFIED SHALL BE REPAIRED/CORRECTED WITHIN 12 MONTHS OF INSPECTION IN ALL NEW ENGLAND SERVICE TERRITORIES

ALL E PRIORITY CONDITIONS SHALL BE CORRECTED IMMEDIATELY UPON NOTIFICATION.

ALL F PRIORITY CONDITIONS IDENTIFIED DURING THE PATROL ARE TRANSMITTED TO THE SYSTEM FORESTRY GROUP ON AN ANNUAL BASIS FOR INCLUSION IN THE RIGHT-OF-WAY MAINTENANCE PROGRAM.

The Transmission patrol schedule/status is created and tracked by report RPT 3100 Circuit Patrol Status The T&D Superintendent's or Transmission Line Services management are responsible to create this schedule for their respective areas The 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 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:

Steel Condition		Concrete Condition	
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 Inspector, while patrolling, shall also complete maintenance codes "532 – Tower numbers missing" and "581 – stencil required", if found deficient upon inspection. For these two codes, the Inspector will input the code into the 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 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

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
A) Single B) H. Frame C) 3 Pole D) 4 Pole E) 5 Pole F) 6 Pole
G) Flex-Tower H) Square-Tower I) Hairpin J) Other

MATERIAL
A) Wood (fill in information for each pole i.e. 2 pole 3 pole 4 pole, etc.)
Height _____ Class _____ Year Set _____ Manufacturer _____
Year Last Treated _____ Treatment A) External B) Internal C) Both D) Other E) Unknown F) None
B) Steel C) Lattice

CONFIGURATION Deadend Tangent Switch Structure Davit Arm Stand Off Other

STEEL/LATTICE CONDITION (Circle One) 1 2 3 4 5 6

FOUNDATION STEEL / CONCRETE (Circle One) 1 2 3 4 5 6 / 1 2 3 4 5

POLE *		Sub. No.	Priority/ QTY
510 A (R)	Broken		/
511 B (RP)	Visual Rotting		/
512 C (R)	Leaning		/
513 D (R)	Replace Single Arms		/
514 B (R)	Repl Double Arm		/
515 D (R)	Repair Braces		/
516 B (R)	Replace Braces		/
517 B (R)	Replace Anchor		/
518 B (R)	Install Anchor		/
519 B (R)	Repair/Replace Guy Wire		/
521 D (R)	Tighten Guy Wire		/
522 D (NR)	Replace/Install Guy Shield		/
524 B (R)	Guy Not Bonded		/
525 B (RP)	Lightning Damage		/
526 D (RP)	Woodpecker Dmg		/
527 B (RP)	Insects		/
TOWER			
531 A (R)	Tower Legs Broken		/
532 A (NR)	Numbers Missing		/
534 B (R)	Loose Bolts/Hard		/
535 B (NR)	Repair Anti-Climb		/
536 F (R)	Vegetation On Tower		/
537 B (R)	Structure Damage		/
538 B (R)	Straighten Tower		/
539 B (R)	Arms Damaged		/

* Enter Sub No. if a multiple Structure
** Enter Circuit No. if more than circuit on pole

NR = Maint. Code May Not Directly Affect Reliability
R= Maint. Code May Affect Reliability
RP= Maint. Code May Affect Reliability and Has Specific Program in Place to Address

CONDUCTOR **		Circuit No.	Priority/ QTY
541 B (R)	Conductor		/
542 B (R)	Static		/
543 A (R)	Ground Wire		/
544 B (R)	Sleeve/Conn.		/
545 B (NR)	Reseal		/
546 B (NR)	Under 25 Ft.		/
547 A (R)	Infrared Problem Identified		/
LINE HARDWARE			
551 B (R)	Insulators/Dam		/
552 D (NR)	Insulator Plumb		/
553 B (R)	Hardware Dam		/
555 I (R)	Lightning Arrestor		/
FOUNDATION – GENERAL			
561 B (R)	Erosion		/
RIGHT OF WAY			
571 F (NR)	Erosion		/
572 F (NR)	Encroachments		/
573 F (NR)	Debris		/
574 F (R)	Danger Tree		/
575 F (NR)	Gate Broke		/
576 A (NR)	Oil/Gas Leak		/
MISCELLANEOUS			
581 A (NR)	Steroid Structure		/
582 B (R)	Switch Damaged		/
583 B (R)	Damaged Ground		/
584 D (NR)	Install Warning Sign		/
585 B (NR)	Replace Signs		/
586 B (NR)	Remove Steps		/
587 B (R)	Add Dirt & Tamp		/
GIS			
760 I (NR)	GIS Map Doesn't Match Field		/
761 I (NR)	GIS Equip. Sterotag In Error		/
762 I (NR)	GIS Equip/Hardware Missing		/
763 I (NR)	GIS Equip. Removed In Field Remove from GIS		/
769 I (NR)	GIS Other GPS/GIS Errors		/

Comments:

2 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

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

11 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. This patrol shall be accomplished by a line-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 "A, B, C, E, F" 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)

Priority A

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)

Number of Insulators in String	Number of Damaged Insulators Per String			
	Priority E	Priority A	Priority B	Priority C
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 with bulk power circuits done yearly. This activity 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" are to be addressed within the next year. Transmission components found to
be greater than 40 degrees Centigrade above the reference temperature are to be addressed as soon as possible as system operating conditions allow. In order to verify the location of the component identified by IR with a temperature anomaly, it is suggested that repair crews utilize a live line micro ohmmeter, such as the SensorLink Corp. Ohmstik, as a confirmation tool. Conditions/Maintenance problems identified are to be prioritized "A, B, C, E" 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 "A 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 MAINTENANCE DATA BASE

The Maintenance database consists of information (data) downloaded from the hand held and information (data) entered from the desktop computer. The field 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

The maintenance activities are scheduled by priority categories E Priority" requires immediate repair. All "A Priority" conditions identified prior to November 1 must be repaired/corrected by November 30th in New York The "A Priority" conditions that exist in New England service territories shall be scheduled for repair/corrected on a rolling 12 month basis The "B Priority" conditions are scheduled based on the reliability of the circuit, load served, Line Importance Factor, and condition of facilities The "B Priority" maintenance is to be performed on circuits selected by Transmission Asset Management (transmission) and Distribution Network Strategy (sub-transmission) 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 Transmission Asset Management and Distribution Network Strategy (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 in consultation with Transmission Asset Management or Distribution Network Strategy

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 TIME REPORTING

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

STORMS requires that the Transmission Inspector/Operations Personnel fill out a daily time sheet. The Transmission Inspector would record their time actually performing the foot patrol inspection of the Transmission and Sub-transmission system under the FO1160 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 Transmission Planning/Area Resource Coordinator (ARC)

Operations Personnel performing scheduled maintenance on the Transmission and Sub-transmission systems should record their time actually performing maintenance activities under the appropriate work request number set up by their Transmission Planning/ARC in their respective area Operations Personnel performing maintenance activities that have not been scheduled should charge the FM1160 activity along with appropriate work order number. STORMS work request numbers are created when the work has been scheduled by Transmission Planning/ARC Work orders or work request numbers can be obtained from the Operations Supervisor or from the Transmission Planning/ARC

XI COMPLETION

The replacement/repair of an identified maintenance problem code must be completed in the database upon field completion. The completion of the maintenance problem codes can be done through the edit screen found on the desktop computer Field personnel that perform the work are required to complete the work order form providing the date completed, and employee ID number The work o

order form is returned to the T&D Supervisor or Transmission Line Services Supervisor who will close out the completed maintenance problem codes in the database at their desk top computer or designate the inspector or clerk to perform the close out Additional maintenance problems 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 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.

XII 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 - An electronic 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 down load the Hand Held device and retrieve the information in the form of reports

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

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

XIII RESPONSIBILITIES

Distribution Engineering Services
1 Update program as necessary
2 Provide Customer Operations support and training as requested

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

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 Network Strategy
1 Provide input into program revisions.
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 Ensure Inspectors are trained where applicable.
5 Provide program management

Process and Systems
1 Provide and support database

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

T&D Technical Training
1 Provide training upon request.

XIV 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, E, and F maintenance items to the qualified worker who will be performing the inspections

NG-USA EOP 1007

"Transmission Line Patrol – 23kV-345Kv"

08/01/07

Codes 760 – 769 added to the Transmission Field Survey Worksheet

ATTACHMENT 5

NG USA EOP – G017 STREET LIGHT STANDARD INSPECTION PROGRAM

nationalgrid	Doc No.: NG-USA EOP G017
	Page: Page 1 of 6
ELECTRIC OPERATING PROCEDURES	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.

E Priority – An identified facility/component that must be replaced/repaired 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.

I&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

ATTACHMENT 6

NG USA EOP – 400 06 1 SUBSTATION V&O INSPECTION STANDARD AND
EOP – 400.06 2 SUBSTATION INSPECTION PROCEDURE

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 sealing and heat discoloration.

4 3 Alarm and communication radios operation should be verified The telephones should be checked for proper operation

4 4 Station Service secondary supplies should be checked alive and transfer switches checked for correct position

4 5 Structures and foundations should be inspected for deterioration, damage and paint condition

4 6 Substation security measures must be checked for proper operation and signs of unauthorized entry This includes: fencing gates, warning signs entry alarms, locks and chains

4 7 General substation housekeeping should also be taken care of

5 Record of Revisions

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

VISUAL AND OPERATIONAL (V&O) INSPECTION

INTRODUCTION

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

PURPOSE

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

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

ACCOUNTABILITY

Substation and other Supervisors supervising inspection and maintenance activities

Substation and other Workers performing inspection and maintenance activities

REFERENCES

National Grid USA Safety Handbook

SMS 400 13 1 Oil Leak Reporting Procedure

SMS 400 08 1 Trouble Reporting Procedure

EP-14 Oil Filled Electrical Equipment Management

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

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

PROCEDURE CONTENTS

Table of Contents

1 Test Equipment Required.

1 1 Digital Multi-meter. IEC 1010-1 Cat. IV
   1) Spare battery
1 2 Recloser Battery test meter with load test feature
   a) For Form 3 Recloser battery tests

2 Materials Required.

2 1 PDA with National Grid V&O software installed
2 2 Clipboard
2 3 Binoculars
2 4 Flashlight
2 5 Magnet for resetting drag hands
2 6 Additional items listed in Appendix A

3 Initial Substation Entry

3 1 Personal Protective Equipment.
   1) Minimum requirement is ANSI Z41/EH rated safety footwear, hard hat and safety glasses
3 2 Vehicles entering substation.
   1) Lower and/or insure antennas will maintain minimum approach distances to energized conductors and apparatus
   2) Use extreme caution when maneuvering to avoid hitting apparatus or violating Minimum Approach Distances

4 Inspect Yard

4 1 Perform a quick initial inspection for:

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

5. Notify the System Operator

5 1 Inform them you are in the Station for a V&O Inspection and that you will be testing alarms

5 2 Ask System Operator if any equipment has been tagged out or relays blocked

6 Reporting and Correcting Problems and Discrepancies

6 1 Severe Trouble shall be reported to the responsible Control Center and the person in charge of the substation immediately

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

6 2 See the section Oil Leak Reporting for information on reporting oil leaks

6 3 Document all paint and preservation problems

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

6 4 Problems and discrepancies found should be repaired during the V&O Inspection whenever possible

6 5 Problems and discrepancies not corrected during the V&O Inspection shall be recorded on the Inspection Card (Apparatus Inspections) or as a note in the PDA (Station V&O Inspections)

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

6 6 Record findings in the PDA if listed in the PDA "round"

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

7 Control House

7 1 Check control house door locks working and in good condition

7 2 Station Log Book

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

7 3 SPCC – SPCC locations only

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

7 4 Control Panels

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

7 5 Noises - Listen for any unusual noises from relays, modules, RAPRs, timer circuits etc

7 6 Relay targets and alarms

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

7 7 Reclosing Relays

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

7 8 Ground Trip Switches (cutouts)

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

7 9 Bus Transfer Schemes

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

7 10 High Side Transfer Schemes

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

7 11 Annunciator and Alarm Test Switches

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

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

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

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

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

7 12 Radio Alarms
   1) Inspect condition of radio system for damage, and proper operation
   2) If individual alarms have not been sent to the System Operator send a test alarm to from the radio cabinet
      a) Verify the System Operator received the alarm
   3) Make sure cabinet door is closed so the receiver voice communication is disabled

7 13 Tags and Clearance and Control switching forms and Supplies
   1) Check the stock of Clearance and Control Tags
      a) Restock as necessary
   2) Check the stock of Ground Device Identification Tickets (GDIT)
      a) Restock as necessary
   3) Check the stock of Filed Switching Order Pads
      a) Restock as necessary.
   4) Check that pens (red and blue/black) and pencils are available
      a) Restock as necessary.

7 14 Control House Heating and Lighting
   1) Test control house lighting.
      a) Replace any defective bulbs, or ballasts or sockets
   2) Test emergency lighting
      a) Replace batteries if needed
   3) Inspect heaters, fans and thermostats for proper operation Make sure fans are not broken or bound up and they are in good working order

7 15 Station Service and Transfer Switch
   1) Check transfer switch on preferred supply
   2) Check transfer switch for damage or overheating
   3) Test and record preferred and alternate secondary voltages at transfer panel

7 16 Check AC supply panels for:
   1) Tripped circuit breakers
   2) Circuit breakers in the proper position

7 17 Check DC Circuit Breaker of Fuse Panel
   1) Check DC supply panels for:
      a) Tripped circuit breakers or blown fuses
      b) Circuit breakers in the proper position

7 18 Protective Grounds
- 1) Check that grounds in station are in sets of 3 and that they are hung up properly
- 2) Check that the phase end and ground clamps are in good working order
- 3) Lubricate as required
- 4) Inspect for the cracked or cut insulation and broken conductor strands
- 5) Replace or repair damaged protective grounds Do not leave damaged grounds at the station

7 19 Switch Sticks
- 1) Inspect Switch Sticks and Grounding Sticks for current dielectric test date
  - a) Send out of date sticks to lab for testing
- 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 <u>Yard Inspection</u>

8 1 Unusual Noises
- 1) Be alert for arcing gurgling and pinging noises which could indicate imminent and violent equipment failure

8 2 Walk the fence and inspect:
- 1) Barbed wire - Strands to be intact and tight.
- 2) Fence fabric - Holes or breaks in the chain link

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

8 3 Gates
1) Test gates for proper operation
   a) Gates should swing easily out of the way
2) When closed. the gates should by chained tightly, or locked with minimal space
3) Verify locking chains hardware and locks present and in good condition

8 4 Check for proper "Danger High Voltage" warning signs:
1) Every 50 feet along perimeter of fence
2) On gates and on non-hinged side of gate (see National Grid Standard #0105)

8 5 Substation yard security problems shall be corrected or reported immediately to supervisor

8 6 Vandalism related problems should be specifically recorded as such and reported to supervisor

8 7 Yard Lights
1) Check all yard lights working (Yard lights should have been turned on during control house inspection)
2) Repair broken bulbs. glass fixtures. spot light heads or other lighting that needs attention
   a) If work cannot be completed safely and while maintaining safe work clearances or if special equipment such as a bucket truck is needed. note on the V&O report.

8 8 Vegetation
1) Check for any growth of trees or vegetation in fence and gate areas that animals or people could used to climb over the fence
   a) Cut or record for the Arborist to have removed
2) Record vegetation growth within the substation that requires spraying or removal

8 9 Bus and structure.
1) Record missing or damaged animal protection devices
2) Inspect insulators for:
   a) Broken chipped or damaged skirts.
   b) Carbon tracking or flash over
   c) Surface contamination (dirt rust. salt spray etc)
   d) Broken or damaged insulators should be recorded on V&O Report.
3) Broken porcelain should be picked up off the ground
4) Visually inspect current and voltage transformers for damage or signs of overheating
5) Visually inspect arresters for:
   a) Blown or damaged arresters
   b) Surface contamination

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

8 10 Structure and apparatus ground connections
1) Inspect for any cut broken or missing ground connections to apparatus. structures and guy wires
2) Inspect static wires and record any problems
3) Visually Inspect Station Service Transformers for:
   a) Evidence of oil leaks on transformer tank and on the ground
   b) Bushing damage or surface contamination
   c) Damaged or improperly closed primary fuses
   d) Output Voltage if not previously measured at station service transfer switch

8 11 Inspect equipment and structure foundations
1) Large cracks
2) Settling (not level)
3) Deterioration (large areas of surface erosion stone showing).

8 12 Inspect Cableways

8 13 Damage. missing or broken cover sections and deterioration

8 14 Inspect buildings junction boxes. structures etc for overall paint condition
   a) Record items needing attention

8 15 Clean up substation yard
1) Remove broken porcelain. debris and trash
2) If area requires major clean up or crushed stone requires leveling. note on V&O Report.
3) If equipment or materials are intentionally stored in the yard insure that they are neatly placed and not a hazard to personal Barricade area if necessary
   a) Storage should be in compliance with SMS 499 10 1 Substation Work Area Identification Procedure.

9 Oil Leak Reporting

9 1 Oil filled apparatus must be inspected for any signs of leaks
1) The oil leak status shall be recorded for each piece of oil filled apparatus that has an oil leak screen in the PDA
2) Leaks from small apparatus that do not have an oil leak screen in the PDA should be recorded in a PDA notes screen

9 2 Oil Leak Status Codes
1) Oil leaks are categorized as follows:
   a) Unknown – Unknown is used to indicate that no information has been entered in AIMMS for this equipment
   b) Clean - Apparatus is dry and shows no evidence of oil leaks

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

9 3 Leaks categorized as Leak require immediate action to stop the leak or contain the released oil

9 4 All leaks require creation of a Leak Report Work Order

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

9 5 Leaks from PCB Equipment

1) If a leak is discovered from equipment classified as over 500 ppm PCB cleanup must begin within 48 hours (40 CFR 761 30(a)(1)(x)
2) The inspection records must also include:
   a) The location of the leak;
   b) The estimate of fluid released;
   c) The date and description of any cleanup containment, repair or replacement;
   d) The results of any containment (for example. was containment successful or not)
   e) The daily inspection results required for uncorrected active leaks (refer to Environmental Procedure EP-14)
   f) The records must be available for inspection by the EPA and must be maintained for at least three years after disposal of the equipment.

10 Apparatus Inspections

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

Circuit Breakers

SMP 401 01 2 – Air Magnetic Circuit Breaker Maintenance Procedure
SMP 401 02 2 – Oil Circuit Breaker Maintenance Procedure
SMP 401 03 2 – Vacuum Circuit Breaker Maintenance Procedure
SMP 401 04 2 – Air Blast Circuit Breaker Maintenance Procedure5
SMP 401 05 2 – Two Pressure Gas Circuit Breaker Maintenance Procedure
SMP 401 06 2 – Gas Puffer Circuit Breaker Maintenance Procedure
SMP 401 07 2 – Station Recloser Maintenance Procedure
SMP 401 08 2 – Vacuum Switch Maintenance Procedure

Transformers

SMP 402 01 2 – Power – 15 MVA and above Maintenance Procedure
SMP 402 02 2 – Power – Below 15 MVA Maintenance Procedure
SMP 402 03 2 – Dry Type Transformer Maintenance Procedure

Instrument Transformers
- SMP 403.01 2 – Currents Potentials and Metering Maintenance Procedure Voltage Regulators
- SMP 404 01 2 – Step Voltage Regulator Maintenance Procedure
- SMP 404 02 2 – Induction Voltage Regulator Procedure

Emergency Generators
- SMP 405.01 2 – Emergency Generators Maintenance Procedure

Batteries & Chargers
- SMP 406.01 2 – Lead/Acid Battery Maintenance Procedure
- SMP 406 03 2 – Static 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 5844690
9) Switchboard Lamp 145 Volt. 15W S/C 5841410
10) Indicating Bulb type 49 S/C 5843078
11) Indicating Bulb type 47 S/C 5843100
12) 18 Volt Miniature 0 11A Automotive S/C 5843110
13) Indicating 35V. 06A S/C 5843132
14) Indicating type 43A S/C 5843250
15) Switchboard Lamp 24X S/C 5844610
16) Switchboard Lamp 55C S/C 5844630
17) Indicating Lamp 120 P S B S/C 5841359
18) (for V S.A. Reclosers)

12 7 Incandescent Lamps:
1) Incandescent Lamp 75 Watt S/C 5841739
2) Incandescent Lamp 100 Watt S/C 5841840
3) Incandescent Lamp 135 Watt S/C 5842001
4) Incandescent Lamp 200 Watt S/C 5842150
5) Mogul Base Lamp 500 Watt S/C 5842390Flood lamp PAR 38 100 Watt S/C 5842045
6) Fluorescent Lamps:
7) 8 FT Single Pin Lamp 75 Watt S/C 5841050
8) 4 FT Bi - Pin Lamp 40 Watt S/C 5840950
9) 4 FT Single Pin Lamp 40 Watt S/C 5840940
10) 8 FT Recessed Pin Lamp 105 Watt S/C 5841130

12 8 Spare emergency light batteries
12 9 Spare fuses
12 10 Recloser control and trip fuses
a) Reclosers often use time delay fuses that are similar in appearance to AGC types If the wrong type fuse is installed it will blow after a couple of operations
2) Cartridge fuses
a) 5A
b) 10A
c) 15A
d) 20A
e) 30 A
3) AGC Fuses
a) 2 A slow blow and instantaneous
b) 5A slow blow and instantaneous
c) 10A slow blow and instantaneous
d) 20A slow blow and instantaneous
12 11 Spare nitrogen bottles
12 12 Battery Supplies
a) 5 Gallon distilled water and battery filler S/C 5599778
b) Battery NO SMOKING Signs S/C 5483448
c) Extra hydrometer S/C 5474448
d) Extra thermometer S/C 487304
e) Baking Soda
f) Spare eyewash bottles S/C 5890600
g) Nylon brush to clean battery posts
h) Battery grease
12 13 Spare recloser batteries

13. Appendix B – Trouble Reporting

13.1 Trouble

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

13.2 Severe Trouble

1) A severe trouble condition is a situation that is immediately hazardous to the system operation and/or personnel. These troubles are immediately reported to the System Operator and to the person in charge of the substation. The employee shall secure the area and warn unauthorized people to stay clear of the danger

2) Examples of Severe Trouble

a) Dead station battery
b) Blown bushings or cable terminator
c) Downed live lines
d) Multiple broken support insulators
e) Electrical fires
f) Grounds cut in station
g) Loss of station service power
h) Broken pole or structure
i) Blown by pass/shunt arresters on regulators
j) Low oil levels
k) Unusually noises

13.3 Not Immediately Fixable Trouble

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

13.4 Examples of Not Immediately Fixable Trouble

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

13.5 Fixable Trouble

1) Fixable items should be repaired as they are discovered during the V&O Inspection. This insures that the station is maintained in the best possible operating condition and prevents unnecessary return trips. The items fixed should be noted on the V&O Report and in the station logbook

2) Examples of Fixable Trouble

a) Low Battery electrolyte
b) Replacing blown lamps
c) Changing filters
d) Installing missing covers

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

14. Record of Revisions

Revision	Changes
07/26/2007	Control House Removed - Verify Check Lists Posted – New England only
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.

ATTACHMENT 7

MONTHLY REPORTING TO PSC STAFF

7A – Reported Shocks for Calendar Year 2007

7B – Visual Inspection Summary for A and E Priorities

7C – Elevated Voltage Testing Results Cycle 3 2007

Shock Reports from the Public

nationalgrid November 2007 Report (12/01/06-11/30/07)	Monthly Update Nov 2007	2007 Yearly Total
I. Total shock calls received:		
Voltage Found	7	139
Unsubstantiated	8	55
Employee Contact		
Non-Employee Contact	3	25
II. Medical Attention Sought:		
Employee		
Non-Employee	1	15
Domestic Animal		2
The following sections apply for the incidents listed as "Voltage Found" in Section I		
III Equipment owner:		
Utility		31
Non-utility (Coned only)		
Customer	7	108
IV Action to make safe:		
Permanent repair at time of discovery	1	20
Temp repair at time of discovery		7
Cut and cap service line		22
Customer circuit breaker or fuse	5	47
Barriers		
Other	1	43
V. Voltage Source:		
Streetlight service line		1
Streetlight base connection		
Streetlight internal wiring or light fixture		2
Issue with primary joint. or transformer		7
Defective service line		9
Abandoned service line		5
Customer wiring	4	57
Customer equipment	1	30
Other	2	28
VI. Voltage Range:		
1.0V to 4.4V		2
4.5V to 7.9V		3
8.0V to 24.9V		10
25.0V to 99.9V		14
100.0V or higher	1	20
No Reading Primary Involved		2
No Reading	6	88

nationalgrid

Visual Inspection Programs

Transmission - 2007

Total Inspections 24,037

Inclusive Dates: December 01, 2006 thru November 30, 2007

Deficiencies Identified	Repair Priority Codes E (Immediate)	A (By Nov 30)	Repair Complete	Repair Pending*	Comments
510 - POLE - Broken		6	6	0	
511 - POLE - Visual Rotting	1	22	23	0	
512 - POLE - Leaning		1	1	0	
513 - POLE - Replace Single Arms		4	4	0	
514 - POLE - Replace Double Arms		3	1	2	
515 - POLE - Repair Braces		11	11	0	
516 - POLE - Replace Braces		5	5	0	
519 - POLE - Repair/Replace Guy Wire		5	5	0	
522 - POLE - Replace/Install Guy Shield		0	0	0	
526 - POLE - Woodpecker Damage		11	11	0	
527 POLE - Insects		1	1	0	
531 TOWER - Tower Legs Broken		2	1	1	
533 TOWER - Rusted Steel		0	0	0	
534 TOWER - Loose Bolts/Hard		8	8	0	
536 TOWER - Vegetion on Tower		1	1	0	
537 TOWER - Structure Damage		1	1	0	
538 TOWER - Straighten Tower		1	1	0	
541 - CONDUCTOR - Conductor		1	1	0	
542 CONDUCTOR - Static	1	24	24	1	
543 - CONDUCTOR - Ground Wire		155	155	0	
544 CONDUCTOR - Sleeve/Conn		1	1	0	
547 - Infrared Problem Identified	1	12	12	1	
551 - LINE HDW - Insulators/Dam		29	29	0	
555 - LINE HDW - Lightning Arrestor		2	2	0	
563 - FOUNDATION - Erosion		4	4	0	
573 - RIGHT OF WAY - Debris		1	1	0	
581 - MISC - Stencil Structure		3	3	0	
583 - MISC - Damaged Ground		82	82	0	
Totals	3	397	395	5	

* "Pending Repairs" are all A Priorities

Visual Inspection Programs

[illegible] grid

Distribution 2007

Deficiencies Identified	Repair Priority Codes: I (Immediate)	Repair Priority Codes: A (By Nov 30)	Total Inspected [illegible] — Inspection Dates [illegible] November 23, 2007: Repair Complete	Repair Pending	Comments
[illegible] - Street Light Hazard Condition		[illegible]	[illegible]	[illegible]	
[illegible] - Street Light - Not Banded		[illegible]	[illegible]	[illegible]	
[illegible] - Street Light - Not Banded to Standard		[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Damage Reject		[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Down Ground & Rod Present		[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Double Wood - NO transfer req'd		[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Broken	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Visual rotting ground line		[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Excess checking		[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Riser guard required		[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Visual rotting pole top		[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Leaning pole	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Pole - Stencil/Correction req'd		1	1	[illegible]	
[illegible] - POLE - Other (use comments)		[illegible]	[illegible]	[illegible]	
[illegible] - Crossarm - Damage arm	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Crossarm - Loose/defective pins	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Crossarm - Loose brace, hardware	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Crossarm - Damage double crossarm	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Crossarm - Damage alley arm		1	[illegible]	[illegible]	
[illegible] - Crossarm - Wood brace required [illegible]		1	[illegible]	[illegible]	
[illegible] - Crossarm - Primary on Arm	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Crossarm - Other (use comments)		1	[illegible]	[illegible]	
[illegible] - Insulator - Broken/Cracked/Flashed	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Insulator - Floating	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Insulator - [illegible]		[illegible]	[illegible]	[illegible]	
[illegible] - Primary - Insuff. grnd clearance	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Primary - Dmgd. cond/broken strands	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Primary - In trees	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Primary - Damaged sleeve/Connector	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Primary - Improper Tag	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Primary - L.A. Missing Transition		[illegible]	[illegible]	[illegible]	
[illegible] - Primary - L.A. Missing End of Line		[illegible]	[illegible]	[illegible]	
[illegible] - PRIMARY - Other (use comments)		[illegible]	[illegible]	[illegible]	
[illegible] - Transformer - Oil weeping		[illegible]	[illegible]	[illegible]	
[illegible] - Transformer - Bushings broken/cracked	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Transformer - Missing ground wire		[illegible]	[illegible]	[illegible]	
[illegible] - Transformer - LA blown/missing/improper		[illegible]	[illegible]	[illegible]	
[illegible] - Transformer - [illegible] Installation of [illegible]		[illegible]	[illegible]	[illegible]	
[illegible] - Transformer - Improper/missing Bond	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - TRANSFORMER - Other (use comments)		[illegible]	[illegible]	[illegible]	
[illegible] - Capacitor - Oil weeping		[illegible]	[illegible]	[illegible]	
[illegible] - Capacitor - Missing ground wire		[illegible]	[illegible]	[illegible]	
[illegible] - Capacitor - Blown fuse		[illegible]	[illegible]	[illegible]	
[illegible] - Capacitor - L.A. blown/missing/improper		[illegible]	[illegible]	[illegible]	
[illegible] - Regulator - Missing ground wire		[illegible]	[illegible]	[illegible]	
[illegible] - Regulator Control Cab. height/ground		[illegible]	[illegible]	[illegible]	
[illegible] - Regulator - L.A. blown/missing/improper		[illegible]	[illegible]	[illegible]	
[illegible] - Recloser - Bushings broken or crack		[illegible]	[illegible]	[illegible]	
[illegible] - Recloser - L.A. blown/missing/improper		[illegible]	[illegible]	[illegible]	
[illegible] - Arrester - Blown arresters		[illegible]	[illegible]	[illegible]	
[illegible] - Switch - Single phase defective		[illegible]	[illegible]	[illegible]	
[illegible] - Switch - Improper/missing bond		[illegible]	[illegible]	[illegible]	
[illegible] - Switch - L.A. blown/missing/improper		[illegible]	[illegible]	[illegible]	
[illegible] - Switch - Handle Not Banded		[illegible]	[illegible]	[illegible]	
[illegible] - Ground - Ground wire broken/loose	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Ground - Hazard condition	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Ground - Guard Req'd		[illegible]	[illegible]	[illegible]	
[illegible] - Ground - non standard		[illegible]	[illegible]	[illegible]	
[illegible] - Guy - Guy Wire marker		[illegible]	[illegible]	[illegible]	
[illegible] - Guy - Guy Insulator Required		[illegible]	[illegible]	[illegible]	
[illegible] - Guy - Excessive slack in guy		[illegible]	[illegible]	[illegible]	
[illegible] - Guy - Broken guy wire	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Guy - non standard bonding or [illegible]		[illegible]	[illegible]	[illegible]	
[illegible] - Anchor req'd - joint owned		[illegible]	[illegible]	[illegible]	
[illegible] - Anchor req'd - sole NG		[illegible]	[illegible]	[illegible]	
[illegible] - Secondary - In trees	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Secondary - Improper tag	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Secondary - Floating	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - SECONDARY - Other (use comments)		[illegible]	[illegible]	[illegible]	
[illegible] - Service - Ins. loose from house	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Service - In trees	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Service - non std or unsecured NG [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - SERVICE - Other (use comments)		[illegible]	1	[illegible]	
[illegible] - ROW - Brush/Tree		[illegible]	[illegible]	[illegible]	
[illegible] - GIS map doesn't match field		[illegible]	[illegible]	[illegible]	
[illegible] - GIS Pole/Line numbering in error		[illegible]	[illegible]	[illegible]	
[illegible] - Spacer Cable - Damaged/Missing spacer	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Spacer Cable - Bracket Damage	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Cutout - Defective cutout	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Cutout - Failed Porcelain	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Cutout - Enclosed		[illegible]	[illegible]	[illegible]	
[illegible] - Cutout - Other - Use Comments		[illegible]	[illegible]	[illegible]	
[illegible] - Riser - Improper cable support/terminals	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - Riser - Improper/missing bond		[illegible]	[illegible]	[illegible]	
[illegible] - Riser - L.A. blown/missing/improper		[illegible]	[illegible]	[illegible]	
[illegible] - Switchgear - Barrier broken/damaged/[illegible]		[illegible]	[illegible]	[illegible]	
[illegible] - Switchgear - Door Broken/Damaged		[illegible]	[illegible]	[illegible]	
[illegible] - Switchgear - Missing Nomenclature		[illegible]	[illegible]	[illegible]	
[illegible] - PM Transf - Door Broken/damaged/[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - PM Transf - Excessive Vegetation		[illegible]	[illegible]	[illegible]	
[illegible] - PM Transf - Missing Ground		[illegible]	[illegible]	[illegible]	
[illegible] - PM Transf - Missing Nomenclature		[illegible]	[illegible]	[illegible]	
[illegible] - PM Transf - Mud/Debris		[illegible]	[illegible]	[illegible]	
[illegible] - PM Transf - Oil Weeping	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - PM Transf - Pad broken/damaged	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] - PM Transf - Rusted/ Paint peeling		[illegible]	[illegible]	[illegible]	
[illegible] - Enclosures - Missing Ground		[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	

nationalgrid

Visual Inspection Programs

Underground Distribution 2007

Total Inspections: [illegible]

Inclusive Dates: December 01 2006 thru November 30 2007

Deficiencies Identified	Repair Priority Codes: E (Immediate)	Repair Priority Codes: A (By Nov 30)	Repair Complete	Repair Pending	Comments
109 - Handholes - Broken/damaged/unsecured	[illegible]	[illegible]	[illegible]	[illegible]	
112 - Handholes - Missing nomenclature		[illegible]	[illegible]	[illegible]	
114 - Handholes - Other (use comments)	[illegible]	[illegible]	[illegible]	[illegible]	
121 - Manholes - Cable/Joint leaking		[illegible]	[illegible]	[illegible]	
116 - Manholes - Cracked/broken		[illegible]	[illegible]	[illegible]	
115 - Manholes - Improper grade		[illegible]	[illegible]	[illegible]	
117 - Manholes - Missing nomen/ID item		[illegible]	[illegible]	[illegible]	
120 - Manholes - Retech		[illegible]	[illegible]	[illegible]	
121 - Manholes - Ring/cover repair/replace		[illegible]	[illegible]	[illegible]	
122 - Manholes - Roof Condition - Use Comments		[illegible]	[illegible]	[illegible]	
123 - Manholes - Chimney Condition - Use Comments		[illegible]	[illegible]	[illegible]	
133 - Network Protector - Worn/damaged gasket		[illegible]	[illegible]	[illegible]	
139 - Network Transformer - Missing nomenclature		[illegible]	[illegible]	[illegible]	
144 - Switchgear - Cable Not Clamped		[illegible]	[illegible]	[illegible]	
145 - Switchgear - Missing nomenclature		[illegible]	[illegible]	[illegible]	
153 - Transformer - Door Broken/damaged/unsecured		[illegible]	[illegible]	[illegible]	
156 - Transformer - Oil Weeping		[illegible]	[illegible]	[illegible]	
155 - Transformer - Pad broken/damaged		[illegible]	[illegible]	[illegible]	
157 - Transformer - Rusted/Paint Peeling		[illegible]	[illegible]	[illegible]	
162 - Vaults - Cracked/broken		[illegible]	[illegible]	[illegible]	
163 - Vaults - Damaged/broken cover		[illegible]	[illegible]	[illegible]	
165 - Vaults - Damaged/broken ladder		[illegible]	[illegible]	[illegible]	
Totals	[illegible]	[illegible]	[illegible]	[illegible]	

Monthly Elevated Voltage Status Report

nationalgrid Testing Summary	Total System Units Requiring Testing	Units Completed	Percent Completed	Units with Voltage Found (>= 1.0v)	Percent of Units Tested with Voltage (>= 1.0v)	Units Classified as Inaccessible
Distribution Facilities	1,291,343	1,291,343	100.00%	198	0.015%	14,766
Monthly Update		121,346	9.40%	8	0.007%	3,802
Underground Facilities	104,229	104,229	100.00%	8	0.008%	1,777
Monthly Update		10,490	10.06%		0.000%	602
Street Lights / Traffic Signals	82,559	82,559	100.00%	290	0.351%	2,091
Monthly Update		3,315	4.02%	2	0.060%	19
Substation Fences	929	929	100.00%	1		
Monthly Update		210	22.60%			
Transmission	105,527	105,527	100.00%	62	0.06%	2,493
Monthly Update		6,982	6.55%		0.00%	777
TOTAL	1,585,587	1,585,587	100.00%	559	0.04%	21,127
Monthly Update		142,133	8.96%	10	0.01%	5,200

Update covers Testing completed through November 2007 for preload year 2007 - New York

Definition of Inaccessible: Unable to get to a location due to fence, animals, dense brush, swamp, terrain, highway

Additional Notes: At this time Transmission includes all structures 23kv - 345kv

Monthly Elevated Voltage Status Report

nationalgrid Summary of Voltages Found	# of units between 1.0v and 4.4v	# of units between 4.5v and 7.9v	# of units between 8.0v - 24.9v	# of units between 25.0v - 99.9v	# of units greater than 100.0v	Total
Distribution Facilities	170	13	8	7	0	198
Pole (910)	8	2	0	1	0	11
Ground (914)	70	7	5	2	0	84
Guy (915)	99	5	2	0	0	107
Riser (916)	16	0	2	2	0	20
Other	24	1	1	2	0	28
Underground Facilities	4	2	1	1	0	8
Handhole / Pull box (950)	0	0	1	0	0	1
Manhole (951)	1	1	0	0	0	2
Padmount Switchgear (952)	0	0	0	0	0	0
Padmount Transformer (953)	0	1	0	1	0	2
Vault – Cover/Door (954)	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0
Other	3	0	0	0	0	3
Street Lights / Traffic Signals	123	32	103	32	0	290
Metal Street Light Pole (971/981)	120	25	96	30	0	271
Traffic Signal Pole (991)	0	0	1	1	0	2
Control Box (992)	2	0	0	0	0	2
Pedestrian Crossing Pole (993)	0	0	0	0	0	0
Other	1	7	6	1	0	15
Substation Fences	0	1	0	0	0	1
Fence (995)	0	1	0	0	0	1
Other	0	0	0	0	0	0
Transmission	55	5	2	0	0	62
Lattice Tower (931)	4	0	0	0	0	4
Pole (930)	9	0	0	0	0	9
Ground (933)	41	5	1	0	0	47
Guy (934)	0	0	0	0	0	0
Other	13	2	1	0	0	16
Totals	352	53	114	40	0	559

NOTE - National Grid is only mitigating those locations where voltage is confirmed to be 4 5 volts or greater

NOTE - Individual facility counts (pole, ground, guy, etc) may add up to more than the total on a summary line due to voltage on multiple facilities at a single location or pole

NOTE - "Other" category generally includes incorrect facility types reported (example - a pole code turned in for voltage found on an underground device).

Monthly Elevated Voltage Status Report

nationalgrid **Mitigation Efforts**	Units with Voltage Found >=4.5 volts	Units Permanently Repaired	Units Scheduled for Repair by Utility	Units Scheduled for Repair by Others	Repairs Made
Distribution Facilities	28	18	10	0	(1)CableFeed; (9)DownGround; (2)EquipOther(usecomments); (3)GroundConnection; (1)Insulator; (1)PoorInsulation; (1)Z-CustomerProblem
Underground Facilities	4	2	2	0	(2)GroundConnection
Street Lights / Traffic Signals	167	97	70	0	(4)Cable&Ground; (37)GroundConnection; (2)LampWiring; (4)LuminaireChange; (7)Neutral; (31)NoneRequired; (8)RemadeAllConnections; (1)ServiceWire; (3)Z-CustomerProblem
Substation Fences	1	1	0	0	(1)DownGround
Transmission	7	7	0	0	(5)DownGround; (1)GroundConnection; (1)NoneRequired

ATTACHMENT 8 – CERTIFICATIONS

CERTIFICATION - ELEVATED VOLTAGE TESTING

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

Neil Proudman, on this 11th day of January, 2008, certifies as follows:

1 I am the Vice President of Niagara Mohawk Power Corporation d/b/a National Grid (the "Company"), and in that capacity I make this Certification for the annual period ending November 30, 2007 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, 2005 and July 21, 2005 in Case 04-M-0159 (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 elevated voltage (the "Elevated Voltage Testing Program")

3 I am responsible for overseeing the Company's Elevated Voltage Testing Program and in that capacity I have monitored the Company's Elevated Voltage Testing Program during the twelve months ended November 30, 2007 (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 Elevated 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 Elevated 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 11th day of January, 2008
Notary Public:

Jeremy J. Cole
Notary Public, State of New York
Qualified in Onondaga County No. 02E06031383
My Commission Expires 9/23/2009

CERTIFICATION - INSPECTIONS

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

Neil Proudman, on this 11th day of January, 2008, certifies as follows:

1 I am the Vice President of Niagara Mohawk Power Corporation d/b/a National Grid (the "Company"), and in that capacity I make this Certification for the annual period ending November 30, 2007 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, 2005 and July 21, 2005 in Case 04-M-0159 (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 November 30, 2007 (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 19% of its Facilities during the year 2007, in order to comply with the five-year inspection cycle required under the Orders

Neil Proudman

Sworn to before me this 11th day of January, 2008
Notary Public:

Jeremy J. Cole
Notary Public, State of New York
Qualified in Onondaga County No. 02EU6031303
My Commission Expires 9/22/2009

ATTACHMENT 9 – DRAFT EOPs - IMPLEMENTATION OF NEW LINE SERVICE QUALITY STANDARDS

9A – NG-USA EOP D004

9B – NG-USA EOP UG006

9C – NG-USA EOP T007

nationalgrid ELECTRIC OPERATING PROCEDURES	Doc No.: NG-USA EOP D004 Page: 1 of Date: 11/01/07
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 categories are defined as follows:

Level 1- An identified facility/component or tree condition that must be repaired/replaced within 5 days

Level 2 - Identified facility/component condition that must be repaired/replaced within 6 months

Level 3 - Identified facility/component condition that must be repaired/replaced within 2 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 1-877-716-1996
   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 Distribution Inspector and your work reporting area.
   b. Details of the Level 1 Priority Condition:
      i. Problem found
      ii. District, Feeder No., Line No., Tax District and Pole No.
      iii. Street address and any additional information that would assist in finding the location of the problem
      iv. If you are standing by or have secured the location
3. Notification to area Inspections Supervisor for follow-up.

APPLICABILITY

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

DEFINITIONS

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

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

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

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

PROGRAM ADMINISTRATOR:

Distribution Engineering Services

SCOPE:

Distribution Maintenance

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

I DISTRIBUTION PATROL

Distribution Patrols are conducted by a Distribution Inspector that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities. Distribution patrols are scheduled in such a manner that each distribution feeder is examined in the field once every five (5) years. In NY, the patrols shall be completed by November 30 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 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

REGION	DISTRICT	EMPLOYEE ID
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 Yes or NO

WOOD POLE MOUNTED STREETLIGHT	P/Q
098 1, 2 (NR) Street light Hazard Cond	/
099 2 (NR) Not Bonded	/
100 4 (NR) Not Bonded to Standards	/
POLE	
103 4 (NR) Down Ground & Rod Present	/
106 3 (NR) D'bl Wood-NG Treat Req'd	/
107 4 (NR) D'bl Wood-Tel Treat Req'd	/
108 4 (NR) D'bl Wood-CATV Treat Req'd	/
110 1, 2 (R) Broken	/
111 1,2,3,4 (RP) Visual Rotting Grd Line	/
113 3 (NR) Curlap Treated Bismark Yr	/
115 1,2,3 (NR) Riser Guard Req'd	/
116 1,2,3, 4 (RP) Visual Rotting Pole Top	/
117 1,2,3 (NR) Leaning Pole	/
118 P (NR) Stencil /Correction Req'd	/
CROSSARM	
120 1,2,3 (R) Damage Arm	/
121 1,2,3 (NR) Loose/Defective Pins	/
122 3 (NR) Wooden Pins 13.2kv	
123 1,2,3 (R) Loose Brace, hdwr	/
124 1,2,3 (R) Dmg Obt Crossarm	/
125 1,2,3 (R) Damage Alley Arm	/
126 4 (NR) Crossarm Wood Brace Req'd/BIL	/
127 1, 2 (R) Primary Dn Arm	/
INSULATOR	
130 1,2,3 (R) Broken/Cracked/ Flashed	
131 1,2,3 (R) Untied or Floating	
133 3 (R) Non-Standard Voltage	
134 3, 4 (NR) AL Cap Assoc W/Switch/Fuse	/
135 4 (R) Covered Wire on Porcelain	/
PRIMARY	/
140 1,2 (R) Insuff. Grnd Clearance	/
141 1,2, 3 (R) Damaged Cond/Brkn Strands	/
142 1, F (NR) Primary- Limbs on Primary	
145 1,2,3 (R) Damaged Ismps/Connector	/
146 2,3,4 (R) Improper Sag	/
147 3 (R) LA Transition or Tap Blown/ missing/improper	/
148 3 (R) LA End of Line blown/missing/mpp	/
149 3 (R) LA blown	/
TRANSFORMER	/
150 1,2 (NR) Oil Weeping	/
151 1,2,3 (R) Bushings Brk/Cracked	
152 2 (R) Missing Ground Wire	/
153 3 (R) LA Blown/Missing/Improper	/
155 4 (R) Animal guards required	/
156 3 (NR) Non Std Insted of Gap	/
157 2 (R) Improper/Missing Bond	/
CAPACITOR	/
160 1,2 (NR) Oil Weeping	/
161 1,2 © Bulging	
162 1,2,3 (R) Bushings Brk/Cracked	/
163 2 (NR) Missing Ground Wire	/
164 2 (NR) Blown Fuse	/
165 3 (NR) Improper/Missing Bond	/
166 3 (R) Animal Guard Missing	/
167 3 (R) LA Blown/Missing/Improp	/
168 4 (NR) Control Cab height/ground	/
	/
	/
	/

REGULATOR	P/Q
170 1,2 (NR) Oil Weeping	/
171 1,2,3 (R) Bushings/Brkn/Crkd	/
172 2 (R) Missing Ground Wire	/
174 4 (NR) Ctrl Cab Hght/Grnd	/
175 3 (R) Improper/Missing Bond	/
176 3 (R) Animal Guard Missing	/
177 3 (R) L.A. Blown/Missing/ Improp	/
SECTIONALIZER	
180 1,2 (NR) Oil Weeping	/
181 1,2,3 (R) Bushings Brkn/Crkd	/
182 2 (R) Missing Grd Wire	/
183 4 (NR) Ctrl Cab Hght/Grnd	/
184 3 (R) Improper/Missing Bond	/
185 3 (R) Animal Guard Missing	/
186 3 (R) LA Blown/Missing/ Improp	/
RECLOSER	
190 1,2 (R) Oil Weeping	/
191 1,2,3 (R) Bushings Brkn/Crk	/
192 2 (R) Missing ground	/
193 4 (NR) Ctrl Cab Hght/Grd	/
194 3 (R) Improper/Missing Bond	/
195 3 (R) Animal Guard Missing	/
199 2,3 (R) L.A Blown/Missg/Improp	/
SWITCH	
203 1,2,3 (R) Gang Oper'd Defective	/
204 1,2,3 (R) Single Phase Defective	/
205 3 (R) Improper/Missing Bond	/
207 3, 4 (R) L.A. Blown/Missg/Improp	/
208 2 (NR) Ground Required	/
GROUND	
210 2 (R) Wire Broken/Loose	/
211 2 (R) Hazard Condition	/
212 3 (NR) Guard Req'd	/
213 3 (NR) Non Standard	/
214 3 (NR) Not bonded to neutral	/
GUY	
220 P (NR) Guy Wire Marker	/
221 2 (NR) Guy Insulator Required	/
222 3 (NR) Excessive Slack	/
223 1,2,3 (R) Broken Wire	/
225 4 (NR) NonStd Bonding/Insul	/
ANCHOR	
226 1,2,3 (NR) Req'd-Jt Owned	/
227 1,2,3 (NR) Req'd-Sole NG	/
SECONDARY	
231 1,F (NR) In Trees	/
232 1,2,3 (NR) Improper Sag	/
234 1,2,3 (NR) Floating	/
SERVICE	
240 1,2,3 (NR) Loose from House	/
241 1,F (NR) In Trees	/
243 4 (NR) Non Std/Unsecured	/
ROW	
250 F (NR) Brush/Tree	/
GIS	
260 4 (NR) Map doesn't match field	/
261 4 (NR) Pole/line #ing error	/
262 4 (NR) Equip/Hardware/missg	/
263 4 (NR) Equip removed or fld remove from GIS	/

GIS	P/Q
268 4) (NR) Other GPS/GIS errors	/
SPACER CABLE	
270 1,2,3 (R) Dama g/Missg Spcr	/
271 1,2,3 (R) Bracket Damage	/
273 3 (R) Messenger not bonded	/
274 3 (R) Messenger guard miss'g	/
276 3 (R) Uncovered Splice	/
CUTOUT	
280 1,2 (R) Defective Cutout	/
281 3 (R) Potted Porcelain	
282 4(NR) Bonded Porcelain	/
283 4 (NR) Enclosed	/
284 4 (NR) Non Porcelain	/
286 4 (NR) Other	/
RISER	/
290 1 2 3 (NR) Improp Cable Supp/ Terminate	/
291 2 (R) Improper/missing bond	
292 3 (R) Animal Guard Missing	/
293 2,3 (R) L.A. Blown/Missg/Improp	
SWITCHGEAR	/
651 1,2,3 (R) Barrier brkn/dmgd/unsec	/
652 1,2,3 4 (NR) Door broken/damaged	
654 2 (R) Cable not bonded	
656 2 (R) Door broken/damaged	
657 F (NR) Excessive Vegetation	/
659 2 (R) Missing Ground	/
660 P (NR) Missing Nomenclature	
661 4 (NR) Other	
662 4 (NR) Rusted/Paint Peeling	/
PAD TRANSFORMER	
672 1,2,3 (R) Bushing Broken/Crk'd	/
673 1,2,3 (R) Door Broken/Dmg'd	/
675 1,2,3 (R) Elbows track'g/burned	/
676 F (NR) Excessive Vegetation	
680 2 (R) Missing Ground	/
681 P (NR) Missing Nomenclature	/
682 4 (NR) Mud/Debris	/
684 1,2 (NR) Oil Weeping	/
685 1,2,3,4 (NR) Pad broken/damaged	/
686 4 (NR) Protection (bollards)	/
687 4 (NR) Rusted/Paint Peeling	/
ENCLOSURES	/
740 1,2,3,4 (R) Door Broken/Cracked	/
741 1,2,3(R) Door Brkn/dmg'd/unsec	/
742 1,2,3(R) Elbows Tracking/Burned	/
743 F (NR) Excessive Vegetation	
744 2 (NR) Missing Ground	/
745 P (NR) Missing Nomenclature	/
746 4 (NR) Rusted/Paint Peeling	/
Pole Inspection	/
801 1,2,3,4 (NR) Identified Priority Pole	/
802 1,2,3,4 (NR) Identified Reject Pole	/
803 4 (NR) Excessive checking	/
804 4 (NR) Climbing Inspection	

KEY

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

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 5 days. All "Level 2 Priority" conditions identified must be repaired/corrected within 6 months. All "Level 3 Priority" conditions must be repaired within 2 years. Level 4 Priority is for inventory purposes only

Once the Distribution Feeder is completed in the Distribution 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 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 in STORMS is completed for the work request the maintenance code was downloaded to

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

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

VI RESPONSIBILITIES:

Distribution Engineering Services

1 Update EOP as necessary

Customer Operations

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

Contract Management Services

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

Distribution Inspector

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

Asset Strategy and Policy

1 Select problem codes/circuits to be scheduled for maintenance repair work using data collected through Distribution Maintenance Program.
2 Select circuits to be patrolled for a running five-year cycle.
3 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
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"

08/01/07

New organizational title changes Added maintenance codes associated with URD and UCD installations that were previously contained in UG006.

nationalgrid ELECTRIC OPERATING PROCEDURES	Doc No.: NG-USA EOP UG006 Page: Page 1 of Date: 11/01/2007
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 5 days

Level 2 - Identified facility/component condition that must be repaired/replaced within 6 months

Level 3 – Identified facility/component condition that must be repaired/replaced within 2 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 1-877-716-1996
   b. Bay State West and North & Granite: Westboro Control Center 1-508-389-9032
   c Bay State South and Ocean State: Lincoln Control Center 1-401-335-6075

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

APPLICABILITY

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

DEFINITIONS

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

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

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

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

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

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

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

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

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
VI. Definitions
VII 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 November 30th 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

Table 1 on page 4 details the Inspection Program and Maintenance Codes

INSPECTION PROGRAM AND MAINTENANCE CODES

TABLE 1

Maintenance Code	Description	Level 1	Level 2	Level 3	Level 4 Perform Forestry
260	GIS map doesn't match field				X
261	GIS Pole/line numbering in error on GIS				X
262	GIS Equipment/hardware missing in GIS				X
263	GIS Equip removed in fld. remv from GIS				X
269	GIS Other GPS/GIS errors				X
600	Handholes - Broken/damaged/unsecured		X		
602	Handholes - Missing nomenclature				
603	Handholes - Secondary needs repair	X			
604	Handholes - Other (use comments)				X
610	Manhole - Bonded		X		
611	Manholes - Cable/Joint leaking		X		
612	Manholes - Cables bonded		X		
614	Manholes - Cracked/broken				X
615	Manholes - Fire proofing			X	
616	Manholes - Improper grade				X
617	Manholes - Missing nomenclature				X
620	Manholes - Rerack		X		
621	Manholes - Ring/cover repair/replace			X	
622	Manholes - Roof Condition - Use Comments				X
623	Manholes - Chimney Condition - Comments				X
624	Manholes - Manhole Needs Cleaning				X
630	Network Protector - Barriers broken/dama		X		
632	Network Protector - Oil leak	X			
633	Network Protector - Worn/damaged gasket		X		
635	Network transformer - Bushing Broken/Cra		X		
637	Network transformer - Low oil		X		
638	Network transformer - Missing Ground	X			
639	Network transformer - Missing nomenclatu				X
642	Network transformer - Oil Weeping		X		
643	Network transformer - Rusted/ Paint peel				X
651	Switchgear - Barrier broken/damaged/unse		X		
652	Switchgear - Base broken/damaged			X	
654	Switchgear - Cable Not Bonded		X		
656	Switchgear - Door Broken/Damaged		X		
657	Switchgear - excessive vegetation				X
659	Switchgear - Missing ground		X		
660	Switchgear - Missing Nomenclature				
661	Switchgear - Other				X
662	Switchgear - Rusted/Paint peeling				X
672	Transformer - Bushing Broken/Cracked			X	
673	Transformer - Door Broken/damaged/unsecu		X		
675	Transformer - Elbows/Terminator tracking/burned			X	
676	Transformer - Excessive Vegetation				
680	Transformer - Missing Ground		X		
681	Transformer - Missing nomenclature				X

Maintenance Code	Description	Level 1	Level 2	Level 3	Level 4 Perform Forestry
682	Transformer - mud/debris				X
684	Transformer - Oil Weeping		X		
685	Transformer - Pad broken/damaged			X	
686	Transformer - Protection (ballards) dama				X
687	Transformer - Rusted/ Paint peeling				X
690	Trench - Exposed Cable	X			
692	Trench Path - Sunken				X
700	Vaults - Cable missing bond		X		
702	Vaults - Cracked/broken			X	
703	Vaults - Damaged/broken cover				X
704	Vaults - Damaged/broken door				X
705	Vaults - Damaged/broken ladder		X		
706	Vaults - Improper grade			X	
707	Vaults - Improper nomenclature				X
708	Vaults - Light not working				X
712	Vaults - Sump pump broken				X
720	Submersible equip - Excess corrosion				X
721	Submersible equip - Physical damage				X
722	Submersible equip - Leaking		X		
730	Anodes - Missing			X	
731	Anodes - Need replacement			X	

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 5 days. All "Level 2 Priority" conditions identified must be repaired/corrected within 6 months. All "Level 3 Priority" conditions must be repaired within 2 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 Distribution Maintenance database upon downloading into STORMS.

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

VI RESPONSIBILITIES

Distribution Engineering Services

1 Update program as necessary

Customer Operations

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

Underground Inspector

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

Contract Management Services

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

Asset Strategy and Policy

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

Process and Systems

1 Provide and support database.

T&D Technical Training

1 Provide training upon request

REFERENCE:

NY PSC Order 04-M-0159
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

NG-USA EOP UG006

"Underground Inspection and Maintenance"

02/01/07

Addition of code #622 623 and 624 – Table I

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 a 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 down load 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

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 5 days

Level 2 - Identified facility/component condition that must be repaired/replaced within 6 months

Level 3 – Identified facility/component condition that must be repaired/replaced within 2 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. 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 Transmission 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

The Transmission patrol schedule/status is created and tracked by report RPT 3100 Circuit Patrol Status The Inspection Supervisors, T&D Superintendent's or Transmission Line Services management are responsible to create this schedule for their respective areas The Transmission Inspector uses a Windows based 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 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:

Steel Condition	
1	Serviceable
2	Intact
3	Light Corrosion
4	Light Pitting
5	Significant Pitting
6	Very Severe Deterioration

Concrete Condition	
1	Serviceable
2	Light Deterioration
3	Medium Deterioration
4	Severe Deterioration
5	Very Severe Deterioration

The Transmission Inspector, while patrolling, shall also complete maintenance codes "522 – Replace/install Guy Shield", 532 – Tower numbers missing" and "581 - stencil structure", if found deficient upon inspection 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 Windows based 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

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	A) Single B) H Frame C) 3 Pole D) 4 Pole E) 5 Pole F) 6 Pole G) Flex-Tower H) Square-Tower I) Hairpin J) Other			
MATERIAL	A) Wood (fill in information for each pole 1 is 2 pole 3 pole, 4 pole, etc.) Height _____ Class _____ Year Set _____ Manufacturer _____ Year Last Treated _____ Treatment A) External B) Internal C) Both D) Other E) Unknown F) None B) Steel C) Lattice			
CONFIGURATION	Deadend Tangent Switch Structure Davit Arm Stand Off Other			
STEEL/LATTICE CONDITION	(Circle One) 1 2 3 4 5 6	FOUNDATION: STEEL CONCRETE	(Circle One) 1 2 3 4 5 6 1 2 3 4 5	

POLE *	Sub. No.	Priority/ QTY
510 1,2 (R) Broken		/
511 1,2,3,4 (RP) Visual Rating		/
512 1,2,3,4 (R) Leaning		/
513 1,2,3 (R) Replace Single Arms		/
514 1,2,3 (R) Repl Double Arm		/
515 1,2,3 (R) Repair Braces		/
516 1,2,3 (R) Replace Braces		/
517 1,2 (R) Replace Anchor		/
518 1,2,3,4 (R) Install Anchor		/
519 1,2,3 (R) Repair/Replace Guy Wire		/
521 2,3 (R) Tighten Guy Wire		/
522 P (NR) Replace/Install Guy Shield		/
524 4 (R) Guy Not Bonded		/
525 1,2,3,4 (RP) Lightning Damage		/
526 2,3,4 (RP) Woodpecker Dmg		/
527 2,3,4 (RP) Insects		/
TOWER		
531 1,2 (R) Tower Legs Broken		/
532 P (NR) Numbers Missing		/
534 1,2,3 (R) Loose Bolts/Nuts		/
535 4 (NR) Repair Anti-Climb		/
536 P (R) Vegetation On Tower		/
537 1,2,3 (R) Structure Damage		/
538 1,2,3,4 (R) Straighten Tower		/
539 1,2,3,4 (R) Arms Damaged		/
POLE INSPECTION		/
901 2 (RP) Identified Priority Pole		/
902 3 (RP) Identified Reject Pole		/
903 4 (RP) Excess Checking		/
904 4 (RP) Climbing Inspection Req'd.		
RP= Maint. Code May Affect Reliability and Has Specific Program in Place to Address Affect Reliability and Has Specific Program in Place to Address		

CONDUCTOR **	Circuit No.	Priority/ QTY
541 1,2,3 (R) Conductor		/
542 1,2,3 (R) Static		/
543 2 (R) Ground Wire		/
544 1,2,3 (R) Sleeve/Conn		/
546 4 (NR) Under 25 Ft		/
547 1,2 (R) Infrared Problem Identified		/
LINE HARDWARE		
551 2,3,4 (R) Insulators/Dam		/
552 4 (NR) Insulator Plumb		/
553 1,2,3,4 (R) Hardware Dam		/
555 2 (R) Lightning Arrester		/
FOUNDATION – GENERAL		
563 1,2,3,4 (R) Erosion		/
RIGHT OF WAY		
571 4 (NR) Erosion		/
572 4 (NR) Encroachments		/
573 4 (NR) Debris		/
574 P (R) Danger Tree		/
575 4 (NR) Gate Broke		/
576 4 (NR) Oil/Gas Leak		/
MISCELLANEOUS		
581 P (NR) Stencil Structure		/
582 1,2,3,4 (R) Switch Damaged		/
583 2 (R) Damaged Ground		/
584 4 (NR) Install Warning Sign		/
585 4 (NR) Replace Signs		/
586 4 (NR) Remove Steps		/
587 3,4 (R) Add Dbl & Tamp		/
GIS		
700 4 (NR) GIS Map Doesn't Match Field		/
701 4 (NR) GIS Equip. Stenciling In Error		/
702 4 (NR) GIS Equip/Hardware Missing		/
703 4 (NR) GIS Equip. Removed In Field Remove from GIS		/
709 4 (NR) GIS Other GPS/GIS Errors		/

Comments:

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 were 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 I

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)

Number of Insulators In String	Number of Damaged Insulators Per String			
	Level 1	Level 2	Level 3	Level 4
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 347. 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 5 days. All "Level 2 Priority" conditions identified must be repaired/corrected within 6 months. All "Level 3 Priority" conditions must be repaired within 2 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 the maintenance code was downloaded to.

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.

Asset Strategy and Policy
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
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 F007

"Transmission Line Patrol – 23kV-345Kv"

08/01/07

Codes 760 – 769 added to the Transmission Field Survey Worksheet