STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE NO. 04-M-0159

National Grid

Elevated Voltage Testing and Facility Inspection

2008 Annual Report

January 15, 2009

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 System by November 30, 2005, and complete the testing program for the entire system by August 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	1,251,009	1,251,009	100
Underground	102,131	102,131	100
Streetlights*	84,455	84,455	100
Transmission	97,530	97,530	100
Substation	931	931	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 for 2008, the fourth year, was 19% (i.e., 95% of the annual 20% target). July Order, Appendix A, p. 6.

The facilities exhibiting stray voltage discovered as a result of this process are summarized 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)	143	10	15	8	2
Underground (Units)	3	0	0	4	0
Streetlights (Units)	313	52	57	11	0
Transmission (Units)	34	5	1	0	0
Substation (Units)	0	0	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, the following conclusions should be drawn:

- very few elevated voltage conditions are apparent as a percentage of the total system assets;
- elevated voltage conditions found on Streetlights have increased over the testing performed during 2008;
- the majority of those stray voltage conditions found through testing 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); and
- elevated voltage conditions identified on underground assets are largely attributed to inadequate ground conditions.

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

Program	**Units / Miles Goal**	**Units / Miles Completed**	**% of Goal Completed**	**YR 4 PSC Goal %***
Distribution	7,591	7,591	100	19
Underground	16,439	16,439	100	19
Streetlights*	0	0	100	19
Transmission	1,633	1,633	100	19
Substation	931	931	100	19

- Distribution and Transmission are reported in Miles. Underground, Streetlights, and Substations are reported in Units.
- PSC Goal of 19% is based on the fourth year criteria of 95% of the annual 20% target.
- National Grid set a goal of zero Streetlight units for the 2008 cycle. The five year cycle program is ahead of schedule and, due to budget constraints, Streetlight Inspections will be completed during the 2009 cycle.

A four 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	29,303	91	73
Underground	83,017	81	73
Streetlights*	49,525	89	73
Transmission	5,937	83	73
Substation	931	100	73

- Distribution and Transmission are reported in Miles. Underground, Streetlights, and Substations are reported in units.
- Streetlights include Traffic Controls and Customer Streetlights.
- PSC Goal % is based on first year criteria of 17%, plus second year criteria of 18%, plus third year criteria of 19%, plus fourth year criteria of 19%.

For 2008 National Grid changed its priority code levels to a numerical system. The Levels include: Level 1 – Emergency, temporary repair within five days, permanent repair within 45 days; Level 2 – Repaired within six months; Level 3 – Repaired within two years. Level 4 is for internal inventory items only.

Summary of maintenance code priorities collected during the 2008 Inspection program are identified in the following table.

Program	**Level 1**	**Level 2**	**Level 3**
Distribution	372	14195	55690
Underground	41	1349	143
Streetlights	0	0	0
Transmission	10	546	3363
Substation	0	0	0

Background

The New York State Public Service Commission (the "Commission") issued an Order Instituting Safety Standards in January of 2005 (the "January Order"). Based on its 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 at or 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 five 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, 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 municipally-owned streetlights and traffic controls annually;
- test approximately half of their System by November 30, 2005, and complete the testing program for the entire system by August 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 Inspections 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; 90% of the annual 20% goal, or 18% of asset inspections in year two; and 95% of the annual 20% goal, or 19% of asset inspections in each year thereafter, except that in every fifth year, each utility must ensure that it has inspected all of its facilities. The National Grid inspection goals for year four of the program included 7,591 miles of distribution, 1,633 miles of transmission, 16,439 manhole/hand-hole inspections, and zero streetlight inspections. Year four streetlight

inspections targets were set at zero because the overall five year program is ahead of schedule.

The New York Utility group continued to meet to discuss and compare individual testing and inspection programs during 2008. The group met periodically with 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 2008 Annual Report is intended to reflect program status through November 30, 2008. 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's 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 divided its electric system into a variety of subprograms to schedule and track the testing and inspections. The categories included distribution, underground, streetlights and 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 32,000 miles and is made up of approximately 1,200,000 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 102,000 metallic manholes, hand-holes, vaults, URD pad mounted transformers, switchgear, et cetera. 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 84,000 underground fed metallic streetlight standards and municipally-owned lights and traffic control devices. Overhead fed streetlights on wooden poles are not counted within the streetlight program. 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

[4] July Order, p. 23.

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 7,700 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 931 substations in the Company's New York system. EV results for substation fences were collected internally by the operating group. The initial dataset identified 931 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 is 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 and 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-USA EOP - G016 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.

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 multimeters was developed and communicated to the workforce. A 470 ohm shunt resistor is also necessary for use with the multimeter. 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. The 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 multimeter 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 troubleshoot 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, et cetera). 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, 2008 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, 2008 show testing for 1,251,009 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 two 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	263	25	12	22	5
Cycle 2	0	0	0	0	0
Cycle 3	170	13	8	6	0
Cycle 4	143	10	15	8	2

Note: Transmission, Distribution, Substation Fences, and UG only have two completed cycles due to the PSC date revisions (relief) in the first year. National Grid only has preloaded years of 2005, 2007, and 2008 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	110	10	6	12	1
Ground	170	21	12	5	1
Guy	275	17	7	3	0
Riser	51	1	4	8	0
Other	90	9	13	17	6

-Note that totals of voltages found details (pole, ground, et cetera) 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, Cycle 3, and Cycle 4 testing.

Of the locations found with voltage, National Grid investigates and mitigates at locations of 4.5 volts or greater. The following table describes work performed to respond to locations with voltages of 4.5 volts or greater.

Distribution Facilities Repairs Voltage > = 4.5 volts	
Quantity	Work Description
1	Arrester
1	Cable & Ground
2	Cable Feed
21	Down Ground
17	Equipment Other
18	Ground Connection
7	Guy
1	Induced
6	Insulator
3	Neutral
1	Poor Insulation
7	None Required
12	Procedure Not Followed
6	Remade Connections
5	Service Wire
15	Customer Problem
123	Total

Note that this table contains results from Cycle 1, Cycle 2, Cycle 3, and Cycle 4 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, et cetera. The GIS data was 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, 2008.

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 2008 report is found in Attachment 7. Results of the Underground system testing program through November 30, 2008 show a completion of 100% of the underground program for cycle 4, or 102,131 units.

A unit relates to manholes, hand-holes, vaults, pad mounted equipment, et cetera, 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	0	0	1	0
Cycle 4	3	0	0	4	0

Note: Transmission, Distribution, Substation Fences, and UG only have two completed cycles due to the PSC date revisions (relief) in the first year. National Grid only has preloaded years of 2005, 2007, and 2008 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	2	0	1	2	0
Manhole	4	0	0	0	0
Switchgear	1	0	0	0	0
Transformer	2	0	0	1	0
Vault Cover	0	0	0	0	0
Pedestal	0	0	0	0	0
Other	15	0	0	3	0

Note that this table contains results from Cycle 1, Cycle 2, Cycle 3, and Cycle 4 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 locations found with voltage, National Grid investigates and mitigates at locations of 4.5 volts or greater. The following table describes work performed to respond to locations with voltages of 4.5 volts or greater.

Underground Facilities Repairs Voltage > = 4.5 volts	
Quantity	Work Description
4	Cable & Ground
1	Equipment Other
1	None Required

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 fourth cycle of testing (2008), the Company utilized the data collected during 2005, 2006, and 2007, and then supplemented this data with any new installations from the OLDS system. National Grid used this data to ensure that it provided the testing contractors with the maximum number of locations that may require testing. The Safety Orders set a schedule for 100% of publicly accessible streetlight facilities to be tested for

elevated voltage by November 30, 2008. 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 2008 report is found in Attachment 7. The results of the cycle 4 streetlight program through November 30, 2008 show a completion of 100% of the streetlight/traffic control facilities, which equates to 84,455 units.

The units tested relates to streetlights and traffic control facilities. 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, Cycle 3, and Cycle 4), 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	11	19	3	0
Cycle 3	123	27	87	22	0
Cycle 4	313	52	57	11	0

The results for cycle 4 testing show an increase in elevated voltage conditions between 1 – 4.4 volts and 4.5 – 7.9 volts identified. The majority of these increases can be explained by a better process and training of the vendors. Increases can also 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. All in all, the locations with the higher voltages of 8 – 24.9 and 25 – 99 volts have dropped.

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	664	166	213	47	0
Traffic Signal	3	0	1	1	0
Control Box	2	0	0	0	0
Pedestrian Crossing	0	0	0	0	0
Other	2	15	25	3	0

Note that this table contains results from Cycle 1, Cycle 2, Cycle 3, and Cycle 4 testing.

Of the locations found with voltage, National Grid investigates and mitigates at locations of 4.5 volts or greater. The following table describes work performed to respond to locations with voltages of 4.5 volts or greater.

Streetlight / Traffic Facilities Repairs Voltage > = 4.5 volts	
Quantity	Work Description
54	Cable and Ground
15	Cable Feed
13	Equipment Other
120	Ground Connection
5	Lamp Wiring
17	Luminaire Change
57	Neutral
29	None Required
5	Photo Eye
7	Poor Insulation
1	Procedure Not Followed
93	Remade all Connections
2	Service Wire
11	Customer Problem

Note that this table contains results from Cycle 1, Cycle 2, Cycle 3, and Cycle 4 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, 2008.

It became apparent early in the testing that the HD Electric LV-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 forwarded to Staff. These results are included in Attachment 7. The results of the transmission program through November 30, 2008 show National Grid completing 100% of the required testing, or 97,530 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 six poles. Each multi-pole structure is counted as one item in the testing database.

For the testing completed during cycle 1, cycle 2, cycle 3, and cycle 4, 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	56	4	2	0	0
Cycle 4	34	5	1	0	0

Note: Transmission, Distribution, Substation Fences, and UG only have two completed cycles due to the PSC date revisions (relief) in the first year. National Grid only has preloaded years of 2005, 2007, and 2008 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	8	2	1	0	0
Pole	30	0	0	0	0
Ground	114	5	2	0	0
Guy	2	0	0	0	0
Other	30	4	1	0	0

Note that this table contains results from Cycle 1, Cycle 2, Cycle 3, and Cycle 4 testing.

Of the locations found with voltage, National Grid investigates and mitigates at locations of 4.5 volts or greater. The following table describes work performed to respond to locations with voltages of 4.5 volts or greater.

Transmission Facilities Repairs Voltage > = 4.5 volts	
Quantity	Work Description
11	Down Ground
1	Ground Connection
12	Total

Substations

Overview

The substation facilities are made up of 931 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 931 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, 2008.

Results

Testing was completed in 2008 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, 2008 show National Grid completing 100% of the required testing, or 931 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	0	0	0	0	0
Cycle 2	16	0	0	0	0
Cycle 3	0	1	0	0	0
Cycle 4	20	0	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	36	1	0	0	0
Other	0	0	0	0	0

Note that this table contains results from Cycle 1, Cycle 2, Cycle 3, and Cycle 4 testing.

Of the locations found with voltage, National Grid investigates and mitigates at locations of 4.5 volts or greater. The following table describes work performed to respond to locations with voltages of 4.5 volts or greater.

Substation Facilities Repairs Voltage > = 4.5 volts	
Quantity	Work Description
1	Down Ground
1	Total

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; and 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.

For the 2008 cycle, National Grid made a change to its priority levels to ensure identified risks would be repaired within a specified time frame. The Levels include: Level 1 – Emergency, temporary repair within five days, permanent repair within 45 days; Level 2 – Repaired within six months; Level 3 – Repaired within two years. Level 4 is for internal inventory items only.

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 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 Levels include: Level 1 – Emergency, temporary repair within five days, permanent repair within 45 days; Level 2 – Repaired within six months; Level 3 – Repaired within two years. Level 4 is for internal inventory items only.

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 2008 program are:

Total Miles Goal	Miles Completed	% Goal Completed
7,591	7,591	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.

Cycle 4 2008 data

Distribution Facilities Deficiencies found			
Category	**Level 1**	**Level 2**	**Level 3**
Anchor		56	29
Capacitor		71	875
Crossarm	149	830	3535

Cutout	20	133	12212
Enclosures		4	3
GIS Issue			
Ground	24	968	6142
Guy	4	1375	2802
Handhole		3	
Insulator	34	310	6008
Osmose		15	35
Pole	25	1767	11915
Primary	33	120	2268
Primary Transformer	44	365	104
Recloser		1	18
Regulator		1	221
Riser		534	681
ROW			
Secondary	11	125	973
Sectionalizer			16
Service	26	71	98
Spacer Cable	2	35	864
Street Light		3328	
Switch		2	664
Switchgear		14	5
Transformer		4067	6222
Grand Total	**372**	**14195**	**55690**

Deficiencies identified as Level 1 were addressed immediately or made safe and referred for additional follow up.

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 are 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

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

splices would be visually inspected. However, the conduit systems connecting the two 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 Levels include: Level 1 – Emergency, temporary repair within five days, permanent repair within 45 days; Level 2 – Repaired within six months; Level 3 – Repaired within two years. Level 4 is for internal inventory items only.

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, et cetera. 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
16,439	16,439	100

* Goals were established in the February 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 4 2008 data

Underground Facilities Deficiencies			
Category	**Level 1**	**Level 2**	**Level 3**
Anodes			39
GIS Issue			
Handholes	38	343	
Manholes		940	90
Network Protector	2	22	

Submersible Equipment		1	
Switchgear			
Transformer	1	9	2
Vaults		34	12
Grand Total	**41**	**1349**	**143**

Deficiencies identified as Level 1 were addressed immediately or made safe and referred for additional follow up by Design.

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 G017, 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 in the EOP (Attachment 5). Deficiencies are prioritized to identify how quickly they should be addressed. The Levels include: Level 1 – Emergency, temporary repair within five days, permanent repair within 45 days; Level 2 – Repaired within six months; Level 3 – Repaired within two years. Level 4 is for internal inventory items only.

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.

National Grid set an internal goal of zero Streetlight inspections for the 2008 cycle because the overall five year program is ahead of schedule and because of resource and funding issues. The remaining Streetlight inspections will be completed during the 2009 cycle.

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 and Maintenance 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 GIS/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). The Levels include: Level 1 – Emergency, temporary repair within five days, permanent repair within 45 days; Level 2 – Repaired within six months; Level 3 – Repaired within two years. Level 4 is for internal inventory items only.

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
1,633	1,633	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 4 2008 data

Transmission Facilities Deficiencies			
Category	**Level 1**	**Level 2**	**Level 3**
Conductor	2	250	308
Foundation			3
GIS			
Infared	5	46	
Line HDW		131	1337
Miscellaneous		9	1
Osmose		7	14
Pole	1	103	1549
ROW			
Tower	2		151
Grand Total	**10**	**546**	**3363**

Deficiencies identified as Level 1 were addressed immediately or made safe and referred for additional follow up by Design.

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 SMS 400.06.1, entitled "Substation V&O Inspection Standard" and NG-US SMP 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, and vegetation were included.

Results

For the calendar year 2008, 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
931	931	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 4 2008 data:

Substation Facilities Deficiencies	
Deficiency	**Counts**
Fence	10
Vegetation	3
Lighting	12
Grading	0
Other	11
Total	**36**

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, 2008.

Elevated Voltage Testing Annual Summary			
Program	**Total Units**	**Units Completed**	**% Completed**
Distribution	1,251,009	1,251,009	100
Underground	102,131	102,131	100
Streetlights*	84,455	84,455	100
Transmission	97,530	97,530	100
Substation	931	931	100

*Note that streetlights include traffic controls but exclude 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 five year period. The PSC Order called for utilities to meet a minimum of 85% of the 20% goal in year one, 90% of the 20% goal in year two, and 95% of the 20% goal in each year thereafter. This equates to 17%, 18%, and 19% of the system, respectively, except that in every fifth year, each utility must ensure that it has inspected all of its facilities. 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).

Facilities	Units / Miles Goal	Units / Miles Completed	% of Goal Completed	% YR 4 PSC Goal***
Distribution*	7,591	7,591	100	19
Underground	16,439	19,439	100	19
Streetlights**	0	0	100	19
Transmission*	1,633	1,633	100	19
Substation	931	931	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.
*** PSC Goal of 19% is based on the fourth year criteria of 95% of the annual 20% target.

The cumulative total for the inspection program to date is:

Visual Inspections Cumulative			
Program	**Units / Miles Completed**	**% of System Completed**	**PSC Goal %***
Distribution	29,303	91	73
Underground	83,017	81	73
Streetlights*	49,525	89	73
Transmission	5,937	83	73
Substation	931	100	73

* PSC Goal % is based on first year criteria of 17%, plus second year criteria of 18%, plus third year criteria of 19%, plus fourth year criteria of 19%.

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 Inspections 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 Inspection 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 Construction Delivery 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 of 4.5 volts or greater 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 through 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
1	Cable & Ground
2	Cable Feed
21	Down Ground
17	Equipment Other
18	Ground Connection
7	Guy
1	Induced
6	Insulator
3	Neutral
1	Poor Insulation
7	None Required
12	Procedure
6	Remade Connections

5	Service Wire
15	Customer Problem
123	Total

Note that this table contains results from Cycle 1, Cycle 2, Cycle 3, and Cycle 4 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 Streetlights has increased during 2008, 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
23	Cable and Ground
4	Cable Feed
8	Equipment Other
20	Ground Connection
1	Lamp Wiring
3	Luminaire Change
11	Neutral
4	None Required
0	Photo Eye
0	Poor Insulation
0	Procedure Not Followed
33	Remade all Connections
1	Service Wire

Note that this table contains results from Cycle 1, Cycle 2, Cycle 3, and Cycle 4 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	Cycle 4 Quantity
Cable and Ground	18	0	22	23
Cable Feed	9	1	0	4
Ground Connection	41	8	86	20
Lamp Wiring	2	0	4	1
Luminaire Change	9	0	13	3

Neutral	11	23	41	11
None Required	7	1	39	4
Photo Eye	5	0	0	0
Poor Insulation	4	3	0	0
Procedure Not Followed	1	0	0	0
Remade all Connections	42	0	50	33
Customer Problem	7	0	10	0
Equipment Other	0	0	0	8
Service Wire	0	0	0	1

Of the streetlight locations identified with elevated voltage conditions during cycle 4, the poor neutral and ground connections dominated the causes, consistent with earlier testing cycles.

Transmission Testing

Based on the four 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 18, 2007.

Substation Testing

There were no elevated voltage conditions found on substation fences for the 2008 cycle.

Underground Testing

The underground system identified a few instances of elevated voltage during the cycle 4 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 (streetlights 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.

2008 changes include implementation of new Line Service Quality Standards. National Grid has implemented a new line inspection protocol effective with inspections January 1, 2008 for overhead, underground, and transmission systems as outlined in the attached Electrical Operating Procedures NG-USA EOP D004, UG006, and T007 (Attachments 2, 3 and 4). 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 five business days.
ii. Level 2: Items that must be completed within six months.
iii. Level 3: Items that must be completed within two years.
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.

[6] Level 1 is an immediate issue that either requires the inspector to standby until a qualified crew/supervisor arrives to resolve the issues or requires resolution as soon as practical, but no longer than five business days. Level 2 is an issue that, if left unresolved, has a high probability of failure within six months to one 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 six months to complete). Level 3 is an issue that has a high probability of failure within two to five years of the feeder inspection. Either the identified work will be completed within two 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.

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 80% of National Grid's facilities have been inspected since the Commission's standards were adopted, including inspections performed in 2008.

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 2008 annual report, filed by January 15, 2009, should include information on deficiencies identified and repair work performed over the past four 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 2008:

      Attachment 1 – NG-USA EOP G016 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

- 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, et cetera) 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

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
Cutout	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**

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	**34843**	**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**

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	2824	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**

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**

Tables reflecting the repair status for distribution assets for cycle 4:

Distribution Inspection Repairs Analysis			
Level 1	**Cycle 4 (2008)**		
Category	**Complete**	**Pending**	**Total Reported**
Crossarm	149	0	149
Cutout	20	0	20
Ground	24	0	24
Guy	4	0	4
Insulator	34	0	34
Pole	25	0	25
Primary	33	0	33
Primary Transformer	44	0	44
Secondary	11	0	11
Service	26	0	26
Spacer Cable	2	0	2
Grand Total	**372**	**0**	**372**

Distribution Inspection Repairs Analysis			
Level 2	**Cycle 4 (2008)**		
Category	**Complete**	**Pending**	**Total Reported**
Anchor	27	29	56
Capacitor	45	26	71
Crossarm	517	313	830
Cutout	89	44	133
Enclosures	3	1	4
Ground	726	242	968
Guy	724	651	1375
Handhole	1	2	3
Insulator	226	84	310
Osmose	2	13	15
Pole	630	1137	1767
Primary	83	37	120
Primary Transformer	289	76	365
Recloser	1		1
Regulator		1	1
Riser	141	393	534
Secondary	68	57	125
Service	36	35	71
Spacer Cable	33	2	35
Street Light	1759	1569	3328
Switch	1	1	2
Switchgear	13	1	14
Transformer	2595	1472	4067
Grand Total	**8009**	**6186**	**14195**

Distribution Inspection Repairs Analysis			
Level 3	**Cycle 4 (2008)**		
Category	**Complete**	**Pending**	**Total Reported**
Anchor	10	19	29
Capacitor	86	789	875
Crossarm	335	3200	3535
Cutout	847	11365	12212
Enclosures		3	3
Ground	599	5543	6142
Guy	257	2545	2802
Insulator	395	5613	6008
Osmose	2	33	35
Pole	841	11074	11915
Primary	113	2155	2268
Primary Transformer	16	88	104
Recloser	1	17	18
Regulator	21	200	221
Riser	47	634	681
Secondary	41	932	973
Sectionalizer	1	15	16
Service	6	92	98
Spacer Cable	24	840	864
Switch	46	618	664
Switchgear	3	2	5
Transformer	636	5586	6222
Grand Total	**4327**	**51363**	**55690**

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**

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**

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**

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**

Tables reflecting the repair status for Underground assets for cycle 4:

Underground Inspection Repairs Analysis			
Level 1	**Cycle 4 (2008)**		
Category	**Complete**	**Pending**	**Total Reported**
Handholes	38	0	38
Network Protector	2	0	2
Transformer	1	0	1
Grand Total	**41**	**0**	**41**

Underground Inspection Repairs Analysis			
Level 2	**Cycle 4 (2008)**		
Category	**Complete**	**Pending**	**Total Reported**
Handholes	257	86	343
Manholes	519	421	940
Network Protector	6	16	22
Submersible Equipment		1	1
Transformer	7	2	9
Vaults	22	12	34
Grand Total	**811**	**538**	**1349**

Underground Inspection Repairs Analysis			
Level 3	**Cycle 4 (2008)**		
Category	**Complete**	**Pending**	**Total Reported**
Anodes	19	20	39
Manholes	40	50	90
Transformer	1	1	2
Vaults	2	10	12
Grand Total	**62**	**81**	**143**

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**

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**

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**

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**

Tables reflecting the repair status for Transmission assets for cycle 4:

Transmission Inspection Repairs Analysis			
Level 1	**Cycle 4 (2008)**		
Category	**Complete**	**Pending**	**Total Reported**
Conductor	2	0	2
Infared	5	0	5
Pole	1	0	1
Tower	2	0	2
Grand Total	**10**	**0**	**10**

Transmission Inspection Repairs Analysis			
Level 2	**Cycle 4 (2008)**		
Category	**Complete**	**Pending**	**Total Reported**
Conductor	250	0	250
Infared	13	33	46
Line HDW	63	68	131
Miscellaneous	7	2	9
Osmose	3	4	7
Pole	32	71	103
Grand Total	**368**	**178**	**546**

Transmission Inspection Repairs Analysis			
Level 3	**Cycle 4 (2008)**		
Category	**Complete**	**Pending**	**Total Reported**
Conductor	3	305	308
Foundation	0	3	3
Line HDW	15	1322	1337
Miscellaneous	0	1	1
Osmose	0	14	14
Pole	65	1484	1549
Tower	5	146	151
Grand Total	**88**	**3275**	**3363**

Streetlights

No Streetlight inspections took place in 2008 due to the overall five year program being ahead of schedule and resource and funding issues. All Streetlight inspections will be 100% complete during the 2009 cycle.

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-USA 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**

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 2007 through November 2008, and R&D activities during 2008.

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.

QC – Quality Control Program

- 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 National Grid and within five to seven days of the original test.
- The entire file including the Q/C data will be transmitted to National Grid for processing within five days of the Q/C completion, but not longer than 30 days from the original test.
- National Grid will set a threshold of 95% compliance for Distribution, Underground, Transmission, Sub-Transmission, and Traffic Signals to make original test data valid and accepted into the database for processing. National Grid will set a threshold of 98% compliance for Street lighting.
- 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, et cetera.

C/A – Customer Acceptance Audit Program

A Customer Acceptance (C/A) audit program was implemented for tested assets as well as inaccessible assets performed by National Grid at a rate of 5% of all Q/C tests.

- Random CA file needs to be generated by National Grid weekly for 5% of each venders audit test.
- Audit data will be provided to the vender in an excel form.
- A random selection of 5% will be CA audited from the file.
- Vender has five to seven days to complete the CA audit upon receipt of the data.
- The CA audit will be returned to National Grid within five days of the completed audit.
- National Grid will set a threshold of 95% compliance for Distribution, Underground, Transmission, Sub-Transmission, and Traffic Signals. A threshold of 98% will be set for Streetlight assets.

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:

91,532 EV Testing audits were performed during the 2008 cycle (i.e. tests repeated) by the vendors contracted to perform the Elevated Voltage testing Programs in New York. The combined level of compliance rating was 99.05%.

A Customer Acceptance (CA) Audit process was also implemented during the 2008 cycle. 3,897 random CA Audits were performed on the EV Testing Vendor Audits with a compliance rating of 98.4%.

Asset Inspections:

926 Inspection audits were conducted:

- 826 on Distribution
- 40 on Underground
- 60 on Transmission

All the audits have yielded a favorable compliance rating.

Root Cause Analysis

EV Testing:

As part of the audit process a root cause analysis was performed on all "failed" audits. The consistent reason for failures was due to a philosophy of more is better. Testers tested assets that actually did not require testing resulting in 90% of the failures. The vendors provided action plans that included re-training with emphasis on what requires a test and one-on-one interaction with testers who consistently over tested. This resulted in a reduction in failures for the remaining of the cycle.

Inspections:

National Grid performed 926 Inspection audits during the 2008 cycle with an above 97% passing rate. These audits were conducted to insure 1) that Inspectors were confident with the maintenance codes and the appropriate risk levels associated. A large number of new maintenance codes were added throughout the cycle year to better capture specific asset deficiencies and training was a critical piece to our success. 2) to insure that the deficiencies captured which had aggressive repair date targets associated would not negatively impact the Operations group who is responsible for ensuring the repairs took place. One specific Distribution audit was conducted on all Level 2 deficiencies captured during a specific time frame. This audit had a 99.9% passing rating giving the company a high level of confidence that the process is working.

Summary of Electric Shocks

Staff requested that a summary of Electric Shock Reports for the calendar year be included in the annual report. This report contains a summary of Electrical Shock Reports based on the cycle year of December 1, 2007 through November 30, 2008. 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 2008.

Total shock calls received during 2008 was 222 orders. The following is a break down of orders received:

Voltage Found	124
Unsubstantiated	64
Employee Contact	0
Non-Employee Contact	34

For incidents where medical attention was sought:

Employee	0
Non-Employee	11
Domestic Animal	3
Non Domestic Animal/Wildlife	1

A break down of ownership of the 124 instances of Voltage Found:

National Grid	48
Customer Owned	76

Research and Development

During the 2008 cycle 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.

Flywheel Energy Storage

A unique project with NYSERDA and Sandia Labs (representing the U.S. Department of Energy) to evaluate flywheel energy storage (FES) at the distribution customer level for frequency regulation within the NY ISO area was completed. Seven FES units were deployed, and full power of 100 kW in total has been absorbed or delivered within a time span of four seconds. Good signal communication was established with the New York ISO and the units operated as planned in response to deviations from the 60 Hz base. This was a proof-of-concept experiment that did not change grid frequency at the 100-kW power level employed, but could accomplish this goal at the MW-level within a substation.

Hybrid Vehicle Demonstration

Fleet Management purchased two Toyota Prius hybrid vehicles as a pilot program. These vehicles were placed into service in the NY and NE corporate vehicle pools, and Fleet Management is continuing to evaluate where they can deploy additional hybrids based on

specific applications. During 2006, an additional four hybrid vehicles were added to National Grid's fleet, making the total six. A hybrid aerial vehicle is expected to be in service by the end of 2008. This project is being managed by the Fleet Department Senior Engineer.

Superconducting Underground Distribution Cables

High temperature superconducting cables (HTS) have the capability to transfer vast amounts of power through existing underground ducts. A demonstration project is underway in Albany, NY to install the world's longest 34.5 kV high temperature superconductive underground cable in the United States. Ease of installation, operating performance, and economics will be reviewed in light of the tremendous increase in capacity, which could be realized as a result of using these cables. This project is receiving significant funding from NYSERDA and the DOE. National Grid will garner information about this new technology and its operating methods, and develop HTS cable standards for future use in the major low voltage network systems of Albany, Buffalo, Syracuse, and on any transmission line that needs more capacity. The underground infrastructure for this project has been constructed and the refrigeration system has been functionally tested. The overhead infrastructure and the take off structures have been completed. The HTS Cable was heated up in July 2006, and is still functioning today. National Grid is monitoring the cable continuously and so far its performance is excellent. In 2007, the cable was de-energized to install and splice the second generation cable into this project. In January 2008, the cable was re-energized with the second generation wire and splice, and continues to conduct the current successfully. This is the first ever splice done from a first generation to a second generation cable in the grid, and the first operation in the grid of a second generation cable. The management and funding of this project currently resides with the Business Services group of National Grid in the capital region. RD&D continues to monitor progress and communicate results.

ROAM Technology

National Grid installed Holophane's Remote Operations Asset Management (ROAM) technology at 500 streetlight locations in the Buffalo, NY, area. This technology provided analysis of lamps for on/off, cycling, day-burner, and power to the luminaries. The devices used radio frequency to communicate within the mesh. National Grid evaluated 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.

University Outreach

National Grid has had a long-standing relationship with Clarkson University for many years, which has included funding the construction and operation of a high voltage lab that is used to test and evaluate T&D equipment. Work ranges from evaluating new materials and products to analyzing equipment that has failed while in service. Several activities are underway with Clarkson University, specifically:

- Evaluated Insulation Piercing Connectors that are used on overhead secondary circuits.
- Evaluating underground components for overhead use.
- Examining Contaminated Fuse Cutouts.

The State University at Buffalo, in partnership with National Grid US, is developing an extensive, web-based, interactive, software tool to monitor PHEV (Plug-in Hybrid Electric Vehicle) developments and assess the impact of PHEVs on utility distribution infrastructure down to the feeder level. The core of the tool is a software program that brings together geographical usage (kWh) data, utility infrastructure data, and PHEV charging characteristics to identify grid capacity limitations. The resulting program (when complete) may be used by National Grid for planning and reliability assessment.

Attachment Summary

Attachment 1 – NG-USA EOP G016 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 SMS 400.06.1 Substation V&O Inspection Standard and SMP 400.06.2 Substation Inspection Procedure

Attachment 7 - Monthly Reporting to PSC Staff

7A – Reported Shocks for cycle year 2008
7B – Visual Inspection Summary for Level 1 & 2 Deficiencies
7C – Elevated Voltage Testing Results Cycle 4 2008

Attachment 8 - Certifications