State of New York
Public Service Commission

Case 04-M-0159

Niagara Mohawk Power Corporation
d/b/a National Grid

Stray Voltage Testing and Facility Inspection

2022 Annual Report

Report on the results of stray voltage testing and facility inspections
for the 12-month period ended December 31, 2022

February 15, 2023

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I. Background

The New York State Public Service Commission's ("Commission") Electric Safety Standards adopted on January 5, 2005 in Case 04-M-0159, with subsequent revisions issued July 21, 2005, December 15, 2008, March 22, 2013, and January 13, 2015 (collectively referred to herein as the "Safety Standards" or "Order"), require annual stray voltage testing of certain electric facilities accessible to the public and inspections of utility electric facilities at least every five years.

In the March 22, 2013 Order, the Commission revised the annual testing requirement for stray voltage. Under the revision, overhead distribution facilities, underground residential distribution ("URD") facilities, overhead and underground transmission structures, and substation fences will be tested for stray voltage at least once every five years. Streetlights and underground distribution facilities will continue to be tested annually.

This report describes the stray voltage detection program and facility inspection program conducted by Niagara Mohawk Power Corporation d/b/a National Grid ("Niagara Mohawk" or "Company") for the 12-month period ended December 31, 2022.

II. Company Overview

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

a. Distribution Overhead System

Niagara Mohawk's distribution overhead system consists of structures supporting circuits energized at voltages up to 15kV spanning close to 32,000 circuit miles. Distribution system stray voltage testing and facility inspections are currently performed by the Company's internal workforce and contractors.

b. Distribution and Transmission Underground System

Niagara Mohawk's distribution and transmission underground system is made up of facilities such as manholes, hand-holes, vaults, and switchgear. Fiberglass hand holes are not subject to stray voltage testing under the Safety Standards.[1] Stray voltage testing of the Company's underground system is currently performed by contractors. Facility inspections of the underground system are currently performed by contractors.

[1] *See* July 21, 2005 Order, at 23; March 22, 2013 Order, at Appendix A, 3(c).

c. Streetlight System

Niagara Mohawk's streetlight system contains underground fed metallic streetlight standards and municipal-owned streetlights and traffic control devices. Overhead fed streetlights on wooden poles are not included in the streetlight program for stray voltage testing. For the underground fed metallic streetlight standards, contractors perform the stray voltage testing at night when the lights are operational. Stray voltage testing on traffic control devices takes place in conjunction with the contractors' testing of the overhead and underground systems during the daytime hours. The streetlight facility inspections on Company-owned facilities take place during the day and are performed by an external workforce.

d. Transmission Overhead System

Niagara Mohawk's transmission overhead system, which includes the sub-transmission system, consists of structures that support circuits energized at voltages of 12 kV, 23kV, 34.5kV, 46kV, 69kV, 115kV, 230kV, and 345kV. The transmission system spans the entire state and is approximately 8,465 circuit miles in length. Stray voltage testing on the transmission system is performed by Niagara Mohawk and contractors.

e. Substations

Stray voltage results for substation fences were collected both internally by the operating group and externally by contractors. The dataset identified both Company-owned and customer-owned substation locations to be tested.

III. Stray Voltage Testing Program

During the calendar year ended December 31, 2022, the Company conducted stray voltage testing of 100% of Company and non-Company owned metallic streetlights and traffic signals and 100% of publicly accessible Company-owned underground distribution facilities that are capable of conducting electricity. In addition, the Company conducted stray voltage testing of its publicly accessible overhead distribution facilities, URD facilities, overhead and underground transmission structures, and substation fences that are capable of conducting electricity.

In addition, and in compliance with the Safety Standards, Niagara Mohawk:

a. Immediately safeguarded and/or mitigated all voltage findings ≥ 1.0 volt. In instances where the stray voltage finding was determined to be caused by customer-owned equipment, the area was immediately made safe and the customer or responsible person associated with the premises was notified of the unsafe condition and the need for the customer to arrange for a permanent repair. Voltage findings determined to be caused by a Company-owned facility were immediately safeguarded and/or mitigated. All permanent repairs were made within 45 days.

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

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

Niagara Mohawk visited 414,883 facilities for stray voltage testing in calendar year 2022. Testing was not required on 136,366 facilities because: the facilities are wood utility poles that have no attached appurtenances capable of conducting electricity; or the facilities' electrically conductive appurtenances are not accessible to the public (pre-wired wood); the facilities are enclosed in fiberglass (non-conductive materials); the facilities are de-energized; and/or the facilities are inaccessible to the public.

Inaccessible facilities include:

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

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

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

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

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

As required by the Safety Standards, Niagara Mohawk performed 3,086 miles of mobile testing system scans between January 1, 2022 and December 31, 2022. A summary of the results of the mobile testing scans is contained in Appendix 8, which is a copy of the Company's mobile scan report filed with the Commission on November 22, 2022.

IV. Facility Inspection Program

The Safety Standards require Niagara Mohawk to visually inspect approximately 20% of its facilities annually, resulting in a five-year inspection goal for all facilities to be inspected.

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

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

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

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

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

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

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

[2] Substation inspections are more complex than those performed on other facilities and differ in variety of ways including, but not limited to: inspection schedules, system that captures inspection data, and work prioritization (supervisory review determines work to be completed versus Levels I-IV).

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

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

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

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

The Company provides new distribution inspectors with training upon hiring, with ongoing yearly refresher courses. Niagara Mohawk updates course materials based on relevant EOPs and Company standards.

V. Company Facilities

Niagara Mohawk has approximately 1,536,180 individual facilities that must be visited for stray voltage testing and approximately 1,594,813 individual facilities that require a facility inspection. These facilities are broken down into the following five main categories:

a. Distribution Overhead – The Company's testing criteria for distribution overhead facilities involves testing all Company-owned or jointly-owned wood poles with utility electrical facilities located on both public thoroughfares and customer property, including backyards or alleys. Stray voltage testing is performed on all wooden poles with metallic attachments (*e.g.* ground wires, ground rods, anchor guy wires, or riser pipes), and/or any electrical equipment within reach of the general public. Distribution overhead facilities are included in both the stray voltage and facility inspection programs.

b. Distribution and Transmission Underground Facilities –The Company's testing criteria for underground facilities involves testing all subsurface structures, including above ground, pad-mounted structures. Included in the underground facilities are padmount switchgear cases, padmount transformer cases, electric utility manhole covers, submersible transformer covers, electric utility handhole covers, network vaults, and grates. These facilities are included in both the stray voltage and facility inspection programs. Inspections of the underground system involve underground and padmount assets.

c. Streetlights and Traffic Signals – Streetlights include Company-owned metal pole streetlights and municipal-owned metal pole streetlights to which the Company provides service. The testing criteria for streetlights and traffic signals involves testing all metal pole streetlights, traffic signals, and pedestrian crosswalk signals located on publicly accessible thoroughfares. Stray voltage testing of streetlights is performed at night while the fixtures are energized. Privately-owned light fixtures are not included in the stray voltage testing program, per the Safety Standards.[3] All Company-owned streetlights are included in the facility inspection program.

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

e. Transmission Overhead Structures – The testing criteria for transmission overhead structures involves testing all structures, guys, and down leads attached to the facilities. Transmission structures support circuit voltages of 12 kV and greater. Transmission poles with distribution underbuild are included in the transmission category. All transmission structures are included in both the stray voltage and facility inspection programs.

VI. Annual Performance Targets

The year ended December 31, 2022 was the third year of the Company's stray voltage and inspection Cycle 4 program. In compliance with the Safety Standards, Niagara Mohawk met the annual performance target for stray voltage testing of 20% of overhead distribution facilities, URD facilities, overhead and underground transmission structures, and substation fences, as well as 100% of metallic streetlights and underground distribution facilities. In addition, in compliance with the Safety Standards, Niagara Mohawk met the annual performance target for inspection of approximately 20% (*i.e.,* 95% of the annual target of 20%, or 19%) of its electric facilities for the period that ended December 31, 2022.

[3] March 22, 2013 Order, at Appendix A, §§ 1(d) and 3(a).

The results are summarized in the tables below.

Stray Voltage Testing Results

Elevated Voltage Testing Annual Summary			
Program	**Total Units**	**Units Completed in 2022**	**% Completed**
Distribution**	1,317,455	277,340	21.051%
Underground	28,208	28,208	100.000%
Streetlights*	84,528	84,528	100.000%
Transmission**	105,121	23,910	22.745%
Substation	868	868	100.000%

*Note: Streetlights include traffic controls but exclude fiberglass standards.
**Note: Pursuant to the March 22, 2013 Order, the Company is required to test 100% of streetlights and underground distribution facilities annually. Overhead distribution facilities, URD facilities, overhead and underground transmission structures, and substation fences are required to be tested at least once every five years.

Facility Inspection Program Results

Category	Total System Units	Units Completed in 2022	Actual Inspected in 2022
Overhead Distribution	1,268,823	263,075	20.734%
Overhead Transmission	105,748	24,115	22.804%
Underground	103,111	20,452	19.835%
Pad-mounted Transformers	73,751	14,672	19.894%
Streetlights	43,380	6,032	13.905%
TOTAL	1,594,813	328,346	20.588%

Inspection Performance Summaries

Overhead Distribution Facilities

Inspection Year	Number of Overhead Distribution Structures Inspected	% of Overall System Inspected (Cumulative)
2020	257,879	20%
2021	259,312	21%
2022	263,075	21%

Overhead Transmission Facilities

Inspection Year	Number of Overhead Transmission Facilities Inspected	% of Overall System Inspected (Cumulative)
2020	22,112	21%
2021	22,292	21%
2022	24,115	23%

Underground Facilities

Inspection Year	Number of Underground Facilities Inspected	% of Overall System Inspected (Cumulative)
2020	18,729	18%
2021	20,573	20%
2022	20,452	20%

Pad-mount Transformers

Inspection Year	Number of Padmount Transformers Inspected	% of Overall System Inspected (Cumulative)
2020	13,061	18%
2021	15,502	21%
2022	14,672	20%

Streetlights

Inspection Year	Number of Streetlights Inspected	% of Overall System Inspected (Cumulative)
2020	12,974	23%
2021	12,992	27%
2022	6.032	14%

VII. Certifications

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

- Tested its publicly accessible electric facilities and streetlights in accordance with the Safety Standards, and

- Inspected the requisite number of electric facilities.

The certifications are attached as Appendix 16 to this report.

VIII. Analysis of Causes of Findings and Stray Voltage

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

Niagara Mohawk identified 12 instances of stray voltage during the Company's manual stray voltage testing program in 2022. These voltages resulted from a variety of conditions including: deterioration of conductors; age of equipment; exposure to the elements; and various customer related issues. A majority (5) of stray voltage conditions identified were on distribution structures.

The following table contains a breakdown of the causes of stray voltage findings identified through the Company's 2022 manual testing effort. Niagara Mohawk has repaired and/or mitigated all findings that were determined to be hazardous. Mobile testing findings are addressed in the Mobile Stray Voltage Testing Report attached as Appendix 8.

Structure Type	Cause of Stray Voltage	Stray Voltage Found
Distribution	Guy	3
Distribution	Equip Other	1
Distribution	None Required	1
Street Lights - Traffic Signals	Cable Feed	3
Transmission	Cable & Ground	1
Transmission	Ground Connection	1
Transmission	Guy	1
Transmission	None Required	1
TOTAL		12

*Note: Upon further testing, no condition found.

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

IX. Analysis of Inspection Results

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

Overhead Distribution Structures

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
263,075	77,461	29.444%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	498	0.444%
2	4,227	3.772%
3	17,047	15.212%
4	90,290	80.571%
Total:	112,062	100.000%

Overhead Transmission Facilities

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
24,115	17,780	73.730%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	23	0.084%
2	207	0.759%
3	1,568	5.752%
4	25,462	93.404%
Total:	27,260	100.000%

Underground Facilities

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
20,452	9,203	44.998%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	96	0.960%
2	934	9.342%
3	622	6.221%
4	8,346	83.477%
Total:	9,998	100.000%

Pad-mount Transformers

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
14,672	2,521	17.182%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	30	0.737%
2	253	6.213%
3	76	1.866%
4	3,713	91.184%
Total:	4,072	100.000%

Streetlights

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
6,032	5,141	85.229%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	0	0.000%
2	49	0.658%
3	99	1.330%
4	7,294	98.011%
Total:	7,442	100.000%

In 2022, Niagara Mohawk identified an overall total of 160,834 deficiencies:

- Priority Rating 1 Total = 647, or 0.402% of the overall total.
- Priority Rating 2 Total = 5,670, or 3.525% of the overall total.
- Priority Rating 3 Total = 19,412, or 12.069% of the overall total.
- Priority Rating 4 Total = 135,105 (inventory), or 84.002% of the overall total.

X. Quality Assurance

Electric Quality Assurance/Quality Control Program

National Grid's Elevated Voltage ("EV") and Visual Inspection & Maintenance ("I&M") Quality Assurance/Quality Control program provides for increased program continuity, monthly audits for monitoring of program performance, and assurance that a Quality Assurance/Quality Control ("QA/QC") program independent of the EV and I&M work groups is maintained.

Separate of the independent Electric QA/QC program, Quality Control ("QC") audits are conducted by National Grid I&M supervisory staff. The purpose of the QC audits is to self-validate recorded findings involving all distribution, transmission, and sub-transmission assets that have been inspected to identify potential maintenance codes and elevated voltage issues. Conversely, the independent Electric QA/QC program encompasses a quantitative random sampling of the entire population of inspection results derived from the field audited EV testing and I&M inspections.

Revisions to QA/QC Program 2022

- NA

I&M Risk Levels Identified

The analysis of the QA/QC I&M Program data is intended to identify the nature and magnitude of Risk Level 1 and Risk Level 2 as applicable to the I&M Program results.

Electric QA/QC I&M Risk Level Definitions
QA/QC program involves performing an additional QA/QC audit of randomly-selected assets having been previously assessed by the field inspector, with the intent of verifying previously identified maintenance codes.
Risk 1 • Reliability/ Safety Concern. • Identified facility/component repaired or replaced within one week of the inspection date.
Risk 2 • Facility/component condition that must be repaired/replaced within 1 year. • QA/QC identification of maintenance codes which may affect reliability.
Risk 3 • Facility/component condition that must be repaired/replaced within 3 years. • QA/QC identification of maintenance codes which may not effect reliability. • The QA/QC auditor determined the original I&M inspector's maintenance code was incorrect. • The independent QA/QC auditor determines a data quality issue.

Asset Inspection & Maintenance Audits

National Grid's Electric QA/QC group audited (5,512) distribution, transmission and sub-transmission assets that had been field inspected for maintenance during 2022. The method used to confirm and/or achieve the required quality of asset audits, involved follow-up field audit by QA/QC personnel through a monthly random sample, with the intent of verifying identified maintenance codes derived from the population of assets inspected by field force operations during calendar year 2022. This process captured incorrect or missed maintenance codes and noted timeliness of repairs when evident. In order to achieve a minimum 95% level of confidence, applicable to the entire population of inspection data and resulting random sample analysis, commonly applied statistical principles were utilized to conduct the audit process.

The QA/QC field audit process is designed to validate the field inspector findings. Results are considered passing when there is a match between the field inspection maintenance codes and QA/QC follow-up audit results. Based upon the accrued inspection data provided by the Company's Inspections Department, and the findings identified through follow-up QA/QC process, the overall accuracy of field inspection findings that impacts reliability (Risk 1 and Risk 2), was validated at **97%**.

2022 Field Inspections – QA/QC Audit Results

The following table illustrates the population and breakdown of assets inspected by field force and compliance percentages related to system reliability concerns (Risk Levels 1 & 2 findings) identified through QA/QC process during calendar year 2022

Asset Category	I & M Field Inspector	QA/QC Field Auditor		QA/QC Risk Levels		Compliance Percent (%)
	Assets Inspected	Assets Audited	M Codes Audited	Risk 1	Risk 2	
Distribution	263,075	4811	5440	4	145	97%
Sub-Transmission	13,742	326	517	0	4	99%
Transmission	10,373	375	493	0	5	99%
		Total Compliance Percent				**98%**

QA/QC I&M Audit Analysis

National Grid desires a minimum threshold for inspection compliance percentage at 95%. QA/QC analysis of regional findings by misidentified maintenance codes and missed maintenance codes are conducted for the purpose of determining compliance percentage of maintenance code trending for a particular region.

- Misidentified Maintenance Code – When the field Inspector incorrectly identifies a maintenance code for a condition found at a structure.

- Missed Maintenance Code – When the QA/QC Inspector identifies a maintenance code that the field inspector did not account for at a structure.

If the compliance percentage is less than 95% to 90%, the electric QA/QC group will conduct further analysis of accrued data for potential trending. Operations will be responsible for corrective action where applicable. If the validation accuracy is less than 90%, Operations is responsible for further trending analysis and/or corrective action and an implementation plan to improve field force inspections.

QA/QC Miss-Identified Maintenance Code Trends

QA/QC Missed Maintenance Code Trends

Region	QA/QC Misidentified M Codes	Maintenance Code Description	QTY	Total Sample Size Audited YTD	Compliance Percent
50	593-Sub-T	MISC – Hazard Code	11	47	77%
62	213-Dist	Ground – None Standard	11	767	99%

Region	QA/QC added M Codes	Maintenance Code Description	QTY	Total Sample Size Audited YTD	Compliance Percent
48	152-Dist	Transformer – Missing ground wire	10	933	99%
	153-Dist	Transformer – LA Blown/Missing/Improper	14		98%
	215-Dist	Guy – Guy Span not in compliance w/Code	12		99%
	221-Dist	Guy – Not in compliance with NESC Code	12		99%
54	215-Dist	Guy – Guy Span not in compliance w/Code	17	725	98%
56	221-Dist	Guy – Not in compliance with NESC Code	11	509	98%

QA/QC Missed Maintenance Code Trends

Region	QA/QC added M Codes	Maintenance Code Description	QTY	Total Sample Size Audited YTD	Compliance Percent
57	213-Dist	Ground – None Standard	14	1103	99%
	218-Dist	Guy – Not in compliance with NESC Code	10		99%

I&M Results – Repairs

Per the Safety Standards, the QA/QC program is responsible to verify permanent repairs have been made in response to field force operations inspections performed, along with the timeliness of the repair. The 2022 field force inspection process yielded the following asset deficiencies and repair activities for I & M defined Level 1, Level 2, and Level 3 priorities:

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Year	Priority Level / Repair Expected		Deficiencies Found (Total)	Repaired Within Required Time Frame	Repaired Past Required Due Date	Not Repaired and Not Due	Not Repaired – Overdue
2022							
	I	Within 1 week	647	640	7	0	0
	II	Within 1 year	5669	1165	0	4504	0
	III	Within 3 years	19417	484	0	18933	0
	IV	N/A	131019	17013	0	114006	0
	Temp Repairs	Within 90 days	67	50	0	2	15

The QA/QC group performed 159 Level 1 only follow-up field audits and validated that the 153 repairs were completed within the required timeframe and 6 Level 1 had not been repaired and were overdue at time of audit.

Elevated Voltage (EV) Assets Audited

The National Grid QA/QC 2022 EV Field Audit program targeted an overall minimum confidence level of 95% applicable to field force operations inspection of its Distribution, Underground, Transmission and Sub-Transmission assets. Additionally, a minimum confidence level of 98% should be realized for tested streetlights and traffic controls. The inspection process requires elevated voltage testing be conducted for each utility asset that can conduct electricity and is publicly accessible. In order for each QA/QC EV audit to have successfully "passed", the following test parameters must be validated:

- The voltage recording shall be below established regulatory thresholds ($\leq$ 1 volt or mitigated)

- All assets having a “testable object” were in fact tested by the field Inspector.

EV Risks Identified

The analysis of the QA/QC EV Program data is intended to identify the nature and magnitude of Risk Level 1 and Risk Level 2 as applicable to the EV Program results.

Electric QA/QC EV Risk Level Definitions
QA/QC program methodology involved performing an additional QA/QC audit of randomly-selected assets having been previously tested by field inspector. In order for the QA/QC test to have “passed,” it must confirm that all assets having a ‘testable object’ were in fact tested.
Risk 1 • An elevated voltage reading was identified by the EV field tester and the independent QA/QC auditor found the voltage not mitigated below regulatory/company thresholds after the 45 days. • The QA/QC auditor measured a voltage that exceeds the regulatory/company thresholds greater than or equal to 1 volt.
Risk 2 • The EV field tester determined there was not a testable object, and the independent QA/QC auditor identifies a testable component existed at the audited asset. • The EV field tester determined there was in fact a testable component and the independent QA/QC auditor revealed no testable component at the audited asset.
Risk 3 • The EV field tester and or the independent QA/QC field auditor deem the structure inaccessible or non-testable. • The independent QA/QC field auditor determines a data quality issue. • Reasonable effort to effectively eliminate the stray voltage condition on overhead Sub-Transmission or Transmission structures was attempted but it some cases cannot achieve a reading of 1 volt or less after mitigation due to neutral currents and induced voltages.

2022 QA/QC EV Field Asset Audit Results

The QA/QC group audited **6900** elevated voltage assets for Distribution, Underground, Transmission, Sub-Transmission and Streetlights in eight operating regions.

QA/QC EV Assets Audited

Region	QA/QC Assets Audit Totals
48	1473
50	678
51	663
54	931
56	590
57	1171

60	492
62	902
Total	**6900**

Total QA/QC EV Asset Audits Totals by Category Type

Category Type	Region 48	Region 50	Region 51	Region 54	Region 56	Region 57	Region 60	Region 62	Totals
Distribution	855	495	505	633	413	884	199	670	**4654**
Underground	41	37	31	53	29	21	70	30	**312**
Sub Trans	28	28	43	34	18	122	20	25	**318**
Transmission	19	27	25	60	25	64	90	60	**370**
Streetlights	530	91	59	151	105	80	113	117	**1246**
Totals	**1473**	**678**	**663**	**931**	**590**	**1171**	**492**	**902**	**6900**

2022 QA/QC EV Field Asset Audit Results – Risk Level

Risk Level 1 Identified

The National Grid 2022 QA/QC EV audits achieved an overall confidence level of **99%** for Risk Level 1 for distribution, underground, transmission and sub-transmission assets.

Additionally, an overall confidence level of **100%** for Risk 1 Level was achieved for the electric QA/QC EV streetlight/ traffic control audits.

QA/QC Risk 1 Level Identified

Category Type	Region 48	Region 50	Region 51	Region 54	Region 56	Region 57	Region 60	Region 62	Total
Distribution	0	0	0	1	0	0	0	0	1
Underground	0	0	0	0	0	0	0	0	0
Sub Trans	0	0	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0	0	0
Streetlights	0	0	0	0	0	0	0	0	0
Totals	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**

Risk Level 2 Identified

A total of 185 QA/QC EV audits (approximately 3% of 6900 audits performed) resulted in Risk Level 2 being identified. The National Grid 2022 QA/QC EV audits achieved an overall confidence level **97%** accuracy of identification of testable components.

QA/QC Risk Level 2 Identified

Category Type	Region 48	Region 50	Region 51	Region 54	Region 56	Region 57	Region 60	Region 62	Total
Distribution	31	4	8	8	7	24	3	16	**101**
Underground	2	3	0	0	3	0	0	1	**9**
Sub Trans	0	1	2	1	0	2	0	1	**7**
Transmission	0	1	0	0	0	1	0	4	**6**
Streetlights	46	1	1	2	2	6	1	3	**62**
Totals	**79**	**10**	**11**	**11**	**12**	**33**	**4**	**25**	**185**

QA/QC EV Audit Analysis – Risk Level 1 & Risk Level 2

(1) Category Type: Distribution, Underground, Sub - Transmission & Transmission

Region	Dist., UG, Sub-T, Trans			Compliance Percent	Electric QA/QC Additional Analysis Required	Operations Corrective Action Required
	Risk 1	Risk 2	Assets Audited		≥90% and ≤95%	<90%
48	0	33	943	97%		
50	0	9	587	98%		
51	0	10	604	98%		
54	1	9	780	99%		
56	0	10	485	98%		
57	0	27	1091	98%		
60	0	3	379	99%		
62	0	22	785	97%		

Note: In regions where QA/QC field audits validated the minimum confidence level to have been met or exceeded, no additional analysis or corrective action is required (N/A).

- If the validation accuracy range is 90% to 95%, (Distribution, Underground, Sub-Transmission & Transmission) the electric QA/QC group will conduct further analysis of accrued data for potential trending. Operations will be responsible for corrective action where applicable.

- If the validation accuracy is less than 90%, (Distribution, Underground, Sub-Transmission & Transmission) Operations is responsible for further trending analysis and/or corrective action and an implementation plan to improve field force inspections.

QA/QC EV Audit Analysis – Risk Level 1 & 2

(2) Category Type: Streetlights & Traffic Controls

Regions	Street Lights & Traffic Controls			Compliance Percent	Electric QA/QC Additional Analysis Required	Operations Corrective Action Required
	Risk 1	Risk 2	Total Sample Size Audited YTD		≥95% and ≤98%	<95%
48	0	46	530	91%		X
50	0	1	91	99%		
51	0	1	59	98%	X	
54	0	2	151	99%		
56	0	2	105	98%	X	
57	0	6	80	93%		X
60	0	1	113	99%		
62	0	3	117	97%	X	

Note: In regions where QA/QC field audits validated the minimum confidence level to have been met or exceeded, no additional analysis or corrective action is required (N/A).

- If the validation accuracy range is 95% to 98%, (Street Lights & Traffic Controls) the electric QA/QC group will conduct further analysis of accrued data for potential trending. Operations will be responsible for corrective action where applicable.

- If the validation accuracy is less than 95%, (Street Lights & Traffic Controls) Operations is responsible for further trending analysis and/or corrective action and implementation plan to improve field force inspections.

Summary

QA/QC I&M Audit Program

The National Grid Electric QA/QC analysis of the Missed maintenance codes (defects) conducted in 2022 by the National Grid QA/QC team concluded that the following:

Distribution
Maintenance Code 218/221 (Guy – Not in compliance with NESC Code) was missed repetitively across the NY territory. QA/QC discovered 67 errors applicable to maintenance Code 218/221.

Sub-Transmission
Maintenance Code 593 (Misc.– Hazard Condition) was missed repetitively across the NY territory. QA/QC discovered 13 errors applicable to maintenance Code 593.

Transmission
Maintenance Code 528/532 (Pole/Tower – Aerial number missing) was missed repetitively across the NY territory. QA/QC discovered 26 errors applicable to maintenance Code 528/532.

Action item:
Electric QA/QC and Electric Operations conducted further analysis of the data file and additional investigation into identification of deficiency causal factors. Corrective actions have been assigned to the appropriate regional Inspection groups.

QA/QC EV Program

One Risk Level 1 deficiencies for Distribution, Underground, Sub-Transmission and Transmission were identified through the QA/QC audit process. Based upon the compliance percentage of QA/QC inspection program findings (99% accuracy), further analysis of the accrued QA/QC EV inspection data is not warranted.

Action Item: NA

APPENDIX SUMMARY

Appendix 1: Stray Voltage Testing Summary

Appendix 2: Summary of Energized Objects

Appendix 3: Summary of Shock Reports from the Public

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

Appendix 5: Temporary Repair Exceptions

Appendix 6: Inspections Summary

Appendix 7: Summary of Overdue Repairs

Appendix 8: Mobile Testing

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

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

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

Appendix 12: NG-USA EOP T007.01 Transmission and Sub Transmission Ground Level Visual Inspection

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

Appendix 14: NG-USA EOP G004 Shock Complaints

Appendix 15: NG-USA EOP G029 Tracking Temporary Repairs to Electric System

Appendix 16: Certifications

Appendix 1

Stray Voltage Testing Summary

Appendix 1

Stray Voltage Testing Summary

Nationalgrid Data as of December 31,2022	Total System Units Requiring Testing	Units Completed	Percent Completed	Units with Voltage Found (>= 1.0v)	Percent of Units Tested with Voltage (>= 1.0v)	Units Classified as Inaccessible
Distribution Facilities	1,317,455	277,340	21.05%	5	0.002%	4,634
Underground Facilities	28,208	28,208	100.00%	0	0.000%	2,009
Street Lights / Traffic Signals	84,528	84,528	100.00%	3	0.004%	2,050
Substation Fences	868	868	100.00%	0	0.000%	0
Transmission	105,121	23,910	22.75%	4	0.02%	0
TOTAL	1,536,180	414,854	27.01%	12	0.00%	8,693

Appendix 2

Summary of Energized Objects

Appendix 2

Summary of Energized Objects (Manual Testing)

Summary of Voltages Found

nationalgrid	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	5	0	0	5	5	0	0
Pole (910)	0	0	0	0	0	0	0
Ground (914)	2	0	0	2	2	0	0
Guy (915)	5	0	0	5	5	0	0
Riser (916)	0	0	0	0	0	0	0
Other	1	0	0	1	1	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box (950)	0	0	0	0	0	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	0	1	2	3	3	0	0
Metal Street Light Pole (971/981)	0	1	2	3	3	0	0
Traffic Signal Pole (991)	0	0	0	0	0	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	3	1	0	4	4	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	2	1	0	3	3	0	0
Guy (934)	0	0	0	0	0	0	0
Other	1	0	0	1	1	0	0
Totals	8	2	2	12	12	0	0

NOTE - National Grid is only mitigating those locations where voltage is confirmed to be 1.0 volts or greater

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

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

NOTE - 'Readings after Mitigation' total reflects only permanent repairs made. Temporary repairs will be made permanent within 45 days.

Appendix 3

Summary of Shock Reports from the Public

Appendix 3

Summary of Shock Reports from the Public

nationalgrid 2022 1st Quarter January 1, 2022 - March 31, 2022	Quarterly Update	Yearly Total
I. Total shock calls received:	**23**	**23**
Unsubstantiated	8	8
Normally Energized Equipment	3	3
Stray Voltage:		
Person	12	12
Animal		
II. Injuries Sustained/Medical Attention Received Due To SV		
Person	1	1
Animal		
III. Voltage Source:	**12**	**12**
Utility Responsibility		
Issue with primary, joint, or transformer		
Secondary joint (Crab)		
SL service Line		
Abandoned SL service line		
Defective service line		
Abandoned service line		
OH Secondary		
OH Service		
OH Service neutral	1	1
Pole		
Riser		
Other		
Customer Responsibility		
Contractor damage		
Customer equipment/wiring	11	11
Other Utility/Gov't Agency Responsibility		
SL Base Connection		
SL Internal wiring or light fixture		
Overhead equipment		
IV. Voltage Range:	**12**	**12**
1.0V to 4.4V		
4.5V to 24.9V		
25V and above		
Unknown	12	12

nationalgrid **2022 2nd Quarter** **April thru June 2022**	Quarterly Update	Yearly Total
I. Total shock calls received:	**34**	**57**
Unsubstantiated	9	17
Normally Energized Equipment	5	8
Stray Voltage:		
Person	20	32
Animal		
II. Injuries Sustained/Medical Attention Received Due To	**2**	**3**
Person	2	3
Animal		
III. Voltage Source:	**20**	**32**
Utility Responsibility		
Issue with primary, joint, or transformer		
Secondary joint (Crab)		
SL service Line		
Abandoned SL service line		
Defective service line		
Abandoned service line		
OH Secondary	1	1
OH Service		
OH Service neutral	1	2
Pole	1	1
Riser		
Other	3	3
Customer Responsibility		
Contractor damage		
Customer equipment/wiring	12	23
Other Utility/Gov't Agency Responsibility		
SL Base Connection		
SL Internal wiring or light fixture		
Overhead equipment	2	2
IV. Voltage Range:	**20**	**32**
1.0V to 4.4V	1	1
4.5V to 24.9V	2	2
25V and above	4	4
Unknown	13	25

nationalgrid **2022 3rd Quarter** **July thru September 2022**	Quarterly Update	Yearly Total
I. Total shock calls received:	**27**	**50**
Unsubstantiated	7	15
Normally Energized Equipment	6	9
Stray Voltage:		
Person	14	26
Animal		
II. Injuries Sustained/Medical Attention Received Due To	**2**	**3**
Person	2	3
Animal		
III. Voltage Source:	**14**	**26**
Utility Responsibility		
Issue with primary, joint, or transformer		
Secondary joint (Crab)		
SL service Line		
Abandoned SL service line		
Defective service line		
Abandoned service line		
OH Secondary		0
OH Service		
OH Service neutral	1	2
Pole		0
Riser		
Other		0
Customer Responsibility		
Contractor damage		
Customer equipment/wiring	12	23
Other Utility/Gov't Agency Responsibility		
SL Base Connection		
SL Internal wiring or light fixture		
Overhead equipment	1	1
IV. Voltage Range:	**14**	**26**
1.0V to 4.4V	4	4
4.5V to 24.9V		0
25V and above	1	1
Unknown	9	21

nationalgrid

2022 4th Quarter
October thru December 2022

		Quarterly Update	Yearly Total
I.	**Total shock calls received:**	**19**	**69**
	Unsubstantiated	7	22
	Normally Energized Equipment	2	11
	Stray Voltage:		
	Person	9	35
	Animal	1	1
II.	**Injuries Sustained/Medical Attention Received Due To**		**3**
	Person	0	3
	Animal	0	0
III.	**Voltage Source:**	**10**	**36**
	Utility Responsibility		
	Issue with primary, joint, or transformer		
	Secondary joint (Crab)		
	SL service Line		
	Abandoned SL service line		
	Defective service line		
	Abandoned service line		
	OH Secondary		
	OH Service		
	OH Service neutral	0	2
	Pole		
	Riser		
	Other	1	1
	Customer Responsibility		
	Contractor damage		
	Customer equipment/wiring	8	31
	Other Utility/Gov't Agency Responsibility		
	SL Base Connection		
	SL Internal wiring or light fixture		
	Overhead equipment	1	2
IV.	**Voltage Range:**	**10**	**36**
	1.0V to 4.4V	1	5
	4.5V to 24.9V	1	1
	25V and above	0	1
	Unknown	8	29

Appendix 4

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Appendix 4

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Detail of Deficiencies by Facilities	2018				2019				2020				2021				2022			
Priority Level	I	II	III	Temp Repairs	I	II	III	Temp Repairs	I	II	III	Temp Repairs	I	II	III	Temp Repairs	I	II	III	Temp Repairs
Repair Expected	Within 1 week	Within 1 year	Within 3 years	Within 90 days	Within 1 week	Within 1 year	Within 3 years	Within 90 days	Within 1 week	Within 1 year	Within 3 years	Within 90 days	Within 1 week	Within 1 year	Within 3 years	Within 90 days	Within 1 week	Within 1 year	Within 3 years	Within 90 days
Overhead Facilities																				
Repaired in Time Frame	1817	449	36065	66	871	2998	28269	57	798	2963	10732	49	508	3495	2217	57	493	1147	565	39
Repaired - Overdue	71	4	1511	13	23	114	1331	11	9	149	0	3	5	34	0	2	5	0	0	0
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	16923	0	0	0	19193	0	0	3080	16482	0
Not Repaired - Overdue	0	3	414	0	0	8	1132	0	0	85	0	0	0	7	0	0	0	0	0	5
Total Overhead Facilities	1888	456	37990	79	894	3120	30732	68	807	3197	27655	52	513	3536	21410	59	498	4227	17047	44
Underground Facilities																				
Repaired in Time Frame	278	867	115	1	102	472	70	1	117	999	102	1	88	749	86	5	96	162	23	5
Repaired - Overdue	9	2	0	1	0	28	1	0	2	25	0	2	2	40	0	5	0	0	0	7
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	152	0	0	0	237	0	0	772	599	0
Not Repaired - Overdue	0	1	1	0	0	9	1	0	0	16	0	0	0	39	0	0	0	0	0	0
Total Underground Facilities	287	870	116	2	102	509	72	1	119	1040	254	3	90	828	323	10	96	934	622	12
Pad Mount Facilities																				
Repaired in Time Frame	67	494	73	3	82	424	72	1	67	423	39	0	47	350	12	0	30	48	1	2
Repaired - Overdue	5	4	0	0	0	9	6	1	3	25	0	0	0	3	0	0	0	0	0	0
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	57	0	0	0	79	0	0	205	75	0
Not Repaired - Overdue	0	26	0	0	0	13	2	0	0	0	0	0	0	4	0	0	0	0	0	0
Total Pad Mount Facilities	72	524	73	3	82	446	80	2	70	448	96	0	47	357	91	0	30	253	76	2
Street Light Facilities																				
Repaired in Time Frame	0	197	2	0	0	204	116	0	0	343	1	3	0	178	0	0	0	7	13	0
Repaired - Overdue	0	7	0	0	0	0	0	0	0	1	0	0	0	51	0	0	0	0	0	0
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	106	0	0	0	0	0	0	42	86	0
Not Repaired - Overdue	0	24	0	0	0	37	9	1	0	71	0	0	0	9	0	0	0	0	0	0
Total Street Light Facilities	0	228	2	0	0	241	125	1	0	415	107	3	0	238	0	0	0	49	99	0
Transmission Facilities																				
Repaired in Time Frame	10	100	1489	2	7	55	584	3	9	44	131	2	13	43	69	5	21	44	11	5
Repaired - Overdue	0	42	495	2	0	19	132	3	0	35	0	1	2	5	0	0	2	0	0	0
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	1059	0	0	0	2157	0	0	163	1557	0
Not Repaired - Overdue	0	50	485	0	0	18	303	0	0	33	0	0	0	13	0	0	0	0	0	1
Total Transmission Facilities	10	192	2469	4	7	92	1019	6	9	112	1190	3	15	61	2226	5	23	207	1568	6

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process - Level IV Conditons

Overhead Facilities	2018		2019		2020		2021		2022	
	Number of Conditions Found	Number of Conditions Repaired	Number of Conditions Found	Number of Conditions Repaired	Number of Conditions Found	Number of Conditions Repaired	Number of Conditions Found	Number of Conditions Repaired	Number of Conditions Found	Number of Conditions Repaired
Overhead Facilities										
Pole Condition										
Pole Condition	46079	30212	35981	23286	30870	16535	26768	11492	21813	7655
Grounding System	23821	9206	20737	7431	13617	1817	22900	2707	21061	913
Anchors/Guy Wire	53856	9976	38725	6697	39450	5523	28265	3253	5751	3733
Cross Arm/Bracing	851	1	889	3	1013	0	804	0	710	0
Riser	772	0	811	1	953	0	1268	0	2302	0
Conductors										
Primary Wire/Broken Ties	1	0	0	0	1	0	0	0	0	0
Secondary Wire	0	0	1	0	0	0	0	0	0	0
Neutral	0	0	0	0	0	0	0	0	0	0
Insulators	5678	2	5551	0	7614	0	7222	0	6309	0
Pole Equipment										
Transformers	23978	5	21385	8	25212	0	21755	2	20253	1
Cutouts	3	0	2	0	0	0	0	0	1	0
Lightning Arrestors	5821	0	6925	0	6226	4	5678	2	4333	1
Other Equipment	1718	837	1361	706	1992	414	1747	428	2582	221
Miscellaneous									10	0
Trimming Related	0	0	0	0	0	0	0	0		
Other	3891	654	4353	465	4679	631	3562	505	5165	502
Overhead Facilities Total	166469	50893	136721	38597	131627	24924	119969	18389	90290	13026
Transmission Facilities										
Towers/Poles										
Steel Towers	519	0	901	0	778	0	659	0	819	0
Poles	5587	1	3082	0	3709	0	4000	0	4961	0
Anchors/Guy Wire	1300	970	958	713	585	284	768	517	414	237
Crossarm/Brace	0	0	15	0	1	0	0	0	3	0
Grounding System	47	0	420	0	71	0	105	0	49	0
Conductors										
Cable	7	0	11	0	2	0	6	0	14	0
Static/Neutral	0	0	1	0	0	0	0	0	0	0
Insulators	167	0	123	0	82	0	106	0	256	0
Miscellaneous							66	0	552	0
Right of Way Condition	89	0	159	0	452	0				
Other	23382	4120	17329	3539	17732	3057	20675	2786	18394	1321
Transmission Facilities Total	31098	5091	22999	4252	23412	3341	26385	3303	25462	1558

Underground Facilities										
Underground Structures										
Damaged Cover	1	0	6	3	26	9	22	5	7	5
Damaged Structure	90	9	47	1	805	0	873	0	209	0
Congested Structure	0	0	0	0	0	0	0	0	0	0
Damaged Equipment	2	0	3	0	0	0	2	0	2	0
Conductors										
Primary Cable	0	0	0	0	0	0	1	0	0	0
Secondary Cable	0	0	0	0	0	0	0	0	9	0
Neutral Cable	0	0	0	0	0	0	0	0	0	0
Racking Needed	0	0	0	0	0	0	4	0	0	0
Miscellaneous										
Other	14051	3771	9866	2049	9129	1172	10477	1061	8119	1101
Underground Facilities Total	14144	3780	9920	2053	9960	1181	11379	1066	8346	1106
Pad Mount Transformers										
Underground Structures										
Damaged Structure	2298	683	1735	338	1864	160	1503	146	807	77
Damaged Equipment	38	38	22	22	15	15	5	5	8	8
Damaged Cable	0	0	0	0	0	0	0	0	0	0
Oil Leak	3	0	0	0	1	0	2	0	0	0
Off Pad	1	0	0	0	0	0	0	0	0	0
Lock/Latch/Penta	0	0	0	0	0	0	0	0	0	0
Miscellaneous										
Other	8027	4920	5210	3211	3931	1764	3081	1251	2898	1239
Pad Mount Transformer Total	10367	5641	6967	3571	5811	1939	4591	1402	3713	1324
Streetlights										
Streetlight										
Base/Standard/Light	10554	10	8604	1	10544	0	9572	0	7072	0
Handhole/Service Box	0	0	0	0	0	0	0	0	0	0
Service/Internal Wiring	1215	0	84	0	3	0	5	0	2	0
Access Cover	1489	0	1782	0	1741	0	1351	0	148	0
Miscellaneous										
Other	111	0	234	0	144	0	38	0	72	0
Streetlight Total	13369	10	10704	1	12432	0	10966	0	7294	0
Total Level IV Conditions										
Overall Total	235,447	65,415	187,311	48,474	183,242	31,385	173,290	24,160	135,105	17,014

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Year	Prority Level / Repair Expected		Deficiencies Found (Total)	Repaired In Time Frame	Repaired - Overdue	Not Repaired - Not Due	Not Repaired - Overdue
2018							
	I	Within 1 week	2257	2172	85	0	0
	II	Within 1 year	2270	2107	59	0	104
	III	Within 3 years	40650	37744	2006	0	900
	IV	N/A	232685	65415	0	167270	0
	Temp Repairs	Within 90 days	88	72	16	0	0
2019							
	I	Within 1 week	1085	1062	23	0	0
	II	Within 1 year	4408	4153	170	0	85
	III	Within 3 years	32028	29111	1470	0	1447
	IV	N/A	184113	48474	0	135639	0
	Temp Repairs	Within 90 days	78	62	15	0	1
2020							
	I	Within 1 week	1005	991	14	0	0
	II	Within 1 year	5212	4772	235	0	205
	III	Within 3 years	29302	11005	0	18297	0
	IV	N/A	179589	31385	0	148204	0
	Temp Repairs	Within 90 days	61	55	6	0	0
2021							
	I	Within 1 week	665	656	9	0	0
	II	Within 1 year	5020	4815	133	0	72
	III	Within 3 years	24050	2384	0	21666	0
	IV	N/A	170548	24160	0	146388	0
	Temp Repairs	Within 90 days	74	67	7	0	0
2022							
	I	Within 1 week	647	640	7	0	0
	II	Within 1 year	5670	1408	0	4262	0
	III	Within 3 years	19412	613	0	18799	0
	IV	N/A	131026	17014	0	114012	0
	Temp Repairs	Within 90 days	64	51	7	0	6

Appendix 5

Temporary Repair Exceptions

Appendix 5

Temporary Repair Exceptions

National Grid has 6 temporary repair exceptions to report.

Distribution

Feeder#	Line#	Pole#	Location	Region	District	Date Inspected	Comments	Maint Code	Priority	Comments	Quantity
25571	80	50-3	Sacandaga Rd	60	32	05/25/2022	LVL9 REINSPECT BY SG ON 8/22, 10/5 DUE TO WAITING ON ACCESS/ROW. OMSTKT#2771486 LVL1 MADE SAFE BY SCHEOH ON 5/26/22 PER SG. LVL1 CHANGED TO LVL9. POLE IS INSIDE CRANESVILLE GRAVEL BANK OFF RTE147 P50	116	9	lvl1 made safe	1
25571	80	50-3	Sacandaga Rd	60	32	05/25/2022	LVL9 REINSPECT BY SG ON 8/22, 10/5 DUE TO WAITING ON ACCESS/ROW. OMSTKT#2771486 LVL1 MADE SAFE BY SCHEOH ON 5/26/22 PER SG. LVL1 CHANGED TO LVL9. POLE IS INSIDE CRANESVILLE GRAVEL BANK OFF RTE147 P50	120	9	lvl1 made safe	1
25571	80	50-4	Sacandaga Rd	60	32	05/25/2022	LVL9 REINSPECT BY SG ON 8/22, 10/5 DUE TO WAITING ON ACCESS/ROW. OMSTKT#2771486 LVL1 MADE SAFE BY SCHEOH ON 5/26/22 PER SG. LVL1 CHANGED TO LVL9. POLE IS INSIDE CRANESVILLE GRAVEL BANK OFF RTE147 P50	124	9	lvl1 made safe	1
25577	78	11	Vly Rd	60	32	06/09/2022	LVL9 REINSPECT BY SG ON 8/22, 10/5 DUE TO WAITING ON OUTAGE APPROVAL. RISER HAS BROKEN ORANGEBURG CONDUIT SECURED TO POLE WITH ROPE. WIRE IS EXPOSED ABOVE 8'	115	9	TIED OFF WITH ROPE	1
33151	31	12	SHELVING ROCK RD TAP OFF P 200	62	38	06/29/2022	LVL9 REINSPECT BY SG ON 9/22, 11/3 DUE TO WAITING ADK PARK/ENVIRONMENTAL APPROVAL. BROKEN TOP	116	9	Broke at top	1

							TEMP FIX DONE NEURTARL LINE ONN GROUND				

Transmission

Circuit#	Structure#	Location	Region	District	Date Insp	Comments	Maint Code	Priority	Comments	Quantity
S1780/A5451	62	Two Mile Creek Rd	48	01	03/22/2022		514	9		1

Appendix 6

Inspections Summary

Appendix 6

2022 PSC QTR 4 REPORT

NATIONAL GRID 2020 - 2024 Inspection Summary	Total System Units	2020 Units Completed	2021 Units Completed	2022 Units Completed	2023 Units Completed	2024 Units Completed	2020-2024 Units Completed	2020-2024 Percent Completed
Distribution - Unique Inspections	1,268,823	257,879	259,312	263,075			780,266	61.50%
Distribution - Total Inspections	0	258,158	260,355	263,323			781,836	n/a
Underground Facilities - Unique	103,111	18,729	20,573	20,452			59,754	57.95%
Underground Facilities - Total	0	18,967	20,798	20,474			60,239	n/a
URD - Unique Inspections	73,751	13,061	15,502	14,672			43,235	58.62%
URD -Total Inspections	0	13,079	15,560	14,683			43,322	n/a
Street Light / Traffic Sig - Unique	43,380	12,974	12,992	6,032			31,998	73.76%
Street Light / Traffic Sig - Total	0	12,980	12,993	6,439			32,412	n/a
Transmission - Unique Inspections	105,748	22,112	22,292	24,115			68,519	64.79%
Transmission - Total Inspections	0	22,155	22,391	24,154			68,700	n/a
Grand Total - Unique Inspections	1,594,813	324,755	330,671	328,346			983,772	61.69%

Appendix 7

Summary of Overdue Repairs

Appendix 7

Summary of Overdue Repairs for Level II Repairs

Year	Facilities	-- Repaired -- Number of Days Overdue				-- Not Repaired -- Number of Days Overdue				Comments
		1-30	31-90	91-180	>180	1-30	31-90	91-180	>180	
2018	Distribution								29	Not Repaired: 29 Items
	Sub Transmission								50	Not Repaired: 50 Items
	Transmission								1	Not Repaired: 1 Item
	Underground									
	Pad-mounts									
	Streetlights									
2019	Distribution								21	Not Repaired: 21 Items
	Sub Transmission								2	Not Repaired: 2 Items
	Transmission								22	Not Repaired: 22 Items
	Underground								9	Not Repaired: 9 Items
	Pad-mounts									
	Streetlights									
2020	Distribution								85	Not Repaired: 85 Items
	Sub Transmission				1				20	Not Repaired: 20 Items
	Transmission								14	Not Repaired: 14 Items
	Underground								16	Not Repaired: 16 Items
	Pad-mounts									
	Streetlights									
2021	Distribution	3		1			2	2	7	Not Repaired: 11 Items
	Sub Transmission						1	2	9	Not Repaired: 12 Items
	Transmission						1			Not Repaired: 1 Item
	Underground	7	5				1	23	15	Not Repaired: 39 Items
	Pad-mounts									
	Streetlights									
2022	Distribution									
	Sub Transmission									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									

Summary of Overdue Repairs for Level III Repairs

Year	Facilities	-- Repaired -- Number of Days Overdue				-- Not Repaired -- Number of Days Overdue				Comments
		1-30	31-90	91-180	>180	1-30	31-90	91-180	>180	
2018	Distribution								414	**Not Repaired: 414 Items**
	Sub Transmission								280	**Not Repaired: 280 Items**
	Transmission								205	**Not Repaired: 205 Items**
	Underground								1	**Not Repaired: 1 Item**
	Pad-mounts									
	Streetlights									
2019	Distribution	143			7		242	462	430	**Not Repaired: 1134 Items**
	Sub Transmission			2			11	22	21	**Not Repaired: 54 Items**
	Transmission						17	88	158	**Not Repaired: 263 Items**
	Underground		1						1	**Not Repaired: 1 Item**
	Pad-mounts									
	Streetlights									
2020	Distribution									
	Sub Transmission									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2021	Distribution									
	Sub Transmission									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									
2022	Distribution									
	Sub Transmission									
	Transmission									
	Underground									
	Pad-mounts									
	Streetlights									

Appendix 8

Mobile Testing

2022 Mobile Stray Voltage Testing Report
November 2022

A. Background

Niagara Mohawk Power Corporation d/b/a National Grid ("Niagara Mohawk" or "Company") submits its 2022 Mobile Stray Voltage Testing Report ("Report") pursuant to the Public Service Commission's *Order Adopting Changes to Electric Safety Standards* issued December 15, 2008, in Case 04-M-0159 and *Orders Requiring Additional Mobile Stray Voltage Testing* issued July 21, 2010 and June 23, 2011 in Case 10-E-0271 (collectively, the "Orders"). In compliance with the Commission's Orders, Niagara Mohawk's 2022 mobile testing consisted of one mobile scan in Albany and Niagara Falls and two mobile scans in Buffalo. The results of the mobile scans are detailed in the tables below. Niagara Mohawk utilized Osmose Utilities Services, Inc. ("Osmose") to conduct the mobile scans.

B. Mobile Testing Verification Process

Niagara Mohawk verifies a stray voltage finding made by the mobile scan by using its own internal testing verification procedure as outlined in the Company's Electric Operating Procedure, NG-USA EOP G016. Verification entails using a handheld device probe to test all metallic objects in the area using a ground reference point as close as practical to the facility being tested up to 25 feet. In the event a suitable ground source cannot be located within the 25-foot range, the Company employs Osmose's verification procedure, which allows for using a ground reference point of within 100 feet of the structure.

C. Mobile Testing Results by City

1. Albany

Testing began in Albany August 1, 2022, and was completed August 9, 2022, with the following results:

a. Total stray voltage findings = 4*
b. Stray voltage findings at 4.4v and below = 2 (50%)
c. Stray voltage findings at 4.5v and above = 2 (50%)
d. Miles scanned = 234
e. Niagara Mohawk structures scanned = 4,482

Events/Hits					
	2018	2019	2020	2021	2022
Albany	108	111	10	2	4
*Of 30 total events, 26 were found on streetlights. Please note, streetlights in the City of Albany are municipal-owned. While the Company is required to test municipal-owned street lights for elevated voltage, the City of Albany is responsible for maintaining and repairing these assets.					

2. Niagara Falls

Testing began in Niagara Falls June 2, 2022, and was completed June 3, 2022, with the following results:

a. Total stray voltage findings = 3
b. Stray voltage findings at 4.4v and below = 2 (67%)
c. Stray voltage findings at 4.5v and above = 1 (33%)
d. Miles scanned = 34
e. Niagara Mohawk structures scanned = 1,300

Events/Hits					
	2018	2019	2020	2021	2022
Niagara Falls	32	38	11	4	3
100% of events in 2022 were found on streetlights.					

3. Buffalo

Niagara Mohawk conducted two separate mobile scans of Buffalo in 2022. The first mobile scan began April 11, 2022, and was completed June 2, 2022, with the following results:

a. Total stray voltage findings = 684
b. Stray voltage findings at 4.4v and below = 641 (94%)
c. Stray voltage findings at 4.5v and above = 43 (6%)
d. Miles scanned = 1,439
e. Niagara Mohawk structures scanned = 27,499

The second mobile scan began on August 15, 2022, and was completed on October 5, 2022, with the following results:

a. Total stray voltage findings = 889
b. Stray voltage findings at 4.4v and below = 826 (93%)
c. Stray voltage findings at 4.5v and above = 63 (7%)
d. Miles scanned = 1,379[1]
e. Niagara Mohawk structures scanned = 27,606

Events/Hits										
	2018 Scan 1	2018 Scan 2	2019 Scan 1	2019 Scan 2	2020 Scan 1	2020 Scan 2	2021 Scan 1	2021 Scan 2	2022 Scan 1	2022 Scan 2
Buffalo	338	318	354	427	401	514	246	290	684	889
96% of events in 2022 were found on streetlights										

[1] Variances in mileages and structures scanned are attributable to route reconfiguration due to construction, road blocks, and private roads.

A majority of the 2022 findings were below 4.5v: Albany (50%), Niagara Falls (67%), and Buffalo (94% in Scan 1 and 93% in Scan 2).

D. Mobile Testing Repair/Mitigation Efforts

As of October 31, 2022, Niagara Mohawk completed 93.61% of the total permanent repairs in Buffalo (Scan 1 & Scan 2), Niagara Falls, and Albany.

A summary table illustrating repair status by region can be found in Appendices A-E. These tables are updated as of October 31, 2022.

E. Mobile Testing Program Costs

As of October 31, 2022, the total cost of the mobile scan surveys is $1,802,881.

City	Actual Miles	Events Found	Event Rate	Repairs	Mobile Inspection Cost
Buffalo Scan 1	1,439	684	0.47	684	$1,730,462
Buffalo Scan 2	1,379	889	0.64	796	
Niagara Falls	34	3	0.08	3	$32,918
Albany	234	4	0.01	*0	$39,501
Total	3,086	1,580	0.51	1,483	$1,802,881

*As noted above, streetlights in the City of Albany are municipal-owned; therefore, the City of Albany is responsible for maintaining and repairing these assets. There were 30 events found during the 2022 scan, of which 26 were on streetlights owned by the City of Albany. Municipal contractors shadowed National Grid crews during the scan and all needed repairs on streetlights were completed at that time.

F. Mobile and Manual Testing Program Comparison

It cost the Company on average five times more to conduct mobile testing (per mile cost) when compared to manual testing (per unit cost) in Albany, Niagara Falls, and Buffalo in 2022.

	Albany		**Niagara Falls**		**Buffalo Scan 1 & 2**	
2022 Estimated Costs[2]	**Manual**	**Mobile**	**Manual**	**Mobile**	**Manual**	**Mobile**
Non-Streetlighting Eqp.	$16,904	$39,501	$4,145	$32,918	$101,803	$1,730,462
Metallic Streetlighting Eqp.	$4,095		$1,848		$26,788	
Delta	**Δ** $18,502		**Δ** $26,925		**Δ** $1,601,871	

[2] The estimated manual testing costs are based on the per unit cost of conducting a manual elevated voltage test in Albany, Niagara Falls, and Buffalo and the number of facilities scanned during mobile testing in 2022. The numbers reflect what it would have cost the Company had it performed manual testing in these cities in 2022.

Appendix A

Mobile Testing & Repair Summary

NY Stray Voltage Mobile Testing Summary Report 2022 10/31/2022					
	Buffalo Scan 1	**Buffalo Scan 2**	**N. Falls**	**Albany**	***Grand Total***
Testing Summary					
Total Number of Events	684	889	3	4	**1,580**
At or Above 4.5 Volts	43	63	1	2	**109**
Between 1.0 and 4.4 Volts	641	826	2	2	**1,471**
Total NGRID Owned Events	684	889	3	4	**1,580**
At or Above 4.5 Volts	43	63	1	2	**109**
Between 1.0 and 4.4 Volts	642	827	2	2	**1,473**
Total Private Owned Events	138	147	0	0	**285**
At or Above 4.5 Volts	19	28	0	0	**47**
Between 1.0 and 4.4 Volts	119	119	0	0	**238**
Survey Percent Complete by City					
Buffalo (Scan 1)	1439				**100.00%**
Buffalo (Scan 2)		1379			**100.00%**
Niagara Falls			34		**100.00%**
Albany				234	**100.00%**
Total Miles To Be Scanned (estimates)	1,439	1,379	34	234	**3,086**

NY Stray Voltage Mobile Testing Repair Summary Report 2022 10/31/2022					
	Buffalo Scan 1	**Buffalo Scan 2**	**N. Falls**	**Albany**	***Grand Total***
Repair Summary					
NGRID Repairs					
Required	684	889	3	4	**1,580**
Completed	684	796	3	0	**1,483**
Pending (All repairs)	0	93	0	4	**97**
Pending (De-energized streetlights)	0	0	0	0	**0**
Exceeding 45 Days	6	0	0	4	**10**
Percent Complete	100.00%	89.54%	100.00%	0.00%	93.86%
TOH Repairs	0	0	0	0	**0**
TOH Complete	0	0	0	0	**0**
TOH Pending	0	0	0	0	**0**
TOH Exceeding 90 Days	0	0	0	0	**0**
TOH Percent Complete	100.00%	100.00%	100.00%	100.00%	**100.00%**
Private Repairs					
Required	138	147	0	0	**285**
Completed	138	147	0	0	**285**
Pending	0	0	0	0	**0**
Exceeding 45 Days	0	0	0	0	**0**
Percent Complete	100.00%	100.00%	100.00%	100.00%	**100.00%**
Total Repairs Pending	0	93	0	4	**97**
Total Repairs Complete	684	796	3	0	**1,483**
Total Repairs Percent Complete	100.00%	89.54%	100.00%	0.00%	**93.86%**

Appendix B

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

nationalgrid
Data as of October 31, 2022

	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole (910)	0	0	0	0	0	0	0
Ground (914)	0	0	0	0	0	0	0
Guy (915)	0	0	0	0	0	0	0
Riser (916)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box (950)	0	0	0	0	0	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	2	1	0	3	3	0	0
Metal Street Light Pole (971/981)	2	1	0	3	3	0	0
Traffic Signal Pole (991)	0	0	0	0	0	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	0	0	0	0	0	0	0
Guy (934)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	0	0	0	0	0	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	0	0	0	0	0	0	0
Totals	2	1	0	3	3	0	0

*Includes railing

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

Appendix C

Summary of Energized Objects - Mobile Testing - City of Albany

nationalgrid
Data as of October 31, 2022

	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole (910)	0	0	0	0	0	0	0
Ground (914)	0	0	0	0	0	0	0
Guy (915)	0	0	0	0	0	0	0
Riser (916)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box (950)	0	0	0	0	0	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	0	2	0	2	0	0	0
Metal Street Light Pole (971/981)	0	0	0	0	0	0	0
Traffic Signal Pole (991)	0	2	0	2	0	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	0	0	0	0	0	0	0
Guy (934)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	2	0	0	2	0	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	2	0	0	2	0	0	0
Totals	2	2	0	4	0	0	0

*Includes railing

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

While there were 30 findings detected during the scan in the City of Albany, streetlight mitigation efforts are performed by Municipal contractors and therefore, not represented on Appendix C.

Appendix D

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

nationalgrid
Data as of October 31, 2022

	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole (910)	0	0	0	0	0	0	0
Ground (914)	0	0	0	0	0	0	0
Guy (915)	0	0	0	0	0	0	0
Riser (916)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	6	0	0	6	6	0	0
Handhole / Pull box (950)	4	0	0	4	4	0	0
Manhole (951)	2	0	0	2	2	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	626	35	7	668	668	0	0
Metal Street Light Pole (971/981)	619	34	7	660	660	0	0
Traffic Signal Pole (991)	7	1	0	8	8	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	0	0	0	0	0	0	0
Guy (934)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	9	1	0	10	10	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	9	1	0	10	10	0	0
Totals	641	36	7	684	684	0	0

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

Appendix E

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

nationalgrid
Data as of October 31, 2022

	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole (910)	0	0	0	0	0	0	0
Ground (914)	0	0	0	0	0	0	0
Guy (915)	0	0	0	0	0	0	0
Riser (916)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	6	0	0	6	6	0	0
Handhole / Pull box (950)	6	0	0	6	6	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	813	63	0	876	783	0	0
Metal Street Light Pole (971/981)	786	62	0	848	757	0	0
Traffic Signal Pole (991)	27	1	0	28	26	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	0	0	0	0	0	0	0
Guy (934)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	7	0	0	7	7	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	7	0	0	7	7	0	0
Totals	826	63	0	889	796	0	0

*Includes railing

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

Appendix 9

NG-USA EOP G016 Equipment Elevated Voltage Testing

INTRODUCTION

This procedure outlines the requirements for the equipment elevated voltage testing on National Grid Facilities in New York, Massachusetts and Rhode Island as required by:

1. New York Public Service Commission's "Electric Safety Standards" issued on January 5, 2005, the New York Public Service Commission's "Order Adopting Changes to Electric Safety Standards issued and effective on December 15, 2008.
2. New York Public Service Commission's "Order Requiring Additional Mobile Stray Voltage Testing" issued and effective on July 21, 2010 and the New York's Public Service Commission "Order Granting Petition In Part and Modifying Electric Safety Standards" issued and effective on March 22, 2013.
3. Rhode Island Public Utilities Commission in Docket 4237 "Order to Establish a Contact Voltage Detection, Repair and Reporting Program" issued on November 9, 2012, and the subsequent order issued on February 1, 2013.
4. Massachusetts Department of Telecommunications and Energy provided a series of recommendations on December 9, 2005, that have been included in this procedure.

While there are variances in requirements between New York, Massachusetts, and Rhode Island driven by regulatory requirements in each State, the minimum requirements are based on sound utility practice.

PURPOSE

This procedure applies to all personnel involved (employees or contractors) with or responsible for the testing, mitigation/repair and reporting of facilities designated by this EOP for equipment elevated voltage testing. It should be noted that the term "Contact Voltage" has been adopted and is used in the EOP (refer to EOP-DEF).

ACCOUNTABILITY

1. Electric Work Methods, Electrical Material & Design Standards
    a. Update Procedure as Necessary
    b. Provide personnel guidance and assistance as requested.
2. Operations – Inspection & Maintenance
    a. Ensure the program as outlined in this EOP is implemented properly and timely.
    b. Ensure that the program as outlined in the EOP is completed each year.
    c. Provide qualified personnel to complete equipment elevated voltage testing.
    d. Ensure all qualified personal have been trained on performing equipment elevated voltage testing.
3. Quality Assurance Quality Control
    a. Ensure a QAQC program has been implemented as part of the mandatory requirements for New York and Massachusetts Regulators.

b. QAQC Inspector shall randomly audit elevated voltage testing performed to ensure testing completeness and accuracy.

4. Equipment Elevated Voltage Inspector
   a. Demonstrate the ability to perform equipment elevated voltage testing per this procedure
   b. Demonstrate the ability to become proficient in the use of the appropriate database.
   c. Perform walking patrols, collect information, edit data, and guard unsafe facilities.
   d. Attend the equipment elevated voltage training program and demonstrate competency with the equipment.
5. Distribution Asset Management
   a. Provide input into program revisions.
   b. Ensure the equipment elevated voltage program as outlined in this EOP is implemented, budgeted, and sanctioned properly and timely.

REFERENCES

NYPSC Order 04-M-0159
NYPSC Order Adopting Changes to Electric Safety Standards
NYPSC Order Requiring Additional Mobile Stray Voltage Testing
RIPUC Docket 4237 Order 20871 (November 9, 2012) and Order 20950 (February 1, 2013)
Proposed Rhode Island Electric Contact Voltage Program, Revised October 2, 2012 (Docket 4237)
NYSPSC Order Granting Petition in Part and Modifying Electric Safety Standards
Applicable National Grid Safety Rules & Procedures
Testing Equipment Operation Instructions

DEFINITIONS

All definitions can be found in EOP Definitions

TRAINING

Training is provided by Learning and Development through the National Grid training program.

DOCUMENT CONTENTS

Table of Contents

1.0 SAFETY

1.1 All work shall be performed in accordance with:

1.1.1 National Grid Employee Safety Handbook

1.1.2 Applicable National Grid Electric Operating Procedures (EOP)

1.1.3 Applicable National Grid Safety and Health Procedures (SHP)

1.2 All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.

1.3 The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:

1.3.1 Traffic control devices – Work Area Protection

1.3.2 Emergency Events: communication methods (code blue), first responders, and closest hospital.

1.4 Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to Employee Safety Handbook Tables 2A, 2B and Appendix A for distances).

1.5 Identify if a Process Hazard Assessment (PHA) is required. Refer to NG-EOP-G037 "Process Hazard Analysis"

1.6 Identify if an ARC flash assessment is required. Refer to NG-EOP G035 "ARC Flash Awareness and Mitigation" and Work Methods SharePoint site for Arc Flash Mitigation Tables to determine working distance and energy levels.

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

2.1 Streetlights and Municipally Owned Facilities

2.1.1 Company owned metallic street lighting standards shall be one hundred percent (100%) tested for equipment elevated voltage annually.

a. This test is to be performed while the light is operating.

2.1.2 Municipally owned streetlight systems that National Grid directly provides energy to shall be one hundred percent (100%) tested for equipment elevated voltage annually.

a. National Grid is responsible to complete this testing unless assurances of the completion of required testing and transfer of such test data are made by the appropriate municipality.

b. This test is to be performed while the light is operating.

2.1.3 Municipally owned metallic traffic signal standards and accessible devices shall be one hundred percent (100%) tested annually for equipment elevated voltage.

2.1.4 All streetlights identified on public thoroughfares regardless of ownership shall be one hundred percent (100%) tested annually for equipment elevated voltage.

2.1.5 All streetlights under a maintenance contract shall be one hundred percent (100%) tested annually for equipment elevated voltage.

a. Exceptions not requiring equipment elevated voltage testing:

i. Private lighting, park associations, parking lots, fiberglass (or other non-conductive) streetlight standards.

ii. Locations where streetlight standards are not publicly accessible, such as facilities located in the center of highways that cannot be accessed without stopping traffic or creating potentially hazardous situations for the worker and/or public.

2.2 National Grid Electric Substation Fences

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

2.3 Overhead Distribution Facilities

2.3.1 Towers and/or metallic poles with distribution facilities shall be tested for equipment elevated voltage at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.

2.3.2 The following equipment on wood distribution poles requires equipment elevated voltage testing at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle:

a. Metallic riser guard or conduit (company or non-company).

b. Uncovered or uninsulated down ground (company or non-company).

c. Down guy wire (company or non-company).

d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole within reach from the ground.

2.3.3 Exceptions: Customer meters and customer meter poles are excluded.

2.4 Overhead Transmission Facilities

2.4.1 Towers and/or metallic poles with transmission facilities shall be tested for equipment elevated voltage at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.

2.4.2 The following equipment on wood transmission poles or structures require equipment elevated voltage testing at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle:

a. Metallic riser guard or conduit (company or non-company).

b. Uncovered or uninsulated down ground (company or non-company).

c. Down guy wire (company or non-company).

d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole or structure within reach from the ground.

2.5 Underground Facilities

2.5.1 Equipment elevated voltage testing is required on all of the following equipment where accessible to the public.

a. All metallic manhole covers, vault covers and grates, junction box covers, and handhole covers at an annual rate of one hundred percent (100%).

2.5.2 Pad-mounted transformers and switchgear are tested at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.

2.5.3 Starting in 2010 and continuing thereafter, unless changed by subsequent order of the NY Public Service Commission:

a. Two (2) mobile stray voltage surveys shall be conducted at an annual rate of one hundred percent (100%) in Buffalo

b. One (1) mobile stray voltage survey is required to be conducted at an annual rate of one hundred percent (100%) in Albany and Niagara Falls.

2.5.4 Exceptions: Non-metallic concrete or fiberglass pads, handholes or pull/splice boxes are not required to be tested.

2.6 Daily Job Site Test Requirements

2.6.1 Each job site where National Grid personnel or its contractors complete a work assignment, they shall perform the following:

a. Perform an equipment elevated voltage test at the start and at the end of the workday or at the start and at the completion of the assignment. This testing requirement is considered good utility practice and does not require specific documentation.

2.6.2 Exceptions:

a. Electric substation fencing will not require equipment elevated voltage testing unless scheduled as part of the inspection program or if work was done on the fencing.

b. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

2.7 Exemptions

2.7.1 No testing is required inside a completely fenced in area where access is denied to the general public and where access is only achieved by climbing a fence. Good judgment is required by the tester in these scenarios.

3.0 FACILITIES WHERE EQUIPMENT ELEVATED VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – RHODE ISLAND

3.1 Company Owned Street Lights

3.1.1 Company owned metallic street lighting standards are required to be tested for equipment elevated voltage on a three-year cycle.

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

3.2 Overhead Distribution Facilities

3.2.1 Towers and/or metallic poles with distribution facilities shall be tested for equipment elevated voltage at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.

3.2.2 The following equipment on wood distribution poles or structures require equipment elevated voltage testing at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle:

a. Metallic riser guard or conduit (company or non-company).

b. Uncovered or uninsulated down ground (company or non-company).

c. Down guy wire (company or non-company).

d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole or structure within reach from the ground.

3.3 Underground Facilities

3.3.1 Equipment elevated voltage testing at an annual rate of twenty percent (20%), to be completed on a five-year cycle:

a. Metallic manhole covers, vault covers and grates, junction box covers, handhole covers

b. Pad-mounted transformers, secondary pedestals, and pad-mounted switchgears.

3.3.2 Starting in Fiscal Year 2013 and continuing thereafter, unless changed by subsequent order of the Rhode Island Public Utilities Commission, mobile contact voltage surveys will be performed in designated Contact Voltage Areas (CVA).

3.3.3 The mobile surveys will be performed at an annual rate of twenty percent (20%), to be completed on a five-year cycle

Exceptions: Non-metallic concrete or fiberglass pads, handholes or pull/splice boxes are not required to be tested.

3.4 Daily Job Site Test Requirements

3.4.1 Each job site where National Grid personnel or its contractors complete a work assignment:

a. An equipment elevated voltage test shall be taken at the start and at the end of the workday or at start and at the completion of the assignment. This testing requirement is considered good utility practice and does not require specific documentation.

3.4.2 Exceptions

a. Electric substation fencing will not require equipment elevated voltage testing unless scheduled as part of the inspection program or if work was done on the fencing.

b. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

3.5 Exemptions

3.5.1 See Section 1.7.1

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

4.1 Company Owned Street Lights

4.1.1 Company owned metallic street lighting standards are required to be tested for equipment elevated voltage at an annual rate of twenty percent (20%) on a five-year cycle.

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

4.2 Overhead Distribution Facilities

4.2.1 Towers and/or metallic poles with distribution facilities shall be tested for equipment elevated voltage at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.

4.2.2 The following equipment on wood distribution poles or structures require equipment elevated voltage testing at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle:

a. Metallic riser guard or conduit (company or non-company).

b. Uncovered or uninsulated down ground (company or non-company).

c. Down guy wire (company or non-company).

d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole within reach from the ground.

4.3 Underground Facilities

4.3.1 Equipment elevated voltage testing at an annual rate of twenty percent (20%), to be completed on a five-year cycle:

a. All metallic manhole covers, vault covers and grates, junction box covers, handhole covers

b. Pad-mounted transformers, secondary pedestals, and pad-mounted switchgears.

4.3.2 Exceptions: Non-metallic concrete or fiberglass pads or handholes or pull/splice boxes are not required to be tested.

4.4 Daily Job Site Test Requirements

4.4.1 Each job site where National Grid personnel or its contractors complete a work assignment:

a. An equipment elevated voltage test shall be taken at the start and at the end of the workday or at the start and at the completion of the assignment. This testing requirement is considered good utility practice and does not require specific documentation.

b. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

4.4.2 Exceptions

a. Substation fencing will not require equipment elevated voltage testing unless scheduled as part of the inspection program or if work was done on the fencing.

b. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

4.5 Exemptions

4.5.1 See Section 1.7.1

5.0 TEST EQUIPMENT

5.1 A handheld device (proximity detection unit) that can detect voltage from 5 to 600 VAC.

5.2 A portable AC digital high impedance voltmeter must have the ability to take readings with and without an input load impedance of 500 ohms.

5.3 The handheld devices utilized shall be certified by an independent test laboratory as being able to reliably detect voltages from 5-600 VAC. The following units have been certified:

5.3.1 HD Electric Stray Voltage Detector model LV-5

5.3.2 Fluke 85

5.3.3 Fluke 87

5.3.4 Fluke 170 series or equivalent

5.3.5 Fluke 175

5.3.6 Fluke 177

5.3.7 Fluke 179

5.3.8 Fluke 187

5.3.9 Fluke 189

5.4 Mobile Contact Voltage Detection Equipment:

5.4.1 Narda 8950/10 Stray Voltage System

5.4.2 SVD2000 Stray Voltage Mobile Detector

6.0 TEST PROCEDURE

6.1 Job Safety Requirements

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

a. Structures are never to be touched with a bare hand while performing the tests, only the proximity detector or meter probe is to be used to make contact with the facilities.

b. Appropriate PPE shall be worn.

c. Each individual always needs to be aware of his/her surroundings.

d. Make sure to observe all traffic before entering a street.

e. Traffic safety vest (DOT Compliant Class III) shall always be worn when exposed to traffic. Be aware that when bending down, the visibility benefits of the traffic safety vest are diminished.

f. Obey all traffic control devices.

g. When working in the street, face oncoming traffic whenever possible.

6.2 Measurements for detecting elevated voltages will be performed in accordance with the following:

6.2.1 Initial measurements for the presence of voltage shall be made using a certified proximity detection unit, refer to Section 4.3

a. To verify the proper operation of the proximity detector, follow operating instructions for the unit being utilized, this is to be done daily.

b. After verification that the detection unit is working, approach the area/equipment to be tested. The proximity detector will illuminate prior to touching the area/equipment being tested if voltage is present. If the proximity detector does not illuminate in close proximity to the

area/equipment, touch the area/equipment to be tested with the probe of the unit.

6.2.2 If voltage is detected, re-test using a portable AC voltmeter (The 500-ohm resistor is NOT used in this initial test):

a. Measurements with a portable AC voltmeter shall be taken on clean bare metallic surface (structure, ground wire, etc.)

b. When using a portable AC voltmeter, connection shall be made to suitable neutral or ground source with the common (black) lead.

1. In locations where the neutral or ground point is at a distance in excess of the voltmeter lead length

i. The connection to the neutral/ground shall be made with up to 25 feet' of # 16 stranded copper lead wire (covered).

ii. The other end of which shall be securely connected to the common (black) probe of the meter.

iii. When using such "extension leads" appropriate care shall be taken in the placement of such leads to not create a physical hazard to workers, pedestrian or vehicular traffic.

2. In locations where a system ground is not available, or the existing ground registered voltage upon the proximity test

i. A metal rod shall be firmly embedded into the earth to a minimum depth of 6" to create a ground reference point for the measurement to be taken.

ii. An alternate method is available for obtaining a ground reference point utilizing an aluminum plate in lieu of driving a ground rod. The reference point should be as close as practicable to the facility being tested to simulate an equipment elevated voltage touch potential situation (3' to 4'.) On occasion longer leads may be necessary to find undisturbed earth (up to 25'.)

c. The "live" meter (red) probe lead shall then be placed into contact with the structure under inspection to determine the voltage.

1. Voltage readings greater than 30 volts AC shall be recorded in the database for the site.

2. For voltage readings less than 30 volts, install a 500-ohm input load impedance resistor on the voltmeter. Take another voltage measurement and record this voltage in the database for the site.

6.2.3 Measurements for elevated voltages/contact voltage using mobile technology will be performed in accordance with the following:

a. Mobile testing is performed by contract crews driving pre-determined routes in Contact Voltage Areas searching for elevated voltage levels.

b. The equipment used is mounted to vehicles and detects contact voltage levels greater than 1 volt while driving at speeds of up to 25 mph near underground facilities.

c. Once elevated voltages are detected the crew stops and performs a thorough check with certified manual testing equipment to determine if there is contact voltage present.

6.2.4 Any positive indications by either mobile testing or handheld tools shall be followed up with voltage measurements on the target structures.

a. Voltage measurements shall be taken in accordance with Section 5.2.2 above.

b. The investigators shall verify that a suitable ground (i.e. a ground that is not energized) is used as a reference. Ground source location shall be marked with tape, paint or flag for future testing of repair work.

6.2.5 A Total Harmonic Distortion (THD) test method will be implemented as a pilot for Rhode Island mobile elevated voltage testing. THD will be determined using a Fluke Power Quality clamp meter or a Fluke scope meter both of which have the ability to measure THD.

7.0 CORRECTIVE ACTION REQUIREMENTS FOR EQUIPMENT ELEVATED VOLTAGE FINDINGS

7.1 Manual Testing

7.1.1 New York

If equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded by a person or a protective barrier until made safe by Company personnel or if municipally owned, made safe by the owner or company.

If the voltage measures less than 1 volt and is found to be consistent with system operation design (no visual evidence of a problem upon review) **No further action is required.**

a. If the voltage measures greater than or equal to 1 volt and less than 4.5 volts:

i. The asset can either be guarded in person or by a protective barrier that prevents public contact.

ii. Contact your supervisor for required action. Sound judgment shall be utilized in this application.

b. If the voltage measures greater than or equal to 4.5 volts:

i. It shall be guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities.

ii. Immediate response is required using the notification in Section 6.3.

7.1.2 Massachusetts and Rhode Island

If equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded by a person or a protective barrier until made safe by Company personnel or if municipally owned, made safe by the owner or company.

If the voltage is less than 4.5 volts and is found to be consistent with system operation design (no visual evidence of a problem upon review) **No further action is required**.

a. If the voltage measures greater than 4.5 volts and less than 8 volts:

i. The asset shall be guarded in person or by a protective barrier that prevents public contact.

ii. Contact your supervisor for required action. Sound judgment shall be utilized in this application.

b. If the voltage measurement is greater than 8 volts:

i. It shall be guarded by an equipment elevated voltage inspector or a Company employee who has been trained to stand by on energized facilities.

ii. Immediate response is required using the notification in Section 6.3.

7.2 Mobile Testing

7.2.1 Rhode Island Total Harmonic Distortion Pilot

Under the Total Harmonic Distortion (THD) pilot in Section 5.2.5, if during mobile testing of the Contact Voltage Area the voltage measures greater than 1 volt and less than 4.5 volts and has a total harmonic distortion of less than 10% the voltage will be considered contact voltage.

a. These areas will be safeguarded from the public and permanent repairs will be made.

b. If the total harmonic distortion is greater than 10% (no visual evidence of a problem upon review) **No further action is required.**

7.2.2 New York and Rhode Island

In the event of an elevated/contact voltage finding on an electric facility or a streetlight, all publicly accessible structures and sidewalks within a minimum 30-foot radius of the electric facility or streetlight must be tested for stray voltage.

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

7.3.1 Notification by location:

a. New York Regional Control Center 1-877-716-4996

b. New England Regional Control Center, North

1. Western, Central, North & Granite 1-508-421-7879

c. New England Regional Control Center, South

1. Southeast, South Shore & Ocean State (RI) 1-508-421-7885

7.3.2 Inform the System operator that this is an equipment elevated voltage call, and provide the following information:

a. Inspector name, Company (if not National Grid)

b. Address where the problem is identified; include facility number, circuit number, ownership, type of equipment and unique ID.

c. Voltage found and whether they are physically guarding or leaving the site after flagging and installing a protective barrier. National Grid personnel or designee will be assigned to respond.

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

7.5 Permanent repairs to the equipment shall be made within 45 days of the occurrence, except as noted in Section 6.6

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

7.7 The contractor and/or equipment elevated voltage Inspector may detect a minimal voltage level that is attributable to the design of the facility and not the result of an improper condition, no corrective action is required in this instance.

7.8 Angel Guards

7.8.1 Individuals conducting the equipment elevated voltage tests on streetlight standards shall have a supply of “Angel guards” available for installation if the cover is missing or wires are found to be exposed to the public at the time of testing.

7.8.2 Angel guards shall only be installed after the testing of the streetlight standard is complete and there is no indication of equipment elevated voltage above 1 volt (NY) and 4.5 volts (RI and MA)

7.8.3 Repairs have been completed to correct the equipment elevated voltage.

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

7.10 Customer Owned Equipment

7.10.1 Where the Company finds equipment elevated voltage above the allowable thresholds and identifies its source as customer-owned equipment:

a. The Company shall guard the site and notify the customer or a responsible person, as appropriate, that a potentially hazardous situation exists.

b. The Company shall advise the customer or responsible person that the cause of the equipment elevated voltage shall be immediately remedied.

7.10.2 Company personnel are encouraged to work with the customer to determine and rectify the problem. If the customer agrees to accept the Company's assistance, the Company may charge a reasonable cost for this effort.

a. The Company may temporarily remove a customer's meter or take such other actions as are appropriate and necessary to protect the public.

8.0 EQUIPMENT ELEVATED VOLTAGE DATABASE

8.1 The equipment elevated voltage database will be populated with information that is collected by the inspector using a hand-held device. The database shall be easily searchable for information and reporting.

8.2 The equipment elevated voltage inspector shall populate the following Information fields for manual testing:

Survey Date	Inspectors Name
Region	GPS Taken
District	Pre-load Match
Contractor	Equipment EV Test Required
GIS ID/Asset # (Unique ID)	Voltage Found Y/N
Facility Type	Voltage Measurement
Owner	Type of Equipment (Appendix A)
Feeder/Circuit	Immediate Action Taken
Line #	Person Notified
Tax District	Permanent Repair Date
Pole/Structure/Equipment ID	Type of Repair
Street Name	Person Responsible for repair (Employee ID)

8.3 Information fields required to be completed for facilities for mobile testing

Survey Date	Street Name
Region	GPS taken
District	Voltage Found Y/N
Contractor	Voltage Measurements
Facility Type	Type of Equipment (see Appendix A)
Owner	Immediate Action Taken
Pole/Structure/Equipment ID	Person Notified
Permanent Repair Date	Type of Repair

9.0 NEW YORK ANNUAL REPORTING AND CERTIFICATION REQUIREMENTS

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

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

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

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

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

9.6 The annual reporting and certification are required by February 15 of each year. In addition to certifications, it shall address the following:

9.6.1 Details the results of equipment elevated voltage test results and inspections conducted over the 12-month period ending December 31 of the prior calendar year.

9.6.2 Addresses the performance mechanism contained in Section 10 of the PSC Order Adopting Changes to Electric Safety Standard effective December 15, 2008 (December 15, 2008 Order).

9.6.3 Contain certification described in 8.3, 8.4 and 8.5 of this section.

9.6.4 Contain a breakdown of the voltage findings in a tabular format as detailed in Attachment 1 of the December 15, 2008 Order; for all findings that result in a reading of 1 V or more after completion of mitigation efforts, a detail report of company efforts shall be provided.

9.6.5 Contain a breakdown of the shock reports received from the public as detailed in Attachment 2 of the December 15, 2008 Order.

9.6.6 Discussion of the analysis undertaken on the causes of the stray voltage within the Company's electric system, the conclusions drawn there from, the preventative and remedial measures identified, and the Company's plan to implement those measures.

9.6.7 Description of the priority levels used to gauge the severity of a deficiency, including repair timeframes, and details the requirements for training personnel to properly identify and categorize the deficiencies.

9.6.8 Contain a breakdown of facilities to be inspected, unique inspection conducted per year, and the cumulative number of unique inspections conducted to meet the five-year requirement.

9.6.9 Contain a breakdown of the deficiencies found, permanent repair actions taken by year, whether a repair was completed within the required timeframe, and the number of deficiencies awaiting repair. This information should be provided on a yearly basis by priority level and by equipment groupings as detailed in Attachment 3 of the December 15, 2008 Order.

9.6.10 Contain a review and analysis of the inspection results. The review should identify areas of concern along with remedial actions or future plans to alleviate inadequacies in current program assets.

9.6.11 Description of the quality assurance program along with the results from quality assurance activities conducted during the year.

9.6.12 Any additional information that is pertinent to the issues addressed by the safety standards should also be included.

9.7 The Company shall file reports on their mobile stray voltage testing with the Secretary of the New York PSC within 45 days after completion of the mobile testing or February 15, of each year. The filing shall include the historic results and costs associated with the manual test program in each area listed in Section 2 of this procedure.

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

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

10.0 MASSACHUSETTS REPORTING REQUIREMENTS

10.1 National Grid shall submit an annual report that includes the following:

10.1.1 Annual reports that list inspection and testing data, including number of inspections conducted by equipment type.

10.1.2 Number of equipment elevated voltage events detected by inspection personnel versus call-ins or notification by third parties.

10.1.3 Variance reports on current year inspection targets.

10.1.4 Equipment elevated voltage events detected on equipment that is not included in equipment elevated voltage equipment inspection schedules (which will enable

the Massachusetts DPU to determine if the company is inspecting and testing the correct equipment).

10.1.5 Number of exceptional or non-routine events that required reporting to OSHA or other government organizations due to injuries or other substantive impacts

10.1.6 Description of the quality assurance program along with the results from quality assurance activities conducted during the year.

11.0 Rhode Island Reporting Requirements

11.1 National Grid shall submit an annual Contact Voltage Compliance report that includes the following in a searchable form:

11.1.1 Event record number

11.1.2 Location of testing

11.1.3 Date and time of testing

11.1.4 Company or customer asset

11.1.5 Failed equipment type

11.1.6 Voltage recorded

11.1.7 Personal injuries to members of the public, pets or property damage

11.1.8 Any other equipment involved and age

11.1.9 Prior incidents at this location in the past five years

11.1.10 Corrective actions taken at the location and date taken

11.1.11 Number of customers if service is interrupted while making repairs

11.1.12 Duration of interruption

11.1.13 Summary of investigation into cause of the incident

11.1.14 Number of calls to the company “shock” line

11.1.15 Total repair costs by Contact Voltage Area

11.1.16 All information as provided for in Section 8.3

The Company will provide a summary of the above information as part of the report. In addition, the Company will include a recommendation for which specific CVAs will be tested the following year, whether there are any recommended changes to the CVAs and whether there are any advances in technology for detection of elevated voltages.

12.0 TYPE OF EQUIPMENT - APPENDIX A

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

13.0 EXCEPTION APPROVALS

13.1 It is recognized that situations may arise that are not covered by this procedure

13.1.1 In a storm or emergency event, such as an MVA, 911 call or similar situation, approval to proceed can be obtained from the below individuals, superseding section 13.3.2. These exceptions should be documented and communicated to the Work Methods and Safety Managers as soon as possible following the emergency event.

a. New York

1. Regional OH/UG Manager
2. Regional OH/UG Lead Supervisor

b. New England

1. Divisional OH/UG Manager
2. Designated "On Call" OH/UG Team Lead
3. Divisional OH/UG Lead Supervisor

NOTE: All individuals granting "the exception and approval to proceed' shall be knowledgeable and proficient in the construction and operation of the Overhead or Underground electrical apparatus involved along with the associated hazards in specific duties pertaining to this electric operation procedure.

13.2 When this occurs, an exception may be approved

13.3 The person in charge of the work shall

13.3.1 Develop a work plan detailing

a. The need for an exception to the EOP
b. Additional safeguards to be employed

13.3.2 Provide the work plan to and obtain approval from all of:

a. The manager in charge of the work
b. The manager of T&D Work Methods
c. A manager from Safety

13.3.3 Alternatively, approval may be obtained from a designee of any of the above

13.4 If agreement cannot be obtained at the manager level

13.4.1 The request shall be forwarded to the Director levels

a. Director's may assign a designee

13.5 After approval is obtained

13.5.1 The work plan shall be reviewed with all workers who will participate in the job

a. All workers need to agree on the work plan

13.5.2 Document the exception on the job brief

13.6 If agreement cannot be obtained the department Steward, the Union Safety Advocate or Officer will be sought out for approval

13.7 T&D Work Methods shall publish a Memorandum documenting the approval

13.7.1 A copy of the work plan shall be included

13.7.2 Such memorandum shall be sent to all stakeholders and approvers

13.7.3 The memo shall be stored for the record

14.0 REVISION HISTORY

Version	Date	Description of Revision
1.0	04/01/11	This document supersedes document dated 08/17/09.
2.0	09/30/13	This document supersedes document date 04/01/11.
3.0	04/19/18	Revised the following: Formatting changes, broke paragraphs into subsections Accountability Section, added “Quality Assurance Quality Control” group and removed “Network Strategy” and replaced with “Asset Management” Removed the Definitions Section Section 1 Added new “Safety Requirements” section 2.0 Renumbered section to revised listing 2.1.1 – 2.14 Revised language to include the percent rate of 100% 3.3.1 Added percent rate of 20% for underground testing in Rhode Island 4.11 Added percent rate of 20% for streetlight testing in Massachusetts 4.3.1 Added percent rate of 20% for underground testing in Massachusetts 7.3.1b.c Revised phone numbers for Northborough control center 7.8 Added “Angel Guard” Tittle and revised subsections 8.0 Database requirements, added language and formatted facilities list 13.0 7. Added new Exception Approval Section
4.0	02/01/20	Exception Approval Language
5.0	10/01/21	Four-year Revision - Minor updates and changes, added link to definitions, updated safety section, updated copyright clause and sponsor information.

Appendix 10

NG-USA EOP D004 Distribution Line Patrol and Maintenance

INTRODUCTION

The purpose of this procedure is to outline the requirements for the patrol and maintenance activities associated with National Grid Distribution feeders.

The inspection procedures shall be dictated by the individual state's regulatory agency. If the regulatory agency in a specific state (MA & RI) does not require inspection procedures the inspections can still be performed in those states per this EOP but are not required.

The Distribution Maintenance Program was designed to provide for a patrol and inspection of each distribution feeder once every five (5) years. The patrols are conducted by a Distribution Inspector identifying all required maintenance on a *Windows*® based hand-held computer. The maintenance items identified through this patrol are separated into five priority levels 1, 2, 3, 4 and 9. The maintenance codes identified default to the appropriate priority level. The default priority level can be adjusted by the individual performing the inspection based on actual field conditions. These priority levels are defined as follows:

Level 1 - An identified facility/component or tree condition that shall be repaired/replaced within 30 days for (NE) and 7 days for (NY).

Level 2 - Identified facility/component condition that shall be repaired/replaced within 1 year or as scheduled by Program Management for NE.

Level 3 – Identified facility/component condition that shall be repaired/replaced within 3 years or as scheduled by Program Management for NE.

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

Level 9 – This priority category is to collect inventory information for temporary repairs made by operations to restore service or maintain public safety until permanent repairs can be made.

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

1. Notification by location:
   New York: System Operations Dispatch 1-877-716-4996
   NE North: Bay State West & Central: Northborough Control Center 1-508-421-7879
   NE North: North & Granite: Northborough Control Center 1-508-421-7879
   NE South: Bay State South & Ocean State (RI): Northborough Control Center 1-508-421-7885

2. Detailed information provided to the regional notification location:
   a. Identify yourself as a Company Distribution Inspector and your work reporting area.
   b. Details of the Level 1 Priority Condition:
      i. Problem found.
      ii. District, Feeder No., Line No., Tax District and Pole No.

iii. Street address and any additional information that would assist in finding the location of the problem.

iv. If you are standing by or have secured the location.

3. Notify area Inspections Supervisor for follow-up.

PURPOSE

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

ACCOUNTABILITY

1. Electric Work Methods
   A. Update procedure as necessary
2. Electric Operations
   A. Ensure the work generated by the Distribution Maintenance Program and assigned by Asset Strategy and Investment Planning is completed in the appropriate time frame.
   B. Request assistance from Distribution Line Contracting when necessary to complete work assigned in the appropriate time frame.
3. Distribution Line Contracting
   A. At the request of Operations obtain, schedule and manage contractors to perform inspections and required maintenance.
   B. Provide input into program revisions.
4. Distribution Inspector
   A. Demonstrate the ability to identify maintenance concerns and the aptitude to become proficient in the use of a hand-held computer and desktop computer.
   B. Demonstrate the understanding and requirements of this NG EOP D004.
   C. Possess the ability to do walking patrols, collect information on a hand held, download to a desk top computer, edit data, provide requested information/reports/work tickets to supervision, and track/close out work completed in the database system.
5. Distribution Network Strategy
   A. Select program codes/circuits to be scheduled for maintenance repair work using data collected through Distribution Maintenance Program.
   B. Approve changes to the maintenance code table.
   C. Select circuits to be patrolled for a running five-year cycle.
   D. Provide input into program revisions.
6. Inspections and Maintenance
   A. Ensure circuits scheduled for patrol are completed each year.
   B. Provide qualified personnel as inspectors to provide consistent and accurate identified maintenance concerns/problems.
   C. Provide program management.
   D. Report System Maintenance progress monthly by Division.
7. Process and Systems.
   A. Provide and support database.

REFERENCES

National Grid Safety Procedures
National Grid Employee Safety Handbook
NY PSC Order 04-M-0159
NY PSC Order Adopting Changes to Electric Safety Standard, December 2008
Elevated Equipment Voltage Testing NG-EOP G016
Underground Inspection NG-EOP UG006
Work Methods Bulletin 11-14 Voltage Regulation Limits
Massachusetts DTE Directive 12/9/05

TRAINING

Provided by appropriate National Grid training program.

DOCUMENT CONTENTS

Table of Contents

1.0 SAFETY REQUIREMENTS

1.1 All work shall be performed in accordance with:

- 1.1.1. National Grid Employee Safety Handbook
- 1.1.2. Applicable National Grid Electric Operating Procedures (EOP)
- 1.1.3. Applicable National Grid Safety and Health Procedures (SHP)

1.2. All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.

1.3. The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:

- 1.3.1. Traffic control devices – Work Area Protection (WAP)
- 1.3.2. Emergency Events: communication methods (code blue), first responders, and closest hospital.

1.4. Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to Employee Safety Handbook Tables 2A, 2B and Appendix A for distances).

- 1.4.1. Use of DI Foot wear if MAD will be broken, according to NG-EOP G026 “Mechanized Equipment Grounding”

1.5 Identify if a Process Hazard Assessment (PHA) is required. Refer to NG-EOP G037 “Process Hazard Analysis”

1.6 Identify if an ARC flash assessment is required. Refer to NG-EOP G035 “ARC Flash Awareness and Mitigation” and Work Methods Infonet site for Arc Flash Table to determine working distance and energy levels – see link below:

Arc Flash Mitigation Tables

2.0 DISTRIBUTION PATROL

2.1 New York

2.1.1 Distribution Patrols are conducted by a Distribution Inspector that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities.

2.1.2 Distribution patrols are scheduled in such a manner that each distribution feeder is examined in the field once every five (5) years. In NY, the patrols shall be completed by December 31 due to regulatory reporting.

2.1.3 New Distribution Feeders added to the system will be incorporated through our Geographic Information System (GIS) system and added to the appropriate inspection cycle.

2.1.4 If the Distribution Inspector finds unmapped facilities from the information supplied from GIS, the inspector shall add the information into the *Windows*® based hand-held computer for maintenance tracking purposes. NG-EOP G011,

Preparation and Distribution of Electric Facilities Records, identifies the correct procedure for updating GIS records, if needed.

2.2 Rhode Island

2.2.1 Distribution Patrols are conducted by a Distribution Inspector that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities.

2.2.2 Distribution patrols are scheduled in such a manner that each distribution feeder is examined in the field once every five (5) years. In RI the patrols shall be completed by March 31. The most current Distribution Patrol schedule can be found in the Distribution Maintenance Program data base (RPT 1310 Feeder Patrol Status).

2.2.3 New Distribution Feeders added to the system will be incorporated through our Geographic Information System (GIS) system and added to the appropriate inspection cycle.

2.2.4 If the Distribution Inspector finds unmapped facilities from the information supplied from GIS, the inspector shall add the information into the *Windows*® based hand-held computer for maintenance tracking purposes. NG-EOP G011, Preparation and Distribution of Electric Facilities Records, identifies the correct procedure for updating GIS records, if needed.

2.3 Massachusetts

2.3.1 Distribution Patrols are conducted by a Distribution Inspector that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities.

2.3.2 Distribution patrols are scheduled in such a manner that each distribution feeder is examined in the field once every five (5) years. In MA, the patrols shall be completed by December 31 due to regulatory reporting. The most current Distribution Patrol schedule can be found in the Distribution Maintenance Program data base (RPT 1310 Feeder Patrol Status).

2.3.3 New Distribution Feeders added to the system will be incorporated through our Geographic Information System (GIS) system and added to the appropriate inspection cycle.

2.3.4 If the Distribution Inspector finds unmapped facilities from the information supplied from GIS, the inspector shall add the information into the *Windows*® based hand-held computer for maintenance tracking purposes. NG-EOP G011, Preparation and Distribution of Electric Facilities Records, identifies the correct procedure for updating GIS records, if needed.

2.4 Records

2.4.1 Distribution Patrol data is recorded by the Distribution Inspector on a *Windows*® based hand-held computer and downloaded to the Distribution Maintenance Program.

2.4.2 The Distribution Inspector should also complete maintenance code 118 - stencil installed and maintenance code 220 - guy wire marker, maintenance code 660 - switchgear missing nomenclature, maintenance code 681- transformer missing nomenclature, and maintenance code 745 - enclosure missing nomenclature if found deficient upon inspection while at the site or enter the appropriate code as a Level 4 maintenance item including a comment.

2.4.3 Maintenance Codes are shown on the Distribution Field Survey Worksheet #NG0236 (Page 8). The Distribution Field Survey Worksheet can be used by the field to record maintenance items and is used for informational purposes only.

2.4.4 The latest distribution maintenance codes are downloaded to the hand-held computer each time there is a change that affects the maintenance code table contained in the Distribution Maintenance Database. Printed copies of the latest maintenance code tables may be obtained by running a report on the look up tables from the Distribution Maintenance Database.

2.5 The *Windows*® based hand-held computer is to be used as the primary vehicle for recording maintenance problems in the field. There may be times where it is not practicable to use the hand-held computer. In these cases, the person performing the inspection should record the information on the Distribution Field Survey Worksheet (#NG0236).

https://teams.nationalgrid.com/sites/Syracuse/SitePages/Home.aspx

Once complete, the Distribution Field Survey Worksheet information shall be input into the Distribution Maintenance Database by the inspector, clerk, or supervisor or their designee.

3.0 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

3.1 This EOP requires the visual inspection of the following facilities as designated above for New York, Rhode Island or Massachusetts:

a. Wood Pole Mounted Street Light
b. Poles
c. Crossarms
d. Insulators
e. Primary
f. Transformers
g. Capacitor
h. Regulator
i. Sectionalizer
j. Recloser
k. Switches
l. Ground
m. Guy
n. Anchor
o. Secondary
p. Service
q. ROW
r. GIS
s. Spacer Cable
t. Cutout
u. Risers
v. Switchgear
w. Padmount Transformers
x. Enclosures

4.0 DISTRIBUTION MAINTENANCE DATABASE

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

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

5.0 MAINTENANCE SCHEDULE

5.1 Maintenance activities are scheduled by maintenance codes. Maintenance codes are given a priority level to aide in the scheduling of work assuring a safe and reliable distribution system.

5.2 All “Level 1 Priority” conditions identified shall be repaired/corrected within:

5.2.1 New England – 30 days

5.2.2 New York – 7 days.

5.3 NY Only - all “Level 2 Priority” conditions identified shall be repaired/corrected within 1 year. In NE, work will be reviewed, prioritized and scheduled according to the Annual Work Plan

5.4 NY Only - All “Level 3 Priority” conditions shall be repaired within 3 years. In NE, work will be reviewed, prioritized and scheduled according to the Annual Work Plan

5.5 All Level 4 Priority is for inventory purposes only.

5.6 All Level 9 priority conditions should be completed within 90 days. Level 9 priority conditions not completed within 90 days, the company shall periodically perform site visits to monitor the condition of the temporary repair. Refer to NG-EOP G029 – Tracking Temporary Repairs to Electric System for details on Level 9 priority conditions.

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

6.0 COMPLETION OF MAINTENANCE CODES

6.1 Level 1 priority maintenance codes completion process:

6.1.1 Distribution Inspector contacts System Operations Dispatch (SOD) providing information on the Level 1 maintenance item and fills out a Level 1 Priority Report Form (page 11).

6.1.2 SOD generates an ABB OMS order for Regional Control

6.1.3 Inspections Supervisor captures ABB OMS ID # and details for Level 1 maintenance item status. Inspections Supervisor tracks Level 1 maintenance status with operations ensuring that the Level 1 item is completed within 30 days (NE) and 7 days (NY). Inspection Supervisor closes out the Level 1 maintenance item in the Distribution Maintenance Database by adding the ABB OMS ID # number to maintenance record.

6.2 NY Only - Level 2 and Level 3 priority maintenance codes are completed in the Distribution Maintenance database once the 699 requirement is completed in STORMS for the work request associated with the maintenance code.

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

ALL MAINTENANCE WORK PERFORMED THAT WAS IDENTIFIED ON THE WORK ORDER OR DISCOVERED DURING THE REPLACEMENT/REPAIR/CORRECTION OF THE ORIGINAL MAINTENANCE PROBLEM SHALL BE LISTED ON THE DATABASE AND THEN CLOSED OUT WHEN COMPLETE.

Reference Only

DISTRIBUTION FIELD SURVEY WORKSHEET

nationalgrid

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

WOOD POLE MOUNTED STREET LIGHT	P/Q	REGULATOR	P/Q	SPACER CABLE	P/Q
098 1,2 (NR) ☐ Street Light Hazard Cond.	/	170 1,2 (NR) ☐ Oil Weeping	/	270 1,2,3,9 (R) ☐ Damaged/Missing Spacer	/
099 2 (NR) ☐ Not Bonded	/	171 1,2 (R) ☐ Bushings Broken/Cracked	/	271 1,2,3,9 (R) ☐ Bracket Damage	/
POLE		172 2 (R) ☐ Missing Ground Wire	/	272 3 (R) ☐ Bracket Not Bonded	/
106 3,9 (NR) ☐ Dbl Wood-NG Trnsf Req'd	/	174 4 (NR) ☐ Control Cab Height/Ground	/	273 3 (R) ☐ Messenger Not Bonded	/
107 4 (NR) ☐ Dbl Wood-Tel Trnsf Req'd	/	175 3 (R) ☐ Improper/Missing Bond	/	274 3 (R) ☐ Messenger Guard Missing	/
108 4 (NR) ☐ Dbl Wood-CATV Trnsf Req'd	/	176 3 (R) ☐ Animal Guard Missing	/	276 3 (R) ☐ Uncovered Splice	/
110 1,2,9 (R) ☐ Broken/severely damaged	/	177 3 (R) ☐ LA Blown/Missing/Improper	/	**CUTOUT**	
111 1,2,3,4 (RP) ☐ Visual Rotting Grd Line	/			280 2 (R) ☐ Defective Cutout	/
112 1,2,3 (RP) ☐ Woodpecker Holes - Replace	/	**SECTIONALIZER**		281 2 (R) ☐ Potted Porcelain	/
113 3 (NR) ☐ CuNap Treated Bthmark Yr	/	180 1,2 (NR) ☐ Oil Weeping	/	287 4 (NR) ☐ 3 Phase Equip Mount	/
114 2 (R) ☐ Woodpecker Holes	/	181 2 (R) ☐ Bushings Broken/Cracked	/	288 3 (NR) ☐ S&C SMD - 20 Power Fuse	/
115 1,2,3,9 (NR) ☐ Riser Guard Req'd	/	182 2 (R) ☐ Missing Ground Wire	/	**RISER**	
116 1,2,3,9 (RP) ☐ Visual Rotting Pole Top	/	183 4 (NR) ☐ Control Cab Height/Ground	/	290 1,2,3,9 (NR) ☐ Improp Cable Supp/Term	/
117 1,2 (NR) ☐ Leaning Pole	/	184 3 (R) ☐ Improper/Missing Bond	/	291 2 (R) ☐ Improper/Missing Bond	/
118 4 P (NR) ☐ Stencil / Correction Req'd	/	185 3 (R) ☐ Animal Guard Missing	/	292 3 (R) ☐ Animal Guard Missing	/
119 4 (NR) ☐ Bird's Nest	/	186 3 (R) ☐ LA Blown/Missing/Improper	/	293 2,3 (R) ☐ LA Blown/Missing/Improper	/
CROSSARM		**RECLOSER**		**CONDUCTOR**	
120 1,2,4,9 (R) ☐ Damage Arm	/	190 1,2 (R) ☐ Oil Weeping	/	300 4 (NR) ☐ Pool Clearance	/
121 1,2,4,9 (NR) ☐ Loose/Defective Pins	/	191 1,2 (R) ☐ Bushings Broken/Cracked	/	**HANDHOLES**	
122 3 (NR) ☐ Wooden Pine 13.2kv	/	192 2(R) ☐ Missing Ground Wire	/	600 1,2,9 (NR) ☐ Broken/Damaged/Unsecured	/
123 1,2,4,9 (R) ☐ Loose Brace, Hrdwr	/	193 4 (NR) ☐ Control Cab Height/Ground	/	601 4 (NR) ☐ Improper Grade	/
124 1,2,4,9 (R) ☐ Damage Dbl Crossarm	/	194 3(R) ☐ Improper/Missing Bond	/	602 P (NR) ☐ Missing Nomenclature	/
125 1,2,4,9 (R) ☐ Damage Alley Arm	/	195 3 (R) ☐ Animal Guard Missing	/	603 1 (R) ☐ Secondary Needs Repair	/
127 1,2 (R) ☐ Primary On Arm	/	196 2,3 (R) ☐ LA Blown/Missing/Improper	/	604 4 (NR) ☐ Other (use comments)	/
128 3,9 (R) ☐ Loose Ridge Pin	/	197 2 (R) ☐ TripSaver - Light On	/	605 4 (NR) ☐ Excessive Vegetation	/
INSULATOR		**SWITCH**		**SWITCHGEAR**	
130 1,2 (R) ☐ Broken/Cracked/Flashed	/	203 1,2 (R) ☐ Gang Oper'd Defective	/	651 1,2,3 (R) ☐ Barrier Brkn/Dmgd/Unsec	/
131 1,2,9 (R) ☐ Floating	/	204 1,2,3 (R) ☐ Single Phase Defective	/	652 1,2 (NR) ☐ Base Broken/Damaged	/
132 4 (NR) ☐ I7 Aluminum Capped	/	205 3 (R) ☐ Improper/Missing Bond	/	656 1,2,9 (R) ☐ Door Broken/Damaged	/
133 3 (R) ☐ Non-Standard Voltage	/	207 3,4 (R) ☐ LA Blown/Missing/Improper	/	657 1 (NR) ☐ Excessive Vegetation	/
134 4 (NR) ☐ AL Cap Assoc w/Switch/Fuse	/	208 2 (NR) ☐ Handle Not Bonded	/	660 P (NR) ☐ Missing Nomenclature	/
PRIMARY		**GROUND**		661 4 (NR) ☐ Other	/
140 1,2,9 (R) ☐ Insuff. Grnd Clearance	/	210 1,2,9 (R) Wire Broken/Loose	/	662 4 (NR) ☐ Rusted/Paint Peeling	/
141 1,2,3 ☐ Damaged Cond/Brkn Strands	/	211 1,2 (R) ☐ Hazard Condition	/	**PAD TRANSFORMER**	
142 1 (NR) ☐ Limbs on Primary	/	212 3 (NR) ☐ Guard Req'd	/	673 1,2 (R) ☐ Door Broken/Damaged	/
145 1,2,3 (R) ☐ Dmg'd Stirups/Connector	/	213 3,4 (NR) ☐ Non Standard	/	676 4 (NR) ☐ Excessive Vegetation	/
146 1,2,3 (R) ☐ Improper Sag	/	214 3,9 (NR) ☐ Not Bonded to Neutral	/	681 4,P (NR) ☐ Missing Nomenclature	/
147 3 (R) ☐ LA Missing Transition	/	**GUY**		684 1,2 (NR) ☐ Oil Weeping	/
148 3 (R) ☐ LA Missing End of Line	/	215 3(NR) ☐ Guy-Span Not In Compliance w/Code	/	685 1,2,3,4,9 (NR) ☐ Pad Broken/Damaged	/
149 3 (R) ☐ LA Blown	/			686 4 (NR) ☐ Protection (Ballards)	/
TRANSFORMER		220 4,P (NR) ☐ Guy Wire Marker	/	687 4 (NR) ☐ Rusted/Paint Peeling	/
150 1,2 (NR) ☐ Oil Weeping	/	221 3 (NR) ☐ Not in Compliance w/Code	/	688 1,2,9 (NR) ☐ Pushed Off Base	/
151 1,2 (R) ☐ Bushings Broken/Cracked	/	222 3,9 (NR) ☐ Excessive Slack	/	**ENCLOSURES**	
152 2 (R) ☐ Missing Ground Wire	/	223 1,2,3,9 (R) ☐ Broken Wire	/	740 1,2,3,4 (R) ☐ Base Broken/Cracked	/
153 2,3,4 (R) ☐ LA Blown/Missing/Improper	/	**ANCHOR**		741 1,2,3,9 P (R) ☐ Door Brkn/Dmgd/Unsec	/
154 3,4 (NR) ☐ Not in Use	/	226 1,2,3,9 (NR) ☐ Req'd - Jt. Owned	/	743 4 (NR) ☐ Excessive Vegetation	/
155 3,4 (R) ☐ Animal guards required	/	227 1,2,3,9 (NR) ☐ Req'd - Sole NG	/	745 4 P (R) ☐ Missing Nomenclature	/
156 3 (NR) ☐ Non Std Install of Gap	/	**SECONDARY**		746 4 (NR) ☐ Rusted/Paint Peeling	/
157 2 (R) ☐ Improper/Missing Bond	/	231 1 (NR) ☐ Limb on Secondary	/	**POLE INSPECTION**	
CAPACITOR		232 1,2,9 (NR) ☐ Improper Sag	/	801 1,2,3,4 (R) ☐ Identified Priority Pole	/
160 1,2 (NR) ☐ Oil Weeping	/	234 1,2,3,9 (NR) ☐ Floating	/	802 1,2,3,4 (R) ☐ Identified Reject Pole	/
161 1,2 (R) ☐ Bulging	/	**SERVICE**		803 4 (NR) ☐ Excessive Checking	/
162 1,2 (R) ☐ Bushings Broken/Cracked	/	240 1 (NR) ☐ Ins. Loose from House	/	804 4 (NR) ☐ Climbing Inspection	/
163 2 (R) ☐ Missing Ground Wire	/	241 1 (NR) ☐ Limb on Service	/		
164 2 (NR) ☐ Blown Fuse	/	243 1,9 (NR) ☐ Non Std/Unsecured	/		
165 3 (NR) ☐ Improper/Missing Bond	/	**ROW**			
166 3 (R) ☐ Animal Guard Missing	/	250 4 (NR) ☐ Brush/Tree/Washout	/		
167 3 (R) ☐ LA Blown/Missing/Improper	/	**GIS**			
168 4 (NR) ☐ Control Cab Heigh/Ground	/	260 4(NR) ☐ Map Doesn't Match Field	/		
169 4 (NR) ☐ Capacitor Out of Service	/	261 4(NR) ☐ Pole/Line Numbering Error	/		
		262 4(NR) ☐ Equip/Hardware/Missing	/		
		263 4(NR) ☐ Equip Removed in Field, Remove From GIS	/		
		264 4(NR) ☐ Misc.-Transmission Overbuilt	/		
		269 4 (NR) ☐ Other GPS/GIS Errors	/		

Comments:

KEY

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

NG0236 (02.15)

Level "1" & Elevated Voltage Priority Report Form

Any Level "1" Priority or Elevated Voltage condition found must be called into Dispatch.

Feeder:_____

Line #:_____

Pole #:_____

Closest Meter #:_____

Street Address: _____

City/Town: _____

Level "1" Priority/Elevated Voltage condition found.

_____

_____

Call Dispatch to inform that this is either an Elevated Voltage call or an Inspection issue.

Dispatcher notified: _____

Date/Time: _____

Inspector: _____

7.0 REVISION HISTORY

Version	Date	Description of Revision
1.0	04/01/11	This document supersedes document dated 08/17/09.
2.0	04/27/15	This document supersedes document dated 12/03/14
3.0	04/25/17	Four-year revision, separated by state and removed priority levels 2 & 3 for MA & RI, NY Remains the same, Aligned with UG 006 for uniformity.
4.0	10/01/20	Updated Accountability section to reflect department name changes, Section 1: Added Safety Section, Introduction, Section 5.2, 6.1.3: Updated Repair time for New England.

Appendix 11

NG-USA EOP UG006 Underground Inspection and Maintenance

INTRODUCTION

This document outlines the requirements for the patrol and maintenance activities associated with National Grid's Underground Transmission and Distribution facilities.

The inspection procedures shall be dictated by the individual states' regulatory agency. If the regulatory agency in a specific state (MA & RI) does not require inspection procedures the inspections can still be performed in those states per this EOP but are not required.

This program is designed for the patrol and designated maintenance of underground facilities on a five (5) year schedule for New York only. Massachusetts and Rhode Island will perform working inspections on underground facilities each time work is performed. The Inspector or crew member will record all required maintenance on an approved National Grid database.

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

Level 1 - All "Level 1 Priority" conditions identified shall be repaired / corrected within 7 days.

Level 2 - New York - All "Level 2 Priority" conditions identified shall be repaired / corrected within 1 year. New England (RI/MA) -working inspections will be reviewed, prioritized and scheduled according to the Annual Work Plan

Level 3 - New York - All "Level 3 Priority" conditions shall be repaired within 3 years.

New England (RI/MA) -working inspections will be reviewed, prioritized and scheduled according to the Annual Work Plan

Level 4 – All "Level 4 Priority" conditions are for inventory purposes only.

All Level 1 priority conditions identified in the field by a contractor shall notify their PMCC contact. The PMCC contact shall notify dispatch and local underground supervision.

Any Level 1 priority conditions identified in the field by National Grid crews shall notify dispatch and their local supervision.

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

1. Notification by location:
   New York: System Operations Dispatch 1-877-716-4996
   NE North: Bay State West & Central: Northborough Control Center 1-508-421-7879
   NE North: North & Granite: Northborough Control Center 1-508-421-7879
   NE South: Bay State South & Ocean State (RI): Northborough Control Center 1-508-421-7885

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

PURPOSE

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

ACCOUNTABILITY

1. Electric Work Methods
    A. Update procedure as necessary.
    B. Provide personal guidance and assistance as requested.
2. Operations
    A. Ensure the components of the procedure are implemented.
    B. Ensure workers are trained in this procedure.
    C. Provide revision input as necessary.
    D. Ensure the work generated by the Distribution Maintenance Program and assigned by Asset Strategy and Investment Planning is completed in the appropriate time frame.
    E. Request assistance from Distribution Line Contracting when necessary to complete work assigned in the appropriate time frame.
3. Distribution Line Contracting
    A. At the request of Operations, obtain schedule and manage contractors to perform inspections and required maintenance.
    B. Provide input into program revisions.
4. Distribution Network Strategy
    A. Select program codes/circuits to be scheduled for maintenance repair work using data collected through Distribution Maintenance Program.
    B. Approve changes to the maintenance code table.
    C. Select circuits to be patrolled for a running five-year cycle.
    D. Provide input into program revisions.
5. Inspections
    A. Ensure circuits scheduled for patrol are completed each year.

6. Employees
    A. Demonstrate the understanding of the procedure.
    B. Comply with the requirements of the procedure.

REFERENCES

NY PSC Order 04-M-0159
NY PSC Order Adopting Changes to Electric Safety Standard, December 2008
National Grid Safety Procedures
National Grid Employee Safety Handbook
NG-EOP D004 Distribution Line Patrol and Maintenance
NG-EOP G011 Preparation and Distribution of Electric Facilities Records
NG-EOP G016 Elevated Equipment Voltage Testing
NG-EOP UG001 Infrared Non-Contact Thermometer Inspection Requirement for Underground Equipment
NG-EOP T007 Transmission Line Patrol and Maintenance
Massachusetts DTE Directive 12/9/05
US Sanction Paper, MA FY15 Distribution Inspection and Maintenance (I&M) Program USSC-14-080 Signed by Lee S. Eckert 4/7/14
Work Methods Bulletin # 22-14 200 Amp Loadbreak Insulating Cap Installation Requirements

TRAINING

Provided by appropriate National Grid training program.

DOCUMENT CONTENTS

Table of Contents

1.0 SAFETY REQUIREMENTS

1.1 All work shall be performed in accordance with:

1.1.1 National Grid Employee Safety Handbook

1.1.2 Applicable National Grid Electric Operating Procedures (EOP)

1.1.3 Applicable National Grid Safety and Health Procedures (SHP)

1.1.4 All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.

1.2 The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:

1.2.1 Traffic control devices – Work Area Protection (WAP)

1.2.2 Emergency Events: communication methods (code blue), first responders, and closest hospital.

1.3 Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to Employee Safety Handbook Tables 2A, 2B and Appendix A for distances).

1.3.1 The inspector shall verify upon entry into manhole or vault that insulating caps are installed on all primary bushings. The attached drain wire shall be bonded to the system ground bus. Without insulating caps installed properly appropriate MAD shall be maintained.

1.3.2 Use of EH Overshoes if MAD will be broken, according to NG-EOP-26 “Mechanized Equipment Grounding”

1.4 Identify if a Process Hazard Assessment (PHA) is required. Refer to NG-EOP-G037 “Process Hazard Analysis”

1.5 Identify if an ARC flash assessment is required. Refer to NG-EOP G035 “ARC Flash Awareness and Mitigation” and Work Methods SharePoint site for Arc Flash Mitigation Tables to determine working distance and energy levels.

2.0 PATROLS

2.1 New York

2.1.1 Inspection of underground equipment will be scheduled in such a manner that each underground facility listed in section 3, will be examined once every five years. These patrols shall be completed by December 31st of the schedule year.

2.1.2 One-fifth (20%) of all underground utility components should be inspected each year.

a. URD and UCD facilities shall be inspected in accordance with NG-EOP D004 existing overhead distribution circuit schedule.

b. All riser poles are inspected in accordance with NG-EOP T007 and NG-EOP D004.

c. Refer to NG-EOP UG001 for infrared, non-contact thermometer inspections of separable connectors.

d. An elevated equipment voltage test shall be completed at each location, refer to NG-EOP G016.

e. Customer owned manholes and vaults that enclose National Grid equipment shall require the inspection of these National Grid facilities.

f. A manhole inspection sheet shall be completed per the patrol intervals as stated in section 6.0. Manhole inspection form NG0453, shall be filled out at the same time the patrols are completed.

2.1.3 The Inspection group is responsible to create the patrol schedule for their respective Areas for the remainder of underground facilities.

a. The Inspector uses a Windows® based hand-held computer to record information pertaining to the asset being inspected.

b. The Inspector shall capture the region, district, employee ID, feeder number, structure ID number, GPS location, tax zone, line number, comments, and maintenance problem codes.

c. The Inspector while patrolling should also record missing nomenclature codes for the various UG facilities per form NG0244 – “Inspection program and maintenance codes.”

d. The Inspector will input the code into the Windows® based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site.

e. If the Inspector finds unmapped facilities from the information supplied from the Geographic Information System (GIS), refer to NG-EOP G011.

2.2 Rhode Island

2.2.1 A working inspection on underground facilities is required each time a crew performs work at one of those facilities listed in section 3.

a. Refer to NG-EOP UG001 for infrared, non-contact thermometer inspections of separable connectors.

b. An elevated equipment voltage test shall be completed at each location, refer to NG-EOP G016.

c. Customer owned manholes and vaults that enclose National Grid equipment shall require a working inspection of National Grid facilities.

d. A manhole inspection sheet shall be completed per the patrol intervals as stated in section 6.0. Manhole inspection form NG0453, shall be filled out at the same time the working inspections are completed.

2.2.2 The crew shall record the following

a. Region, district, employee ID, feeder number, structure ID number, GPS location, line number, comments, and maintenance problem codes.

b. The crew while inspecting, should also record missing nomenclature codes for the various UG facilities, if found deficient upon inspection.

c. The crew will input the code into the Windows® based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site.

d. If the crew finds unmapped facilities from the information supplied from GIS, refer to NG-EOP G011, for required procedure for corrections.

e. Crews shall perform working inspections by using either a handheld data entry unit or paper inspection logs requiring data entry by clerical support.

2.3 Massachusetts

2.3.1 A working inspection on underground facilities is required each time a crew performs work at one of these facilities listed in section 3.

a. Refer to NG-EOP UG001 for infrared, non-contact thermometer inspections of separable connectors.

b. An elevated equipment voltage test shall be completed at each location, refer to NG-EOP G016.

c. Customer owned manholes and vaults that enclose National Grid equipment shall require a working inspection of National Grid facilities.

d. A manhole inspection sheet shall be completed per the patrol intervals as stated in section 6.0. Manhole inspection form NG0453, shall be filled out at the same time the working inspections are completed.

2.3.2 The crew shall record the following

a. Region, district, employee ID, feeder number, structure ID number, GPS location, line number, comments, and maintenance problem codes.

b. The crew while inspecting, should also record missing nomenclature codes for the various UG facilities, if found deficient upon inspection.

c. The crew will input the code into the Windows® based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site.

d. If the crew finds unmapped facilities from the information supplied from GIS, refer to NG-EOP G011, for required procedure for corrections.

e. Crews shall perform working inspections by using either a handheld data entry unit or paper inspection logs requiring data entry by clerical support.

3.0 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

3.1 This EOP requires the visual inspection of the following facilities as designated above for New York, Rhode Island or Massachusetts and may require manhole pumping to assure a proper inspection:

a. Manholes
b. Vaults
c. Handholes: non-fiberglass
d. Splice boxes: non-fiberglass
e. Junction boxes: non-fiberglass
f. Pad-mounted transformers
g. Pad-mounted switchgears
h. Submersible equipment
i. Handholes*
j. Splice boxes*
k. Junction boxes*

** Fiberglass Enclosures do not require opening*

3.2 Maintenance Codes are shown on the Underground Field Survey Worksheet (Form NG-0244) should be used by the field to record maintenance items. Printed copies of the latest maintenance code tables may be obtained from the Underground Maintenance Database.

4.0 Underground Field Survey Worksheet (NG0244)

UNDERGROUND FIELD SURVEY WORKSHEET

DATE:	INSPECTOR NAME:	EMPLOYEE ID
DIVISION	DISTRICT	FEEDER:

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

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

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

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

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

GIS	P/Q	SWITCHGEAR	P/Q
260 4 (NR) ☐GIS map doesn't match field	/	657 FP4 (NR) ☐ Excessive vegetation	/
261 4 (NR) ☐GIS Pole/line numbering in error on GIS	/	659 2P9 (R) ☐ Missing ground	/
262 4 (NR) ☐GIS Equipment/hardware missing in GIS	/	660 4P (NR) ☐ Missing nomenclature	/
263 4 (NR) ☐GIS Equipment removed in field, removed from GIS	/	661 4P (NR) ☐ Other	/
265 4 (NR) ☐GIS - Asset Inspection Not Required	/	662 4 (NR) ☐ Rusted/Paint Peeling	/
269 4 (NR) ☐GIS Other GPS/GIS Errors	/		
HANDHOLES		TRANSFORMER	
600 12P9 (NR) ☐Damaged Structure	/	672 123P9 (R) ☐ Bushing Broken/Cracked	/
601 4P (NR) ☐Improper Grade	/	673 123P9 (R) ☐ Door Broken/damaged/unsecure	/
602 4P (NR) ☐Missing nomenclature	/	675 123P9 (R) ☐ Elbows/tracking/burned	/
603 1P (R) ☐Secondary needs repair	/	676 FP4 (NR) ☐ Excessive vegetation	/
604 4P (NR) ☐Other (use comments)	/	676 F (NR) ☐ Excessive vegetation	/
605 4 (NR) ☐Excessive Vegetation	/	680 1P (R) ☐Missing Ground	/
606 12P9 (NR) ☐Cover Damaged/ Unsecured	/	681 4P (NR) ☐Missing nomenclature	/
MANHOLE		682 4P (NR) ☐ Mud/Debris	/
610 2P9 (NR) ☐ Ground Rods Missing	/	684 12P9 (NR) ☐ Oil Weeping	/
611 2P9 (R) ☐ Cable/Joint leaking	/	685 1234P9 (NR) ☐ Pad broken/damaged	/
612 2P9 (NR) ☐ Cables Bonded/Grid defective	/	686 4P (NR) ☐ Protection (bollards) damage	/
614 1234P9 (NR) ☐ Cracked/broken	/	687 4P (NR) ☐ Rusted/Paint peeling	/
615 3P9 (R) ☐ Fire proofing	/	688 12P9 (NR) ☐ Pad Pushed Off Base	/
616 24P9 (NR) ☐ Improper grade	/		/
617 4P (NR) ☐ Missing nomenclature	/		/
620 2P9 (NR) ☐ Rerack	/	TRENCH	
621 1234P9 (NR) ☐ Ring/cover repair/replace	/	690 1P (R) ☐ Exposed Cable	/
622 14P (NR) ☐ Roof condition – use comments	/	692 4P (NR) ☐ Path – Sunken	/
623 14P (NR) ☐ Chimney Condition – comments	/	VAULTS	
624 4P (NR) ☐ Manhole needs cleaning	/	700 2P9 (NR) ☐ Cable missing bond	/
625 1P (R) ☐ Secondary needs repair	/	702 1234P9 (NR) ☐ Cracked/broken	/
626 4P (NR) ☐ No Holes in Manhole Cover	/	703 124P9 (NR) ☐ Damaged/broken cover	/
NETWORK PROTECTOR		704 124P9 (NR) ☐ Damaged/broken door	/
630 2P9 (R)☐ Barriers broken/damage	/	705 124P9 (NR) ☐ Damaged/broken ladder	/
632 1P (R) ☐ Oil leak	/	706 1234P9 (NR) ☐ Improper grade	/
633 2P9 (NR) ☐ Worn/Damaged gasket	/	707 4P (NR) ☐Improper nomenclature	/
NETWORK TRANSFORMER		708 4P (NR) ☐ Light not working	/
635 2P9 (R) ☐ Bushing Broken/Cracked	/	712 4P (NR) ☐ Sump pump broken	/
637 2P9 (R) ☐ Low oil	/	713 1P (R) ☐ Secondary needs repair	/
638 1P (NR) ☐ Missing ground	/	SUBMERSIBLE EQUIPMENT	
639 P (NR) ☐ Missing nomenclature	/	720 1234P9 (R) ☐ Excess Corrosion	/
642 12P9 (R) ☐ Oil Weeping	/	721 1234P9 (R) ☐ Physical damage	/
643 4P (NR) ☐ Rusted/Paint peel	/	722 12P9 (R) ☐ Leaking	/
CABLE			
645 9 (R) ☐ GT- 90° Celsius	/		
646 4 (NR) ☐ Zero Amps on Secondary	/		
647 1 (NR) ☐ Missing Insulator Cap	/		
SWITCHGEAR		ANODES	
651 123P9 (R) ☐ Barrier broken/damaged/unsecure	/	730 3P9 (R) ☐ Missing	/
652 123P9 (NR) ☐ Base broken/damaged	/	731 3P9 (NR) ☐ Need replacement	/
654 2P9 (R) ☐ Cable not bonded	/	**KEY**	
656 123P9 (R) ☐ Door Broken/Damaged	/	PQ = Priority Quantity NR = Maintenance Code may not directly affect reliability R = Maintenance Code may affect reliability RP = Maintenance Code may affect reliability and has specific program in place to address.	

Comments:

NG-0244 10/22

5.0 MAINTENANCE DATABASE

5.1 The Maintenance Database consists of data downloaded from the Windows® based hand - held and data entered from the desktop computer. The Windows® based hand-held used in the field, can be downloaded to any National Grid desk top computer that is connected to the network and the inspector or crew member is logged on as a valid user of the UG Maintenance program.

5.2 The National Grid desktop computer is also used to generate various reports and work tickets depending on the user's need. These reports are utilized to schedule and accomplish distribution maintenance work.

6.0 MAINTENANCE SCHEDULE

6.1 Maintenance activities are identified by maintenance codes. Maintenance codes are given a priority level to aide in the scheduling of work assuring a safe and reliable underground system.

6.2 Level 1 Priority Conditions All "Level 1 Priority" conditions identified shall be repaired/corrected within 7 days.

6.3 Level 2 Priority Conditions

6.3.1 New York - All "Level 2 Priority" conditions identified shall be repaired/corrected within 1 year.

6.3.2 New England (RI/MA) -working inspections will be reviewed, prioritized, and scheduled according to the Annual Work Plan.

6.4 Level 3 Priority Conditions

6.4.1 New York - All "Level 3 Priority" conditions shall be repaired within 3 years.

6.4.2 New England (RI/MA) -working inspections will be reviewed, prioritized, and scheduled according to the Annual Work Plan.

6.5 All "Level 4 Priority" conditions are for inventory purposes only.

6.6 NY Only - Once the Underground sequence is completed in the Underground Maintenance Database,

6.6.1 Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS.

a. Expense maintenance work goes straight to scheduling

b. Capital work is sent to Underground Engineering/Design.

7.0 COMPLETION OF MAINTENANCE CODES

7.1 The completion of Level 1 priority maintenance codes is performed by the field operations Supervisor or their designee.

7.2 Level 2 and Level 3 priority maintenance codes are completed in the Underground Maintenance database once the 699 requirement is completed in STORMS for the work request associated with the maintenance code.

ALL MAINTENANCE WORK IS TO BE COMPLETED PER NATIONAL GRID

UNDERGROUND CONSTRUCTION STANDARDS

8.0 MANHOLE INSPECTION SHEET – FORM NG0453

8.1 The Manhole Inspection Sheet (Form NG0453) shall be filled out for every manhole, heavy duty handhole, primary pull-box or network secondary or radial secondary handhole. The sheet can be filled out on a paper form or an electronic device.

8.2 A manhole inspection sheet shall be completed per the patrol intervals or during a working inspection as stated in section 2.0. The manhole inspection sheet shall be filled out at the same time the patrols or working inspections are completed.

8.3 Operations will determine who will complete the manhole inspections sheets. If the individual completing the manhole inspection sheet finds unmapped facilities or incorrectly mapped facilities, refer to NG-EOP G011, Preparation and Distribution of Electric Facilities Records, for the required procedure for corrections.

8.4 The integrity of the secondary cables is critical to the proper operation of the network secondary system. It is possible that any secondary cable is either burned open or has a limiter which has operated, thus the affected cable will not be carrying any current.

8.4.1 When working in a manhole, heavy duty handhole, primary pull-box or network secondary or radial secondary handhole with network secondary conductors:

a. Visually inspect secondary conductors looking for any burned, overheated or otherwise damaged insulation.

b. Check temperature of secondary conductors using the heat gun. Extremes of temperature or differences between sets going in the same direction are of interest.

c. Take current readings on each phase in each set. All cables should have some current. Cables with no current are of interest as they are likely burned off or have an open limiter. This information should be logged on the manhole inspection sheet.

d. If an open limiter is found during the inspection the open limiter shall be reported to Operations. Operations shall replace the open limiters expeditiously.

8.5 The manhole inspection sheets shall be given to the local engineering department for that respective region.

8.6 The local engineering department shall review the details of the manhole inspection sheets and determine the status and/or corrective action needed for their regional system.

MANHOLE INSPECTION SHEET FORM NG0453

nationalgrid

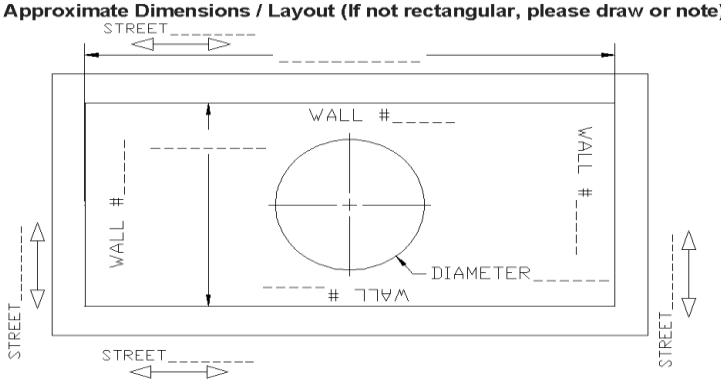
Manhole Inspection Sheet

Survey Date: _____ Manhole / Pullbox / Handhole Number_____

City / Town: _____ Streets / Intersect_____

Manhole / Pullbox / Handhole Construction (circle one): Brick Concrete Block Pre-cast

Approximate Dimensions / Layout (If not rectangular, please draw or note).



Manhole Cover:

Standard "NM"?

☐ **Yes**
☐ **No**

Standard Two - Piece?

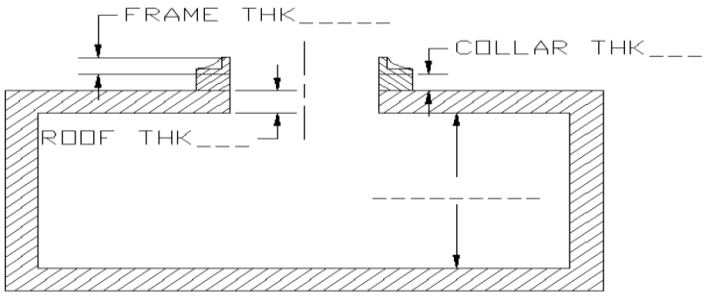
☐ **Yes**
☐ **No**

Flat Steel Covers?

☐ **Yes**
☐ **No**

If Yes, # of Covers?___

Collar Material (circle one): Concrete Brick Other_____



NG0453 (08/14)

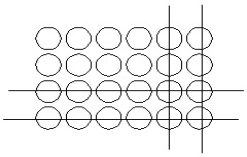
Wall #____ Conduit Material (Circle One): Fiber Tile Steel PVC Conduit Sizes____

Wall #____ Conduit Material (Circle One): Fiber Tile Steel PVC Conduit Sizes____

Wall #____ Conduit Material (Circle One): Fiber Tile Steel PVC Conduit Sizes____

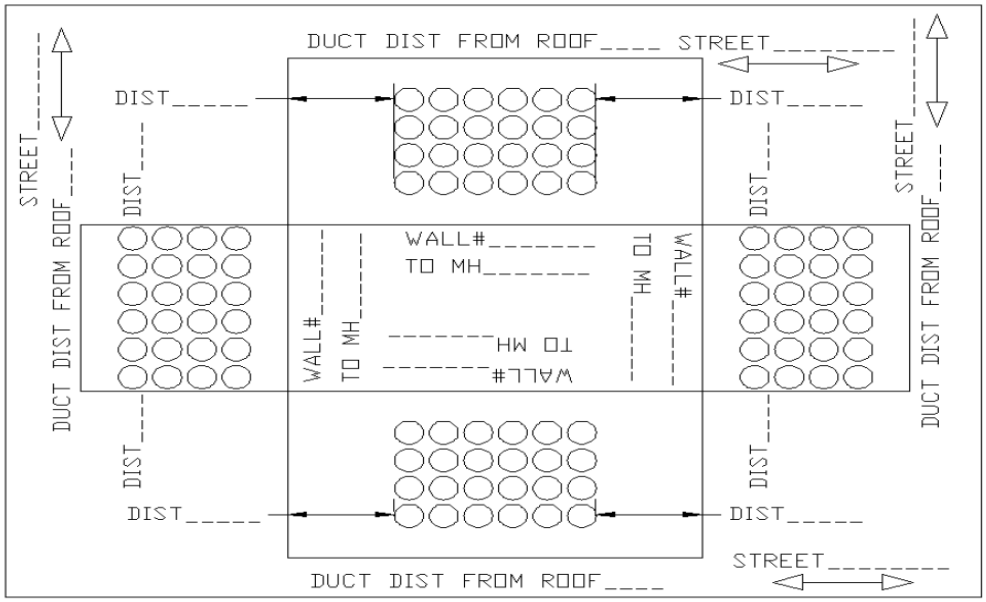
Wall #____ Conduit Material (Circle One): Fiber Tile Steel PVC Conduit Sizes____

Duct-line Configuration: Cross-out conduits in image below to illustrate configuration on each wall (2H4W example below). Additionally please fill in approximately measurements from duct-lines to roofs and walls. For multiple duct-lines, draw and note as appropriate.



Duct-line Occupancy Key:
A – Abandon Cable
E – Empty
P – Primary
S – Secondary
SL – Street Light
SV – Service Conductor
F – Fiber / Communications

When possible please note empty conduits, circuit #'s, and cable sizes.



NG0453 (08/14)

Wall # _____

Secondary Sets:

PILC: # Sets_____ Conductor Size_____ Neutral Size _____

Lead Sheathed Rubber: # Sets_____ Conductor Size_____ Neutral Size _____

EPR / Rubber: # Sets_____ Conductor Size_____ Neutral Size _____

Customer / Building Services:

Address:_____ # Sets_____ Conductor Size / Type_____ Neutral Size__

Address:_____ # Sets_____ Conductor Size / Type_____ Neutral Size__

Address:_____ # Sets_____ Conductor Size / Type_____ Neutral Size__

Address:_____ # Sets_____ Conductor Size / Type_____ Neutral Size__

Additional Comments / Other Work Required:_____

_____

Wall # _____

Secondary Sets:

PILC: # Sets_____ Conductor Size_____ Neutral Size_____

Lead Sheathed Rubber: # Sets_____ Conductor Size_____ Neutral Size_____

EPR / Rubber: # Sets_____ Conductor Size_____ Neutral Size_____

Customer / Building Services:

Address:_____ # Sets_____ Conductor Size / Type_____ Neutral Size__

Address:_____ # Sets_____ Conductor Size / Type_____ Neutral Size__

Address:_____ # Sets_____ Conductor Size / Type_____ Neutral Size__

Address:_____ # Sets_____ Conductor Size / Type_____ Neutral Size__

Additional Comments / Other Work Required:_____

_____

_____

NG0453 (08/14)

Secondary Bus Type:

Lead Wiped Secondary Splices: ☐ No ☐ Yes; if Yes # sets?_____

Crabs: ☐ No ☐ Yes

If Yes, Open Positions? ☐ No ☐ Yes # Open Positions_____

Moles: ☐ No ☐ Yes

If Yes; Open Positions? ☐ No ☐ Yes # Open Positions_____

Is there currently adequate space for Cable Limiters? ☐ Yes ☐ No

If there is not adequate space for Cable Limiters please note required work to accommodate installation (Mole Relocation, Civil Work, etc):_____

_____

Is there Cathodic Protection currently installed? ☐ Yes ☐ No

Rack Insulators Required? (Broke or Missing) ☐ Yes ☐ No If Yes, How many?_____

Environmental Cleaning Required? ☐ Yes ☐ No

Amp Measurements Per Secondary Cable:

Phase		Phase		Phase	

NG0453 (08/14)

9.0 REVISION HISTORY

Version	Date	Author(s)	Description of Revision
1.0	11/25/14		This document supersedes document dated 08/17/09.
2.0	10/01/20	JAT	Revised Introduction Section, updated contact phone numbers. Revised Accountability, revised group tittles, Deleted Definitions Section 1, Added Safety Template. All Section broke up paragraphs to subsets
3	10/27/22	JAT	Update EOP to reflect changes per Medford IA# 594928, Added to References Section Work Methods Bulletin# 22-14, 200 Amp Loadbreak Insulating Cap Installation Requirements, added language to Safety Section 1.3.1 in reference to the Inspector verifying that insulating caps are installed on all primary bushings and drain wires bonded to the system ground bus. Updated the Underground Field Survey Worksheet (Form NG-0244) to include new maintenance code 647 – Missing Insulator Cap

Appendix 12

NG-USA EOP T007.01 Transmission and Sub Transmission Ground Level Visual Inspection

Appendix 13

NG-USA EOP G017 Street Light Standard Inspection Program

INTRODUCTION

The purpose of this procedure is to outline the requirements for the inspection cycle for Street Light Standard facilities owned by National Grid. The inspection shall include identifying and reporting the physical condition of street lighting equipment on street light pole standards.

Streetlights attached to wood poles are inspected as part of the Overhead Distribution Inspection Patrol covered by NG-EOP D004.

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

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

These priority levels are defined as follows:

Level 1 An identified facility/component that shall be repaired/replaced within 30 days for (NE) and 7 days for (NY).
Level 2 Identified facility/component condition that shall be repaired/replaced within 1 year or as scheduled by Program Management in NE.
Level 3 Identified facility/component condition that shall be repaired/replaced within 3 years or as scheduled by Program Management in NE.
Level 4 This priority category is to collect inventory information on actual field conditions to be used by Investment Strategy and Work Planning.

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

1. Notification by location
   New York: Upstate Dispatch & Scheduling: 877-716-4996
   New England: Bay State West & Central Northborough Control Center: 508-421-7879
   New England: Bay State South & Ocean State Northborough Control Center: 508-421-7885

2. Detailed information provided to the regional notification location
   a. Identify yourself as a Company Inspector or Contractor for National Grid and your work reporting area.

   b. Details of the Level 1 Priority Condition
      i. Describe the facility/component condition found.
      ii. Street Address, District, Feeder No., Line No., Tax District and Pole No.
      iii. If standing by or have secured the location.
      iv. Provide any additional information that would assist in the location of facility of the problem.
3. Notify area Inspection Supervisor for follow-up.

PURPOSE

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

ACCOUNTABILITY

1. Electric Work Methods
    A. Update procedure as necessary
    B. Provide personnel guidance and assistance as requested.

2. Operations – Inspection & Maintenance
    A. Provide qualified and trained personnel as the distribution inspectors, to provide consistent and accurate data.
    B. Request assistance from Distribution Line Contracting when necessary to complete work assigned in the appropriate time frame.

3. Distribution Line Contracting
    A. At the request of Operations/Distribution Asset Management obtain, schedule, and manage contractors to perform inspections and perform required maintenance.

4. Operations Distribution Inspector
    A. Demonstrate the ability to identify streetlight maintenance items and the ability to become proficient in the use of a hand-held computer and desktop computer.
    B. Demonstrate the understanding and requirements of NG-EOP-G017.
    C. Possess the ability to do walking patrols, collect information on a handheld, download to a desk top computer, edit data, provide requested information/reports/work tickets to supervision, and track/close out work completed in the database system.

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

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

REFERENCES

All supporting documents relative to this EOP can be found on the Work Methods SharePoint site.

National Grid Safety Procedures
National Grid Employee Safety Handbook
NY PSC Order 04-M-0159 - Proceeding on Motion of the Commission to Examine the Safety of Electric Transmission and Distribution Systems. January 2015
NY PSC Order Adopting Changes to Electric Safety Standard, December 2008
Elevated Equipment Voltage NG- EOP G016

TRAINING

Training is provided by Learning and Development through the National Grid training program.

DOCUMENT CONTENTS

Table of Contents

1.0 SAFETY REQUIREMENTS

1.1 All work shall be performed in accordance with:

1.2 National Grid Employee Safety Handbook

1.3 Applicable National Grid Electric Operating Procedures (EOP)

1.4 Applicable National Grid Safety and Health Procedures (SHP). All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.

1.5 Including but not limited to: (default is not to list core PPE)

1.6 The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:

1.7 Traffic control devices – Work Area Protection

1.8 Emergency Events: communication methods (code blue), first responders, and closest hospital.

1.9 Add other specific topics to be discussed.

1.10 Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to Employee Safety Handbook Tables 2A, 2B and Appendix A for distances).

1.11 Identify if a Process Hazard Assessment (PHA) is required. Refer to NG-EOP G037 "Process Hazard Analysis"

1.12 Identify if an ARC flash assessment is required. Refer to NG-EOP G035 “ARC Flash Awareness and Mitigation” and Work Methods SharePoint site for Arc Flash Mitigation Tables to determine working distance and energy levels.

2.0 STREET LIGHT INSPECTIONS

2.1 Street Lighting inspections will be performed as foot patrols and are conducted by a qualified worker or contractor.

2.2 The foot patrols are scheduled in such a manner that street lighting facilities are inspected once every five years for both New York and New England.

2.2.1 In New York & Massachusetts, the street light standards inspections scheduled for the year shall be completed by December 31.

2.2.2 In Rhode Island, the street light standards inspections scheduled for the year shall be completed by March 31.

2.3 The Outdoor Lighting group is responsible for creating and/or revising this schedule for the respective geographic areas.

2.4 The Inspector or qualified contractor uses a Windows® based hand-held computer to record the following

2.4.1 Employee ID, region, district, street lighting installation standard number, GPS location.

2.4.2 Priority Level 1, 2, 3 and 4 maintenance items, and comments.

2.5 Outdoor Lighting maintenance codes shown in Table I.

2.6 The inspector shall place the CSS-OL label street light standard number on the facility if not found numbered during the foot patrol.

3.0 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

3.1 Luminaires:

A complete lighting unit consisting of a housing, auxiliary electrical, components, reflector/refractor and lamp socket.

3.2 Luminaire Arm:

A device used on Metal or Fiberglass pole to extend and hold the luminaire out over the roadway surface.

3.3 Pole Standards:

Metal or fiberglass pole for post style luminaries

3.4 Foundations:

A supporting structure for an anchor base pole – usually precast concrete.

TABLE I

PRIORITY 1, 2 and 3 MAINTENANCE ITEMS FOR OUTDOOR LIGHTING

Category	CODE	Default Priority	Description
Luminaire	300	3	Light "ON" Day
	301	3	Replace Lens
	302	4	Clean
	303	4	Paint
	304	4	Replace Wattage Label
	305	2	Wires Exposed
	306	2	Damaged - Replace
	307	4	Missing
	308	4	Other - Comments
Arm	320	2	Damaged - Replace
	321	4	Damaged - Repair
	322	4	Rust - Paint
	323	4	Other - Comments
Pole Standard	330	4	Structure Damage - Replace
	331	4	Damaged/Leaning - Repair
	332	4	Paint/Maintenance
	333	P	Access Cover - Replace
	334	4	Bad Wiring - Repair
	335	4	Stencil Required
	336	2	Temporary Overhead *
	337	2	Ground - Repair
	338	4	Knockdown/Missing
	339	4	Other – Comments
	344	P	Standard Repair 1 Patch
	345	P	Standard Repair 2 Patches
	346	P	Standard Repair 3 Patches
	347	P	Standard Repair Wrap material applied
	348	P	Standard Repair Angel Guard
	349	P	Knockdown Box/Cone Installed
Foundation	350	4	Damaged/Leaning - Repair
	351	4	Anchor Bolts Damaged
	352	4	Elevated - Repair
	353	4	Other - Comments
	360	4	GIS – Not Found in Field

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

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

4.0 STREET LIGHT MAINTENANCE DATABASE/REPORTS

4.1 The Street Light Maintenance Data Base consists of records downloaded from the hand-held computers and information entered from the desktop computers.

4.2 The records can be downloaded to the database through any desktop computer that is connected to the network and the inspector is logged on as a valid user of the Street Light Standard Inspection program.

4.3 The desktop computer is also used to generate various reports and work orders, depending on the user's need. These reports/work orders are utilized to schedule and accomplish distribution maintenance work.

5.0 MAINTENANCE SCHEDULE

5.1 Maintenance activities are scheduled by priority Levels.

5.2 All "Level 1 Priority" conditions identified IN NY shall be repaired/corrected within:

5.2.1 New England - 30 days

5.2.2 New York – 7 days

5.3 All "Level 2 Priority" conditions identified shall be repaired/corrected within 1 year.

5.4 All "Level 3 Priority" conditions must be repaired within 3 years. Level 4 Priority is for inventory purposes only.

5.5 Once the Street Light Patrol is completed in the Street Light Maintenance Database or 21 days have elapsed since the inspection, the Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS.

5.5.1 Expense maintenance work goes straight to scheduling.

5.5.2 Capital work goes to Distribution Design and then scheduled.

5.5.3 Level 1 Priority maintenance codes are communicated by the Distribution Inspector directly to the Inspection Supervisor for the area where the streetlight is located.

6.0 COMPLETION

6.1 The completion of Level 1 priority maintenance codes is performed by the field operations Supervisor or their designee.

6.2 Level 2 & 3 priority maintenance codes are tracked in the Street Light Maintenance database and placed into STORMS.

6.2.1 STORMS work order initiated for level 2 &3 work to be scheduled.

6.2.2 CSS-OL database is updated once the associated STORMS orders are complete for the work request associated with the maintenance code from the Street Light Database.

6.3 All maintenance work is to be completed per National grid Distribution Standards.

6.4 All maintenance work performed that was identified on the STORMS work order or discovered during the replacement/repair/correction of the original maintenance problem shall be listed in the Street Light Maintenance database and closed out when complete.

7.0 EXCEPTION APPROVALS

7.1 It is recognized that situations may arise that are not covered by this procedure:

a. In a storm or emergency event, such as an MVA, 911 call or similar situation, approval to proceed can be obtained from the below individuals, superseding section 7.3.2. These exceptions should be documented and communicated to the Work Methods and Safety Managers as soon as possible following the emergency event.

a. New York

1. Regional OH/UG Manager

2. Regional OH/UG Lead Supervisor

b. New England

1. Divisional OH/UG Manager

2. Designated “On Call” OH/UG Team Lead

3. Divisional OH/UG Lead Supervisor

Note: All individuals granting “the exception and approval to proceed’ shall be knowledgeable and proficient in the construction and operation of the Overhead or Underground electrical apparatus involved along with the associated hazards in specific duties pertaining to this electric operation procedure.

7.2 When this occurs, an exception may be approved

7.3 The person in charge of the work shall

7.3.1 Develop a work plan detailing

a. The need for an exception to the EOP

b. Additional safeguards to be employed

7.3.2 Provide the work plan to and obtain approval from all of:

a. The manager in charge of the work

b. The manager of T&D Work Methods

c. A manager from Safety

7.3.3 Alternatively, approval may be obtained from a designee of any of the above

7.4 If agreement cannot be obtained at the manager level

7.4.1 The request shall be forwarded to the Director levels

a. Director's may assign a designee

7.5 After approval is obtained

7.5.1 The work plan shall be reviewed with all workers who will participate in the job

a. All workers need to agree on the work plan

7.5.2 Document the exception on the job brief

7.6 If agreement cannot be obtained the department Steward, the Union Safety Advocate or Officer will be sought out for approval

7.7 T&D Work Methods shall publish a Memorandum documenting the approval

7.7.1 A copy of the work plan shall be included

7.7.2 Such memorandum shall be sent to all stakeholders and approvers

7.7.3 The memo shall be stored for the record

8.0 REVISION HISTORY

Version	Date	Author(s)	Description of Revision
1.0	02/16/10		This document supersedes document dated 07/25/05.
2.0	08/07/15	MGA	This document supersedes document dated 02/16/10
3.0	06/10/19	JAT	Formatting changes, broke paragraphs into subsections. Accountability Section, updated group roles/responsibilities. Updated copyright information footer. 1.0 "Safety Requirements" added, 3.0 Revised "Equipment to be tested", 7.0, New section: "Exception Approvals" added
4.0	02/01/20	JAT	Exception Approval Language
5	10/07/22	JAT	Introduction, updated Level 1 Repair for NE-30 days, added contractor when reporting a level 1; Reference: added Work Methods SharePoint Link in blue Safety Do

Appendix 14

NG-USA EOP G004 Shock Complaints

INTRODUCTION

This procedure describes the requirements for investigating and reporting on a customer's shock complaint. When investigating a shock complaint, Company field personnel shall determine if the shock was caused by faulty customer equipment, a neutral-to-earth voltage associated with the Company's distribution system, or an external DC voltage source. Regardless of the cause, a shock complaint is considered an emergency and shall be dispatched and investigated as soon as possible by the Metering Services Department. The appropriate Dispatch or Control Center shall be notified of all shock incidents by the field. Shocks that involve injury, require medical attention or are fatal, all communications shall be completed as required by National Grid Corporate Communications Department for Newsworthy Event Reports.

PURPOSE

This document details specific steps that shall be followed when National Grid receives a shock complaint call and will determine the source of the electric shock and make the conditions safe.

"

ACCOUNTABILITY

1. Distribution Work Methods
    A. Update procedure as necessary.

2. Management & Supervision
    A. Ensure the components of the procedure are implemented.
    B. Ensure workers are trained in this procedure.
    C. Provide procedure revision input as necessary.

3. Employees
    A. Demonstrate an understanding of this procedure.
    B. Comply with the requirements of this procedure.

REFERENCES

National Grid Employee Safety Handbook
National Grid Construction Standards
National Grid Safety and Health Policies & Procedures
NG-EOP G003 Dairy Farm Stray Voltage Investigation
Metering Services Department Procedure CMS02007 Shock Complaint for UNY
Metering Services Department Procedure NG0023 Warning Notice to Our Customers
National Grid OH Construction Standards

DEFINITIONS
All definitions can be found in EOP Definitions

TRAINING
Training is provided by Learning and Development through the National Grid training program.

DOCUMENT CONTENTS

Table of Contents

1.0 SAFETY

1.1 All work shall be performed in accordance with:

1.1.1 National Grid Employee Safety Handbook

1.1.2 Applicable National Grid Electric Operating Procedures (EOP)

1.1.3 Applicable National Grid Safety and Health Procedures (SHP)

1.2 All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.

1.2.1 Including but not limited to: Safety hard hat, glasses, shoes & high visibility vest

1.3 The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:

1.3.1 Traffic control devices – Work Area Protection (WAP)

1.3.2 Emergency Events: communication methods (code blue), first responders, and closest hospital.

1.3.3 Add other specific topics to be discussed to the job brief.

1.4 Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to Employee Safety Handbook Tables 2A, 2B and Appendix A for distances).

1.5 Identify if a Process Hazard Assessment (PHA) is required. Refer to NG-EOP G037 "Process Hazard Analysis"

1.6 Identify if an ARC flash assessment is required. Refer to NG-EOP G035 "ARC Flash Awareness and Mitigation and Work Methods SharePoint site for Arc Flash Mitigation Tables to determine working distance and energy levels.

2.0 ORDER PROCESSING

2.1 Regardless of the cause, all shock complaints are considered an emergency order type that requires immediate dispatch. When the Customer Contact Center (CCC) receives a call from a customer stating that a person has received a shock, the CCC:

2.1.1 Immediately transfers to Dispatch any calls from 911 officials with an associated emergency or life-threatening situation.

2.1.2 Retrieves the customer's account information and verifies the customer's account information on the Account window.

2.1.3 Informs the customer that someone needs to be present at the premise in order for the shock complaint to be investigated and informs the customer that their service may be disconnected if no one is present at the premise and a problem is detected.

2.1.4 Completes the Issue Investigation Order for Account or a Service Order (paper copy) in its entirety and faxes the completed form to the appropriate dispatch office when the Customer Service System is down.

2.1.5 Calls Dispatch office to verify receipt of the Issue Investigation Order for Account or the faxed Service Order Form.

3.0 INVESTIGATION

3.1 The individual investigating a shock complaint (field service representative) shall:

3.1.1 SHOCK"- Sensation (tingle) felt with in the human body caused by the contact between a difference in voltage potential.

3.1.2 "PSC REPORTABLE SHOCK"- A shock that occurs from human contact caused by one of the following conditions:

a. Accidental contact with National Grid owned energized components.

b. Stray voltage caused by National Grid deterioration of neutral return conductors.

c. Stray voltage caused by accidental energization of National Grid equipment.

3.1.3 Initiate Shock and/or Neutral to Earth Voltage Complaint Investigation Form NG0024 (Exhibit 1)

3.1.4 Use this form NG0024 on **every** shock complaint order, even when the individual conducting the investigation resolves the problem without involving outside departments. Form NG0024 shall be filed with local Metering Services Dept., retained for 6 years and sent to the I&M (Inspection and Maintenance) manager.

3.1.5 Make the first check with a National Grid approved voltage testing device between a known ground source and the origin of the shock.

3.1.6 If the test between the ground source and the shock location indicates higher than secondary voltages:

a. Safely evacuate customer(s) from the premise.

b. From a remote location, contact Customer Meter Services Supervisor and Upstate Dispatch and Scheduling (UDS)/ Reginal Control Center (RCC) and request Electric Operations assistance.

c. Safeguard and keep the hazardous area clear until Electric Operations provides relief.

3.1.7 If the test between ground and the source of the shock indicates secondary or lower voltages, then a DC and AC test must be completed:

a. Connect the AC-DC multi-range voltmeter (ie. Fluke 87) that provides true RMS (Root, Mean, Square) and use the DC scale to observe readings:

   i. If DC voltage is measured, the problem is with a DC source (i.e., cable TV, telephone). Inform the customer that the problem is with a source that National Grid cannot correct or check.

   ii. Record this information on the Shock and/or Neutral to Earth Voltage Complaint Investigation Form NG0024 (Exhibit 1).

   iii. Service representative or Line Crew notifies UDS or regional control center (RCC) notifies Communications Company.

b. If no DC reading, then change the setting to the AC scale on the multi-range voltmeter (such as Fluke 87) leave the voltmeter at the same shock location and observe the readings. If there is a positive AC voltage reading, then leave the voltmeter connected at this location.

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

d. Have the customer assist to open the customer's main breaker(s)/fuse(s), remove the customer meter and observe the voltmeter at the shock location.

   1. If voltage drops to zero on the voltmeter, then the problem is with the customer's equipment.

      i. Reinstall the customer meter and close main breaker(s)/fuse(s).

      ii. Have the customer assist to isolate the trouble circuit by opening each breaker/fuse one at a time until the voltage reading on the voltmeter drops to zero.

      iii. Identify equipment and wiring on troubled circuit.

      iv. Have the customer assist to isolate and disconnect troubled equipment or wiring and issue an "Electric Warning Tag" (Damaged or Defective Equipment for UNY) Form NG0023 CMS02010 Exhibit 2).

      v. The individual conducting the investigation shall inform the customer to contact a licensed electrician or appliance repair person to check out internal wiring or appliances.

      vi. Record this information on the Shock and/or Neutral to Earth Voltage Complaint Investigation Form NG0024 (Exhibit 1).

2. If the voltage does not drop to zero, implying there is a neutral to earth AC source causing the problem voltage at the shock location, each customer on the same secondary shall be disconnected in the same manner as above. Any other customers in close proximity and with a common water supply may also have to be checked. In each case, the voltmeter should remain connected at the original complainant's premise shock location and a second voltmeter shall be utilized for the other voltage readings. The following steps shall be taken:

    i. The service investigation representative shall install a 6" metal probe as a ground reference point. Referred to a probe in this EOP.

    ii. Using a second AC-DC multi-range voltmeter (Fluke 87) observe the voltmeter reading between the probe and the customer's water pipe.

    iii. If a voltage reading is between the driven ground probe and water pipe:

    iv. Keep the voltmeter at the original complainant's premise connected, then disconnect and check each customer on the same secondary, one at a time. (re-install the original customer meter prior to starting neighboring checks)

    v. As the checks for each neighboring customer are completed, if voltage reading at source premise still exists, reinstall the respective customer meter and/or re-close main breaker(s)/fuse(s). Move on to the next premise.

    vi. If voltage reading at source premise still exists after checking all necessary neighboring premises, have UDS (Upstate Dispatch & Scheduling) contact Line Department for assistance.

e. Observe the voltmeter reading between the probe and meter channel neutral.

f. If there is a voltage reading between the probe and meter channel neutral, take an additional reading with an Amp Probe to determine if there is current (greater than one ampere) on the neutral conductor.

    i. If the Amp Probe indicates current flow (greater than one ampere), contact UDS to report your findings. UDS will dispatch a line crew. Do NOT disconnect the neutral.

    ii. If the Amp Probe reading does not indicate current flow (greater than one ampere) on the neutral, then disconnect the neutral in the channel to determine whether the voltage reading is from National Grid neutral or customer neutral. (After determining the source, reconnect channel neutral).

g. If a voltage reading is between the probe and National Grid neutral, proceed in the same manner as if voltage was found on the customer's water pipe (see 2.c above)

h. If a voltage reading is between the probe and the customer neutral, it implies the problem is from a neighboring premise on a different secondary and/or transformer. This type of problem customarily occurs in rural areas where there is no common metallic water pipe system. Probable sources to look for include neighboring pool pumps, pool heaters, electric fences, backyard lighting, other wiring, etc.

i. Determine which neighboring premises might have equipment and/or facilities that could create an AC source to earth (ground) potential.

3.2 If voltage is still present after steps 1 & 2 have been completed and the voltage is AC:

3.2.1 Contact the line and meter & test departments for assistance and remain on site for their arrival.

3.2.2 Further investigation is required by the Engineering Lab in NE or the Meter and Test Department in NY per NG-EOP G003 – Dairy Farm Stray Voltage Investigation.

3.2.3 Continue to record this information on the Shock and/or Neutral to Earth Voltage Complaint Investigation Form NG0024 (Exhibit 1) and forward to the Engineering Lab in NE or the Meter and Test Department in NY. Additionally, this Form NG0024 shall be filed with local Metering Services Dept., retained for 6 years and sent to the I&M (inspection and maintenance) manager.

4.0 EXCEPTION APPROVALS

4.1 It is recognized that situations may arise that are not covered by this procedure

4.1.1 In a storm or emergency event, such as an MVA, 911 call or similar situation, approval to proceed can be obtained from the below individuals, superseding section 4.3.2. These exceptions should be documented and communicated to the Work Methods and Safety Managers as soon as possible following the emergency event.

a. New York
   1. Regional OH/UG Manager
   2. Regional OH/UG Lead Supervisor

b. New England
   1. Divisional OH/UG Manager
   2. Designated "On Call" OH/UG Team Lead
   3. Divisional OH/UG Lead Supervisor□□□□□□□□ □□□□□□□□□□□□□□

Note: All individuals granting "the exception and approval to proceed' shall be knowledgeable and proficient in the construction and operation of the Overhead or Underground electrical apparatus involved along with the associated hazards in specific duties pertaining to this electric operation procedure.

4.2 When this occurs, an exception may be approved

4.3 The person in charge of the work shall

4.3.1 Develop a work plan detailing

a. The need for an exception to the EOP
b. Additional safeguards to be employed

4.3.2 Provide the work plan to and obtain approval from all of:

a. The manager in charge of the work
b. The manager of T&D Work Methods
c. A manager from Safety

4.3.3 Alternatively, approval may be obtained from a designee of any of the above

4.4 If agreement cannot be obtained at the manager level

4.4.1 The request shall be forwarded to the Director levels

a. Director's may assign a designee

4.5 After approval is obtained

4.5.1 The work plan shall be reviewed with all workers who will participate in the job

a. All workers need to agree on the work plan

4.5.2 Document the exception on the job brief

4.6 If agreement cannot be obtained the department Steward, the Union Safety Advocate or Officer will be sought out for approval

4.7 T&D Work Methods shall publish a Memorandum documenting the approval

4.7.1 A copy of the work plan shall be included

4.7.2 Such memorandum shall be sent to all stakeholders and approvers

4.7.3 The memo shall be stored for the record

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

SHOCK AND/OR NEUTRAL TO EARTH
VOLTAGE COMPLAINT INVESTIGATION REPORT

nationalgrid

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

TEST LOCATION SKETCH

VOLTAGE READINGS

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

REMARKS

DATE:	BY:

NG0024 (11.06)

EXHIBIT 2
"Warning Notice" Form #CMS02010 NG0023

WARNING NOTICE

TO OUR CUSTOMER

_____

_____

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

- ☐ **Short in** _____
- ☐ **Defective** _____
- ☐ **Overlooked Branch Circuit**
- ☐ **General Overload**
- ☐ **Over-fused Branch Circuit**
- ☐ **Other:** _____
  _____

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

We recommend that you call your:

- ☐ **Electrical Contractor**
- ☐ **Appliance Repairman**

To make the necessary repairs

nationalgrid

_____

SERVICE REP _____

DATE _____

NG0023(01.06)

5.0 REVISION HISTORY

Version	Date	Author(s)	Description of Revision
1.0	07/14/11	BL	This document supersedes document dated 02/01/07
2.0	04/27/15	BL	This document supersedes document dated 07/14/11
3.0	10/01/19	JD	This document supersedes document dated 04/27/15, added Section 1.0 Safety
4	10/07/22	MJM	This document supersedes document dated 10/01/19. Section 1.6 removed hyperlink to arc flash tables. Section 2.1.5 changed test procedure to match up with Gas Work Methods Doc CMS02007, 3.0 Investigation section: added section on shock complaint reportable to PSC and not reportable, 4.0 added Exception section. Exhibit 2 changed form number to CMS02010 to match text Section 3.1.7 d iv

Appendix 15

NG-USA EOP G029 Tracking Temporary Repairs To Electric System

INTRODUCTION

The purpose of this procedure is to outline the steps to be taken when a temporary repair is made to the primary/secondary electric system to restore service or maintain public safety until a permanent repair can be made. Every effort should be made to make permanent repairs to the primary/secondary electric system within 90 days. For those rare exceptions when permanent repairs are not made within 90 days, special reporting and periodic site visits are required to monitor the temporary repairs until the permanent repairs are completed. In Upstate NY, Temporary residential repairs should be made permanent within ten (10) days.

PURPOSE

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

ACCOUNTABILITY

1. Electric Work Methods
    A. Update procedure as necessary.
2. Operations
    A. Ensure the components of the procedure are implemented.
    B. Ensure workers are trained in this procedure.
    C. Provide revision input as necessary.
    D. Submit Temporary Waiver Form to Customer Order Fulfillment
3. Workers
    A. Demonstrate the understanding of the procedure.
    B. Comply with the requirements of the procedure.
4. Inspections
    A. Ensure components of this procedure are implemented.
    B. Track temporary repairs identified by Inspections
    C. Provide periodic inspections of temporary repairs greater than 90 days.
    D. Compile and submit report to New York Public Service Commission (PSC).
5. Customer Order Fulfillment
    A. Administer, distribute and file Temporary Residential Connection Agreement
    B. Enter into CSS on customer account
    C. Track and enforce terms of agreement enforcing the ten (10) period for receiving electrical inspection for permanent connection or issuing a disconnect order.

REFERENCES

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

DOCUMENT CONTENTS

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1.0 TEMPORARY REPAIRS MADE BY OPERATIONS

1.1 Temporary repairs that are made by operations to restore service or maintain public safety until permanent repairs can be made should be forwarded to the Local Area Inspection Supervisor for tracking in the Maintenance Database.

1.2 Inspections Supervisor and/or his/her designee will enter the Temporary Repair into the Maintenance Database with the appropriate maintenance code and assign a priority of Level 9.

1.3 The Level 9 indicates that this is a temporary repair that shall be made permanent within 90 days.

1.4 Level 9 codes associated with a maintenance item will be assigned directly to Scheduling to be scheduled within 20 business days.

1.5 Level 9 codes that require design will be downloaded from the maintenance database and placed in the work queue of the Distribution Design Supervisor or Engineering Supervisor for the appropriate area.

1.6 Scheduling will have 20 business days to schedule the Level 9 work request to the field for completion within 90 days of the temporary repair.

2.0 TEMPORARY REPAIRS DISCOVERED BY INSPECTIONS GROUP

2.1 Temporary repairs discovered by Inspections group shall be recorded in the Maintenance Database with the appropriate maintenance code and with an assigned priority Level 9.

2.2 The Level 9 indicates that this is a temporary repair that should be made permanent within 90 days.

2.3 Level 9 codes associated with a maintenance item will be assigned directly to Scheduling to be scheduled within 20 business days.

2.4 Level 9 codes that require design will be downloaded from the maintenance database and placed in the work queue of the Distribution Design Supervisor or Engineering Supervisor for the appropriate area.

2.5 Scheduling will have 20 business days to schedule the Level 9 work request to the field for completion within 90 days of the temporary repairs.

3.0 TEMPORARY OVERHEAD REPAIRS (TOH)

3.1 Temporary overhead repairs (TOH) are utilized by operations to restore service while the underground cable that generally serves the facilities is being repaired.

3.2 TOH's that meet National Grid Overhead Standards for construction would not be considered a temporary repair that would need to be tracked under this procedure.

3.3 TOH's not meeting National Grid Overhead Standards for construction are required to be tracked under this procedure as a temporary repair and should follow the process outlined in paragraph 2.0 above.

4.0 TEMPORARY REPAIRS NOT MADE PERMANENT WITHIN 90 DAYS

4.1 Every effort should be made to make temporary repairs permanent within 90 days.

4.2 In extraordinary circumstances, which may include major storms, where permanent repairs may extend beyond 90 days (exceptions), the company shall periodically perform site visits to monitor the condition of the temporary repairs.

4.3 In Upstate New York, National Grid shall also report these exceptions as part of the reporting requirements outlined in the State of New York Public Service Commission Order 04-M-0159 Adopting Changes to Electric Safety Standards Effective December 15, 2008.

4.4 The Inspections group is responsible for tracking all temporary repairs that extend beyond 90 days.

4.5 The initial inspection should take place after 90 days and then periodic inspections should take place every 45 days until the permanent repair is made.

4.6 The Inspection supervisor should run a report from the maintenance database for open Level 9 codes.

4.7 The periodic inspection time frame lines up with the periodic inspection requirements for the elevated voltage findings requirements and could be run at the same intervals.

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

5.0 NYS PUBLIC SERVICE COMMISSION REPORTING (UPSTATE NY ONLY)

5.1 Temporary repairs that are beyond 90 days shall be identified and justified as part of the reporting requirements of the PSC Orders referenced below.

5.2 The 90-day time period commences on the day the temporary repair was made or the day the temporary repair was discovered.

5.3 The Inspections group will be responsible for consolidating the temporary repair information from operations and from the maintenance database in order to prepare the report that will be submitted to the PSC.

5.4 The report will identify the temporary repairs that exceeded 90 days, the periodic site visit information and the justification for the repair taking longer than 90 days.

5.5 The Inspections group shall file the report by February 15 each year.

6.0 TEMPORARY RESIDENTIAL SERVICE REPAIRS (UPSTATE NY ONLY)

6.1 Temporary electric service connections under emergency conditions will only be made for residential customers where the Premise Owner agrees to make permanent repairs and obtain an approved electrical inspection of the repairs within ten (10) business days.

6.1.1 An exception may be permitted by the Customer Fulfillment Department for extension as a result of major storms.

6.1.2 Temporary residential services repairs are valid for no more than 10 business days.

6.2 A Temporary Residential Electric Service Connection Agreement (Agreement) (See Appendix A) must be executed by the Owner, or their designee and a National Grid employee prior to installation of a temporary service.

6.3 Temporary residential electric service connections shall only be made under the following conditions:

6.3.1 When inspection agency services are not available.

6.3.2 In the event of customer-owned equipment failure when electrical repair services are not available, such as:

a. Failure of the residential customer's overhead service attachment bracket.

b. Loss of customers service conductors (service entrance cable or underground service cable) between the service point and their service equipment.

6.3.3 Under no circumstances shall National Grid employees work on customer-owned equipment including, but not limited to, replacing service attachment brackets or performing any repairs on service equipment or meter sockets.

6.3.4 In the event of an emergency such as fire, flood, weather, or earth-related catastrophe, unless ordered otherwise by the local Fire Marshall.

6.4 Copies of the executed Agreement shall be distributed in accordance with the copy distribution outlined at the bottom of the Agreement. It will be the responsibility of the Customer Fulfillment Department to track and enforce the terms of the executed Temporary Residential Electric Service Connection Agreement.

6.5 Temporarily residential services are not subject to NY Public Service Commission Reporting requirements.

7.0 REVISION HISTORY

Version	Date	Description of Revision
1.0	05/07/10	This is a new document.
2.0	04/19/18	Updated entire document to new format. Added Safety, Temporary Residential Service Repair (Upstate NY Only) and Exception Sections.
3.0	04/01/20	This document supersedes 2.0 dated 04/19/18. Remove Exception Approval, N/A Remove Safety Section, N/A

APPENDIX A

nationalgrid

Niagara Mohawk Power Corporation D/B/A National Grid

Temporary Residential Electric Service Connection Agreement

Subject to the terms and conditions of this Temporary Residential Electric Service Connection Agreement (the "Agreement"), Niagara Mohawk Power Corporation d/b/a National Grid (the "Company") agrees to temporarily reconnect this residential electric service at the Service Address specified below (the "Service Reconnection") for no more than ten (10) business days while the Owner secures the services of an electrician to make permanent repairs to the electric service (the "Repairs") and obtains an approved electrical inspection of those Repairs [unless either party is ordered otherwise by the Fire Marshall, Municipal Code Enforcement Agent, Authority Having Jurisdiction (AHJ), or a third party inspection agency operating under the authority of the AHJ.]

In consideration for the Company's implementation of the Service Reconnection, the Owner acknowledges and agrees to the following:

1. The Service Reconnection is a temporary service connection of an emergency nature and is not intended for the permanent or continued provision of service; and
2. The Company will disconnect the Service Reconnection if permanent Repairs are not made and an approved inspection thereof is not received within ten (10) business days of the Effective Date listed below; and
3. All Repairs must be inspected by the AHJ, or a third-party inspection organization acceptable to the AHJ within ten (10) business days of the Effective Date listed below; and
4. The Company is not responsible for any damages incurred as a result of the Service Reconnection or otherwise in connection with this Agreement; and
5. Any potential damage to the Owner's premises or otherwise that may occur as a result of the Service Reconnection without an approved inspection certificate may jeopardize the Owner's eligibility for fire and casualty insurance.
6. The Owner has read and understands the terms and conditions of this Agreement, which continue on the next page.

Owner Initials _____

Temporary Residential Service Address / Service City / Zip Code	
Effective Date _____/_____/_____	**Repair and Inspection Deadline Date** _____/_____/_____
Owner Name (Print)	**Owner Name (Signature)**
Owner Contact Telephone Number	
Owner's Electrician (to Make Repairs)	**Electrical Inspection Agency**
Company Employee Name (Print)	**Company Employee Name (Signature)**

Page 1 of 2

White Copy: Customer Fulfillment (Email: CFNY@nationalgrid.com) **Canary Copy:** Electrician **Pink Copy:** Owner **Goldenrod Copy:** OMS / Distribution Line

APPENDIX A

nationalgrid

Terms and Conditions

1. **RELEASE AND DISCLAIMERS:** This Agreement is limited to emergency temporary electric service connections made by the Company at Owner's request when electrical repair and inspection agency services are not readily available due to emergencies arising from accidental damage, weather, or earth-related catastrophes.

   THE SERVICE RECONNECTION IS BEING MADE AT OWNER'S EXPRESS REQUEST AND SHALL BE AT OWNER'S SOLE AND EXCLUSIVE RISK AND LIABILITY. OWNER FOREVER WAIVES, RELEASES AND DISCHARGES THE COMPANY, ITS PARENTS AND AFFILIATES, AND THEIR RESPECTIVE OFFICERS, DIRECTORS, MEMBERS, MANAGERS, EMPLOYEES, SERVANTS, REPRESENTATIVES, CONTRACTORS, AGENTS, SUCCESSORS, AND ASSIGNS (EACH, INDIVIDUALLY, A "COMPANY PARTY" AND, COLLECTIVELY, THE "COMPANY PARTIES") FROM ANY AND ALL CLAIMS, SUITS, CAUSES OF ACTION AND/OR LIABILITY WHATSOEVER (INCLUDING, WITHOUT LIMITATION, LIABILITY FOR ANY LOSS, INJURY, OR DAMAGE FOR DEATH, PERSONAL INJURY OR PROPERTY DAMAGE) WHICH THE OWNER MAY NOW OR HEREAFTER HAVE AGAINST THE COMPANY AND/OR ANY COMPANY PARTY ARISING OUT OF OR RELATING TO THE SERVICE RECONNECTION OR THIS AGREEMENT. OWNER HEREBY ASSUMES ANY AND ALL RISK AND LIABILITY OF ANY KIND ARISING FROM OR IN CONNECTION WITH THE SERVICE RECONNECTION OR THIS AGREEMENT.

   In no event, whether as a result of breach of contract, tort (including negligence and strict liability), or otherwise shall Company be liable in connection with this Agreement or the Service Reconnection for any special, indirect, incidental, penal, punitive or consequential damages of any nature, whether or not (i) such damages were reasonably foreseeable or (ii) Company was advised or aware that such damages might be incurred. The provisions of this Section shall survive termination, expiration, cancellation, or completion of this Agreement.

2. **NO WARRANTIES OR REPRESENTATIONS:** COMPANY MAKES NO COVENANTS, GUARANTEES, REPRESENTATIONS OR WARRANTIES, WRITTEN OR ORAL, STATUTORY, EXPRESS OR IMPLIED, WITH RESPECT TO THE SERVICE RECONNECTION OR THIS AGREEMENT (INCLUDING, WITHOUT LIMITATION, ANY COVENANTS, GUARANTEES, REPRESENTATIONS OR WARRANTIES WITH RESPECT TO QUALITY, SAFETY, SUITABILITY OR FITNESS FOR A PARTICULAR PURPOSE, THE ABSENCE OF ANY DEFECTS, WHETHER LATENT OR PATENT, OR COMPLIANCE WITH ANY FEDERAL, STATE OR LOCAL LAWS, RULES, REGULATIONS OR ORDINANCES) ALL OF WHICH ARE HEREBY EXPRESSLY EXCLUDED AND DISCLAIMED. THIS AGREEMENT (INCLUDING, WITHOUT LIMITATION, ANY PERFORMANCE HEREUNDER) DOES NOT CONSTITUTE AN ELECTRICAL INSPECTION NOR DOES IT REPRESENT ANY RECOMMENDATION ON THE PART OF THE COMPANY REGARDING IMPLEMENTATION OF THE SERVICE RECONNECTION.

   The provisions of this Section shall survive termination, expiration, cancellation, or completion of this Agreement.

3. **HOLD HARMLESS:** To the fullest extent permitted by applicable law, Owner shall at all times indemnify, defend (with counsel satisfactory to Company), and hold the Company, its parents and affiliates, and their respective officers, members, managers, directors, employees, servants, representatives, contractors, agents, successors, and assigns, harmless from and against any and all damages, costs (including, without limitation, reasonable attorney fees), expenses, losses, claims, demands, suits, recoveries, and liabilities(including, without limitation, liabilities to third parties and liabilities related to injury to, or death of, any person and damage to property), arising out of or relating to this Agreement, the Service Reconnection or the Company's performance or nonperformance of its obligations under this Agreement.

   Owner shall take prompt action to defend and indemnify Company, its affiliates, parents, and their respective officers, members, managers, directors, employees, servants, representatives, contractors, agents, successors, and assigns, against claims, actual or threatened, but in no event later than notice by Company to Owner of the service of a notice, summons, complaint, petition or other service of process against Company alleging damage, injury, liability, or expenses that may be subject to indemnification hereunder. The Owner shall defend any such claim or threatened claim, including as applicable, engagement of legal counsel satisfactory to the Company, to respond to, defend, settle, or compromise any claim or threatened claim. Furthermore, Owner understands and agrees that it is responsible for any and all costs and expenses incurred by Company to enforce this indemnification provision.

   The provisions of this Section shall survive termination, expiration, cancellation, or completion of this Agreement.

4. **MISCELLANEOUS:** This Agreement shall not be amended, superseded or modified, except in a writing signed by both parties. No term of this Agreement may be waived except in a writing signed by an authorized representative of the party against whom the amendment, modification, or waiver is sought to be enforced. Waiver of any provision herein shall not be deemed a waiver of any other provision herein, nor shall waiver of any breach of this Agreement be construed as a continuing waiver of other breaches of the same or other provisions of this Agreement. To the extent that any provision of this Agreement shall be held to be invalid, illegal or unenforceable, it shall be modified so as to give as much effect to the original intent of such provision as is consistent with applicable law and without affecting the validity, legality or enforceability of the remaining provisions of the Agreement. This Agreement shall be interpreted and enforced according to the laws of the State of New York and not those laws determined by application of New York's conflicts of law principles. Owner and Company each agree that there are no understandings, agreements, or representations, expressed or implied, with respect to the subject matter hereof other than those expressed herein. This Agreement supersedes and merges all prior discussions and understandings with respect to the subject matter hereof, and constitutes the entire agreement between the parties with respect to such subject matter.

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Appendix 16

Certifications

CERTIFICATION
STRAY VOLTAGE TESTING

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

Matthew T. Barnett, on this 14th day of February 2023, certifies as follows:

1. I am the Vice President, Maintenance and Construction, New York Electric, of Niagara Mohawk Power Corporation d/b/a National Grid (the "Company"), and in that capacity I make this certification for the annual period ending December 31, 2022 (the "Twelve-Month Period") based on my knowledge of the testing program adopted by the Company in accordance with the Public Service Commission's Orders issued and effective January 5, 2005, July 21, 2005, December 15, 2008, March 22, 2013, and January 13, 2015 in Case 04-M-0159 (collectively the "Orders"), including the Quality Assurance Program filed by the Company with the Commission.

2. In accordance with the requirement of the Orders, the Company developed a program designed to test (i) all publicly accessible underground electric distribution facilities owned by the Company ("Underground Distribution Facilities") on an annual basis, (ii) all metallic streetlights and traffic signal poles located in public thoroughfares in the Company's service territory to which the Company provides service ("Streetlights") on an annual basis, and (iii) all publicly accessible overhead distribution facilities, underground

residential distribution ("URD") facilities, overhead and underground transmission facilities, and substation fences owned by the Company at least once every five years ("Facilities"), all as identified through a good faith effort by the Company for stray voltage (the "Stray Voltage Testing Program").

3. I am responsible for overseeing the Company's Stray Voltage Testing Program.

4. I hereby certify that, to the best of my knowledge, information, and belief the Company has implemented and completed its Stray Voltage Testing Program for the Twelve Month Period. Except for untested structures that are identified as inaccessible in the Company's Annual Report and those Facilities that were already tested at least once during the five-year period ended December 31, 2022, the Company is unaware of any Facilities, Underground Distribution Facilities, or Streetlights that were not tested during the Twelve-Month Period in accordance with the Stray Voltage Testing Program.

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

Distribution Facilities, and Streetlights were known to exist or reasonably expected to be found.

Matthew T. Barnett

Sworn to before me on this 14th day of February, 2023

Notary Public:

Remo Muscedere
Notary Public State of New York
Qualified in Schenectady Co. No. 01MU6087843
My commission expires February 24, 2027

CERTIFICATION
FACILITY INSPECTIONS

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

Matthew T. Barnett, on this 14th day of February 2023, certifies as follows:

1. I am the Vice President, Maintenance and Construction, New York Electric, of Niagara Mohawk Power Corporation d/b/a National Grid (the "Company"), and in that capacity I make this certification for the annual period ending December 31, 2022 (the "Twelve-Month Period") based on my knowledge of the inspection program adopted by the Company in accordance with the Public Service Commission's Orders issued and effective January 5, 2005, July 21, 2005, December 15, 2008, March 22, 2013, and January 13, 2015 in Case 04-M-0159 (collectively the "Orders"), including the Quality Assurance Program filed by the Company with the Commission.

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

3. I am responsible for overseeing the Company's Facility Inspection Program.

4. I hereby certify that, to the best of my knowledge, information, and belief the Company has implemented and completed its Facility Inspection Program to inspect approximately 20% of its Facilities during calendar year 2022, to comply with the five-year inspection cycle required under the Orders.

5. I further certify that, to the best of my knowledge, information, and belief, the Company has inspected 100% of its Facilities for the five-year period ended December 31, 2022, except for those identified in the Company's Annual Report.

Matthew T. Barnett

Sworn to before me on this 14th day of February, 2023

Notary Public:

Remo Muscedere
Notary Public State of New York
Qualified in Schenectady Co. No. 01MU6087843
My commission expires February 24, 2027