Raquel J. Webster
Senior Counsel

September 18, 2019

BY HAND DELIVERY AND ELECTRONIC MAIL

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

RE: Docket 4237 - National Grid 2019 Contact Voltage Annual Report

Dear Ms. Massaro:

Pursuant to R.I. Gen. Laws § 39-2-25 and the Rhode Island Public Utilities Commission's (PUC) Order No. 20950 in Docket 4237, I have enclosed The Narragansett Electric Company's[1] 2019 Contact Voltage Annual Report.

The Annual Report includes the following nine sections:

- Section 1: Background and summary;
- Section 2: Summary of the Company's mobile surveying and testing results of designated contact voltage risk areas (DCVRAs);
- Section 3: Contact Voltage Program costs;
- Section 4: Details regarding calls to the Company's Shock Line;
- Section 5: Copy of the Company's current emergency operating procedure (EOP)-G016;
- Section 6: Additional information on the Company's total harmonic distortion (THD) pilot program results;
- Section 7: The Company's recommendation for the percentage of DCVRAs;
- Section 8: Summary of the Company's latest understanding of the current state of electrical standards and mobile equipment technology; and
- Section 9: Summary of the Company's Recommendations for the FY 2020 Contact Voltage Program.

[1] The Narragansett Electric Company d/b/a National Grid (the Company).

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Thank you for your attention to this filing. If you have any questions, please contact me at 781-907-2121.

Very truly yours,

Raquel J. Webster

Enclosure

cc: Docket 4237 Service List
John Bell, Division
Leo Wold, Esq.

Certificate of Service

I hereby certify that a copy of the cover letter and any materials accompanying this certificate was electronically transmitted to the individuals listed below.

The paper copies of this filing are being hand delivered to the Rhode Island Public Utilities Commission and to the Rhode Island Division of Public Utilities and Carriers.

Joanne M. Scanlon

September 18, 2019
Date

Docket No. 4237 – Commission's Proceeding Relating to Stray and Contact Voltage Pursuant to Enacted Legislation Service List updated 10/4/18

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The Narragansett Electric Company
d/b/a National Grid

Rhode Island
2019 Contact Voltage Annual Report

Submitted to:
Rhode Island Public Utilities Commission
RIPUC Docket No. 4237

Submitted by:

nationalgrid

Table of Contents

Glossary of Terms

Term	Definition
Contact Voltage	A voltage resulting from abnormal power system conditions that may be present between two (2) conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals.
Designated Contact Voltage Risk Areas (DCVRA)	Boundaries of areas approved by the Rhode Island Public Utilities Commission in Docket No. 4237 and subsequent proceedings that are based upon the presence of underground electric distribution and situated in pedestrian-dense areas such as neighborhoods, commercial areas, central business districts, tourist-heavy locations, and other places where pedestrians could be exposed to contact voltage.
Guarded – Made Safe	Guarded – Made Safe is defined as an asset being guarded by a person or a protective barrier that prevents public contact if the elevated voltage found is greater than 4.5 volts. If the voltage measures greater than 4.5 volts and less than 8 volts, it is either guarded in person or by installation of a protective barrier that prevents public contact. If the voltage measurement is greater than 8 volts, it is guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities; in this instance, an immediate maintenance and repair response is required.

Investigatory Mobile Survey Stop	A stop during a survey where the mobile detection device indicated evidence of elevated voltage (greater than zero (0) volts) and a stop was made to survey for elevated voltage with manual instruments (pen detector). All metallic devices within 30 feet are tested manually for elevated voltage at each stop. The Investigatory Mobile Survey Stop may or may not discover an asset with elevated voltage.
Mobile Event	An Investigatory Mobile Survey Stop where elevated voltage (greater than zero 0 volts) was discovered on an asset (either company or customer-owned). These Mobile Events are divided into three categories: (1) those with readings below 1 volt, (2) those having elevated voltage between 1 volt and 4.5 volts, and (3) those having elevated voltage readings 4.5 volts or greater. The readings above reflect the actual voltage determined by manual shunt meter testing of the asset.
Post-Mitigation Manual Testing	Manual elevated voltage testing performed on assets which had a voltage of greater than 1 volt in the prior year's mobile testing and were subsequently mitigated.
Quality Assurance Manual Testing	Manual elevated voltage testing performed on a random sample of assets in the Designated Contact Voltage Risk Areas after the mobile survey is performed.
Total Harmonic Distortion (THD) Contact Voltage Testing	THD is determined by the use of a Fluke power quality clamp meter or a Fluke scope meter during an investigatory Mobile Survey Stop. THD contact voltage testing applies to any voltage measures greater than 1 volt and less than 4.5 volts that had a total harmonic distortion of less than 10%. A THD of less than 10% will be considered as contact voltage for Mobile testing.

Section 1

Background and Summary

Section 1 - Background and Summary

On June 6, 2012, the Rhode Island Contact Voltage statute, R.I. Gen. Laws § 39-2-25, was signed into law. That statute directed the Rhode Island Public Utilities Commission (PUC) to establish a contact voltage detection, repair, and reporting program, which would be applicable to National Grid.[1] On November 9, 2012, the PUC issued an order (Program Order)[2] approving the Company's amended contact voltage program (Contact Voltage Program). The Program Order established thirteen (13) Designated Contact Voltage Risk Areas (DCVRA)[3] for the State of Rhode Island and directed the Company to conduct testing and surveys for contact voltage on all conductive surfaces in public right-of-ways identified within these DCVRAs.

On February 1, 2013, the PUC issued a subsequent order (Compliance Order)[4] that directed the Company to complete its initial testing and surveying of all thirteen (13) DCVRAs in the first year. The Compliance Order further required the Company to file the findings and results of this testing in an annual report (Contact Voltage Annual Report) by no later than September 1, 2013. The Contact Voltage Annual Report must identify the specific elevated voltage events found during surveying and testing and explain the appropriate remedial action taken by the Company to ensure public safety. The Compliance Order also required the Company, after the findings and results of its survey and testing were reviewed, to provide the

1 The Narragansett Electric Company d/b/a National Grid (National Grid or Company).
2 Written Order No. 20871 (issued on November 9, 2012 in Docket No. 4237).
3 The initial thirteen DCVRAs include Newport, Pawtucket, Woonsocket, and ten designated sections in the City of Providence (College Hill, Downtown, Elmwood, Federal Hill, Lower South Providence, Olneyville, Smith Hill, Upper South Providence, Washington Park, and West End). As noted below, a section of Westerly has been added as a fourteenth DCVRA.
4 Written Order No. 20950 (issued on February 1, 2013 in Docket No. 4237).

PUC with a recommendation of the specific DCVRAs to be surveyed and tested in the next year of the program. Finally, the Compliance Order further directed the Company to keep the PUC apprised of any advances in elevated voltage mobile technology as part of its Contact Voltage Annual Report.

The PUC directed that the Contact Voltage Annual Report must be provided in Excel or searchable PDF format and must include the information below by DCVRA.[5] Exhibit 1 provides a searchable Excel file that includes the following information for each mobile event recorded during testing:

1. A record number for each contact voltage event (*Exhibit 1, Column (a)*)
2. The date and time of the testing (*Exhibit 1, Columns (b),(c)*)
3. The specific location of the testing (*Exhibit 1, Columns (d),(f),(g),(h),(i),(j)*)
4. An identification of whether it was a Company or customer asset (*Exhibit 1, Column (p)*)
5. The type of the equipment that failed (*Exhibit 1, Columns (n),(o)*)
6. The voltage recorded (*Exhibit 1, Columns (k),(l),(m)*)
7. Whether there was any personal injury to public, pet or property damage (*Section 4*)[6]
8. An identification of any other equipment involved (*Exhibit 1, Columns (n),(z)*)
9. Whether there were any prior incidents for the last five years at that location (*Exhibit 1, Column (u)*)
10. The corrective actions taken at the location (*Exhibit 1, Column (e),(z)*)
11. The number of customers if service is interrupted (*Exhibit 1, Column (s)*)
12. The duration of the interruption (*Exhibit 1, Column (t)*)
13. A summary of the investigation into the cause of the incident (*Exhibit 1, Column (z)*); and
14. The date when corrective action was taken and the date on which repairs were made (i.e. temporary and final) (*Exhibit 1, Columns (y),(aa),(ab),(ac),(ad)*)

[5] Program Order at 28-29.
[6] Reports of any injury to the public, pets or property are reported in Section 4 below.

In addition, the PUC further directed that the Contact Voltage Annual Report also include information concerning:[7]

1. The aggregated costs of repair for each contact voltage event by DCVRA (*Section 3*)
2. The number of calls to the Shock Line (*Section 4*)
3. Any additional back-up information currently included in Section 7.3[8] of the Company's current EOP-G016 (*Section 5 and Exhibit 3*)
4. A recommendation on whether any DCVRA should be added or modified with a specific rationale supporting the recommendation (*Section 7*)
5. A recommendation of which DCVRAs should comprise the 20 percent to be tested in the next year (*Section 7*); and
6. Any updates the Company discovered concerning the standards (IEEE) and advances in equipment technology (*Section 8*)

On March 31, 2014, the PUC approved the Company's FY 2013 Contact Voltage Annual Report in Docket No. 4237-A and subsequently issued an order (First Annual Report Order)[9] that amended the Company's Annual Contact Voltage Report to include:[10]

1. The addition of a section of Westerly as a fourteenth DCVRA *(Section 2)*
2. The estimated number of mobile survey stops (*Section 2*)
3. A glossary and listing of terminology in the report (*Glossary of Terms*)
4. A summary of mobile survey events and readings (*Section 2, Table 1 and Table 2*); and
5. The inclusion of before and after readings for the Company's Total Harmonic Distortion (THD) pilot program (*Exhibit 1, Column (ac) and Section 6, Table 7 and Table 8*)

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7 Program Order at 28-29, Compliance Order at 8-9.

8 The Program Order directed the Company to include additional back-up information included in Section 7.2 of the Company's EOP-G016, Version 1. This EOP has since been revised (Version 3, attached as Exhibit 3) to include section 7.3, which includes the back-up information applicable for mobile elevated voltage testing to be include in the Annual Report.

9 Written Order No. 21414 (issued on March 31, 2013 in Docket No. 4237-A).

10 First Annual Report Order at 8-9.

On December 16, 2014, the PUC approved the Company's FY 2014 Contact Voltage Annual Report in Docket No. 4237 and subsequently issued an order (Second Annual Report Order)[11] that directed the Company's Contact Voltage Annual Report to address the following:[12]

1. Implement follow-up scans in DCVRAs where remediation work was completed before the next annual mobile survey to verify that the objects found and repaired were fully addressed. (*Section 2 - Post-Mitigation Manual Testing, Exhibit 2*)
2. Implement a process where random objects are selected in each DCVRA; and manually tested for contact voltage following the mobile testing. (*Section 2 - Quality Assurance Manual Testing*)[13]

Similar to last year's Contact Voltage Annual Report, the Company has incorporated these modifications into the charts and exhibits within this filing.

Additionally, on March 14, 2016, the PUC approved the Company's FY 2015 Contact Voltage Annual Report in Docket No. 4237, and subsequently issued an order (Third Annual Report Order)[14] that approved a modified mobile testing schedule proposed by the Company, where mobile surveying and testing will now occur in the April-June timeframe.

Section 2 of the Contact Voltage Annual Report provides a summary of the Company's surveying and testing results of the fourteen (14) DCVRAs for the period of April 1, 2018 to March 31, 2019. Section 3 provides a preliminary summary of the aggregate costs of the Contact Voltage Program (#1 above). Section 4 provides a fiscal year list of calls to the Company's Shock Line and reports of any injury to the public, pets or property (#2 and #7 above). Section 5

[11] Written Order No. 21780 (issued on December 16, 2014 in Docket No. 4237).
[12] Second Annual Report Order at 6.
[13] As noted in the Company's 2017 Contact Voltage Annual Report, which the Company filed with the PUC on July 28, 2017, the Company will no longer perform post-mobile survey audit testing to spot verify the accuracy of the mobile technology.
[14] Written Order No. 22357 (issued on March 14, 2016 in Docket No. 4237).

includes a copy of the Company's current EOP-G016 (#3 above and Exhibit 3).[15] Section 6 provides additional information on the results of the Company's total harmonic distortion (THD) pilot program, which the PUC approved in the First Annual Report Order. Section 7 includes the percentage of DCVRAs to be completed FY20. (#4 and #5 above). Section 8 provides the current state of electrical standards and elevated voltage mobile equipment technology (#6 above).

[15] In Section 5 of Exhibit 3, item 5.4.1 has changed from Narda 8950/10 Stray Voltage system to Electric Field Solutions Voltage Detection System.

Section 2

Mobile Survey and Testing Results

Section 2 - Mobile Survey and Testing Results

In compliance with the First Annual Report Order, TRC (Formerly Willbros Engineers (U.S.), LLC. (Willbros), which previously performed mobile contact voltage testing under its subsidiary, Premier Utility Services, LLC (Premier), conducted the surveying and testing of 20% of previous established DCVRAs over the period of March 18, 2019 to March 20, 2019. TRC conducted all surveying and testing at nighttime to include the testing of street lights. In total, the surveying and testing covered approximately 21 miles.[16] Contractor(s) hired by municipalities to perform repair/mitigation work shadowed the Company/TRC performing the survey and testing and were available to immediately mitigate any elevated voltage findings discovered during the surveying and testing. If the site was customer-owned, the owner was notified by the Company, and appropriate action was taken to ensure public safety at that location.

In addition, the testing in each DCVRA included the THD pilot during which any voltage measure greater than 1 volt and less than 4.5 volts that had a total harmonic distortion of less than 10 percent was considered contact voltage. There were zero (0) mobile events recorded, and, therefore, no locations for the municipal's hired contractor to remediate THD was determined by the use of a Fluke power quality clamp meter or a Fluke scope meter.

There were zero (0) mobile events recorded during the mobile scanning survey having 1 volt or greater. These findings are a reduction from the four (4) mobile events recorded during

[16] The 21 miles includes all mileage driven to survey. This includes both sides of a street and not only linear mileage.

the FY2018 mobile survey, the eight (8) mobile events recorded during the FY2017 mobile survey, the twenty-six (26) mobile events recorded during the FY 2016 mobile survey, and the nineteen (19) mobile events recorded during the FY 2015 mobile survey.

Table 1 below summarizes the FY 2019 mobile survey and provides the dates of testing, number of estimated investigatory mobile survey stops, and number of mobile events by shunt voltage readings.

Table 1
Mobile Events by DCVRA

DCVRA	Dates Tested	Estimated Investigatory Mobile Survey Stops	Mobile Events	Readings < 1 Volt	Readings > 1 Volt but < 4.5 Volts		Readings >= 4.5 Volts	
				Customer and Company Asset	Customer Asset	Company Asset	Customer Asset	Company Asset
PROVIDENCE								
College Hill	03/18/19 – 03/20/19							
Downtown	03/18/19 – 03/20/19	23	23	23				
Elmwood	03/18/19 – 03/20/19	2	2	2				
Federal Hill	03/18/19 – 03/20/19							
Lower So. Prov.	03/18/19 – 03/20/19							
Olnyville	03/18/19 – 03/20/19							
Smith Hill	03/18/19 – 03/20/19							
Upper So. Prov.	03/18/19 – 03/20/19							
Washington Park	03/18/19 – 03/20/19	5	5	5				
West End	03/18/19 – 03/20/19	2	2	2				
NEWPORT	03/18/19 – 03/20/19							
PAWTUCKET	03/18/19 – 03/20/19							
WESTERLY	03/18/19 – 03/20/19							
WOONSOCKET	03/18/19 – 03/20/19							
Total		**32**	**32**	**32**				

As shown in Table 1, during the mobile survey, thirty-two (32) stops were made to investigate elevated voltage readings where the mobile detection system indicated increased electric field strength in the area surveyed. All available conductive objects and surfaces in the location were tested, and all of these mobile events resulting in a finding of no actionable voltage on a conductive object or surface. Overall, many additional manual checks were made on objects and assets over the three-day scanning period.

Table 2 provides the same detail on mobile events as in Table 1, but by Asset Type. As shown in Table 2, streetlights are responsible for the majority of elevated voltage readings. This is consistent with the results from the FY 2013, FY 2014, FY 2015, FY 2016, FY 2017, and FY2018 mobile surveys.

Table 2
Mobile Events by Asset Type

Asset Type	Mobile Events	Readings less than 1 Volt	Readings Greater than 1 Volt but less than 4.5 Volts		Readings Greater than 4.5 Volts	
		Customer and Company Asset	Customer Asset	Company Asset	Customer Asset	Company Asset
Streetlight	17	17				
Traffic Control Box						
Private Lighting	2	2				
Traffic Standard						
No Parking Sign						
Store Fronts	8	8				
Other	5	5				
Total	**32**	**32**				

Table 3 provides a comparison of the number of mobile events by voltage level, found in the FY 2018 and FY 2019 mobile surveys.

Table 3
Comparison of Number of Mobile Events FY 2018 to FY 2019

Number of Mobile Events	FY 2018	FY 2019
Readings less than 1 Volt	9	32
Readings Greater than 1 Volt but less than 4.5 Volts	2	0
Readings Greater than 4.5 Volts	2	0
Total	**13**	**32**

Manual Surveying and Testing Results

As previously noted, in the Second Annual Report Order, the PUC directed the Company to conduct additional testing as part of the Contact Voltage Program and to provide the results in the Contact Voltage Annual Report. This included manually performing post mitigation testing in the areas where previous remediation work was completed before the 2019 mobile survey to ensure that the repairs were addressed. For FY18, no assets required post mitigation testing because we found no company owned assets that needed mitigation.

Section 3

Contact Voltage Program Costs

Section 3 - Contact Voltage Program Costs

The cost to perform the mobile survey, post-mitigation manual testing, and quality assurance manual testing in 20% of previous established DCVRAs was $80,000. There were no repairs required during the FY 2019 contact voltage surveying and testing; therefore, the cost was $0. The aggregate contact voltage testing and repair costs for each DCVRA are included in n Table 4 below. The total cost for the FY 2019 contact voltage testing and repair was $80,000. The Company will reconcile this cost as part of its FY 2019 Electric Infrastructure, Safety, and Reliability Plan Reconciliation Filing, which the Company submitted to the PUC on August 1, 2019.

Table 4
Aggregate Contact Voltage Testing and Repair Costs

DCVRA	Repair Costs (Company Locations)	Mobile Survey, Post-Mitigation Manual Testing
Newport	0	
Pawtucket	0	
College Hill	0	
Downtown	0	
Federal Hill	0	
Lower South Providence	0	
Smith Hill	0	
Woonsocket	0	
Total	**$0**	**$80,000**
Grand Total		

Section 4

Shock Line Calls

Section 4 - Shock Line Calls

As previously noted, the Compliance Order directed the Company to report annual calls to its Shock Line. Shock Line calls to the Company record an event of elevated voltage reported by the either the public or other entities such as another utility. For the period April 1, 2018 to March 31, 2019, the Company received four calls of elevated voltage to its Shock Line. The Company responded to these calls by testing for elevated voltage, mitigating conditions where necessary, and repairing facilities as needed. In addition, if the asset was customer-owned, the Company notified the customer and informed them of any actions the Company planned to take to remedy the issues. There were no reported personal injuries or damages to property from any of these incidents.

Table 5
Shock Line Calls

Date	Town	Street	Asset	Voltage Found	Owner	Injury
03/24/2019	North Kingstown	Boston Neck Rd	Other Customer Owned Equipment	70 Volts	Customer	No
07/20/2018	Warwick	Sleepy Hollow Farm Rd		0.2 Volts	Other Company /Municipality	No
06/07/2018	Exeter	397 New London Tpke	Other Customer Owned Equipment	8 Volts	Customer	No
05/24/2018	Burrillville	Douglas Pike	Wood Pole	5 Volts	Company	No

Recorded elevated voltage in the range of 3.0 Volts to 70 Volts in the area of 1656 Boston Neck Rd, North Kingstown R.I. National Grid concluded that the cause was improperly grounded customer equipment. The customer has been instructed to install earth grounds.

Cox Communications reported 2 volts detected on cable wire at 174 Sleepy Hollow Farm Road in Warwick, Rhode Island. After disconnecting all wires, National Grid took a reading of 0.2 Volts. Cox Communications returned, re-tested and reported no elevated voltage. National Grid found no evidence of a problem at this location.

National Grid recorded elevated voltage on a customer's hot tub at 397 New London Turnpike in Exeter, Rhode Island. The reading taken was 8 Volts. National Grid opened up the capacitor bank. The voltage reading recorded after the capacitor bank was taken off line was 0 Volts.

A Cox Cable technician reported elevated voltage at 405 Douglas Pike in Burrillville, Rhode Island. National Grid tested and measured 5 Volts. National Grid re-bonded the ground at the pole. National Grid retested with a resistor and measured below the threshold at 2.5 Volts.

Section 5

Company EOP-G016

Section 5 - Company EOP-G016

There have been no additional updates or modifications to EOP-G016 since the Company filed the FY 2018 Contact Voltage Annual Report with the PUC on August 28, 2018. Exhibit 3 of this filing includes the 3.0 version of EOP-G016, which was last updated and published on April 19, 2018.

Section 6

THD Pilot Program

Section 6 - THD Pilot Program

In the First Contact Voltage Annual Report Order, the PUC approved the continuation of the Total Harmonic Distortion (THD) pilot program, noting that THD testing will provide the Company and the PUC with additional information and testing results upon which to make a recommendation for continued THD use and possible modifications or changes to the Contact Voltage Program in future years. The THD pilot testing was not performed as part of the FY19 year of testing from March 18, 2019 to March 20, 2019 because all locations identified in the survey measured less than 1 volt.

Table 6
THD Readings

Total Readings Greater than 1 Volt but less than 4.5 Volts	Number of Readings with THD < 10%	Number of Readings with THD > 10%
0	0	0

After reviewing the THD pilot program information and the overall mobile survey testing results, the Company plans to continue using THD testing during the FY 2020 mobile survey cycle. The Company believes that the costs of THD testing are minimal and that THD testing will continue to provide the Company and the PUC with additional information to be considered for any possible modifications or changes to the Contact Voltage Program in future periods.

Section 7

DCVRA Recommendation

Section 7 - DCVRA Recommendation

In the Compliance Order, the PUC directed the Company to include in its Contact Voltage Annual Report a recommendation as to which DCVRAs would be included in the 20 percent to be surveyed and tested in the next year of the Contact Voltage Program.[17] In preparing its recommendation, as discussed below, the Company relied on the results of its previous years of surveying and testing. In addition, the Company has also examined additional areas of the state that may qualify as a new DCVRA. At this time, the Company does not recommend any changes to the current list of fourteen (14) DCVRAs.

[17] Compliance Order at 9.

Section 8

Standards and Equipment Update

Section 8 - Standards and Equipment Update

In its Compliance Order, the PUC directed the Company to continue monitoring advances in elevated voltage mobile technology and keep the PUC apprised of these efforts.[18] On January 29, 2016, the Institute of Electrical and Electronics Engineers (IEEE) Standards Boards approved standard P1695, *Guide to Understanding, Diagnosing and Mitigating Stray and Contact Voltage*. A copy of this guide is currently with the Standards Publications Department pending editorial revisions and approval. As such, the IEEE has not officially published any final documentation or final recommendations on elevated voltage. In addition, the Company is not aware of any additional changes to mobile testing technology. In FY 2020, the Company plans to continue using its existing manual technology and chosen vendor mobile technology for the Contact Voltage Program.

In January of 2013, the Company awarded its first three-year contract to Premier for the FY 2013, FY 2014, and FY 2015 mobile surveys. In October of 2015, the Company awarded a new four-year contract to Willbros, now TRC, for the FY 2016, FY 2017, FY 2018, and FY 2019 mobile surveys. The next request for proposals for the contract will be for the FY 2020 mobile survey.

[18] Compliance Order at 8.

Section 9

Company Recommendations

Section 9 - Company Recommendations

Since the Company has completed 20 percent of surveying and testing of the DCVRAs in FY2019, the Company proposes to continue surveying and testing 20 percent of the DCVRAs in FY 2020, FY 2021 and FY 2022 to complete 100% of the testing in a five-year period. TRC, the Mobile Contact Voltage Testing Survey contractor, has shared the following contract options with the Company:

One-year Contract Extension:

- 20% of current Designated Contact Voltage Risk Areas (DCVRAs) $80,000.00.
- 50% of current Designated Contact Voltage Risk Areas (DCVRAs) $150,000.00.
- 100% of current Designated Contact Voltage Risk Areas (DCVRAs) $240,000.00.

Three-year Contract Extension

- 20% of current Designated Contact Voltage Risk Areas (DCVRAs) $80,000.00.
- 50% of current Designated Contact Voltage Risk Areas (DCVRAs) $150,000.00.
- 100% of current Designated Contact Voltage Risk Areas (DCVRAs) $240,000.00.

Exhibit 1

Designated Contact Voltage Risk Areas (DCVRA)

Zero (0) mobile events were recorded during the mobile scanning survey measuring 1 volt or greater. Therefore, Exhibit 1 is not included in this report.

Exhibit 2

Post-Mitigation Manual Testing

Post mitigation audits were not required to be performed on four (4) items from FY18 as voltage found was on customer owned assets. Therefore, Exhibit 2 is not included in this report.

Exhibit 3

NG-EOP G016

nationalgrid	**ELECTRIC OPERATING PROCEDURE** **GENERAL**	Doc. # **NG-EOP G016** Page 1 of 22
	Equipment Elevated Voltage Testing	Version 3.0 – 04/19/18

INTRODUCTION

The purpose of this procedure is to outline 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 particular 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. T&D 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. Learning & Development
    a. Provide training upon request
6. 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
NG EOP-DEF – EOP Definitions

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 EOP's

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:

1.4 Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained.

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:

http://us3infonet/sites/eng_delivery_svcs/Pages/ArcFlashMitigation.aspx

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

2.1 Street Lights 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 street light 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 street lights identified on public thoroughfares regardless of ownership shall be one hundred percent (100%) tested annually for equipment elevated voltage.

2.1.5 All street lights 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) street light standards.

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

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 work day 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 street light standards are not publicly accessible, such as facilities located in the center of highways that cannot be accessed without stopping traffic or creating potentially hazardous situations for the worker and/or 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 work day 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 2.7.1

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

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 work day 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 2.7.1

5.0 TEST EQUIPMENT

5.1 A hand held device (proximity detection unit) that is capable of detecting voltage from 5 to 600 VAC.

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

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 needs to be aware of his/her surroundings at all times.

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

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

f. Obey all traffic control devices.

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

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 5.3

a. To verify the proper operation of the proximity detector, follow operating instructions for the particular 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’ 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 so as 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 volt meter. 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 hand held tools shall be followed up with voltage measurements on the target structures.

a. Voltage measurements shall be taken in accordance with Section 6.2.2 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 by the use of 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 6.0, 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.

a. 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.**

b. If the voltage measures greater than or equal to 1 volts 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.

c. 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 7.3.

7.1.2 Massachusetts and Rhode Island

If equipment elevated voltage condition is found and verified by the Test Procedure in Section 6.0, 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.

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

b. 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.

c. 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 7.3.

7.2 Mobile Testing

7.2.1 Rhode Island Total Harmonic Distortion Pilot

Under the Total Harmonic Distortion (THD) pilot in Section 6.2.5, 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 street light, all publicly accessible structures and sidewalks within a minimum 30 foot radius of the electric facility or street light 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 7.6

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 street light standards shall have a supply of “Angel guards” available for installation if the cover is missing or wires are found to be exposed to the public at the time of testing.

7.8.2 Angel guards shall only be installed after the testing of the street light 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 street lights, 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 is 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 9.3, 9.4 and 9.5 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 2.5 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)
Street Light	970	Handhole
	971	Standard
	979	Street light – Other (use comments)
Customer Street Light/Other	980	Handhole
	981	Standard
	989	Customer SL/Other – Other (use comments)
Traffic Control	990	Handhole
	991	Standard
	992	Control Box
	993	Pedestrian Crossing Pole
	999	Traffic control – Other (use comments)

13.0 EXCEPTION APPROVAL

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

b. Document the exception on the job brief

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

13.6.1 A copy of the work plan shall be included

13.6.2 Such memorandum shall be sent to all stakeholders and approvers

13.6.3 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 street light 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