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January 31, 2024

**BY ELECTRONIC MAIL**

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

**RE: Docket No. 4237 – Rhode Island Energy’s 2023 Contact Voltage Annual Report Corrected Report**

Dear Ms. Massaro:

On behalf of The Narragansett Electric Company d/b/a Rhode Island Energy, please find the Company’s Corrected 2023 Contact Voltage Annual Report (“Report”). The Report is being filed in accordance with R.I. Gen. Laws § 39-2-25 and the Rhode Island Public Utilities Commission’s Order No. 20950 in Docket 4237.

The Corrected Report updates Table 1. Specifically, on Page 9 of 26 of the Report, Table 1, the columns entitled “DCVRA”, and “Dates Tested”, have been corrected. The Company mistakenly identified “Upper South Providence” DCVRA as “South Providence”. The Company also mistakenly identified that the fiscal year 2023 scans were performed in 2023, but they were performed at the end of 2022. The corrections are highlighted in the attached Report.

The Corrected Report also corrects footnote 16 which inadvertently stated that, in total, the surveying and testing covered approximately “47” miles instead of “97” miles. The footnote has been corrected in the enclosed Report and the correction is highlighted.

Thank you for your attention to this transmittal. If you have any questions or concerns, please do not hesitate to contact me at 401-784-4263.

Sincerely,

A handwritten signature in blue ink, appearing to read "Andrew S. Marcaccio".

Andrew S. Marcaccio

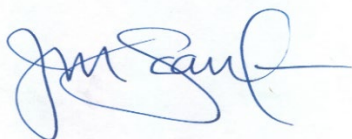
Enclosures

cc: Docket No. 4237 Service List

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

January 31, 2024

Date

**Docket No. 4237 –The Narragansett Electric Co. d/b/a  
Rhode Island Energy - Contact Voltage Compliance Report  
Service List updated 1/4/2024**

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The Narragansett Electric Company  
d/b/a Rhode Island Energy

## **Rhode Island**

# **Corrected 2023 Contact Voltage Annual Report**

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

**Submitted by:**



**Rhode Island Energy™**

a PPL company

**Table of Contents**

Glossary of Terms.....1  
Background and Summary.....1  
Section 1 - Background and Summary .....2  
Section 2 - Mobile Survey and Testing Results.....8  
Section 3 - Contact Voltage Program Costs .....14  
Section 4 - Shock Line Calls.....16  
Section 5 - Company EOP-G016.....18  
Section 6 - THD Pilot Program.....20  
Section 7 - DCVRA Recommendation.....22  
Section 8 - Standards and Equipment Update.....24  
Section 9 - Company Recommendations.....26

**Glossary of Terms**

<b>Term</b>	<b>Definition</b>
<b>Contact Voltage</b>	A voltage resulting from abnormal power system conditions that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals.
<b>Designated Contact Voltage Risk Areas (DCVRA)</b>	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.
<b>Guarded – Made Safe</b>	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.

<b>Term</b>	<b>Definition</b>
<b>Investigatory Mobile Survey Stop</b>	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.
<b>Mobile Event</b>	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.
<b>Post-Mitigation Manual Testing</b>	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.
<b>Quality Assurance Manual Testing</b>	Manual elevated voltage testing performed on a random sample of assets in the Designated Contact Voltage Risk Areas after the mobile survey is performed.
<b>Total Harmonic Distortion (THD) Contact Voltage Testing</b>	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 Rhode Island Energy.<sup>1</sup> On November 9, 2012, the PUC issued an order (Program Order)<sup>2</sup> approving the Company's amended contact voltage program (Contact Voltage Program). The Program Order established thirteen (13) Designated Contact Voltage Risk Areas (DCVRA)<sup>3</sup> 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)<sup>4</sup> 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

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<sup>1</sup> The Narragansett Electric Company d/b/a Rhode Island Energy (Rhode Island Energy or Company).

<sup>2</sup> Written Order No. 20871 (issued on November 9, 2012 in Docket No. 4237).

<sup>3</sup> 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.

<sup>4</sup> Written Order No. 20950 (issued on February 1, 2013 in Docket No. 4237).



Company, after the findings and results of its survey and testing were reviewed, to provide the 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.<sup>5</sup> 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*)<sup>6</sup>
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)*)

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<sup>5</sup> Program Order at 28-29.

<sup>6</sup> 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:<sup>7</sup>

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<sup>8</sup> 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)<sup>9</sup> that amended the Company's Annual Contact Voltage Report to include:<sup>10</sup>

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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<sup>7</sup> Program Order at 28-29, Compliance Order at 8-9.

<sup>8</sup> 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 included in the Annual Report.

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

<sup>10</sup> 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)<sup>11</sup> that directed the Company's Contact Voltage Annual Report to address the following:<sup>12</sup>

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*)<sup>13</sup>

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)<sup>14</sup> 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, 2022 to March 31, 2023. 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

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<sup>11</sup> Written Order No. 21780 (issued on December 16, 2014 in Docket No. 4237).

<sup>12</sup> Second Annual Report Order at 6.

<sup>13</sup> 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.

<sup>14</sup> 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).<sup>15</sup> 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 FY23. (#4 and #5 above). Section 8 provides the current state of electrical standards and elevated voltage mobile equipment technology (#6 above).

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<sup>15</sup> 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, Osmose Utilities Services, Inc. conducted the surveying and testing of 20% of previous established DCVRAs over the period of December 12, 2022 to December 15, 2022. Osmose conducted all surveying and testing at nighttime to include the testing of street lights. In total, the surveying and testing covered approximately 97 miles.<sup>16</sup> Rhode Island Energy was available to 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. THD was determined by the use of a Fluke power quality clamp meter or a Fluke scope meter.

There were seventy-three (73) mobile events recorded during the mobile scanning survey having 1 volt or greater. Of the 73, seven were determined to have voltage less than 4.5 with a THD greater than 10. This finding is an increase from the sixteen (16) mobile events recorded during the FY 2022 mobile survey.

The chart below illustrates the mobile events recorded, since program inception, during the mobile scanning survey having 1 volt or greater.

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<sup>16</sup> The 97 miles includes all mileage driven to survey. This includes both sides of a street and not only linear mileage.

Fiscal Year	# Mobile Events Recorded $\geq 1$ Volt
2023	73
2022	16
2021	21
2020	1
2019	0
2018	4
2017	8
2016	26
2015	19

Table 1 below summarizes the FY 2023 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 $\geq 4.5$ Volts	
				Customer and Company Asset	Customer Asset	Company Asset	Customer Asset	Company Asset
Federal Hill	12/12/22-12/13/22	6	63	0	12	3	44	4
Upper South Providence	12/13/22-12/14/22	2	5	0	1	3	1	0
Lower South Providence	12/14/22-12/15/22	2	2	0	2	0	0	0
Olneyville	12/15/22	2	3	0	2	1	0	0
<b>Total</b>		<b>12</b>	<b>73</b>	<b>0</b>	<b>17</b>	<b>7</b>	<b>45</b>	<b>4</b>

As shown in Table 1, during the mobile survey, twelve (12) 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 resulted in voltage readings that led to barricading the area, guarding the area, or immediate repair by Rhode Island Energy. Overall, many additional manual checks were made on objects and assets over the four-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, manholes are responsible for the majority of elevated voltage readings, followed closely by streetlights. There was an increase in the number of manhole events found during the FY23 survey compared with results from the FY 2013 through FY2022 mobile surveys. However, the high number of streetlight events does follow the trend of previous 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	19	0	6	0	13	0
Electric Box	0	0	0	0	0	0
Manhole Cover	21	0	3	7	8	3
Store Front – Roll Down Gate	1	0	1	0	0	0
Other	12	0	2	0	10	0
Street Sign	8	0	3	0	5	0
Water Cap	4	0	1	0	3	0
Sidewalk	1	0	0	0	1	0
Gas Cap	2	0	0	0	2	0
Fire Hydrant	1	0	1	0	0	0
Metal Plate	1	0	0	0	1	0
Hand Box	1	0	0	0	1	0
Metal Cap	1	0	0	0	1	0
Access Hatch	1	0	0	0	0	1
<b>Total</b>	<b>73</b>	<b>0</b>	<b>17</b>	<b>7</b>	<b>45</b>	<b>4</b>

Table 3 provides a comparison of the number of mobile events by voltage level, found in the FY 2022 and FY 2023 mobile surveys.

**Table 3**  
**Comparison of Number of Mobile Events FY 2021 to FY 2022**

<b>Number of Mobile Events</b>	<b>FY 2022</b>	<b>FY 2023</b>
Readings less than 1 Volt	1	0
Readings Greater than 1 Volt but less than 4.5 Volts	3	24
Readings Greater than 4.5 Volts	13	49
<b>Total</b>	<b>17</b>	<b>73</b>

**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 2023 mobile survey to ensure that the repairs were addressed. For FY22, no assets required post mitigation testing because there were 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 \$1. There were 3 repairs required during the FY 2023 contact voltage surveying and testing. However, the costs were included under the blanket emergency work order and cannot be sorted to summarize the costs of these repairs alone. Therefore, no costs are included in this report. The aggregate contact voltage testing and repair costs for each DCVRA are included in Table 4 below. The total cost for the FY 2023 contact voltage testing and repair was \$1. The Company will reconcile this cost as part of its FY 2023 Electric Infrastructure, Safety, and Reliability Plan Reconciliation Filing

**Table 4  
Aggregate Contact Voltage Testing and Repair Costs**

<b>DCVRA</b>	<b>Repair Costs (Company Locations)</b>	<b>Mobile Survey, Post-Mitigation Manual Testing</b>
Newport	0	
Pawtucket	0	
College Hill	0	
Downtown	0	
Federal Hill	0	
Lower South Providence	0	\$1
Smith Hill	0	
Woonsocket	0	
Westerly	0	
<b>Total</b>	<b>\$0</b>	<b>\$1</b>
<b>Grand Total</b>		<b>\$1</b>

## **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 either the public or other entities such as another utility. For the period April 1, 2022 to October 27, 2023, the Company received one call of elevated voltage to its Shock Line. The Company responded to this call by testing for elevated voltage, mitigating conditions where necessary, and repairing facilities as needed. There were no reported personal injuries or damages to property from this incident.

**Table 5  
Shock Line Calls**

<b>Date</b>	<b>Town</b>	<b>Street</b>	<b>Asset</b>	<b>Voltage Found</b>	<b>Owner</b>	<b>Injury</b>
5/23/2022	Johnston	Country Side Rd	Guy Wire	.1 Volts	Company	No

The Company recorded an elevated voltage of .1 Volt in the area of P12 Country Side Rd. Johnston, RI and the Company concluded that it was caused by a broken guy wire touching a secondary connector located on the pole. The Company made immediate repairs to the guy wire.

**Section 5**

**Company EOP-G016**

## **Section 5 - Company EOP-G016**

There have been minor updates or modifications to EOP-G016 since the Company filed the FY 2022 Contact Voltage Annual Report with the PUC on February 17, 2022.

Exhibit 3 of this filing includes the 4.0 version of EOP-G016, which was last updated and published on October 17, 2023.



## **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 performed as part of the FY23 year of testing from December 12, 2022 to December 15, 2022.

**Table 6  
THD Readings**

<b>Total Readings Greater than 1 Volt but less than 4.5 Volts</b>	<b>Number of Readings with THD &lt; 10%</b>	<b>Number of Readings with THD &gt; 10%</b>
24	17	7

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 2024 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.<sup>17</sup> 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.

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<sup>17</sup> 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.<sup>18</sup>

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 was approved by the IEEE. The Company is not aware of any additional changes to mobile testing technology. In FY 2024, 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 five-year contract to Willbros, now TRC, for the FY 2016, FY 2017, FY 2018, FY 2019, and FY20 mobile surveys. In August of 2020, the Company awarded a new three-year contract to Osmose Utilities for the FY21, FY22, and FY23 mobile surveys. The Company is currently amending an existing contract with Osmose Utilities and will award them the FY24 mobile survey contract. The Company will evaluate the results and make recommendations to continue using Osmose or use another vendor for future mobile surveys.

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<sup>18</sup> Compliance Order at 8.

## **Section 9**

### **Company Recommendations**

**Section 9 - Company Recommendations**

Rhode Island Energy awarded the contract to the lowest qualified vendor, Osmose Utilities. Contract pricing is being negotiated at the time of this submittal. However, the annual cost of mobile scanning is expected to increase slightly in future years. Even though the FY2023 mobile scans showed an increase in mobile events compared to prior years, these events can be traced back to a small number of root causes. The Company does not currently see a trend of increased mobile events; therefore, the recommendation is to continue with testing 20 percent of the DCVRAs each year.

Per the RI PUC Order 24263, the Company was directed to notify municipalities that own street lights of the increasing trend in mobile events.

Over the past 5-years, there has been a fluctuation in the number of voltage findings. What remains consistent is that a majority of the findings are on street lights. Rhode Island Energy will notify municipalities that own street lights of this trend when the contact voltage scans are scheduled to be performed in those DCVRAs.

<b>Fiscal Year</b>	<b># Findings &gt;1 volt</b>	<b># Street Light Findings</b>	<b>% Street Light Findings &gt;1 volt</b>
2023	73	19	26%
2022	16	15	94%
2021	21	17	81%
2020	1	1	100%
2019	0	0	0%
2018	4	3	75%



**Exhibit 1**

Designated Contact Voltage Risk Areas (DCVRA)

Please see Excel version of Exhibit 1.


**Exhibit 2**

Post-Mitigation Manual Testing

Since no Company owned assets were found to have elevated voltage during the FY2022 testing, no post-mitigation manual testing was performed prior to the FU2023 testing.

**Exhibit 3**

RIE-EOP G016

 <b>Rhode Island Energy™</b> <small>a PPL company</small>	<b>ELECTRIC OPERATING PROCEDURE GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 1 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

**INTRODUCTION**

The purpose of this procedure is to outline the requirements for the equipment elevated voltage testing on Rhode Island Energy Facilities in Rhode Island as required by:

1. 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.


**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. 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.

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:
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 <b>Rhode Island Energy™</b> <small>a PPL company</small>	<b>ELECTRIC OPERATING PROCEDURE GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 2 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

- 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**

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)  
Applicable Rhode Island Energy Safety Rules & Procedures  
Testing Equipment Operation Instructions  
NG EOP-DEF – EOP Definitions

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:

	<b>ELECTRIC OPERATING PROCEDURE  GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 3 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023


**DOCUMENT CONTENTS**

Table of Contents

↙

1.0	SAFETY REQUIREMENTS .....	4
2.0	FACILITIES WHERE EQUIPMENT ELEVATED VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – RHODE ISLAND .....	4
3.0	TEST EQUIPMENT .....	5
4.0	TEST PROCEDURE .....	6
5.0	CORRECTIVE ACTION REQUIREMENTS FOR EQUIPMENT ELEVATED VOLTAGE FINDINGS .....	8
6.0	EQUIPMENT ELEVATED VOLTAGE DATABASE .....	11
7.0	RHODE ISLAND REPORTING REQUIREMENTS .....	13
8.0	TYPE OF EQUIPMENT - APPENDIX A .....	14
9.0	EXCEPTION APPROVAL .....	15
10.0	REVISION HISTORY .....	16

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:

	<b>ELECTRIC OPERATING PROCEDURE  GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 4 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023


**1.0 SAFETY REQUIREMENTS**

- 1.1 All work shall be performed in accordance with:
  - 1.1.1 Rhode Island Energy Employee Safety Handbook
  - 1.1.2 Applicable Rhode Island Energy 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](http://us3infonet/sites/eng_delivery_svcs/Pages/ArcFlashMitigation.aspx)

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

- 2.1 Company Owned Street Lights
  - 2.1.1 Company owned metallic street lighting standards are required to be tested for equipment elevated voltage on a three-year cycle.
  - 2.1.2 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.
- 2.2 Overhead Distribution Facilities
  - 2.2.1 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.
  - 2.2.2 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).

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:
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	<b>ELECTRIC OPERATING PROCEDURE  GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 5 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

- 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.

2.3 Underground Facilities

2.3.1 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.

2.3.2 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).

2.3.3 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.

2.4 Daily Job Site Test Requirements

2.4.1 Each job site where Rhode Island Energy 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.

2.4.2 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 Rhode Island Energy personnel will not be required.


2.5 Exemptions

2.5.1 See Section 2.7.1

**3.0 TEST EQUIPMENT**

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:




 <p><b>Rhode Island Energy™</b> a PPL company</p>	<b>ELECTRIC OPERATING PROCEDURE GENERAL</b>	<b>Doc. # RIE-EOP G016</b> Page 6 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

- 3.1 A hand held device (proximity detection unit) that is capable of detecting voltage from 5 to 600 VAC.
- 3.2 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.
- 3.3 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:
  - 3.3.1 HD Electric Stray Voltage Detector model LV-5
  - 3.3.2 Fluke 85
  - 3.3.3 Fluke 87
  - 3.3.4 Fluke 170 series or equivalent
  - 3.3.5 Fluke 175
  - 3.3.6 Fluke 177
  - 3.3.7 Fluke 179
  - 3.3.8 Fluke 187
  - 3.3.9 Fluke 189
- 3.4 Mobile Contact Voltage Detection Equipment:
  - 3.4.1 Narda 8950/10 Stray Voltage System
  - 3.4.2 SVD2000 Stray Voltage Mobile Detector

**4.0 TEST PROCEDURE**


- 4.1 Job Safety Requirements
  - 4.1.1 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.

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:
--	---	----------

 <b>Rhode Island Energy™</b> <small>a PPL company</small>	<b>ELECTRIC OPERATING PROCEDURE GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 7 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

- 4.2 Measurements for detecting elevated voltages will be performed in accordance with the following:
- 4.2.1 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.
- 4.2.2 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'.)

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:
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 <b>Rhode Island Energy™</b> <small>a PPL company</small>	<b>ELECTRIC OPERATING PROCEDURE  GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 8 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

- 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.
- 4.2.3 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.
- 4.2.4 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.
- 4.2.5 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.


**5.0 CORRECTIVE ACTION REQUIREMENTS FOR EQUIPMENT ELEVATED VOLTAGE FINDINGS**

**5.1 Manual Testing**

**5.1.1 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.

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:
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 <b>Rhode Island Energy™</b> <small>a PPL company</small>	<b>ELECTRIC OPERATING PROCEDURE  GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 9 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

- 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.

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:

 <p>Rhode Island Energy™ a PPL company</p>	<b>ELECTRIC OPERATING PROCEDURE GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 10 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

5.2 Mobile Testing

5.2.1 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.**

5.2.2 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.

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

5.3.1 Notification by location:

- a. New England Regional Control Center, South
  - 1. Ocean State (RI) 1-508-421-7885

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

- a. Inspector name, Company (if not Rhode Island Energy)
- 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. Rhode Island Energy personnel or designee will be assigned to respond.

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


5.5 Permanent repairs to the equipment shall be made within 45 days of the occurrence, except as noted in Section 7.6

5.6 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.

5.7 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.

5.8 Angel Guards 

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:


	<b>ELECTRIC OPERATING PROCEDURE  GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 11 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

- 5.8.1 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.
- 5.8.2 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 and 4.5 volts.
- 5.8.3 Repairs have been completed to correct the equipment elevated voltage.
- 5.9 The equipment elevated voltage inspector shall report any potentially hazardous conditions found on Rhode Island Energy facilities seen visually during the survey process.
- 5.10 Customer Owned Equipment
  - 5.10.1 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.
  - 5.10.2 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.

**6.0 EQUIPMENT ELEVATED VOLTAGE DATABASE**

- 6.1 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.

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT			ORIGINATING DEPARTMENT: T&D O&M SERVICES			SPONSOR:		
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 <b>Rhode Island Energy™</b> <small>a PPL company</small>	<b>ELECTRIC OPERATING PROCEDURE  GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 12 of 16
<b>Equipment Elevated Voltage Testing</b>		Version 4.0 – 10/17/2023


6.2 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)

6.3 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

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:

 <b>Rhode Island Energy™</b> <small>a PPL company</small>	<b>ELECTRIC OPERATING PROCEDURE GENERAL</b>	Doc. # <b>RIE-EOP G016</b> Page 13 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023


**7.0 Rhode Island Reporting Requirements**

- 7.1 Rhode Island Energy shall submit an annual Contact Voltage Compliance report that includes the following in a searchable form:
  - 7.1.1 Event record number
  - 7.1.2 Location of testing
  - 7.1.3 Date and time of testing
  - 7.1.4 Company or customer asset
  - 7.1.5 Failed equipment type
  - 7.1.6 Voltage recorded
  - 7.1.7 Personal injuries to members of the public, pets or property damage
  - 7.1.8 Any other equipment involved and age
  - 7.1.9 Prior incidents at this location in the past five years
  - 7.1.10 Corrective actions taken at the location and date taken
  - 7.1.11 Number of customers if service is interrupted while making repairs
  - 7.1.12 Duration of interruption
  - 7.1.13 Summary of investigation into cause of the incident
  - 7.1.14 Number of calls to the company “shock” line
  - 7.1.15 Total repair costs by Contact Voltage Area
  - 7.1.16 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.

FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:




 <b>Rhode Island Energy™</b> <small>a PPL company</small>	<b>ELECTRIC OPERATING PROCEDURE  GENERAL</b>	<b>Doc. # RIE-EOP G016</b> Page 14 of 16
	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

**8.0 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)


FILE: RIE-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING JAT	ORIGINATING DEPARTMENT: T&D O&M SERVICES	SPONSOR:
--	---	----------

 <p><b>Rhode Island Energy™</b> a PPL company</p>	<p><b>ELECTRIC OPERATING PROCEDURE GENERAL</b></p>	<p>Doc. # <b>RIE-EOP G016</b> Page 15 of 16</p>
	<p><b>Equipment Elevated Voltage Testing</b></p>	<p>Version 4.0 – 10/17/2023</p>

**9.0 EXCEPTION APPROVAL**

- 9.1 It is recognized that situations may arise that are not covered by this procedure
- 9.2 When this occurs, an exception may be approved
- 9.3 The person in charge of the work shall
  - 9.3.1 Develop a work plan detailing
    - a. The need for an exception to the EOP
    - b. Additional safeguards to be employed
  - 9.3.2 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
  - 9.3.3 Alternatively approval may be obtained from a designee of any of the above
- 9.4 If agreement cannot be obtained at the manager level
  - 9.4.1 The request shall be forwarded to the Director levels
    - a. Director's may assign a designee
- 9.5 After approval is obtained.
  - 9.5.1 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
- 9.6 T&D Work Methods shall publish a Memorandum documenting the approval
  - 9.6.1 A copy of the work plan shall be included
  - 9.6.2 Such memorandum shall be sent to all stakeholders and approvers
  - 9.6.3 The memo shall be stored for the record

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	<b>Equipment Elevated Voltage Testing</b>	Version 4.0 – 10/17/2023

**10.0 REVISION HISTORY**

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
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” Title and revised subsections 8.0 Database requirements, added language and formatted facilities list 13.0 7. Added new Exception Approval Section
4.0	10/17/2023	Updated document to remove NY and MA requirements. Updated document to replace National Grid with Rhode Island Energy.

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