

January 2, 2014

**VIA HAND DELIVERY & ELECTRONIC MAIL**

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

**RE: Docket 4473 - National Grid's Proposed FY 2015 Electric Infrastructure, Safety, and Reliability Plan**  
**Responses to Commission Data Requests – Set 1**

Dear Ms. Massaro:

On behalf of National Grid,<sup>1</sup> I have enclosed ten (10) copies of the Company's response to the Commission's First Set of Data Requests, which contained only one data request within the set.

Thank you for your attention to this transmittal. If you have any questions, please contact me at (401) 784-7667.

Very truly yours,



Thomas R. Teehan

Enclosures

cc: Steve Scialabba, Division  
Greg Booth, Division  
Leo Wold, Esq.  
James Lanni, Division  
Al Contente, Division

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<sup>1</sup> The Narragansett Electric Company d/b/a National Grid (hereinafter referred to as "National Grid" or the "Company").

Commission 1-1

Request:

Please provide a copy of any data responses provided to the Division of Public Utilities and Carriers as part of its review of National Grid's FY 2015 Electric Infrastructure, Safety, and Reliability Proposal prior to being filed with the Commission

Response:

Attached are copies of the Company's responses and attachments (including a CD-ROM to Attachment 1 of Division Question 1-18) that were provided to the Division of Public Utilities and Carriers ("Division") as part of the Division's review of the Company's proposed FY 2015 Electric Infrastructure, Safety and Reliability Plan.



Thomas R. Teehan  
Senior Counsel

December 2, 2013

**VIA HAND DELIVERY & ELECTRONIC MAIL**

Luly Massaro, Division Clerk  
Rhode Island Division of Public Utilities and Carriers  
89 Jefferson Boulevard  
Warwick, RI 02888

**RE: National Grid's Proposed FY 2015 Electric Infrastructure, Safety, and Reliability Plan  
Responses to Division Data Requests – Set 1**

Dear Ms. Massaro:

For purposes of convenience, on behalf National Grid<sup>1</sup> I have enclosed five (5) copies of a complete set of the Company's responses to the Division's first set of data requests.<sup>2</sup> Included are the responses to Division 1-13 through Division 1-17 as well and all previously filed responses. Please note that the response to Division 1-6 has been updated to identify goodwill and transmission costs to more appropriately reflect Distribution costs. In addition, the table in the response to Division 1-11 has been updated to reflect more recent costs reported in the "Taxes Other Than Income Taxes" category.

Thank you for your attention to this transmittal. If you have any questions, please feel free to contact me at (401) 784-7667.

Very truly yours,

A handwritten signature in blue ink that reads "T. Teehan".

Thomas R. Teehan

Enclosure

cc: Steve Scialabba, Division  
Leo Wold, Esq.  
Jim Lanni  
Al Contente  
Greg Booth

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<sup>1</sup> The Narragansett Electric Company d/b/a National Grid ("National Grid" or the "Company")

<sup>2</sup> On November 22, 2013, the Company provided its responses to Division 1-1 through 1-12 and 1-18.

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-1

Request:

Please provide the total number of distribution poles owned by National Grid.

Response:

The Company owns 262,207 distribution poles in Rhode Island.

The Narragansett Electric Company  
d/b/a National Grid

In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-2

Request:

Please provide the total number of distribution poles by height (i.e.: x number of 35 ft, y number of 40 ft, z number of 45 ft)

Response:

The charts below provide a breakdown of the 262, 207 distribution pole heights owned by the Company in Rhode Island.

Pole Height	Number of Poles
20 27	
24 1	
25 3,280	
30 16,865	
35 100,627	
40 105,266	
45 23,885	
50 5,015	
55 1,944	
60 1,311	
65 903	

Pole Height	Number of Poles
70 544	
75 510	
80 445	
85 319	
90 236	
95 75	
100 107	
105 15	
110 20	
120 1	
Unknown	811

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-3

Request:

Please provide the Gross and Net pole investment (account 364).

Response:

Gross and net pole investment as of December 31, 2012 is as follows:

Account 364

Gross Pole Investment = \$188,362,967

Net Pole Investment = \$108,070,333

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-4

Request:

Please provide each of the separate categories in account 364 (i.e.:guys, anchors, poles, brackets, crossarms).

Response:

Please see the chart below for a breakdown by major categories for Account 364 as of December 31, 2012.

<b>Major Category</b>	<b>Gross Value</b>	<b>Net Book Value</b>
Anchors \$2,876,980		\$2,425,853
Crossarm \$7,853,048		\$6,670,197
Guys \$10,539,082		\$9,176,578
NE Cap Conversion	\$34,970,916	\$14,001,636
Pole \$115,709,847		\$60,999,130
Pole Top Pin	\$1,819,276	\$1,577,194
Secondary Rack	\$975,382	\$855,245
Transformer Cluster Mount	\$3,132,856	\$2,663,311
<b>Sub-Total</b>	<b>\$177,877,388</b>	<b>\$98,369,144</b>
Other - Unclassified	\$10,485,579	\$9,701,189
<b>Per CY2012 FERC</b>	<b>\$188,362,967</b>	<b>\$108,070,333</b>

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-5

Request:

Please provide the Total General & Administration Expenses for year 2012 (FERC Account 910).

Response:

Total General & Administrative Expenses for calendar year 2012 were \$87,010,800. FERC Account 910 (Miscellaneous Customer Service and Informational Expenses) is not included in Total General & Administrative Expenses. The total in FERC account 910 was \$159,496.



The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
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Division 1-6

Request:

Please provide the Gross & Net Plant investment.

Response:

Gross and net plant investment as of December 31, 2012 is as follows:

Total Gross Utility Plant = \$1,966,983,345

Net Plant Investment = \$1,314,165,775

Gross and net plant investment reflects gross transmission plant investment of \$625,049,239 and net plant investment also includes transmission accumulated depreciation of \$90,948,004.

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-7

Request:

Please provide the expenses for year 2012 for Account 593.

Response:

The total expense for the calendar year 2012 in Account 593 was \$11,035,180.

The Narragansett Electric Company  
d/b/a National Grid

In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-8

Request:

Please provide the subcategory expense for account 593.

Response:

Expenses were subcategorized from January through October 2012. The subcategory expenses for account 593 were:

593	Dist Maint-Overhead Lines	\$	4,427,245
593.1	Dist Maint-OH Lines-Trouble	\$	211,364
593.2	Dist Maint-OH Lines-Veg Mgmt	\$	6,396,570
Total:		\$	11,035,180

Expenses for November and December were not subcategorized and are included in the "593 – Dist Maint – Overhead Lines" category above.

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
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Division 1-9

Request:

Please provide the Gross and Net Costs for Account 365.

Response:

Gross and net investment in overhead conductors and devices as of December 31, 2012 is as follows:

Account 365

Gross Cost = \$263,000,686

Net Cost = \$165,178,809

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-10

Request:

Please provide the Gross and Net Costs for Account 369.

Response:

Gross and net investment in services as of December 31, 2012 is as follows:

Account 369

Gross Cost = \$76,930,458

Net Costs = \$44,077,251

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
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Division 1-11

Request:

Please provide the 2012 Tax Expense for Accounts 408.1, 409.1, 410.1, 411.4, 411.1.

Response:

The chart below provides the 2012 Tax Expense for Accounts 408.1, 409.1, 410.1, 411.4, 411.1 for the Narragansett Electric Company by Electric and Gas company operations.

Narragansett Electric Company  
2012 Tax Expense

Account Description		Total	Electric Utility	Gas Utility
408.1	Taxes Other Than Income Taxes	\$87,894,222	\$61,607,389	\$26,286,833
409.1	Income Taxes - Federal	\$(41,239,941)	\$(41,652,340)	\$412,399
410.1	Provision for Deferred Income Taxes	\$88,114,615	\$67,848,254	\$20,266,361
411.4	Investment Tax Credit Adj - Net	\$(460,512)	\$(460,512)	
411.1	Provision for Deferred Income Taxes - Cr.	\$(10,560,948)	\$(8,131,930)	\$(2,429,018)

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
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Division 1-12

Request:

Please provide the depreciation rate for Gross Pole Investment.

Response:

The depreciation rate for Gross Pole Investment is 3.20%.

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
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Division 1-13

Request:

Please provide a summary of the total (Transmission and Distribution) recovery for the Block Island Transmission System (BITS) and indicate whether the estimated cost for Distribution included in the total project costs?

Response:

The BITS facilities will be categorized as "transmission" and the associated costs recovered via FERC rates. The Narragansett Electric Company would own, operate and maintain these facilities and, via the Integrated Facilities Agreement, would rent them to New England Power Company. New England Power Company would recover these rents from The Narragansett Electric Company and Block Island Power Company. The costs would be allocated consistent with the Long-Term Contracting Standard for Renewable Energy Law Section 39-26.1-7(f).

Distribution upgrades to certain existing distribution assets would be needed to accommodate the mainland connection. These distribution facilities consist of an additional 34.5kV breaker and protection upgrades at The Narragansett Electric Company's existing Wakefield substation. The capital project of these upgrades and its cost would be proposed as part of The Narragansett Electric Company's Electric Infrastructure, Safety and Reliability ("ISR") Plan for the applicable fiscal year during which the investment is anticipated to occur. As a result, The Narragansett Electric Company's distribution system upgrades would be recovered through the applicable ISR factors, which are a component of retail rates. The estimates for the distribution upgrades are included in the total project estimate.



The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
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Issued November 13, 2013

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Division 1-14

Request:

Please provide a status of the permitting for the Block Island Transmission System (BITS) and include the timing of the spending for BITS relative to the generation going online.

Response:

Deepwater Wind has provided a progress report dated September 30, 2013 regarding the Block Island Wind Farm. A copy of that report is attached as Attachment 1-14. In addition, Deepwater Wind continues to move forward with conceptual engineering, permitting, and the acquisition of property rights for the construction of the transmission cable that will connect the Town of New Shoreham (Block Island) with the mainland. The Company and Deepwater Wind are continuing to negotiate a Transmission Facilities Purchase Agreement to acquire the engineering, permits, property rights, and other site development work associated with the transmission cable and will submit an unexecuted copy of the final agreement to the Division for the Division's consent to execution.



The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013  
Attachment 1-14  
Page 1 of 2

September 30, 2013

Via Electronic Mail

Corinne Abrams  
Manager, Environmental Transactions  
Energy Procurement  
National Grid  
100 E. Old Country Road  
Hicksville, NY 11801-4218  
Email: corinne.abrams@us.ngrid.com

RE: Power Purchase Agreement (PPA) dated June 30, 2010 Progress Report

Dear Corinne:

Pursuant to Section 3.2 and Section 17 of the PPA, attached hereto please find the Quarterly Progress Report for the quarter ending September 30, 2013. This report is provided to satisfy the requirements of section 3.2 of the PPA, and does not constitute a waiver of any rights under the PPA. Please let me know if you have any questions.

Regards,

**Deepwater Wind Block Island, LLC**

By: Deepwater Wind Rhode Island, LLC, its member

By: Deepwater Wind Holdings, LLC, its member

A handwritten signature in blue ink, appearing to read "Jeffrey Grybowski", is written over a horizontal line.

Jeffrey Grybowski, Chief Executive Officer

Attachment

cc: Brooke K. Skulley, Esq. (brooke.skulley@us.ngrid.com)

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013  
Attachment 1-14  
Page 2 of 2

## Block Island Wind Farm

### Progress Report Q3 2013

#### *Status of construction and significant construction milestones achieved during the quarter:*

Construction has not commenced.

#### *Status of permitting and significant Permits obtained during the quarter:*

Permitting work is on-going. The ACOE and CRMC public comment periods have closed, although it is anticipated that they will reopen briefly to solicit comments on the Scarborough beach landing. The next step in the process is for the ACOE to issue its ROD and for the CRMC to schedule hearings.

#### *Status of Financing for Facility:*

The project has retained a financial consultant to assist with the project's financing. A Lender's Technical Advisor was retained in Q1, 2013 to begin a preliminary review of the project.

#### *Events during quarter expected to result in delays in Commercial Operation:*

At this point there are two activities that are impacting COD. One, the timing of receipt of necessary permits. Two, the timing of the regulatory approvals of the agreements respecting the Block Island Transmission System.

#### *Current projection for Commercial Operation:*

It is anticipated that the major permits for the BIWF and BITS project will be received in 2013. Financial closing will follow the issuance of permits. Project execution will start immediately after financial closing. The Commercial Operation Date will be December 31 of the calendar year in which the conditions to Commercial Operation set forth in Section 3.3(b) of the PPA are satisfied; provided that in no event will the Commercial Operation Date be later than December 31, 2017.

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-15

Request:

Please provide information as requested in the attached spreadsheet for Asset Replacement Programs, including budget and actual expenditures for the current fiscal year and a five year forecast.

Response:

See attachment "Division 1-15 & 1-16 - SCP and AC by ISR Category.xls"

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-16

Request:

Please provide information as requested in the attached spreadsheet for major multi-year substation capacity addition projects, including budget and actual expenditures for the current fiscal year and a five year forecast.

Response:

See attachment "Division 1-15 & 1-16 - SCP and AC by ISR Category.xls"

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

Division 1-17

Request:

Please provide the current 5 year capital plan by budget category.

Response:

Capex Spending Rationale	Budget Classification	FY15 Capital Budget	FY16 Capital Budget	FY17 Capital Budget	FY18 Capital Budget	FY19 Capital Budget
Asset Condition	Asset Replacement	11,957,000	11,646,000	21,352,000	22,317,000	21,394,000
	Asset Replacement - I&M	11,040,000	11,383,000	11,734,000	12,093,000	12,465,000
	Safety	514,000	514,000	514,000	250,000	-
<b>Asset Condition Total</b>		<b>23,511,000</b>	<b>23,543,000</b>	<b>33,600,000</b>	<b>34,660,000</b>	<b>33,859,000</b>
Damage/Failure	Damage/Failure	8,816,000	8,933,000	9,052,000	9,172,000	9,295,000
	Major Storms - Dist	1,000,000	1,100,000	1,200,000	1,300,000	1,400,000
<b>Damage/Failure Total</b>		<b>9,816,000</b>	<b>10,033,000</b>	<b>10,252,000</b>	<b>10,472,000</b>	<b>10,695,000</b>
Non-Infrastructure	General Equipment - Dist	102,000	104,000	106,000	108,000	110,000
	Telecommunications Capital - Dist	175,000	175,000	175,000	175,000	175,000
<b>Non-Infrastructure Total</b>		<b>277,000</b>	<b>279,000</b>	<b>281,000</b>	<b>283,000</b>	<b>285,000</b>
Statutory/Regulatory	3rd Party Attachments	305,000	310,000	315,000	320,000	325,000
	Distributed Generation	100,000	340,000	340,000	-	-
	Land and Land Rights - Dist	179,000	183,000	188,000	193,000	198,000
	Meters - Dist	1,824,000	1,918,000	2,022,000	2,137,000	2,202,000
	New Business - Commercial	3,924,000	4,900,000	7,778,000	4,057,000	4,138,000
	New Business - Residential	2,870,000	2,942,000	3,016,000	3,091,000	3,168,000
	Outdoor Lighting - Capital	533,000	541,000	549,000	557,000	565,000
	Public Requirements	1,268,000	1,343,000	1,142,000	1,156,000	1,170,000
<b>Statutory/Regulatory Total</b>		<b>14,637,000</b>	<b>16,331,000</b>	<b>19,406,000</b>	<b>15,721,000</b>	<b>16,066,000</b>
System Capacity & Performance	Load Relief	19,052,000	19,134,000	10,402,000	11,791,000	11,908,000
	Reliability - Dist	2,707,000	2,680,000	2,059,000	3,073,000	3,187,000
<b>System Capacity &amp; Performance Total</b>		<b>21,759,000</b>	<b>21,814,000</b>	<b>12,461,000</b>	<b>14,864,000</b>	<b>15,095,000</b>
<b>Grand Total</b>		<b>70,000,000</b>	<b>72,000,000</b>	<b>76,000,000</b>	<b>76,000,000</b>	<b>76,000,000</b>

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013

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Division 1-18

Request:

Please provide the Electric Operating Procedures (EOPs) and training materials for the I&M program.

Response:

Attached is the Inspection & Maintenance overhead inspection guide and the four EOP's related to Inspection & Maintenance:

Attachment 1 - 2011 OH Distribution Maintenance Guide-Compressed. Due to the voluminous nature of this attachment, the Company is providing the document on CD-ROM.

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

Attachment 3 - NG-EOP G016-Equipment Elevated Voltage Testing

Attachment 4 - NG-EOP G017-Street Light Standard Inspection Program

Attachment 5 - NG-EOP UG006-Underground Inspection and Maintenance

nationalgrid	<b>ELECTRIC OPERATING PROCEDURE DISTRIBUTION OVERHEAD</b>	Doc. # <b>NG-EOP D004</b> Page 1 of 11
	<b>DISTRIBUTION LINE PATROL AND MAINTENANCE</b>	Version 1.0 – 04/01/11

## **INTRODUCTION**

The purpose of this procedure is to outline the requirements for the patrol and maintenance activities associated with National Grid Distribution feeders. The Distribution Maintenance Program was designed to provide for a patrol and subsequent maintenance of each distribution feeder once every five (5) years in NY and once every six (6) years in NE. The patrols are conducted by a Distribution Inspector identifying all required maintenance on a *Windows®* based hand held computer. The maintenance items identified through this patrol are separated into four priority levels 1, 2, 3, and 4. The problem codes identified default to the appropriate priority level. The default priority level can be adjusted by the individual performing the inspection based on actual field conditions. These priority levels are defined as follows:

*Level 1* - An identified facility/component or tree condition that must be repaired/replaced within 1 week.

*Level 2* - Identified facility/component condition that must be repaired/replaced within 1 year.

*Level 3* – Identified facility/component condition that must be repaired/replaced within 3 years.

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

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

Notification by location:

New York: System Operations Dispatch 1-877-716-4996  
NE North: Westboro Control Center 1-508-421-7879  
NE South: Lincoln Control Center 1-508-421-7885

Detailed information provided to the regional notification location:

Identify yourself as a Company Distribution Inspector and your work reporting area.

Details of the Level 1 Priority Condition:

Problem found.

District, Feeder No., Line No., Tax District and Pole No.

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

If you are standing by or have secured the location.

Notification to area Inspections Supervisor for follow-up.



nationalgrid	<b>ELECTRIC OPERATING PROCEDURE</b>	Doc. # <b>NG-EOP D004</b>
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	<b>DISTRIBUTION LINE PATROL AND MAINTENANCE</b>	Version 1.0 – 04/01/11

## **PURPOSE**

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

## **ACCOUNTABILITY**

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

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013  
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nationalgrid	<b>ELECTRIC OPERATING PROCEDURE</b>	Doc. # <b>NG-EOP D004</b>
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	<b>DISTRIBUTION LINE PATROL AND MAINTENANCE</b>	Version 1.0 – 04/01/11

7. Process and Systems.

A. Provide and support database.

**REFERENCES**

Applicable National Grid Safety Rules and Procedures

NY PSC Order 04-M-0159

NY PSC Order Order Adopting Changes to Electric Safety Standard, December 2008

Elevated Equipment Voltage Testing NG-EOP G016

Underground Inspection NG USA EOP UG006

Massachusetts DTE Directive 12/9/05

**DEFINITIONS**

**Patrol:** A walking/vehicle assessment of National Grid distribution facilities for the purpose of determining the condition of the facility and its associated components.

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

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

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

**TRAINING**

Provide training upon request.

The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
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	<b>DISTRIBUTION LINE PATROL AND MAINTENANCE</b>	Version 1.0 – 04/01/11

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## **1.0 DISTRIBUTION PATROL**

- 1.1 Distribution Patrols are conducted by a Distribution Inspector that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities. Distribution patrols are scheduled in such a manner that each distribution feeder is examined in the field once every five (5) years in NY and once every six (6) years in NE. In NY, the patrols shall be completed by December 31 due to regulatory reporting. In NE the patrols shall be completed by March 31. The most current Distribution Patrol schedule can be found in the Distribution Maintenance Program data base (RPT 1310 Feeder Patrol Status). New Distribution Feeders added to the system will be incorporated through our Geographic Information System (GIS) system and added to the appropriate inspection cycle. If the Distribution Inspector finds unmapped facilities from the information supplied from GIS, the inspector shall add the information into the *Windows®* based hand held computer for maintenance tracking purposes. NG-USA EOP G011, Preparation and Distribution of Electric Facilities Records, identifies the correct procedure for updating GIS records, if needed.
- 1.2 Distribution Patrol data is recorded by the Distribution Inspector on a *Windows®* based hand held computer and downloaded to the Distribution Maintenance Program. The Distribution Inspector shall also complete maintenance code 118, stencil installed and maintenance code 220, guy wire marker, maintenance code 660, switchgear missing nomenclature, maintenance code 681, transformer missing nomenclature, and maintenance code 745, enclosure missing nomenclature if found deficient upon inspection while at the site. Maintenance Codes are shown on the Distribution Field Survey Worksheet #NG0236 (Page 7). The Distribution Field Survey Worksheet can be used by the field to record maintenance items and is used for informational purposes only. The latest distribution maintenance codes are downloaded to the Hand Held Computer each time there is a change that affects the maintenance code table contained in the Distribution Maintenance Database. Printed copies of the latest maintenance code tables may be obtained by running a report on the look up tables from the Distribution Maintenance Database.
- 1.3 The *Windows®* based hand held computer is to be used as the primary vehicle for recording maintenance problems in the field. There may be times where it is not practicable to use the hand held computer. In these cases, the person performing the inspection should record the information on the Distribution Field Survey Worksheet #NG0236).  
<http://docuweb3:8092/ngs/servlet/NgStreamer?name=NG0236+Dist+Field+Survey+Wksht+D004>

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

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## **2.0 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES**

Wood Pole Mounted Street Light  
Poles  
Crossarms  
Insulators  
Primary  
Transformers  
Capacitor  
Regulator  
Sectionalizer  
Recloser  
Switches  
Ground  
Guy  
Anchor  
Secondary  
Service  
ROW  
GIS  
Spacer Cable  
Cutout  
Risers  
Switchgear  
Padmount Transformers  
Enclosures

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## DISTRIBUTION FIELD SURVEY WORKSHEET

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REGION	DISTRICT	EMPLOYEE ID	DATE
FEEDER	TAX DISTRICT/TOWN	MAP #	
LINE # / ROUTE #	POLE # / SUFFIX #		
LOCATION			
# MAIN LINE CATV ATTACHMENT 1 2 3 4 5	# MAIN LINE TELEPHONE ATTACHMENT 1 2 3 4 5	STREET LIGHT ATTACHED	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>WOOD POLE MOUNTED STREET LIGHT</b>	<b>P/Q</b>	<b>SECTIONALIZER</b>	<b>P/Q</b>
098 1,2,9 (NR) <input type="checkbox"/> Street Light Hazard Cond.	/	180 1,2,9 (NR) <input type="checkbox"/> Oil Weeping	/
099 2,9 (NR) <input type="checkbox"/> Not Bonded	/	181 1,2 (R) <input type="checkbox"/> Bushings Broken/Cracked	/
		182 2,9 (R) <input type="checkbox"/> Missing Ground Wire	/
		183 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	/
		184 3,9 (R) <input type="checkbox"/> Improper/Missing Bond	/
		185 3,9 (R) <input type="checkbox"/> Animal Guard Missing	/
		186 3,9 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/
		280 1,2,9 (R) <input type="checkbox"/> Defective Cutout	/
		281 2 (R) <input type="checkbox"/> Potted Porcelain	/
		282 4 (NR) <input type="checkbox"/> Banded Porcelain	/
		283 4 (NR) <input type="checkbox"/> Enclosed	/
		284 4 (NR) <input type="checkbox"/> Non Porcelain	/
		285 4 (NR) <input type="checkbox"/> Hybrid	/
		286 4 (R) <input type="checkbox"/> Spur Tap Not Fused	/
		289 4 (NR) <input type="checkbox"/> Other	/
		<b>RECLOSER</b>	
		190 1,2,9 (NR) <input type="checkbox"/> Oil Weeping	/
		191 1,2 (R) <input type="checkbox"/> Bushings Broken/Cracked	/
		192 2,9 (R) <input type="checkbox"/> Missing Ground Wire	/
		193 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	/
		194 3,9 (R) <input type="checkbox"/> Improper/Missing Bond	/
		195 3,9 (R) <input type="checkbox"/> Animal Guard Missing	/
		196 2,3,9 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/
		<b>RISER</b>	
		290 1,2,3,9 (NR) <input type="checkbox"/> Improper Cable Supp/Term	/
		291 2,9 (R) <input type="checkbox"/> Improper/Missing Bond	/
		292 3,9 (R) <input type="checkbox"/> Animal Guard Missing	/
		293 2,3,9 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/
		<b>INFRAED</b>	
		400 1,2,3,9 (R) <input type="checkbox"/> Problem - Switch	/
		401 1,2,3,9 (R) <input type="checkbox"/> Problem - Cutout	/
		402 1,2,3,9 (R) <input type="checkbox"/> Problem - Splice	/
		403 1,2,3,9 (R) <input type="checkbox"/> Problem - Other	/
		<b>HANDHOLES</b>	
		600 1,2,9 (NR) <input type="checkbox"/> Broken/Damaged/Unsecured	/
		602 P (NR) <input type="checkbox"/> Missing Nomenclature	/
		603 1 (R) <input type="checkbox"/> Secondary Needs Repair	/
		604 4 (NR) <input type="checkbox"/> Other (use comments)	/
		<b>SWITCHGEAR</b>	
		651 1,2,3,9 (R) <input type="checkbox"/> Barrier Brkn/Dmgd/Unsec	/
		652 1,2 (NR) <input type="checkbox"/> Base Broken/Damaged	/
		654 2,9 (R) <input type="checkbox"/> Cable Not Bonded	/
		656 2,9 (R) <input type="checkbox"/> Door Broken/Damaged	/
		657 F (NR) <input type="checkbox"/> Excessive Vegetation	/
		659 2,9 (R) <input type="checkbox"/> Missing Ground	/
		660 P (NR) <input type="checkbox"/> Missing Nomenclature	/
		661 4 (NR) <input type="checkbox"/> Other	/
		662 4 (NR) <input type="checkbox"/> Rusted/Paint Peeling	/
		<b>PAD TRANSFORMER</b>	
		672 1,2,3,9 (R) <input type="checkbox"/> Bushing Broken/Cracked	/
		673 1,2,P (R) <input type="checkbox"/> Door Broken/Damaged	/
		675 1,2 (R) <input type="checkbox"/> Elbows/Terminator/Tracking/Burned	/
		676 F (NR) <input type="checkbox"/> Excessive Vegetation	/
		680 2,9 (R) <input type="checkbox"/> Missing Ground	/
		681 P (NR) <input type="checkbox"/> Missing Nomenclature	/
		684 1,2,9 (NR) <input type="checkbox"/> Oil Weeping	/
		685 1,2,3,4,9 (NR) <input type="checkbox"/> Pad Broken/Damaged	/
		686 4 (NR) <input type="checkbox"/> Protection (Ballards)	/
		687 4 (NR) <input type="checkbox"/> Rusted/Paint Peeling	/
		<b>ENCLOSURES</b>	
		740 1,2,3,4,9 (R) <input type="checkbox"/> Base Broken/Cracked	/
		741 1,2,3,9,P (R) <input type="checkbox"/> Door Brkn/Dmgd/Unsec	/
		742 1,2,3,9 (R) <input type="checkbox"/> Elbows Tracking/Burned	/
		743 F (NR) <input type="checkbox"/> Excessive Vegetation	/
		744 2 (NR) <input type="checkbox"/> Missing Ground	/
		745 P (NR) <input type="checkbox"/> Missing Nomenclature	/
		746 4 (NR) <input type="checkbox"/> Rusted/Paint Peeling	/
		<b>POLE INSPECTION</b>	
		801 1,2,3,4,9 (NR) <input type="checkbox"/> Identified Priority Pole	/
		802 1,2,3,4,9 (NR) <input type="checkbox"/> Identified Reject Pole	/
		803 4 (NR) <input type="checkbox"/> Excessive Checking	/
		804 4 (NR) <input type="checkbox"/> Climbing Inspection	/
		<b>KEY</b>	
		P/Q = Priority / Quantity	
		NR = Maint. Code May Not Direct Affect Reliability	
		R = Maint. Code May Affect Reliability	
		RP = Maint. Code May Affect Reliability and Has Specific Program to Place to Address	
Comments:			

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### **3.0 DISTRIBUTION MAINTENANCE DATA BASE**

- 3.1 The Distribution Maintenance database consists of information collected in the field down loaded from the *Windows®* based hand held computer and data gathered from other sources entered from the desktop computer. The *Windows®* based hand held computer can be down loaded to any National Grid desk top computer that is connected to the network by an employee that has been authorized to perform this function. The Distribution Maintenance database is used by various departments throughout National Grid to generate maintenance reports and cost estimates.
- 3.2 The Distribution Maintenance database contains information to be used by Asset Strategy and Investment Planning to track maintenance codes that may affect reliability (R), affect reliability that have a specific program in place to address (RP), or may not directly affect reliability (NR):

### **4.0 MAINTENANCE SCHEDULE**

- 4.1 Maintenance activities are scheduled by priority Levels. All "Level 1 Priority" conditions identified must be repaired/corrected within 1 week. All "Level 2 Priority" conditions identified must be repaired/corrected within 1 year. All "Level 3 Priority" conditions must be repaired within 3 years. Level 4 Priority is for inventory purposes only.
- 4.2 Once the Distribution Feeder is completed in the Distribution Maintenance Database or 21 days have elapsed since the inspection, the Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS. Expense maintenance work goes straight to scheduling while the capital work goes to Distribution Design. Level 1 Priority maintenance codes are communicated by the Distribution Inspector directly to the field operations group for the area where the feeder is located.

### **5.0 COMPLETION OF MAINTENANCE CODES**

- 5.1 Level 1 priority maintenance codes completion process:
  - 5.1.1 Distribution Inspector contacts System Operations Dispatch (SOD) providing information on the Level 1 maintenance item and fills out a Level 1 Priority Report Form (page 10).
  - 5.1.2 SOD generates a PowerOn order from Regional Control.
  - 5.1.3 Inspections Supervisor captures PowerON ID # and details for Level 1 maintenance item status. Inspections Supervisor tracks Level 1 maintenance status with operations ensuring that the Level 1 item is completed within 1 week. Inspection Supervisor closes out the Level 1 maintenance item in the Distribution Maintenance Database by adding the PowerOn ID # number to maintenance record.

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

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

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



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Level “1” & Elevated Voltage Priority Report Form

**Any Level “1” Priority or Elevated Voltage condition found must be called into Dispatch.**

Feeder: \_\_\_\_\_

Line #: \_\_\_\_\_

Pole #: \_\_\_\_\_

Closest Meter #: \_\_\_\_\_

Street Address: \_\_\_\_\_

City/Town: \_\_\_\_\_

Level “1” Priority/Elevated Voltage condition found.

\_\_\_\_\_  
\_\_\_\_\_

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

Dispatcher notified: \_\_\_\_\_

Date/Time: \_\_\_\_\_

Inspector: \_\_\_\_\_

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## **6.0 REVISION HISTORY**

<b><u>Version</u></b>	<b><u>Date</u></b>	<b><u>Description of Revision</u></b>
1.0	04/01/11	This document supersedes document dated 08/17/09.

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## **INTRODUCTION**

The purpose of this procedure is to outline the requirements for the annual equipment elevated voltage testing on National Grid Facilities in New York as required by the New York Public Service Commission's "Electric Safety Standards" issued on January 5, 2005, the New York Public Service Commission's "Order Adopting Changes to Electric Safety Standards issued and effective on December 15, 2008, the 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.

This procedure also outlines requirements for equipment elevated voltage testing in Rhode Island and requirements by the 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.

Additionally the 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 with or responsible for the testing, repair and reporting of facilities designated by this EOP for equipment elevated voltage. It should be noted that the term "Contact Voltage" has been adopted and is used in the EOP (refer to definitions section).

## **ACCOUNTABILITY**

1. Standards, Policies and Codes
  - A. Update program as necessary.
  - B. Provide personnel guidance and assistance as requested.
2. Inspections & Maintenance
  - A. Ensure the equipment elevated voltage 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 equipment elevated voltage inspectors have been trained.

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File: NG-EOP G016 Equipment Elevated Voltage Testing MGA	Originating Department: Standards, Policies & Codes	Sponsor: Susan Fleck

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3. Equipment Elevated Voltage Inspector

- A. Demonstrate the ability and proficiency to perform equipment elevated voltage testing per this EOP.
- B. Demonstrate the ability to become proficient in the use of the appropriate database.
- C. Possess the ability to do walking patrols, collect information, edit data, and guard unsafe facilities.
- D. Attend equipment elevated voltage training program.

4. Learning & Development

- A. Provide training upon request.

5. Distribution Network Strategy

- A. Provide input into program revisions.
- B. Ensure the equipment elevated voltage program as outlined in this EOP is implemented properly and timely.
- C. Ensure the program as outlined in the EOP is completed each year.
- D. Provide qualified personnel to complete equipment elevated voltage testing.
- E. Ensure all equipment elevated voltage inspectors have been trained.
- F. Provide program management.

**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)  
NYSPPSC Order Granting Petition in Part and Modifying Electric Safety Standards  
Applicable National Grid Safety Rules & Procedures  
Testing Equipment Operation Instructions

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## **DEFINITIONS**

**Contact Voltage** (Draft definition as defined by the Working Group of the Institute of Electrical and Electronic Engineers (IEEE)): Voltage resulting from abnormal power system conditions that may be present between two conductive surfaces that can come into contact by members of the general public and/or animals. Contact voltage is caused by power system fault current as it flows through the impedance of available fault current pathways. Contact voltage is not related to normal system operation and can exist at levels that may be hazardous.

**Contact Voltage Area (CVA)**: Designated underground distribution areas within the cities of Providence, Pawtucket, Newport and Woonsocket established in the "proposed Rhode Island Electric Contact Voltage Program", Revised October 2, 2012 (Docket 4237).

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

**Equipment Elevated Voltage Inspector**: The individual performing the equipment elevated voltage inspection.

**Finding**: Any confirmed voltage reading on an electric facility or streetlight greater than or equal to 1V measured using a volt meter and a 500 ohm shunt resistor.

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

**Mitigation**: Corrective actions performed by the utility to address the stray voltage finding.

**Proximity Detection Unit**: A low voltage hand held detector used to test exposed metallic surfaces and conductors for the presence of low voltage from 6V to 600V.

**Shall**: The word shall is to be understood as mandatory.

**Should**: The word should is to be understood as advisory.

**Stray Voltage**: As defined by NYPSC the term "Stray Voltage" means voltage conditions on electric facilities that should not ordinarily exist.

**Stray Voltage Testing**: The process of checking an electric facility for stray voltage using a device capable of reliably detecting and audibly and/or visually signaling voltages in the range of 6 to 600 volts.

**Total Harmonic Distortion (THD)**: This term has come into common usage to define either voltage or current "distortion factor."

**Distortion Factor (harmonic factor)**: The ratio of the root-mean-squared of the harmonic content to the root-mean-squared value of the fundamental quantity, expressed as a percent of the fundamental.

$$DF = \sqrt{\frac{\text{sum of squares of amplitudes of all harmonics}}{\text{square of amplitude of fundamental}}} * 100\%$$

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## **1.0 FACILITIES WHERE EQUIPMENT ELEVATE VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – NEW YORK**



### **1.1 Street Lights and Municipally Owned Facilities**

- 1.1.1 Company owned metallic street lighting standards are required to be tested for equipment elevated voltage annually. This test is to be performed while the light is operating.
- 1.1.2 Municipally owned street light systems that National Grid directly provides energy to shall be tested for equipment elevated voltage annually. National Grid will complete this testing unless assurances of the completion of required testing and transfer of such test data are made by the appropriate municipality. This test is to be performed while the light is operating.
- 1.1.3 Municipal owned metallic traffic signal standards and accessible devices are to be tested annually for equipment elevated voltage by National Grid.
- 1.1.4 All street lights identified on public thoroughfares regardless of ownership are to be tested annually.
- 1.1.5 All street lights under a maintenance contract are to be tested annually. Exceptions not requiring equipment elevated voltage testing: private lighting, park associations, parking lots, fiberglass (or other non-conductive) street light standards, and locations where street light standards are not publicly accessible, such as facilities located in the center of highways that cannot be accessed without stopping traffic or creating potentially hazardous situations for the worker and/or public.

### **1.2 National Grid Substation Fences**

- 1.2.1 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.

### **1.3 Overhead Distribution Facilities**

- 1.3.1 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. 
- 1.3.2 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: 
  - 1. Metallic riser guard or conduit (company or non-company).
  - 2. Uncovered or uninsulated down ground (company or non-company).
  - 3. Down guy (company or non-company).
  - 4. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole within reach from the ground.

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- 1.3.3 Exceptions: Customer meters and customer meter poles are excluded.
- 1.4 Overhead Transmission Facilities
- 1.4.1 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.
- 1.4.2 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 (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.
- 1.5 Underground Facilities
- 1.5.1 Annual 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.
- 1.5.2 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.
- 1.5.3 Starting in 2010 and continuing thereafter, unless changed by subsequent order of the NY Public Service Commission, two mobile stray voltage surveys shall be conducted annually in Buffalo and one mobile stray voltage survey is required to be conducted annually in Albany and Niagara Falls.
- 1.5.4 Exceptions: Non-metallic concrete or fiberglass pads or handholes or pull/splice boxes are not required to be tested.
- 1.6 Daily Job Site Test Requirements
- 1.6.1 Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for equipment elevated voltage at the start and at the end of the work day or at the start or at the completion of the assignment. This testing requirement is considered good utility practice and does not require specific documentation.
- 1.6.2 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.



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## 1.7 Exemptions

- 1.7.1 A completely fenced in area where access is denied to the general public and where access is only achieved by climbing a fence. Good judgment is required by the tester in these scenarios.

## **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 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..
- 2.2.2 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 (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 Testing for equipment elevated voltage shall be done while completing scheduled inspections of underground equipment covered by NG-EOP UG006, Underground Inspection and Maintenance. The following items are to be tested on a five year cycle, pad-mounted transformers, pad-mounted switchgears, and metallic handhole covers.
- 2.3.2 Testing for equipment elevated voltage shall be completed on underground facilities while completing working inspections covered by NG-EOP UG006. The metallic items to be tested are manholes covers, vault covers and grates, handhole covers, splice box covers, junction box covers, pad-mounted transformers, pad-mounted switchgears, and submersible equipment covers.

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- 2.3.3 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). The mobile surveys will be performed on a five-year cycle. A survey of 100 percent of the CVA will be performed the first year of the program followed by 20 percent of the CVA in successive years.
- 2.4 Daily Job Site Test Requirements
- 2.4.1 Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for equipment elevated voltage 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.
- a. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.
- 2.5 Exemptions
- 2.5.1 A completely fenced in area where access is denied to the general public and where access is only achieved by climbing a fence. Good judgment is required by the tester in these scenarios.

### **3.0 FACILITIES WHERE EQUIPMENT ELEVATED VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – MASSACHUSETTS**

- 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 five 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 public.
- 3.2 Overhead Distribution Facilities
- 3.2.1 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.
- 3.2.2 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 (company or non-company).

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

### 3.3 Underground Facilities

3.3.1 Equipment elevated voltage testing is required on all of the following equipment where accessible to the public on a five year cycle.

- a. All metallic manhole covers, vault covers and grates, junction box covers, handhole covers, pad-mounted transformers, secondary pedestals, and pad-mounted switchgears.

Exceptions: Non-metallic concrete or fiberglass pads or 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 shall be tested for equipment elevated voltage at the start and at the end of the work day or at the start or at the completion of the assignment. This testing requirement is considered good utility practice and does not require specific documentation.

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

### 3.5 Exemptions

3.5.1 A completely fenced in area where access is denied to the general public and where access is only achieved by climbing a fence. Good judgment is required by the tester in these scenarios.

## **4.0 TEST EQUIPMENT**

4.1 A hand held device (proximity detection unit) that is capable of detecting voltage from 6 volts to 600 volts.

4.2 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.

4.3 The handheld devices utilized shall be certified by an independent test laboratory as being able to reliably detect voltages of 6 – 600 volts. The following units have been certified:

4.3.1 HD Electric model LV-S-5 (5-600 volts).

Fluke 85  
Fluke 87  
Fluke 170 series or equivalent  
Fluke 175  
Fluke 177  
Fluke 179  
Fluke 187  
Fluke 189

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- 4.4 Mobile Voltage Detection Equipment:
- Narda 8950/10 Stray Voltage System
  - SVD2000 Stray Voltage Mobile Detector

## **5.0 TEST PROCEDURE**

### **5.1 Job Briefing**




- 5.1.1 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 voltage 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, either at intersections or any other point.
  - e. Traffic safety vest (DOT Compliant Class II) is to be worn at all times when exposed to traffic. Be aware that when bending down, the visibility benefits of the traffic safety vest are diminished.
  - f. Obey all traffic control devices.
  - g. When working in the street, face oncoming traffic whenever possible.

### **5.2 Measurements for voltages will be performed in accordance with the following:**

- 5.2.1 Initial measurements for the presence of voltage shall be made using a certified proximity detection unit as noted in the testing equipment certified equipment list in Section 4.0, 4.3.
- a. To verify the proper operation of the proximity detector, follow operating instructions for the particular certified unit being utilized, this is to be done daily.
  - b. After verification that the detection unit is working, approach the area/equipment to be tested. The proximity detector will illuminate prior to touching the area/equipment being tested if voltage is present. If the proximity detector does not illuminate in close proximity to the area/equipment touch the area/equipment to be tested with the probe of the unit.
- 5.2.2 If this test detects voltage, repeat the test with the 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.

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1. In locations where the neutral or ground point is at a distance in excess of the voltmeter lead length, the connection to the neutral/ground shall be made with up to 25' of # 16 stranded copper lead wire (covered), the other end of which shall be securely connected to the negative (black) probe of the meter. When using such "extension leads" appropriate care shall be taken in the placement of such leads so as to not create a physical hazard to workers, pedestrian or vehicular traffic.
  2. In locations where a system ground is not available, or the existing ground registered voltage upon the proximity test, a metal rod shall be firmly embedded into the earth to a depth of no less than 6" to create a ground reference point for the measurement to be taken. 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 situation (3' to 4'.) On occasion longer leads may be necessary to find undisturbed earth (up to 25'.)
  - c. The "live" meter probe lead shall then be placed into contact with the structure under inspection to determine the voltage.
    1. Voltages readings greater than 30 volts 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.
- 5.2.3 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. The equipment used is mounted to vehicles and detects voltage levels greater than 1 volt while driving at speeds of up to 25 mph near underground facilities. 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.
- 5.2.4 Any positive indications by either mobile testing or hand held tools shall be followed up with multi-meter measurements on the target structures. Voltage measurements shall be taken in accordance with Section 5.2.2 above. 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. 
- 5.2.5 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 

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use of a Fluke Power Quality clamp meter or a Fluke scope meter both of which have the ability to measure THD.

## **6.0 CORRECTIVE ACTION REQUIREMENTS FOR ELEVATED VOLTAGE FINDINGS**

### 6.1 State Specific Requirements

#### 6.1.1 New York

If equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded until made safe by Company personnel or if municipally owned, made safe by the owner or company. Guarded for the purpose of this EOP is defined as guarded by a person or a protective barrier that prevents public contact if the equipment elevated voltage found is greater than 1 volt. **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.** If the voltage measures greater than or equal to 1 volts and less than 4.5 volts it can either be guarded in person or by a protective barrier that prevents public contact, contact your supervisor for required action. Sound judgment shall be utilized in this application. If the voltage measurement is greater than or equal to 4.5 volts it shall be guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities, and immediate response is required using the notification in Section 6.3 below.

#### 6.1.2 Massachusetts and Rhode Island

If equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded until made safe by Company personnel or if municipally owned, made safe by the owner or company. Guarded for the purpose of this EOP is defined as guarded by a person or a protective barrier that prevents public contact if the equipment elevated voltage found is greater than 4.5 volts. **If the voltage measures less than 4.5 volts and is found to be consistent with system operation design (no visual evidence of a problem upon review) no further action is required.** If the voltage measures greater than 4.5 volts and less than 8 volts it can either be guarded in person or by a protective barrier that prevents public contact, contact your supervisor for required action. Sound judgment shall be utilized in this application. If the voltage measurement is greater than 8 volts it shall be guarded by an equipment elevated voltage inspector or a Company employee who has been trained to stand by on energized facilities; an immediate response is required using the notification in section 6.3 below

#### 6.1.3 Rhode Island Total Harmonic Distortion Pilot

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



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distortion is greater than 10% and no visual defects are found, no further action will be required.

6.1.4 New York and Rhode Island

In the event of an elevated voltage finding on an electric facility or street light during the stray voltage test procedure, 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.

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

6.2.1 Notification by location:

a. New York: contact Systems Operations Dispatch 1-877-716-4996

b. New England North, Northborough Distribution Control Center:

1. North Shore (MA) 1-877-247-3606
2. Merrimack Valley (MA) 1-877-247-3607
3. Central (MA) 1-877-247- 3608
4. Western (MA) 1-877-247-3609

c. New England South, Northborough Distribution Control Center

1. Capital (RI) 1-877-247-3610
2. Coastal (RI) 1-877-247-3599
3. Southeast (MA) 1-877-411-3812
4. South Shore (MA) 1-877-411-5599

6.2.2 Inform the operator that this is an equipment elevated voltage call, giving inspector name, company (if not National Grid), unique ID, address where problem is identified, facility number, circuit number , ownership, type of equipment, voltage found and whether they are physically guarding or leaving the site after flagging and installing a protective barrier. National Grid personnel or designee will be assigned to respond.

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

6.4 Except as noted in Section 6, 6.6, permanent repairs to the equipment shall be made within 45 days of the occurrence.

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

6.6 The Stray Voltage Tester/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.

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- 6.7 The 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. Angel guards shall only be installed after the testing of the street light standard is complete and 1) there is no indication of equipment elevated voltage above 1 volt, or 2) repairs have been completed to correct the equipment elevated voltage.
- 6.8 The equipment elevated voltage inspector shall report any potentially hazardous conditions found on National Grid facilities seen visually during the survey process.
- 6.9 Customer Owned Equipment
- 6.9.1 Where the Company finds equipment elevated voltage above 1 volt and identifies its source as customer-owned equipment, the Company shall guard the site and notify the customer or a responsible person, as appropriate, that a potentially hazardous situation exists. The Company shall advise the customer or responsible person that the cause of the equipment elevated voltage shall be immediately remedied.
- 6.9.2 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.

## **7.0 DATABASE REQUIREMENTS**

- 7.1 The database in use shall be easily searchable for information and reporting.
- 7.2 Information fields required to be completed for facilities:
- Survey Date
  - Region
  - District
  - Contractor
  - GIS ID/Asset # (Unique ID)
  - Facility Type
  - Owner
  - Feeder/Circuit
  - Line #
  - Tax District
  - Pole/Structure/Equipment ID
  - Street Name
  - Inspectors Name
  - GPS Taken
  - Pre-load Match
  - Equipment elevated Voltage Test Required
  - Voltage Found Y/N
  - Voltage Measurement

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Type of Equipment (See Appendix A)  
Immediate Action Taken  
Person Notified  
Permanent Repair Date  
Type of Repair  
Person Responsible for repair (Employee ID)

7.3 Information fields required to be completed for facilities in mobile testing

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

## **8.0 NEW YORK ANNUAL REPORTING AND CERTIFICATION REQUIREMENTS**

- 8.1 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.
- 8.2 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.
- 8.3 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.
- 8.4 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.
- 8.5 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.

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- 8.6 The annual reporting and certification is required by February 15 of each year. In addition to certifications, it shall address the following:
- 8.6.1 Details the results of stray voltage test results and inspections conducted over the 12-month period ending December 31 of the prior calendar year. (A separate report will be required for inspections from November 1 – December 31, 2008 to account for transition to calendar year reporting.)
  - 8.6.2 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).
  - 8.6.3 Contain certification describe in 8.3, 8.4 and 8.5 of this section.
  - 8.6.4 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.
  - 8.6.5 Contain a breakdown of the shock reports received from the public as detailed in Attachment 2 of the December 15, 2008 Order.
  - 8.6.6 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.
  - 8.6.7 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.
  - 8.6.8 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.
  - 8.6.9 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.
  - 8.6.10 Contain a review and analysis of the inspection results. Identifying areas of concern along with remedial actions or future plans to alleviate inadequacies in current program assets.
  - 8.6.11 Description of the quality assurance program along with the results from quality assurance activities conducted during the year.
  - 8.6.12 Any additional information that is pertinent to the issues addressed by the safety standards should also be included.

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- 8.7 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, 2011, whichever is earliest, and in each subsequent year. The filing shall include the historic results and costs associated with the manual test program in each area listed in Section 1.5 of this procedure.
- 8.8 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.
- 8.9 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.

#### **9.0 MASSACHUSETTS REPORTING REQUIREMENTS**

- 9.1 National Grid shall submit an annual report that includes the following:
- 9.1.1 Annual reports that list inspection and testing data, including number of inspections conducted by equipment type.
  - 9.1.2 Number of equipment elevated voltage events detected by inspection personnel versus call-ins or notification by third parties.
  - 9.1.3 Variance reports on current year inspection targets.
  - 9.1.4 Equipment elevated voltage events detected on equipment that is not included in equipment elevated voltage equipment inspection schedules (which will enable the DTE to determine if the company is inspecting and testing the correct equipment).
  - 9.1.5 Number of exceptional or non-routine events that required reporting to OSHA or other government organizations due to injuries or other substantive impacts

#### **10.0 Rhode Island Reporting Requirements**

- 10.1 National Grid shall submit an annual report that includes the following in a searchable form:
- 10.1.1 Event record number
  - 10.1.2 Location of testing
  - 10.1.3 Date and time of testing
  - 10.1.4 Company or customer asset
  - 10.1.5 Failed equipment type
  - 10.1.6 Voltage recorded
  - 10.1.7 Personal injuries to members of the public, pets or property damage

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The Narragansett Electric Company  
d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
Responses to Division's First Set of Data Requests  
Issued November 13, 2013  
Attachment 3  
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- 10.1.8 Any other equipment involved and age
- 10.1.9 Prior incidents at this location in the past five years
- 10.1.10 Corrective actions taken at the location and date taken
- 10.1.11 Number of customers if service is interrupted while making repairs
- 10.1.12 Duration of interruption
- 10.1.13 Summary of investigation into cause of the incident
- 10.1.14 Number of calls to the company "shock" line
- 10.1.15 Total repair costs by Contact Voltage Area
- 10.1.16 All information as provided for in Section 7.3

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.

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#### **11.0 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)

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	<b>Equipment Elevated Voltage Testing</b>	Version 2.0 – 09/30/13

## **12.0 REVISION HISTORY**

<b><u>Version</u></b>	<b><u>Date</u></b>	<b><u>Description of Revision</u></b>
1.0	04/01/11	This document supersedes document dated 08/17/09.
2.0	09/30/13	This document supersedes document dated 04/01/11.

nationalgrid	<b>ELECTRIC OPERATING PROCEDURE</b>	Doc. # <b>NG-EOP G017</b>
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	<b>STREET LIGHT STANDARD INSPECTION PROGRAM</b>	Version 1.0 - 02/16/10

## **INTRODUCTION**

The purpose of this procedure is to outline the requirements for the inspection cycle for Street Light Standard installations owned by National Grid.

The inspection shall include identifying and reporting the physical condition of street lighting equipment on street lighting standards. Street lights attached to wood poles are inspected as part of the Overhead Distribution Inspection Patrol covered by NG-USA EOP D004.

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

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

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

Level 2 - Identified facility/component condition that must be repaired/replaced within 1 year.

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

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

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

1. Notification by location:
  - a. New York: contact System Operations Dispatch 1-877-716-4996.
  - b. NE North: Westboro Control Center 1-508-389-9032.
  - c. NE South: Lincoln Control Center 1-401-335-6075.
2. Detailed information provided to the regional notification location:
  - a. Identify yourself as a Company Inspector and your work reporting area.
  - b. Details of the Level 1 Priority Condition:
    - i. Problem found.
    - ii. District, Feeder No., Line No., Tax District and Pole No.
    - iii. Street address and any additional information that would assist in finding the location of the problem.
    - iv. If you are standing by or have secured the location.
3. Notification to area Inspections Supervisor for follow-up.

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Equipment will be inspected on a five year cycle such that one-fifth of the inspections should be scheduled on an established annual basis.

### **PURPOSE**

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

### **ACCOUNTABILITY**

1. Distribution Engineering Services
  - A. Update program as necessary
  - B. Provide field support and training as requested.
2. Customer Operations
  - A. Provide qualified personnel as the distribution inspectors, to provide consistent and accurate data or to contact Contract Management Services for contracting where applicable.
3. Distribution Inspector
  - A. Demonstrate the ability to identify maintenance items and the aptitude to become proficient in the use of a hand held computer and desktop computer.
  - B. Demonstrate the understanding and requirements of this National Grid EOP.
  - C. Possess the ability to do patrols, collect information on a hand held, down load to a desktop computer, edit data, provide requested information/reports/work tickets to supervision, and track/close out work completed in the database.  
Provide qualified personnel to inspect where applicable.
  - D. Ensure all inspectors have been trained.
4. Contract Management Services
  - A. At the request of Customer Operations/Distribution Network Strategy obtain, schedule and manage contractors to perform inspections and perform required maintenance.
5. Network Asset Strategy
  - A. Provide input into program revisions.
  - B. Ensure the program as outlined in this EOP is completed each year.
  - C. To develop and/or revise a five-year inspection schedule of all facilities covered by this EOP.
  - D. Develop Outdoor Lighting Asset Strategy
6. Process and Systems
  - A. Provide and support database.

### **COORDINATION**

Not Applicable

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## **REFERENCES**

Applicable National Grid Safety Rules and Procedures  
NY PSC Order 04-M-0159  
NY PSC Order Adopting Changes to Electric Safety Standard, December 2008  
Elevated Equipment Voltage NG-USA EOP G016

## **DEFINITIONS**

**Patrol:** A walking assessment of distribution facilities for the purpose of determining the condition of the facility and it's associated components.

**Hand Held Computer:** A portable, self-contained electronic data recording device used to create a record of conditions found in the field.

**Inspector:** A qualified employee or contractor who can identify deficiencies, or non-standard construction conditions, on the Company's street light facilities.

**Valid User:** An individual who has been authorized to use the Street Lighting Maintenance Program by the Program Administrator.

**Street Light Standard:** A metallic or fiberglass shaft and arm assembly which supports street lighting luminaire(s) and associated wiring.

## **TRAINING**

T&D Technical Training - Provide training upon request.

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## **1.0 STREET LIGHT PATROLS**

Street Lighting inspections will be performed as patrols and are conducted by a street light qualified worker. The patrols are scheduled in such a manner that street lighting facilities are inspected once every five years. The Outdoor Lighting group is responsible for creating and/or revising this schedule for the respective geographic areas. The Distribution Inspector uses a Windows® based hand held computer to record employee ID, region, district, street lighting installation standard number, GPS location, Priority Level 1, 2, 3 and 4 maintenance items, and comments. The listing of these maintenance items are shown in Table I. Any new facilities added to the system will be incorporated through our Customer Service System – Outdoor Lighting (CSS-OL) database and added to the appropriate inspection cycle. The street light standards inspections scheduled for the year shall be completed by December 31<sup>st</sup>. The inspector shall place the CSS-OL street light standard number on the facility if not found numbered during the patrol.

## **2.0 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES**

- 2.1 Luminaires
- 2.2 Arms
- 2.3 Standards
- 2.4 Foundations
- 2.5 Conductor

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**TABLE I**

**PRIORITY 1, 2 and 3 MAINTENANCE ITEMS FOR OUTDOOR LIGHTING**

Category	CODE	Default Priority	Description
Luminaire	300	2	Light "ON" Day
	301	2	Replace Lens
	302	4	Clean
	303	4	Paint
	304	4	Replace Wattage Label
	305	1	Wires Exposed
	306	2	Damaged - Replace
	307	4	Missing
	308	4	Other - Comments
Arm			
	320	2	Damaged - Replace
	321	4	Damaged - Repair
	322	4	Rust - Paint
	323	4	Other - Comments
Standard			
	330	2	Structure Damage - Replace
	331	4	Damaged/Leaning - Repair
	332	4	Paint/Maintenance
	333	1	Access Cover - Replace
	334	4	Bad Wiring - Repair
	335	4	Stencil Required
	336	2	Temporary Overhead *
	337	2	Ground - Repair
	338	4	Knockdown/Missing
	339	4	Other - Comments
Foundation			
	350	4	Damaged/Leaning - Repair
	351	4	Anchor Bolts Damaged
	352	4	Elevated - Repair
	353	4	Other - Comments

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

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

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### **3.0 STREET LIGHT MAINTENANCE DATABASE/REPORTS**

The Street Light Maintenance Data Base consists of records downloaded from the hand held computers and information entered from the desktop computers. The records can be downloaded to the database through any desktop computer that is connected to the network and the inspector is logged on as a valid user of the Street Light Standard Inspection program. The desktop computer is also used to generate various reports and work tickets, depending on the user's need. These reports/work tickets are utilized to schedule and accomplish distribution maintenance work.

### **4.0 MAINTENANCE SCHEDULE**

Maintenance activities are scheduled by priority Levels. All "Level 1 Priority" conditions identified must be repaired/corrected within 1 week. All "Level 2 Priority" conditions identified must be repaired/corrected within 1 year. All "Level 3 Priority" conditions must be repaired within 3 years. Level 4 Priority is for inventory purposes only.

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

### **5.0 COMPLETION**

The completion of Level 1 priority maintenance codes is performed by the field operations Supervisor or their designee. Level 2 and Level 3 priority maintenance codes are tracked in the Street Light Maintenance database and placed into the Customer Service System – Outdoor Lighting (CSS-OL) database. CSS-OL database automatically initiates a STORMS order. CSS-OL database is updated once the associated STORMS orders are complete for the work request associated with the maintenance code from the Street Light Database.

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

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


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## **6.0 REVISION HISTORY**

<b><u>Version</u></b>	<b><u>Date</u></b>	<b><u>Description of Revision</u></b>
1.0	02/16/10	This document supercedes document dated 07/25/05.

 <b>ELECTRIC OPERATING PROCEDURES</b>	<b>Doc No.:</b> NG-USA EOP UG006
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	<b>Date:</b> 08/17/09
<b>SUBJECT:</b> Underground Inspection and Maintenance	<b>SECTION:</b> Underground

#### GENERAL INFORMATION:

The purpose of this procedure is to outline the requirements for the patrol and maintenance activities associated with National Grid's underground transmission and distribution facilities.

The variance in inspection procedures in New York, Massachusetts, New Hampshire, and Rhode Island service territories is due to the requirements of New York Public Service Order 04-M-0159 and the Massachusetts Department of Telecommunications and Energy recommendations of December 9 2005, which is incremental to National Grid in New York and Massachusetts.

This program is designed for the patrol and designated maintenance of underground facilities on a five year schedule. The Inspector will record all required maintenance on an approved National Grid database.

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

*Level 1* - An identified facility/component or tree condition that must be repaired/replaced within 1 week.

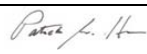
*Level 2* - Identified facility/component condition that must be repaired/replaced within 1 year.

*Level 3* - Identified facility/component condition that must be repaired/replaced within 3 years.

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

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

1. Notification by location:
  - a. New York: contact System Operations Dispatch 1-877-716-4996.
  - b. Bay State West and North & Granite: Westboro Control Center 1-508-389-9032.
  - c. Bay State South, and Ocean State: Lincoln Control Center 1-401-335-6075.
2. Detailed information provided to the regional notification location:
  - a. Identify yourself as a Company Underground Inspector and your work reporting area.
  - b. Details of the Level 1 Priority Condition:
    - i. Problem found.
    - ii. District, Circuit/Feeder No., Line No., Tax District and Manhole/vault No.
    - iii. Street address and any additional information that would assist in finding the location of the problem.
    - iv. If you are standing by or have secured the location.

Supersedes Document Dated: 06/26/08	Authorized By: Director-Distribution Engrg. Services	Approved By:  SVP- Network Strategy
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SUBJECT: Underground Inspection and Maintenance

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**APPLICABILITY:**

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

**DEFINITIONS:**

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

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

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

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

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

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

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

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

**Secondary Splice Box:** An enclosure identified for use in underground systems. A secondary splice box may be required where the customer's number of secondary cables exceeds the maximum allowed amount on the transformer.

**Service Box:** See Hand-hole

**Submersible Equipment:** Electric equipment such as transformers and switches that, are generally located within a Hand-hole, Manhole, or Vault.

**URD:** Underground Residential Distribution

**UCD:** Underground Commercial Distribution

**Underground Distribution Facilities:** Manholes, vaults, hand-holes and service boxes, padmounted equipment and the components and equipment contained in these structures. (See GENERAL INFORMATION above).

**User:** An individual who the program administrator has authorized to use the inspection reporting program.



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**Vault:** An enclosure, above or below ground, which personnel may enter and which is used for the purpose of installing, operating, or maintaining equipment or wiring or both.

**PROGRAM ADMINISTRATOR:**

Distribution Engineering Services

**SCOPE:**

Underground Transmission and Distribution Facility Maintenance

- I. Patrols
- II. Equipment to be Inspected and Maintenance Codes
- III. Maintenance database
- IV. Maintenance Schedule
- V. Completion of Maintenance Codes
- VI. Responsibilities

**I. PATROLS**

**1. New York**

Inspection of underground equipment will be scheduled in such a manner that each underground facility will be examined once every five years. These patrols shall be completed by December 31<sup>st</sup> of the schedule year.

One-fifth of all underground utility components should be inspected each year. URD and UCD facilities shall be inspected on the existing overhead distribution circuit schedule. Additionally all riser poles are inspected in accordance with the Transmission and Distribution Overhead Inspection Programs, NG-USA EOP T007 and NG-USA EOP D004. Customer owned manholes and vaults that enclose National Grid equipment shall require the inspection of these National Grid facilities.

The Inspection group is responsible to create the patrol schedule for their respective Regions for the remainder of underground facilities. The Inspector uses a Windows based hand held computer to record region, district, employee ID, feeder number, structure ID number, GPS location, tax zone, line number, comments and maintenance problem codes. The Inspector while patrolling shall also complete the following maintenance codes if found deficient upon inspection: 602 – Handhole missing nomenclature, 617 – manhole missing nomenclature, 639 - network transformer- missing nomenclature, 660 – switchgear missing nomenclature, 681 – transformer missing nomenclature, and 707 – vaults improper nomenclature. The Inspector will input the code into the Windows based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site. If the Inspector finds unmapped facilities from the information supplied from the Geographic Information System (GIS), refer to NG-USA EOP G011, Preparation and Distribution of Electric Facilities Records, for required procedure for corrections.

**2. New Hampshire and Rhode Island**

Inspection of designated underground equipment will be scheduled in such a manner that each designated Underground Facility will be examined once every five years. These patrols shall be completed by March 31<sup>h</sup> of the fiscal year.

One-fifth of all metallic handholes, padmount transformers and switchgear shall be inspected annually. The metallic handhole covers shall be opened for a visual inspection. An external visual inspection shall be completed on the padmount transformers and switchgear. Additionally all separable components in the

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metallic handholes are to be inspected by infrared. Refer to NG-USA EOP UG001 for infrared procedure. A "Level 1 Priority" shall be assigned to a temperature gradient greater than 20°, although it is recognized that consideration must be taken as to whether a customer outage will occur at this time and the negative impact the outage could have on the customer. This may require scheduling an outage with the customer within one week to satisfy this requirement. A "Level 2 Priority" shall be assigned to a temperature gradient between 10° and 20°. A "Level 3 Priority" shall be assigned to a temperature gradient less than 10°. Additionally, an elevated equipment voltage test shall be completed at each location, refer to NG-USA EOP-G016.

A working inspection on underground facilities is required for all manholes, vaults, handholes, splice boxes, junction boxes, padmount transformers, switchgear and submersible equipment, each time a crew performs work at one of these facilities. The format for data collected shall follow this EOP. All separable components in these facilities are to be inspected by infrared. Additionally an elevated equipment voltage test shall be completed at each location, refer to NG-USA EOP-G016.

All transmission riser poles are inspected in accordance with the Transmission NG-USA EOP-T007.

The Inspection group is responsible to create the patrol schedule for their respective Regions for the designated underground facilities. The Inspector uses a hand held computer to record region, district, employee ID, feeder number, structure ID number, GPS location, line number, comments and maintenance problem codes. The Inspector, while patrolling or crew while inspecting, shall also complete the following maintenance codes if found deficient upon inspection, 602 – Handhole missing nomenclature, 617 – manhole missing nomenclature, 639 – network transformer- missing nomenclature, 660 – switchgear missing nomenclature, 681 – transformer missing nomenclature, and 707 – vaults improper nomenclature. The Inspector will input the code into the Windows based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site. If the Inspector finds unmapped facilities from the information supplied from GIS, refer to NG-USA EOP G011, Preparation and Distribution of Electric Facilities Records, for required procedure for corrections. Crews performing working inspections are to follow the same protocol for inspections by using either a handheld data entry unit or paper inspection logs requiring data entry by clerical support.

### **3. Massachusetts**

Inspection of designated underground equipment will be scheduled in such a manner that each designated Underground Facility will be examined once every five years. These patrols shall be completed by March 31 of the fiscal year.

One-fifth of all manholes, vaults, metallic handholes, padmount transformers and switchgear shall be inspected annually. The metallic handhole covers shall be opened for a visual inspection. Manholes and vaults shall be opened and entered for inspection. An external visual inspection shall be completed on the padmount transformers and switchgear. Additionally all separable components in the metallic handholes, manholes, and vaults are to be inspected by infrared. Refer to NG-USA EOP UG001 for infrared procedure. A "Level 1 Priority" shall be assigned to a temperature gradient greater than 20°, although it is recognized that consideration must be taken as to whether a customer outage will occur at this time and the negative impact the outage could have on the customer. This may require scheduling an outage with the customer within one week to satisfy this requirement. A "Level 2 Priority" shall be assigned to a temperature gradient between 10° and 20°. A "Level 3 Priority" shall be assigned to a temperature gradient less than 10°. Additionally, an elevated equipment voltage test shall be completed at each location, refer to NG-USA EOP-G016.

A working inspection on underground facilities is required for all manholes, vaults, splice boxes, junction boxes, padmount transformers, switchgear and submersible equipment, each time a crew performs work at one of these facilities. The format for data collected shall follow this EOP. All separable components in these facilities are to be inspected by infrared. Additionally an elevated equipment voltage test shall be completed at each location, refer to NG-USA EOP-G016.

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All transmission riser poles are inspected in accordance with the Transmission NG-USA EOP-T007.

The Inspection group responsible to create the patrol schedule for their respective Regions for the designated underground facilities. The Inspector uses a hand held computer to record region, district, employee ID, feeder number, structure ID number, GPS location, line number, comments and maintenance problem codes. The Inspector, while patrolling or crew while inspecting, shall also complete the following maintenance codes if found deficient upon inspection, 602 – Handhole missing nomenclature, 617 – manhole missing nomenclature, 639 - network transformer- missing nomenclature, 660 – switchgear missing nomenclature, 681 – transformer missing nomenclature, and 707 – vaults improper nomenclature. The Inspector will input the code into the Windows based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site. If the Inspector finds unmapped facilities from the information supplied from GIS, refer to NG-USA EOP G011, Preparation and Distribution of Electric Facilities Records, for required procedure for corrections. Crews performing working inspections are to follow the same protocol for inspections by using either a handheld data entry unit or paper inspection logs requiring data entry by clerical support.

## **II. EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES**

This EOP requires the visual inspection of the following facilities as designated above for New York, New Hampshire, Rhodes Island or Massachusetts, which require opening, and may require pumping on some items to assure a proper inspection:

- Manholes
- Vaults
- Handholes – non-fiberglass
- Splice boxes – non-fiberglass
- Junction boxes – non-fiberglass
- Pad mount transformers
- Pad mount switchgears
- Submersible equipment
- Handholes – fiberglass do not require opening
- Splice boxes – fiberglass do not require opening
- Junction boxes – fiberglass do not require opening

Maintenance Codes are shown on the Underground Field Survey Worksheet (Table 1). The Underground Field Survey Worksheet can be used by the field to record maintenance items and is used for informational purposes only. The latest transmission maintenance codes are downloaded to the Hand Held Computer each time there is a change that affects the maintenance code table contained in the Underground Maintenance Database. Printed copies of the latest maintenance code tables may be obtained by running a report on the look up tables from the Underground Maintenance Database.

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d/b/a National Grid  
In Re: Rhode Island Division's Review of FY 2015 Proposed Electric ISR Plan  
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**INSPECTION PROGRAM AND MAINTENANCE CODES**

**TABLE 1**

UNDERGROUND FIELD SURVEY WORKSHEET																								
DATE:			INSPECTOR NAME:				EMPLOYEE ID																	
DIVISION			DISTRICT				FEEDER:																	
TOWN:		STREET:		POLE, MANHOLE, VAULT #			SUFFIX #																	
Handhole		Manhole		Net Protect		Net XFMR's		Switchgear																
Vault		Trench		Submersible		Pull Box		Other																
MANHOLES, HANDHOLES, VAULT STRUCTURES						EV Test Required: Yes No Voltage Action Taken: Repaired De-energized																		
Water (in hole) Yes No						EV Found Voltage: Yes No																		
<table border="1"> <thead> <tr> <th colspan="2">Gas Monitor Readings</th> <th>Alarm Setting</th> </tr> </thead> <tbody> <tr> <td>Lower Explosive Limit (LEL)</td> <td></td> <td>10% or above</td> </tr> <tr> <td>Oxygen (O<sub>2</sub>)</td> <td></td> <td>% below 19.5, above</td> </tr> <tr> <td>Carbon Monoxide (CO)</td> <td></td> <td>33 ppm</td> </tr> <tr> <td>Hydrogen Sulfide (H<sub>2</sub>S)</td> <td></td> <td>10 ppm</td> </tr> </tbody> </table>										Gas Monitor Readings		Alarm Setting	Lower Explosive Limit (LEL)		10% or above	Oxygen (O <sub>2</sub> )		% below 19.5, above	Carbon Monoxide (CO)		33 ppm	Hydrogen Sulfide (H <sub>2</sub> S)		10 ppm
Gas Monitor Readings		Alarm Setting																						
Lower Explosive Limit (LEL)		10% or above																						
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Hydrogen Sulfide (H <sub>2</sub> S)		10 ppm																						
GIS					P/Q	SWITCHGEAR																		
260 4 (NR) GIS map doesn't match field					/	657 F (NR) Excessive vegetation																		
261 4 (NR) GIS Pole/line numbering in error on GIS					/	659 2 (R) Missing ground																		
262 4 (NR) GIS equip/hardware missing in GIS					/	660 P (NR) Missing nomenclature																		
263 4 (NR) GIS equip removed in field, remove from GIS					/	661 4 (NR) Other																		
269 4 (NR) GIS Other GPS/GIS Errors					/	662 4 (NR) Rusted/Paint Peeling																		
HANDHOLES						TRANSFORMER																		
600 2 (NR) Broken/damaged/unsecured					/	672 1,2,3 (R) Bushing Broken/Cracked																		
602 P (NR) Missing nomenclature					/	673 1,2,3 (R) Door Broken/damaged/unsecure																		
603 1 (R) Secondary needs repair					/	675 1,2,3 (R) Elbows/tracking/burned																		
604 4 (NR) Other (use comments)					/	676 F (NR) Excessive vegetation																		
MANHOLE						680 1 (R) Missing Ground																		
610 2 (NR) Ground rods missing					/	681 P (NR) Missing nomenclature																		
611 2 (R) Cable/Joint leaking					/	682 4 (NR) Mud/debris																		
612 2 (NR) Cables bonded/grid defective					/	684 1,2 (NR) Oil Weeping																		
614 1,2,3,4 (NR) Cracked/broken					/	685 1,2,3,4 (NR) Pad broken/damaged																		
615 3 (R) Fire proofing					/	686 4 (NR) Protection (ballards) damage																		
616 4 (NR) Improper grade					/	687 4 (NR) Rusted/Paint peeling																		
617 P (NR) Missing nomenclature					/	688 1,2 (NR) Pad Pushed Off Base																		
620 2 (NR) Rerack					/	TRENCH																		
621 1,2,3,4 (NR) Ring/cover repair/replace					/	690 1 (R) Exposed Cable																		
622 1,4 (NR) Roof condition – use comments					/	692 4 (NR) Path – Sunken																		
623 1,4 (NR) Chimney Condition – comments					/	VAULTS																		
624 4 (NR) Manhole needs cleaning					/	700 2 (NR) Cable missing bond																		
625 1 (R) Secondary needs repair					/	702 1,2,3,4 (NR) Cracked/broken																		
626 4 (NR) No Holes in Manhole Cover					/	703 1,2,4 (NR) Damaged/broken cover																		
NETWORK PROTECTOR						704 1,2,4 (NR) Damaged/broken door																		
630 2 (R) Barriers broken/damage					/	705 1,2,4 (NR) Damaged/broken ladder																		
632 1 (R) Oil leak					/	706 1,2,3,4,P (NR) Improper grade																		
633 2 (NR) Worn/damaged gasket					/	707 4,P (NR) Improper nomenclature																		
NETWORK TRANSFORMER						708 4 (NR) Light not working																		
635 2 (R) Bushing Broken/cracked					/	712 4 (NR) Sump pump broken																		
637 2 (R) Low oil					/	713 1 (R) Secondary needs repair																		
638 1 (NR) Missing ground					/	SUBMERSIBLE EQUIPMENT																		
639 P (NR) Missing nomenclature					/	720 1,2,3,4 (R) Excess Corrosion																		
642 1, 2 (R) Oil Weeping					/	721 1,2,3,4 (R) Physical damage																		
643 4 (NR) Rusted/paint peel					/	722 1,2 (R) Leaking																		
SWITCHGEAR						ANODES																		
651 1,2,3 (R) Barrier broken/damaged/unsecure					/	730 3 (R) Missing																		
652 1,2,3 (NR) Base broken/damaged					/	731 3 (NR) Need replacement																		
654 2 (R) Cable not bonded					/	<b>KEY</b> PQ = Priority Quantity NR = Maint. Code May Not Directly Affect Reliab. R = Maint. Code May Affect Reliability RP = Maint. Code May Affect Reliab. and Has Specific Program to Place to Address																		
656 1,2,3 (R) Door Broken/Damaged					/																			
Comments:																								

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### **III. MAINTENANCE DATABASE**

The Maintenance database consists of data downloaded from the Windows based hand held and data entered from the desktop computer. The Windows based hand held used in the field, can be downloaded to any National Grid desk top computer that is connected to the network and the inspector is logged on as a valid user of the UG Maintenance program. The National Grid desktop computer is also used to generate various reports and work tickets depending on the user's need. These reports are utilized to schedule and accomplish distribution maintenance work.

### **IV. MAINTENANCE SCHEDULE**

Maintenance activities are scheduled by priority Levels. All "Level 1 Priority" conditions identified must be repaired/corrected within 1 week. All "Level 2 Priority" conditions identified must be repaired/corrected within 1 year. All "Level 3 Priority" conditions must be repaired within 3 years. Level 4 Priority is for inventory purposes only.

Once the Underground Circuit/Feeder is completed in the Underground Maintenance Database, the Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS. Expense maintenance work goes straight to scheduling while the capital work goes to Underground Engineering. Level 1 Priority maintenance codes are communicated by the Underground Inspector directly to the field operations group for the area where the feeder is located.

### **V. COMPLETION OF MAINTENANCE CODES**

The completion of Level 1 priority maintenance codes is performed by the field operations Supervisor or their designee. Level 2 and Level 3 priority maintenance codes are completed in the Underground Maintenance database once the 699 requirement is completed in STORMS for the work request associated with the maintenance code.

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

### **VI. RESPONSIBILITIES:**

Distribution Engineering Services

1. Update program as necessary.

Customer Operations

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

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Underground Inspector

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

Contract Management Services

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

Asset Strategy and Policy

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

Process and Systems

1. Provide and support database.

T&D Technical Training

1. Provide training upon request.

**REFERENCE:**

NY PSC Order 04-M-0159  
NY PSC Order Adopting Changes to Electric Safety Standard, December 2008  
Applicable National Grid Safety Rules and Procedures  
Distribution Line Patrol and Maintenance NG-USA EOP D004  
Elevated Equipment Voltage Testing NG USA EOP-G016  
Transmission Line Patrol and Maintenance NG USA EOP – T007  
Massachusetts DTE Directive 12/9/05

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d/b/a National Grid  
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**NG-USA EOP UG006**

**“Underground Inspection and Maintenance”**

**08/17/09**

Changed levels from ABC to 1234 and added Underground Field Survey Worksheet.

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d/b/a National Grid

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Division 1-19

Request:

Please provide the definitions of each of the cause categories for customer interruptions.

Response:

Below are definitions for each of the cause categories for customer interruptions.

- **Adverse Environment** includes the following:
  - o Moisture – Interruption caused by dampness or water getting into the equipment and resulting in the equipment failing.
  - o Flooding – Interruptions caused by flooding.
  - o Flying Debris – Interruptions resulting from natural causes, e.g. flying or wind blown debris caused by windstorm, explosions, etc. but not vandalism.
  - o Contamination – Interruption caused by tracking across contaminated insulators.
- **Animal** – Interruption caused by contact with energized lines/equipment by an animal or bird.
- **Deteriorated Equipment** includes the following:
  - o Deterioration – Interruption caused by corroding, rotting or aging of material, due to the normal process of time or accelerated by atmospheric conditions or other conditions.
  - o Insulation Failure – Cable – Interruption caused by failure of cable insulation. Use for cable failures when no other cause is apparent.
  - o Insulation Failure – Other – Interruption caused by dielectric breakdown of equipment insulation. Use for dielectric breakdown other than cable failures. This also applies to flashovers due to conductors off insulators.



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- **Human Element/Company** includes the following:
  - Construction by Company – Interruption due to inadvertent contact during the construction or reconstruction of distribution facilities by utility system personnel.
  - Construction by Company Contractor – Interruption due to inadvertent contact during the construction or reconstruction of distribution facilities by contractors working for the company.
  - Control Trouble – Any interruption caused by a relay, automatic throw-over device, supervisory control or other control device that causes an interruption device to operate. Relays not adjusted to established settings would be included.
  - Distribution Transformer Overload – Any transformer that fails as a result of loading above Distribution Standard. Also use when the secondary breaker in a self-protected transformer has opened and there is no evidence of trouble on the secondary system.
  - Feeder Overload – Interruption to customers caused by the operation of the circuit breaker due to a phase overload relay operation when no equipment trouble exists.
  - Feeder Unbalance – Interruption to customers caused by the operation of the breaker.
  - Fire on Company Equipment – Interruptions resulting from equipment or lines being damaged by fire due to failed equipment.
  - Improper Application – Interruption caused by the selection of the wrong piece of equipment for the task at hand; improper fuse size, improper relay setting, etc.
  - Improper Installation – Interruption caused by incorrect installation of equipment that would not be considered improper application. Example: the proper equipment not properly installed.
  - Operating/Testing Error – Interruption due to inadvertent operation of an energized device or an error committed during testing or switching.
  - Other Company Activities – Interruption caused by contact with energized lines and/or equipment by a crane, derrick, bucket truck or similar equipment operated by utility system personnel. Interruption caused by failure to properly insulate cable joints, splices, etc. or failure to apply insulation over joints or splices on

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spacer or aerial cable. Interruption caused by slack conductors. Interruption caused by conductors breaking due only to excessive tension. No evidence of ice, snow coating or excessive wind.

- Interruption caused by contact with energized lines/equipment by trees or limbs cut by company contractor.
- **Human Element/Other** includes the following:
  - Human Contact – Interruption caused by contact with energized lines/equipment by a human being who is not an employee or company contractor.
  - Non-Company Activities – Interruption due to inadvertent contact during the construction or reconstruction of distribution facilities by non-utility personnel. Interruption caused by contact with energized lines and/or equipment by a crane, derrick, bucket truck or similar equipment operated by non-utility personnel. Interruption caused by contact with energized lines/equipment by trees or limbs cut by customer or customer contractor.
  - Vandalism – Interruption caused by vandalism includes operation of switches by unauthorized persons, damage by gunfire, objects thrown onto lines and equipment, etc.
  - Vehicle – Interruption caused by a collision of a motor vehicle with distribution equipment.
- **Intentional** – Any outage due to planned maintenance, 911 response, emergency repair work, and load shedding.
- **Lightning** – A fault that occurs as a result of lightning either directly striking or inducing a voltage on a line or piece of equipment.
- **Substation** – Any outage specifically associated with failed equipment at a substation.
- **Sub-transmission** – Any outage caused by loss of supply on the sub-transmission system (under 69kV).
- **Transmission** - Any outage caused by loss of supply on the transmission system (69kV or greater).

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- **Tree** includes the following:
  - Tree Fell (whole tree) – Interruption caused by broken tree due to natural causes.
  - Tree Growth (tree or limb contact) – Interruption caused by contact with energized lines/equipment, by movement or bending of trees or limbs due to wind, ice or snow loading.
  - Tree Limb – Interruption caused by broken limb due to natural causes.
  - Vines – Interruption caused by a plant that clings to energized lines/equipment.
- **Unknown** – Interruption where diligent investigation fails to reveal the cause of the trouble.