STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

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Proceeding on Motion of the Commission :
To Examine the Safety of Electric Case 04-M-0159
Transmission and Distribution Systems :
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PETITION FOR MODIFICATION OF ELECTRIC SAFETY STANDARDS OF CENTRAL HUDSON GAS & ELECTRIC CORPORATION, CONSOLIDATED EDISON COMPANY OF NEW YORK, INC., NEW YORK STATE ELECTRIC & GAS CORPORATION, NIAGARA MOHAWK POWER CORPORATION d/b/a NATIONAL GRID, ORANGE AND ROCKLAND UTILITIES, INC, AND ROCHESTER GAS AND ELECTRIC CORPORATION

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I. INTRODUCTION

The Public Service Commission ("Commission") established Electric Safety Standards ("Safety Standards") in its Order Instituting Safety Standards, issued January 5, 2005 in this proceeding ("Safety Standards Order").[1] The Safety Standards establish requirements for (1) annual voltage testing of publicly accessible electric facilities, (2) inspections of utility electric facilities on a minimum of a five-year cycle, (3) protection and repairs to conditions found during testing or inspection, (4) electric facilities recordkeeping, certification, quality assurance, and reporting requirements; and (5)

[1] The Safety Standards apply to all investor-owned and municipal electric corporations subject to the Commission's jurisdiction that own and/or operate transmission or distribution facilities, whether fully or lightly regulated, and to the corporations subject to the Commission's jurisdiction that own and/or operate electric generating facilities within the State, whether fully or lightly regulated. Safety Standards Order, p. 3.

adoption of the National Electrical Safety Code as the minimum standard governing utility construction, maintenance, and operations. The Safety Standards also contain a performance mechanism that establishes annual performance targets for voltage testing and for inspections, and negative revenue adjustments for failure to achieve these targets ("Performance Mechanism"). The Commission's "Order Adopting Changes to Electric Safety Standards," issued December 15, 2008 in this proceeding, considered and adopted a variety of modifications proposed by the Staff of the Department of Public Service ("Staff") in 2008.[2]

The Commission has stated that it intends "to continuously monitor and evaluate the effectiveness and design of the Safety Standards" and that utilities may petition for modifications to the Safety Standards and may submit "analyses for our review and potential use in determining if future modifications to the testing and inspection programs are warranted."[3] The Commission has stated that it will consider modifications to the Safety Standards provided that changes are supported by data and the level of protection to the public is not compromised.[4]

Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc. ("Con Edison"), New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation d/b/a National Grid, Orange and Rockland Utilities, Inc., and Rochester Gas and Electric Corporation (collectively, "Petitioners") hereby

[2] The current Safety Standards are attached to the Commission's December 15, 2008 Order as Appendix A.
[3] Case 04-M-0159, "Order on Petitions for Rehearing and Waiver," issued July 21, 2005 ("Rehearing Order"), pp. 32-33.
[4] See Safety Standards Order, p. 11. ("Once we have a sufficient quantity of data, we may find that modifications to the standards, that maintain the same level of protection for all New Yorkers, are appropriate.")

individually and collectively petition the Commission for modification to the Electric Safety Standards issued in this proceeding. During the seven-year period from 2005 through 2011, the Petitioners have implemented the Safety Standards and have accumulated substantial data regarding the incidence of stray and contact voltage and shocks associated with various categories of electric facilities. These data demonstrate that modifications to the Safety Standards are warranted to implement the Safety Standards more effectively and efficiently while maintaining the safety and reliability of the electric system.

The Petitioners propose the following modifications to the Safety Standards:

1. The Safety Standards should contain definitions for "contact voltage" and "stray voltage," and the terminology of the Safety Standards should reflect the distinction between these two types of voltage.
2. Require that overhead distribution facilities, underground residential distribution ("URD") facilities, overhead and underground transmission structures, and substation fences be tested for voltage during mandated inspections on a five-year cycle rather than tested annually.
3. Require only external visual inspections of URD pad mounted transformers.
4. Modify the Performance Mechanism to establish negative revenue adjustments of no more than 10 basis points in equity earnings.

The proposed modifications to the Safety Standards are discussed in sections II through V of this petition. In support of the modifications to testing and inspection requirements (modifications No. 2 and No. 3 above), the Petitioners are submitting

"white papers" prepared by New York State Joint Utility Working Group ("Working Group"), a working committee comprised of representatives from each of the Petitioners. For each proposed modification, the associated white paper states the current performance requirement(s) and the proposed modification, provides data analysis supporting the modification, discusses why the proposed modification would maintain the same level of protection for all New Yorkers, and presents estimated cost savings. The white papers are provided as Appendix A and Appendix B to this petition.

II. THE SAFETY STANDARDS SHOULD DISTINGUISH AND PROVIDE SPECIFIC DEFINITIONS FOR "CONTACT VOLTAGE" AND "STRAY VOLTAGE," AND THE TERMINOLOGY OF THE SAFETY STANDARDS SHOULD BE MODIFIED TO REFLECT THIS DISTINCTION

The Safety Standards use the term "stray voltage" to describe voltage conditions resulting from power system conditions that should not exist on normally operating electric facilities.[5] These voltage conditions are the result of power-system fault current energizing a conductive surface in the environment and should not exist on normally operating electric facilities. These voltage conditions need to be mitigated to prevent harm to the public.

The Safety Standards do not contain a term for voltage conditions that result from the normal operation of a power system. These voltage conditions are the result of neutral-to-earth current return or induced current and are not considered harmful to the public. The term "stray voltage" is historically associated with neutral-to-earth voltage

[5] Section 1(c) of the Safety Standards defines "Stray Voltage" as "voltage conditions on electric facilities that should not ordinarily exist. These conditions may be due to one or more factors, including, but not limited to, damaged cables, deteriorated, frayed, or missing insulation, improper maintenance, or improper installation."

(NEV) encountered by farm livestock at contact points.[6] The use of the term "stray voltage" in the Safety Standards to describe both abnormal power system conditions and conditions that result from the normal operation of a power system can be confusing.

Voltages related to normal system operation and voltages related to abnormal system operation are very different and should be defined and addressed separately. In referring to "voltage conditions on electric facilities that should not ordinarily exist," the definition of "stray voltage" in the Safety Standards imply that there may be voltage conditions that ordinarily exist, but do not establish a term for, describe, or make provision for such voltage conditions.

The lack of a term, and specified standards, relating to voltages associated with normal power system operation causes uncertainty in the application of the Safety Standards and can unnecessarily increase the costs of compliance. Identifying, describing the characteristics of, and providing direction regarding such voltage conditions would reduce uncertainty in the voltage detection process of discovery, validation, troubleshooting and repair and would facilitate classification of voltage finding in the utilities' annual reports, thus enhancing the quality of information available to Staff.

In 2005, the Institute of Electrical and Electronics Engineers ("IEEE") formed a working group on Voltages at Publicly and Privately Accessible Locations (IEEE Standard Working Group P1695). The objective of this working group is to establish

[6] See, for example, http://www.wisconsinpublicservice.com/business/farm_voltage_overview.aspx.

guidelines for the detection, investigation and mitigation of elevated voltages including definitions for the various phenomena referred to as "stray voltage."[7] The working group has proposed definitions of elevated voltages that distinguish between normal and abnormal power system conditions as follows:[8]

- Stray voltage is defined as "A voltage resulting from the normal delivery and/or use of electricity (usually smaller than 10 volts) that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals. Stray voltage is caused by primary and/or secondary return current, and power system induced currents, as these currents flow through the impedance of the intended return pathway, its parallel conductive pathways, and conductive loops in close proximity to the power system. Stray voltage is not related to power system faults, and is generally not considered hazardous."

- Contact voltage is defined as "A voltage resulting from abnormal power system conditions that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals. 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."

The Petitioners propose that the Safety Standards be modified to include the following definitions of "stray voltage" and "contact voltage:"

- Contact Voltage: A confirmed voltage reading greater than or equal to 1 volt measured using a volt meter and 500 ohm shunt resistor that is the result of abnormal power system conditions.

- Stray Voltage: A confirmed voltage reading greater than or equal to 1 volt measured using a volt meter and 500 ohm shunt resistor that is the result of the normal delivery and/or use of electricity.

Further, the Petitioners propose that the Safety Standards be modified to reflect terminology consistent with recognition that voltages related to normal system operation

[7] See, http://grouper.ieee.org/groups/td/dist/stray.
[8] These definitions are found at the Working Group Website under "Public Working Group Documents."

("stray voltage") and voltages related to abnormal system operation ("contact voltage") are different and should be addressed separately.

III. MODIFICATION TO REQUIREMENTS FOR VOTLAGE TESTING OF OVERHEAD DISTRIBUTION, UNDERGROUND RESIDENTIAL DISTRIBUTION, TRANSMISSION FACILITIES, AND SUBSTATION FENCES

The primary purpose of voltage testing is to "minimize the potential exposure of the public to voltage conditions."[9] Since 2006, Petitioners have spent over $85 million for manual testing of facilities to satisfy Safety Standards requirements. Each year more than 3.8 million manual tests for contact voltage are conducted in New York State on a variety of utility and non-utility assets. Over the last three years (2009-2011) approximately 80 electric shocks per year were reported to utilities and upon investigation confirmed to be the result of defective utility equipment. The data suggest that the initial manual testing, performed in 2005, provided some benefit by reducing shocks nearly 22% statewide. Since that time, there has been negligible reduction in confirmed electric shock reports even though the utilities have performed more than 24 million tests and spent more than $85 million during this period. Given the statewide shock performance over the past 5 years, it is evident that manual testing has had no measurable impact on reducing shocks.

Modifications can be made to the manual testing requirements for overhead distribution facilities, underground residential distribution facilities, overhead and underground transmission facilities, and substation fences to make manual testing more

[9] Safety Standards Order, p. 2.

cost effective while maintaining the safety of the electric system. These modifications are discussed in the sections below. See, Appendix A.

A. Annual Testing of Overhead Distribution Facilities

1. Experience to Date

New York State has approximately 2.87 million overhead distribution assets, *e.g.*, guy wires, risers and down grounds, that are manually tested for voltage annually. Overhead distribution assets are the single largest asset class, representing more than 76% of all electric assets tested in the state.

After the initial rounds of testing in 2005, Petitioners saw a major decrease in confirmed shock reports associated with overhead facilities in all service areas of New York State (80 in 2005, followed by 40 in 2006). Since then Petitioners have seen shocks associated from this asset class plateau – 53 in 2007, 59 in 2008, 50 in 2009, 67 in 2010 and 60 in 2011. These annual fluctuations reflect only a slightly declining trend in confirmed shocks as a result of manual testing.

During the three years from 2008 through 2011, the detection rate, *i.e.*, instances of contact voltage, discovered during manual testing has been consistently low – 0.0254% in 2008, 0.0281% in 2009, 0.0246% in 2010, and 0.0345% in 2011.

2. Proposed Modification to Safety Standards

Petitioners propose that the Safety Standards be modified to remove the requirement that overhead distribution facilities be tested annually and to require, instead, that overhead distribution facilities be tested during periodic inspections on a five-year cycle. With this approach, all overhead distribution facilities would be manually tested

for voltage at least every five years. The Petitioners do not expect that the incidence of shocks from overhead distribution facilities will deviate materially from the average. However, the Petitioners will monitor and confer with Staff regarding shock incidents associated with overhead distribution facilities.

The proposed modification to the Safety Standards for manual testing of overhead distribution facilities will avoid the cost of deploying personnel every year to test about 2.87 million facilities throughout the State. Requiring field personnel to test these facilities during periodic inspections is a substantially more efficient use of resources.

B. Annual Testing of Underground Residential Distribution Facilities

1. Experience to Date

New York State has approximately 170,000 publicly accessible URD facilities, *e.g.* pad mounted transformers and metallic handholes. Each asset is manually tested annually for voltage. During the three years from 2008 through 2011, the detection rate, *i.e.*, instances of voltage discovered during manual testing, has been consistently very low – 0.0122% in 2008, 0.0046% in 2009, 0.007% in 2010 and 0.0076 in 2011.[10] URD facilities account for a very small number of confirmed shocks, approximately 5 per year from 2009 to 2011.[11]

[10] By design, failures on URD facilities that could result in contact voltage are normally detected before testing. A failure on the primary side of the unit would result in the feeder automatically coming out of service. Because these units do not feed traditional networks, failures on the secondary side usually result in customer complains of flickering lights and low voltage.

[11] Prior to 2009, utilities were not required to report data with the level of detail required to identify shocks associated with URD facilities.

2. Proposed Modification to Safety Standards

Petitioners propose that the Safety Standards be modified to remove the requirement that URD facilities be tested annually and to require, instead, that URD facilities be tested during periodic inspections on a five-year cycle. With this approach, all URD facilities would be manually tested for voltage at least every 5 years.

The Petitioners do not expect that the incidence of shocks from URD facilities will deviate materially from the average. The Petitioners will monitor and confer with Staff regarding shock incidents associated with URD facilities.

C. Annual Testing of Transmission Structures (Overhead and Underground) and Substation Fences

1. Experience to Date – Overhead Transmission Structures

New York has approximately 206,700 overhead transmission structures *e.g.*, metallic transmission towers, grounding cables, and guy wires, that are tested annually for voltage.[12] During the five years from 2007 through 2011, the detection rate, *i.e.*, instances of voltage discovered during testing, has been: 0.0477% in 2007, 0.0348% in 2008, 0.1311% in 2009, 0.1574% in 2010 and 0.1371% in 2011. Elevated voltages detected on overhead transmission structures are generally the result of an imbalance of load on the line that causes a small voltage to be induced on nearby metal objects. Since the amount of the imbalance is limited by protective circuits, and the structures are constructed with extensive grounding systems that protect against these types of voltages, the risk of a shock from contact voltage is nearly zero. Overhead transmission structures

[12] Overhead transmission structures are normally located on utility right of ways that are not generally accessed by the public.

are not prone to contact voltage because the transmission lines are protected by very sensitive relays that are designed to remove the circuit from service as soon as an insulator begins to fail and leak voltage. There have been no instances of confirmed shocks from overhead transmission structures since the Safety Standards became effective in 2005.

2. Experience to Date – Underground Transmission Structures

New York has approximately 2,100 publicly accessible underground transmission structures, *e.g.*, manholes, dielectric valve boxes, and pull boxes that are tested annually for elevated voltage. During the five years from 2007 through 2011, no detections, *i.e.*, instances of voltage discovered during manual testing, have been discovered during testing of underground transmission structures. Underground transmission structures are not prone to contact voltage because the transmission lines are protected by very sensitive relays that are designed to remove the circuit from service as soon as an insulator begins to fail and leak voltage. There have been no instances of confirmed shocks from underground transmission structures since the Safety Standards became effective in 2005.

3. Experience to Date – Substation Fences

New York State has approximately 2,100 publicly accessible substation fences that are tested annually for voltage.[13] During the five years from 2007 through 2011, the detection rate, *i.e.*, instances of voltage discovered during testing, has been: 0.0701% in 2007, 0.0% in 2008, 0.0% in 2009, 0.2104% in 2010 and 0.071% in 2011.[14] There have

[13] Substation fences are generally chain link barriers that prevent access to substation property.
[14] All detections in 2007 were associated with neutral to earth voltages and not a result of defective system equipment. Both of the detections on substation fences in 2010 resulted from ancillary equipment – failures of a

been no instances of confirmed shocks from substation fences since the Safety Standards became effective in 2005.

4. Proposed Modification to Safety Standards

Petitioners propose that the Safety Standards be modified to remove the requirement that overhead and underground transmission structures and substation fences be tested annually for voltage and to require, instead, that these facilities be tested for voltage at the time of periodic inspection. With this approach, all overhead and underground transmission structures and substation fences would be manually tested for voltage at least every 5 years.

IV. INTERNAL INSPECTION OF PAD-MOUNTED UNDERGROUND RESIDENTIAL TRANSFORMERS ARE NOT WARRANTED

The Safety Standards require that electric utilities inspect their facilities at least once every five years. Inspection must visually examine internal components unless the components are encased in a sealed compartment.[15] Thus, pad-mounted underground residential transformers must be inspected externally, as well as internally for accessible components.

A. Experience to Date

New York State has approximately 200,500 pad-mounted URD transformers. All of these units have been inspected at least once during the 2005 – 2009 inspection cycle. The large majority of defects found on inspection have resulted from the external

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doorbell and garage door opener that resulted in very low levels of stray voltage and were not a result of defective system equipment.

[15] Safety Standards, Section 4(b). See also, Safety Standards Order, p. 19 ("Inspection of equipment should be performed in a manner that allows the inspector to examine its components, except those that are ordinarily encased in sealed compartments").

inspection of the units, and very few defects have been found during the internal inspections. In the three-year period from 2009 through 2011, utilities discovered 11,648 defects on pad-mounted URD transformers with 10,167 (87.3 %) resulting from external inspections. See, Appendix B.

B. **Proposed Modification to Safety Standards**

Petitioners propose that the Safety Standards be modified to remove the requirement that pad-mounted URD transformers be internally inspected.

Inspection of the internal components of a pad-mounted URD transformer requires dispatch of more-qualified personnel and requires more time to conduct than an external inspection. Thus, an internal inspection adds to the cost of an external inspection. The additional cost is not warranted by the small number of defects found on internal inspection. Further, the external inspection readily discovers the transformer conditions that could affect public safety or reliability such as displacement from the transformer base caused by external forces (snow plows, automobiles, and lawn mowers) and missing or broken locks that could allow unauthorized access.

V. THE PERFORMANCE MECHANISM REVENUE ADJUSTMENT SHOULD BE UP TO 10 BASIS POINTS IN EQUITY EARNINGS

The Safety Standards contain a performance mechanism that establishes annual performance targets for voltage testing and for inspections, and negative revenue adjustments for failure to achieve these targets.[16]

[16] Safety Standards, Section 10.

For voltage testing, the annual performance target is 100% of all electric facilities and streetlights. The revenue adjustment for failure to achieve the annual voltage testing target is equal to 75 basis points in earnings on equity.

For inspections, the annual performance target is based on a percentage of the average number of electric facilities that must be inspected each year in order to comply with the five-year inspection cycle. The percentages are

- First year inspection goal 85% of annual target
- Second year inspection goal 90% of annual target
- Annual inspection goal thereafter 95% of annual target
- Fifth year inspection goal 100% of all facilities to be inspected

The revenue adjustment for failure to achieve the annual inspection target is equal to 75 basis points in earnings on equity.

The Petitioners propose that the revenue adjustments for failure to achieve each of the annual targets be up to 10 basis points in earnings on equity.

The Commission established the performance mechanism "to provide proper incentives to the utilities to avoid failing to achieve these minimum [testing and inspection] standards."[17] The performance signal was designed to "provide the proper economic signals to the utilities to comply with the safety standards and take the steps necessary to ensure the safety of their systems."[18]

[17] Rehearing Order, p. 29.
[18] Safety Standards Order, p. 41.

A reduction in the amount of the negative revenue adjustment from 75 basis points to up to 10 basis points is warranted for several reasons. To begin, the Commission set the 75 basis point level "in excess of the estimated costs of compliance thereby averting the possibility that a utility may determine that it is more economic to pay the adjustment than comply with the safety standards."[19] Quite the opposite, over the seven years (2005 – 2011) since the Safety Standards were established, compliance with the Safety Standards has become a well-established, ingrained operating practice at each utility. Each of the companies has developed the systems and procedures and has committed the resources required to fully comply with the testing and inspection requirements, and the associated costs are being recovered in rates. Thus, with infrastructure (systems, procedures, and resources) in place, with cost recovery provided for, and with seven consecutive years of full compliance now realized, compliance with safety standards should now be structured consistent with the performance metrics established under the electric service reliability performance mechanisms.[20]

The Commission has stated that the performance mechanism is "designed to operate in a similar fashion" to incentive mechanisms commonly incorporated into performance-based multi-year plans.[21] As examples, the Commission cited "earnings sharing, reliability performance, and customer service" performance mechanisms. The

[19] Rehearing Order, p. 30.

[20] Further, the Commission has made clear that violation of the Safety Standards can subject a utility to "penalty and/or enforcement actions … pursuant to PSL §§25 and 26." (Rehearing Order, p. 28, fn. 21) Entirely apart from the performance mechanism, these statutory measures, including severe monetary penalties, provide utilities a powerful incentive to comply with the Safety Standards rather than seek an economic benefit from non-compliance. In addition, the Commission's strict reporting requirements further protect against potential non-compliance. Utilities must file detailed annual performance reports, and an officer with responsibility for the program must annually certify compliance with testing and inspection requirements.

[21] Rehearing Order, p. 39.

Petitioners believe that to the extent that a negative performance mechanism remains necessary to promote Safety Standards performance, the revenue adjustment incentives should be consistent with the revenue adjustment incentive levels typically applicable to performance mechanisms in rate plans.

Accordingly, the negative revenue adjustment associated with the safety standards should not be structured to address a risk that a utility might seek to economically benefit from non-compliance. The revenue adjustment should be structured, similarly to a reliability performance mechanism, to address the safety and adequacy of service.

Considered in this regard, the 75 basis point revenue adjustment is atypical of rate plan revenue adjustment levels generally and reliability performance mechanisms specifically. A negative revenue adjustment of up to 10 basis points in equity earnings would be a meaningful incentive that more closely matches current rate plan reliability performance mechanism revenue adjustment levels.

VI. **CONCLUSION**

The Petitioners request that the Commission modify the Safety Standards as follows:

1. Provide definitions for “contact voltage” and “stray voltage,” and amend the terminology of the Safety Standards to reflect the distinction between these two types of voltage.
2. Require that overhead distribution facilities, URD facilities, overhead and underground transmission structures, and substation fences be voltage tested during periodic inspections on a five-year cycle rather than tested annually.

3. Require only external visual inspections of URD pad mounted transformers.
4. The Performance Mechanism revenue adjustment should be no more than 10 basis points in equity earnings.

The Petitioners further propose that the Commission authorize each company to defer with interest O&M savings resulting from such modifications as a credit to customers subject to further order of the Commission for the application of such credits.

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