

**Report on Orange and Rockland Utilities, Inc.'s
Implementation of the Electric Safety Standards
For the 12-Month Period Ending on November 30, 2005
Case 04-M-0159**

**Pearl River, NY
January 15, 2006**

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**Section One
Background**

The Public Service Commission’s (“PSC” or “Commission”) Electric Safety Standards (“Safety Standards”), issued on January 5, 2005 in Case 04-M-0159, require utilities to conduct an annual system-wide stray voltage detection program and a five-year cycle equipment inspection program to mitigate stray voltage risks to the public.

This report describes Orange and Rockland Utilities, Inc. (“Orange and Rockland”, “O&R” or “Company”) stray voltage detection program and equipment inspection program conducted in 2005 and addresses the following:

1. Results of the stray voltage testing program;
2. Additional stray voltage detection;
3. Results of the electrical equipment inspection program;
4. Adherence to PSC Performance Mechanism;
5. Certification of stray voltage testing and inspection programs;
6. Analysis of results;
7. Additional stray voltage related initiatives; and
8. Future improvements.

Section Two

Overview of the Orange and Rockland Electric System

O&R provides electric service to approximately 214,000 customers in a service area covering slightly more than 1,000 square miles. The Company operates an electric transmission and distribution (“T&D”) system that includes 163 distribution circuits with approximately 4,300 circuit miles of overhead and underground cable, nearly 300 miles of transmission right of way, 45 distribution substations, three transmission substations and three transmission switch yards. The Company also owns five substations for single industrial customers.

The O&R service territory is separated geographically into two operating divisions, Eastern and Northern. The Eastern Division, which is the Company’s most densely populated Division, is supplied from an open-loop radial 13.2 kV distribution system. The Northern Division is fed from longer 4 kV, 13.2 kV and 34.5 kV radial circuits. The Company’s backbone transmission is 69 kV and 138 kV. In the Northern Division, 69 kV transmission is the predominate source, and a few 34 kV transmission lines serve limited load.

The O&R system load is principally residential in nature and includes a wide variety of commercial, light industrial, agricultural and recreational facilities. The Company’s New York service area encompasses all or portions of Rockland, Orange and Sullivan Counties, and includes 62 incorporated municipalities. The Company also supplies load in northern New Jersey and northeastern Pennsylvania.

Transmission:

The transmission system consists of 3,680 structures - 3,675 overhead facilities and five underground manholes. Approximately 75% of the overhead transmission structures are wood poles, with the remaining 25% comprised of steel lattice towers and steel poles. Transmission line operating voltages are 345 kV, 138 kV, 69 kV and 34 kV. There are over 3,500 acres of right-of-way under the transmission lines. Third parties privately own approximately 93% of the right-of-ways.

O&R also maintains 345 kV and 500 kV overhead transmission lines located within the O&R service territory that are jointly owned with, or wholly owned by, Consolidated Edison Company of New York, Inc. (“Con Edison”)

Distribution:

The O&R distribution system is an open-looped overhead radial system interspersed with underground residential distribution (“URD”).

Underground

O&R does not have an underground network system as is typical in dense urban environments. The Company's underground system is comprised of URD, distribution-circuit exits originating at the substations, and short underground cable sections in place due to clearance considerations. All underground circuits originate from, or terminate to, overhead feeds.

The O&R underground system has 16,396 structures that require stray voltage testing and 16,634 structures that require visual inspection every five years pursuant to the Safety Standards¹. The structures are comprised as follows:

	<u>Test (units)</u>	<u>Inspect (units)</u>
Single-phase pad mounted transformers	12,621	12,621
Three-phase pad mounted transformers	1,479	1,479
Mat mounted transformers		93
Submersible underground transformers	131	131
Switches mounted on box pad	1,652	1,652
Fuse switches/compartments	219	219
Manholes (distribution)	236	236
Pull boxes	58	58
Vault		21
Switches internal to box pads		124

Overhead

O&R is predominately an overhead distribution company, consisting of 163 distribution circuits over approximately 3,100 circuit miles². Service to customers is provided via a distribution system operating at a variety of primary voltages, including 4.16 kV, 4.8 kV, 13.2 kV and 34.5 kV. Primary conductor is typically supported on Class 2 - 45 foot distribution poles that are either solely owned, solely owned – jointly used, or jointly owned with one of several telecommunication companies including Verizon, Frontier and Citizens. A number of third parties have attachment rights to the distribution facilities, including competitive local exchange carriers and cable television providers.

O&R's pole population includes 136,854 structures. All poles and appurtenant equipment require visual inspection every five years pursuant to the Safety Standards. Poles supporting publicly accessible, electrically bonded equipment require annual stray voltage testing.

Streetlights

There are 1,106 streetlights mounted on metal poles throughout the O&R service territory. The Company owns and maintains 399 of these streetlights, and the balance are

¹ 238 units require visual inspection but no stray voltage testing because they either are not accessible to the public or are enclosed in fiberglass (non-conductive) structures.

² The URD system is approximately 1,200 cable miles.

owned and maintained by a municipality or other third party. The Safety Standards require that O&R test all of these metal pole streetlights for stray voltage.³

Traffic Signals

There are 575 traffic signals mounted on metal poles throughout the O&R service territory. The New York State Department of Transportation or local municipalities own these traffic signals. O&R does not own or maintain any traffic signals within its service territory. The Safety Standards require that O&R test all of these metal-pole-mounted traffic signals for stray voltage.

³ The large majority of streetlights in the Company's service area are mounted on wooden poles, and do not require stray voltage testing because their electrically conductive surfaces are not accessible to the public.

Section Three **Testing and Inspection Results**

2005 Stray Voltage Testing Program:

Summary

By order issued on July 21, 2005 in Case 04-M-0159, the Commission required that by November 30, 2005 O&R complete stray voltage testing of all its publicly accessible underground electric facilities located in high pedestrian traffic areas and all publicly accessible streetlights and traffic signals. In addition, the Commission required that the remainder of the Company's electric system be stray voltage tested by August 30, 2006.

During O&R's initial round of annual stray voltage testing completed on November 30, 2005, the Company tested 100% of its transmission system, 94% of the underground system, including 100% of the Company's underground facilities in high pedestrian trafficked areas, and 27% of the overhead system⁴. In addition, the Company tested 100% of Company owned metal-pole streetlights and all municipally owned metal-pole streetlights and traffic signals. The Company also tested all publicly accessible third party facilities electrically bonded to and in close proximity to the tested O&R system components. Overall, O&R tested approximately 36% of its T&D system facilities with publicly accessible components capable of conducting electricity.

O&R conducted separate stray voltage test programs for the transmission and distribution systems. Non-Company labor (i.e., contractors) was used to perform the majority of the test work within each program. Non-Company labor was selected through O&R's bid selection process and was required to adhere to applicable Company safety requirements. O&R established an administrative group to manage and review contractor work and performance. In addition, O&R established a separate Quality Assurance group within its Operations Training and Compliance Department to further facilitate and ensure compliance.

Due to the relatively small size of its system and in order to gain experience with the requirements of the Safety Standards, O&R initiated its stray voltage program with its transmission system. Testing of the transmission system began in March 2005. The overhead portion concluded in July 2005. The underground manhole testing was completed in October 2005. Non-Company labor conducted the testing on overhead transmission structures, and Company personnel tested the transmission manholes.

O&R commenced stray voltage testing of its underground and overhead distribution system in August 2005. O&R completed stray voltage testing on all metal-

⁴ O&R has neither a traditional underground network nor dense urban environments. The Company has defined "High Pedestrian Trafficked Areas" to be inclusive of two orthodox religious communities, college campuses, and major shopping malls.

pole streetlights and traffic signals, and all underground distribution facilities located within high pedestrian trafficked areas by November 30, 2005. Non-Company labor conducted all the testing on distribution facilities and non-Company owned equipment.

Underground

- Scope

For the year 2005, a total of 15,378 publicly accessible URD facilities, or 94% of O&R's URD system, were tested. Approximately 586 URD facilities were tested in those areas defined as being high pedestrian trafficked areas. Other metallic structures and objects within a 5'0" radius of a tested underground facility were also tested regardless of ownership, if electrically bonded to the distribution system.

A total of 4 underground units were not tested due to inaccessibility. Inaccessible structures include:

- Locked Gate/Fence - Structures behind locked gates and fences that are not accessible to the public are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.
- Vaults - Structures located inside buildings. These structures are accessible only to Company and building maintenance personnel and not accessible to the public. These structures are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.
- Orange and Rockland Property - Structures located on O&R Property, such as substations, are accessible only to Company personnel and authorized contractors and not accessible to the public. These facilities are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.

- Overall Program

The testing of the underground distribution system commenced in August 2005 and concluded November 30, 2005. Simultaneously with the testing of the underground system, the Company tested its electric structures in all high pedestrian trafficked areas. Non-Company labor conducted all testing. At the conclusion of the 2005 program, approximately 25 contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager, Division Engineer and a Line Supervisor managed the contractor's performance. The Stray Voltage Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's distribution system maps in conjunction with hand held electronic devices⁵ to record the testing and location of each structure. O&R Stray Voltage Program personnel and the contractor collaboratively managed and maintained the stray voltage testing data. The contractor maintained the field data at its business office, utilizing an SQL database. O&R is currently in the design phase of a new database to support its Stray Voltage Testing and Visual Inspection Programs. It is anticipated that this database will be completed in the first quarter of 2006. Upon completion, O&R personnel will maintain and manage the distribution system stray voltage annual testing data.

- Test Procedure

O&R's Stray Voltage underground testing program is administered in accordance with the Company's February 18, 2005 Program filing with the Commission in Case 04-M-0159. At the conclusion of the 2005 program, the Company's contractor had approximately 25 employees working on program related tasks. To test for stray voltage, the contractor's inspectors used HD Electric Company LV-S-5 Direct Contact Low Voltage Detectors in accordance with O&R's Stray Voltage Procedure 2202 ("Procedure 2202"), set forth as Exhibit 1 to this Report. The HD device is an independently certified low voltage AC test probe⁶. These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Upon detection of AC voltage equal to or greater than 1.0 volt, a follow-up procedure was performed in accordance with O&R's Stray Voltage Investigative Procedure 2203 ("Procedure 2203"), set forth as Exhibit 2 to this Report. If the results of the testing performed utilizing Procedure 2203 proved positive, then O&R immediately implemented corrective action to mitigate the stray voltage in the manner prescribed in Section 5 of Procedure 2203 or safeguarded the facility from the general public until the appropriate responsible entity was contacted to de-energize the structure pending repair.

The Company's Quality Assurance Program ("QA Program") randomly selected and retested nearly 800 distribution structures. This sample size was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for Quality Assurance ("QA") testing and is based on a lot size of 35,000 to 150,000 units. Of the nearly 800 structures selected, 275 (34%) were underground structures. Quality Assurance identified no stray voltage conditions during retesting.

- Results

A total of 15,378 URD structures, 94% of O&R's publicly accessible URD system, were tested throughout Rockland, Orange and Sullivan Counties. Included in the units tested were all 586 underground structures located in areas O&R has designated as

⁵ Dell Axim X50v Pocket PC and Holux GM270 Ultra GPS devices.

⁶ William J. McNulty, P.E. completed the testing and certification process for the HD Electric Company. In addition, Consolidated Edison validated the testing at the NTL test labs.

high pedestrian trafficked areas. Four units were not tested due to inaccessibility to the public. These structures are typically located behind locked gates on private property, in vaults, or on restricted O&R property. Nearly all the structures tested operated at a primary voltage of 13.2 kV (three-phase) or 7.62 kV (single-phase).

No stray voltage conditions were found in any of the underground testing.

Overhead

- Scope

Through November 30, 2005, O&R tested appurtenances on a total of 36,772 poles that are Company solely owned, solely owned – jointly used, or jointly owned with one of several telecommunication companies including Verizon, Frontier and Citizens. This represents 27% of O&R's overhead distribution system poles⁷. Points tested include all attached appurtenances capable of conducting electricity on wood poles, such as guy wires, grounds, risers, and Company and non-Company owned attachments within 8'0" from ground level. Other metallic structures and objects within a 5'0" radius of a wood pole were also tested regardless of ownership if electrically bonded to the distribution system.

A total of 11 overhead units are inaccessible to the public and were not tested. Inaccessible structures include:

- Locked Gate/Fence – Overhead structures behind locked gates and fences that are not accessible to the public and are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.
- Dangerous Grades (Cliffs) – Overhead pole plant located on cliffs and other dangerous grades are generally inaccessible to even Company personal and are approached only under urgent circumstances. The performance of the testing work would constitute an unacceptable risk to the employee. These poles are not accessible to the public and are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.
- Orange and Rockland Property – Overhead structures located on O&R property, such as substations, are accessible only to Company personnel and authorized contractors and are not accessible to the public. These facilities are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.

⁷ O&R's total distribution pole population is 136,854.

- Overall Program

The testing of the overhead distribution system commenced in August 2005 and concluded November 30, 2005. Non-Company labor conducted all testing. At the conclusion of the 2005 program, approximately 25 contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager, Division Engineer and a Line Supervisor managed the contractor's performance. The Stray Voltage Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's distribution system maps in conjunction with hand held electronic devices to record the testing and location of each structure. O&R Stray Voltage Program personnel and the contractor collaboratively managed and maintained the stray voltage testing data. The contractor maintained the field data at its business office, utilizing an SQL database. O&R is currently in the design phase of a new database to support its Stray Voltage Testing and Visual Inspection Programs. It is anticipated that this database will be completed in the first quarter of 2006. Upon completion, O&R personnel will maintain and manage the distribution system stray voltage annual testing data.

- Test Procedure

O&R's Stray Voltage overhead distribution testing program is administered in accordance with the Company's February 18, 2005 Program filing with the Commission in Case 04-M-0159. At the conclusion of the 2005 program, the Company's contractor had 25 employees working on various program related tasks. To test for stray voltage, the contractor's inspectors used HD Electric Company's LV-S-5 Direct Contact Low Voltage Detectors in accordance with O&R's Procedure 2202. The HD device is an independently certified low voltage AC test probe. These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Upon detection of AC voltage equal to or greater than 1.0 volt, a follow-up procedure was performed in accordance with O&R's Procedure 2203. If the results of the testing performed utilizing Procedure 2203 proved positive, O&R immediately implemented corrective action to mitigate the stray voltage in the manner prescribed in Section 5 of Procedure 2203 or safeguarded the facility from the general public until the appropriate responsible entity was contacted to de-energize the structure pending repair.

The QA Program randomly selected and retested nearly 800 distribution structures. This sample size was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for QA testing and is based on a lot size of 35,000 to 150,000 units. Of the nearly 800 structures selected, 199 units selected (25%) were overhead poles. Quality Assurance identified no stray voltage conditions on retesting.

- Results

A total of 36,772 overhead poles, or 27% of O&R's overhead distribution system, was tested throughout Rockland, Orange and Sullivan Counties. Eleven units were not tested due to inaccessibility. Inaccessibility is typically due to facilities being behind locked gates on private property, on dangerous grades (cliffs), or secured on restricted O&R property. Nearly all the structures tested operated at a primary voltage of 13.2 kV (three-phase) or 7.62 kV (single-phase). Some facilities in northwest Orange County and portions of Sullivan County operate at a primary voltage of 34.5 kV (three-phase) or 19.9 kV (single-phase).

Of the poles tested, two stray voltage conditions were identified. This represents 0.005% of the total distribution pole population tested. The contractor and O&R program management safeguarded both conditions, located in Rockland County, until crews arrived to perform the work. Both conditions were mitigated within twenty-four (24) hours of detection. In the first case, a control box used to regulate the operation of a switched capacitor bank was missing from the control box socket. At the exposed contacts of the socket, 40.0 volts were recorded. A cover was inserted over the socket to mitigate the condition. The second case involved an energized triplex service that had been stapled to a pole. The contractor measured 115.0 volts at the conductor. O&R crews were immediately dispatched and the secondary taps were cut, de-energizing the conductor. It is believed this may have been a theft of service condition that the Company continues to investigate.

Streetlights and Traffic Signals

- Scope

O&R owns and maintains 399 metal pole streetlights. An additional 707 metal pole streetlights and 575 traffic signals owned by various municipalities and Highway Departments⁸ were identified through two comprehensive system surveys conducted by the Company's contractor and through the Company's outreach efforts.⁹ By November 30, 2005, the Company tested all 1,106 streetlights and 575 traffic signals except for one streetlight that was not publicly accessible. This unit is not publicly accessible because the streetlight was found to have been removed.

- Overall Program

The testing of the streetlight and traffic signal metal poles commenced in August 2005 and concluded November 30, 2005. Non-Company labor conducted all testing. At

⁸ Traffic signals in the O&R service territory are generally owned by the New York State Department of Transportation or the County Highway Departments.

⁹ These do not include streetlight metal poles located on limited access highways. These poles are not accessible to the public and their location makes stray voltage testing dangerous. These poles are not included in the annual testing program.

the conclusion of the 2005 program, approximately 25 contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager, Division Engineer and a Line Supervisor managed the contractor's performance. The Stray Voltage Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's distribution system maps and street surveys, in conjunction with hand held electronic devices, to record the testing and location of each structure. O&R Stray Voltage Program personnel and the contractor collaboratively managed and maintained the stray voltage testing data. The contractor maintained the field data at its business office, utilizing an SQL database. O&R is currently in the design phase of a new database to support its Stray Voltage Testing and Visual Inspection Programs. It is anticipated that this database will be completed in the first quarter of 2006. Upon completion, O&R personnel will maintain and manage the distribution system stray voltage annual testing data.

- Test Procedure

The Company's Stray Voltage testing program for street light and traffic signal metal poles is administered in accordance with the Company's February 18, 2005 Program filing with the Commission in Case 04-M-0159. At the conclusion of the 2005 program, the Company's contractor had 25 employees working on various program related tasks. To test for stray voltage, the contractor's inspectors used HD Electric Company LV-S-5 Direct Contact Low Voltage Detectors in accordance with O&R's Procedure 2202. The HD device is an independently certified low voltage AC test probe. These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Upon detection of AC voltage equal to or greater than 1.0 volt, a follow-up procedure was performed in accordance with O&R's Procedure 2203. If the results of the testing performed utilizing Procedure 2203 proved positive, then O&R immediately implemented corrective action to mitigate the stray voltage in the manner prescribed in Section 5 of Procedure 2203 or safeguarded the facility from the general public until the appropriate responsible entity was contacted to de-energize the structure pending repair.

O&R identified the number and locations of non-Company owned streetlights and traffic signals by several methods. O&R utilized its Customer Information Management System to identify the volume of traffic signals that it bills to the municipalities or the State. O&R also conducted two municipal forums¹⁰ to communicate the new safety requirements and solicit the municipalities' help in identifying their facilities required for testing by O&R. Finally, the Company's contractors conducted two comprehensive surveys of the O&R service territory to identify all streetlights and traffic signals. Global

¹⁰ The Company conducted a session for Orange and Sullivan County municipal officials and State Department of Transportation employees on April 13, 2005, in the Company's Blooming Grove Auditorium. The Company conducted a session for Rockland County municipal officials and additional State Highway personnel in the Company's Spring Valley Auditorium on April 21, 2005.

Positioning Satellite (“GPS”) technology was used to capture the locations of each non-Company owned facility. These GPS coordinates will be used to create maps of the streetlights and traffic signals to assist with future testing.

The QA Program randomly selected and retested nearly 800 distribution structures. The sample size was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for QA testing and is based on a lot size of 35,000 to 150,000 units. Of the nearly 800 units selected, 140 units (18%) were traffic signal poles, 126 units (16%) were Company owned metal pole streetlights, and 60 units (8%) were municipally owned metal-pole streetlights. Quality Assurance identified no stray voltage conditions during retesting.

- Results

A total of 1,106 metal pole streetlights and 575 traffic signal poles, were tested throughout Rockland, Orange and Sullivan Counties. Streetlights on limited access highways were not tested because they are not accessible to the public and due to the danger to the test personnel in performing testing on highways. Nearly all the structures tested operated at a secondary voltage of 120/240 volts.

Of the streetlights and traffic signals tested, one stray voltage condition was identified on a streetlight pole. This represents 0.098% of the total population. In the sole case of stray voltage identified, an external receptacle installed by a municipality on an O&R owned pole failed, causing the neutral conductor to burn clear and energizing the light pole stanchion. The errant voltage measured was 115.0 volts. O&R personnel safeguarded the pole until the streetlight was de-energized for repairs. The condition was corrected within 24 hours of detection.

The 2005 findings for streetlights and traffic signals (one stray voltage condition is markedly improved from the 2004 findings when O&R on its own initiative tested Company-owned, metal pole street lights located in its New York and New Jersey service areas. During the 2004 tests of over 700 metal-pole streetlights, six stray voltage conditions were identified and mitigated.

Substations

- Scope

During the 2005, O&R tested the publicly accessible fencing of all of its New York substations consisting of 45 distribution substations, three transmission substations, three transmission switchyards and five Company owned substations serving single Customers. These tests were conducted in conjunction with stray voltage testing on the transmission system.

- Overall Program

The testing of the substation fencing commenced in March 2005 concurrent with the transmission testing program and concluded in July 2005. Non-Company labor, separate from the vendor employed for distribution testing, conducted all substation and transmission testing. At the conclusion of the 2005 program, approximately five contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager, Division Engineer and a Line Supervisor managed the contractor's performance. The Stray Voltage Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's transmission plan and profile maps, as well as, substation location maps, in conjunction with hand held electronic devices, to record the testing and location of each substation fence test. O&R Stray Voltage Program personnel and the contractor collaboratively managed and maintained the stray voltage testing data. The contractor maintained the field data at its business office, utilizing proprietary data management software known as Fast Gate. O&R is currently in the design phase of a new database to support its Stray Voltage Testing and Visual Inspection Programs. It is anticipated that this database will be completed in the first quarter of 2006. Upon completion, O&R personnel will maintain and manage the distribution system stray voltage annual testing data.

- Test Procedure

O&R's Stray Voltage substation testing program is administered in accordance with the Company's February 18, 2005 Program filed with the Commission in Case 04-M-0159. At the conclusion of the 2005 program, the Company's contractor had five employees working on various program related tasks. To test for stray voltage, the contractor's inspectors used HD Electric Company LV-S-5 Direct Contact Low Voltage Detectors in accordance with O&R's Procedure 2202. The HD device is an independently certified low voltage AC test probe. These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Upon detection of an AC voltage, a follow-up procedure was performed in accordance with O&R's Procedure 2203. If the results of the testing performed utilizing Procedure 2203 proved positive, O&R immediately implemented corrective action to mitigate the stray voltage in the manner prescribed in Section 5 of Procedure 2203 or safeguarded the facility from the general public until the appropriate responsible entity was contacted to de-energize the structure pending repair.

- Results

O&R substations operate at voltages ranging from 345 kV to 4.16 kV. The exterior fences at 100% of O&R's New York substations, a total of 56 substation fences,

were tested throughout Rockland, Orange and Sullivan Counties. No stray voltage conditions were identified.

Transmission

- Scope

O&R's transmission system consists of 3,680 structures; 3,675 overhead facilities and five underground manholes, including 345 kV and 500 kV overhead transmission lines located within the O&R service territory that are jointly owned with, or wholly owned by, Con Edison. Approximately 75% of the overhead transmission structures are wood poles with the remaining 25% comprised of steel lattice towers and steel poles. Transmission line operating voltages are 345 kV, 138 kV, 69 kV and 34 kV. There are over 3,500 acres of right-of way under the transmission lines. Third parties privately own approximately 93.0% of the right-of-ways.

During the 2005 test program 100% of the transmission system was tested and no stray voltage conditions were identified. None of the transmission pole plant was classified as inaccessible.

- Overall Program

The testing of the transmission system commenced in March 2005, and the overhead component concluded in July 2005. The five transmission manholes were tested in October 2005. Non-Company labor, separate from the vendor employed for distribution testing, conducted all the overhead testing. O&R labor conducted the underground testing. At the conclusion of the 2005 program, approximately five contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager, Division Engineer and a Line Supervisor managed the contractor's performance. The Stray Voltage Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's Transmission Inspection Management System ("TIMS") as well as transmission plan and profile maps, in conjunction with hand held electronic devices, to record the testing and location of each structure. O&R Stray Voltage Program management, O&R Extra High Voltage personnel and the contractor collaboratively managed and maintained the stray voltage testing data. The contractor maintained the field data at its business office, utilizing proprietary data management software known as Fast Gate.

- Test Procedure

O&R's Stray Voltage transmission testing program is administered in accordance with the Company's February 18, 2005 Program filed with the Commission in Case 04-M-0159. The work is contracted to a vendor who, at the conclusion of the 2005 program, had five employees working on various program related tasks. The contractor's

inspectors used HD Electric Company LV-S-5 Direct Contact Low Voltage Detectors in accordance with O&R's Procedure 2202. The HD device is an independently certified low voltage AC test probe. These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Although no stray voltage was detected on transmission structures, O&R's Procedure 2203 provided that upon detection of an AC voltage, a follow-up procedure would be performed. If the results of the testing performed utilizing Procedure 2203 prove positive, O&R would immediately implement corrective action to mitigate the stray voltage in the manner prescribed in Section 5 of the Procedure.

The Quality Assurance Program randomly sampled 50 of the 3,675 overhead structures towers for retesting. The sample size was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for QA testing. Quality Assurance identified no stray voltage conditions on retesting. In addition, the QA Program reviewed the Transmission Line Maintenance ("TLM") Program, from August 1 to August 31, 2005, as stated in the Company's TLM procedures. The review included records, interviews, field observations, and procedures. QA found that the TLM Program effectively maintains the transmission lines to ensure reliability, by performing inspections and producing results consistent with established objectives.

- Results

All of O&R's New York transmission system, consisting of 3,675 overhead structures and five underground transmission manholes were tested throughout Rockland, Orange and Sullivan Counties. No stray voltage conditions were identified.

2005 Electrical Facility Inspection Program:

Summary

Pursuant to the Commission's Safety Standards, O&R is required to visually inspect 100% of its electric equipment over a five-year cycle and inspect approximately 20% of its equipment annually. In 2005, O&R visually inspected approximately 34% of the Company's T&D facilities. This included 99.9% of the transmission system, 34% of the overhead distribution system, and 19% of the underground distribution system. In addition, all O&R substations were visually inspected in 2005 through the Company's Class One Inspection Program performed by its Substation Operations Department¹¹. In 2005 O&R also conducted its annual infrared survey on significant portions of its T&D system as described below.

Non-Company labor performed the majority of the transmission and distribution system inspection work. O&R established an administrative group to manage and review contractor work and performance. In addition, O&R established a separate Quality Assurance group within its Operations Training and Compliance Department to further facilitate and ensure compliance.

O&R conducted the Company's Substation Class One Inspections to ensure compliance with the Safety Standard's visual inspection requirements for substations. O&R's 56 substations are inspected at least once a month. In 2005, Company personnel conducted the inspections of all of O&R's 56 New York substations.

O&R continued its annual overhead transmission facility inspection program in 2005. O&R inspects all of its 3,675 overhead transmission facilities annually. This represents 99.9% of the transmission system.¹² Inspection of the overhead transmission system commenced in March 2005 and concluded in July 2005. Non-Company labor conducted the inspections.

O&R utilized its infrared program, included in the Company's Distribution Maintenance Procedures, set forth in Exhibit 3 of this report, to supplement its T&D visual inspection program. The Company's infrared program evaluates the functionality and condition of hardware and equipment essential to maintaining a reliable system. The program includes semi-annual substation and transmission surveys, the annual survey of all O&R overhead distribution mainline, the survey of all non-mainline facilities in one region each year, rotated among the three major regions¹³, and an inspection of

¹¹ A Class One Inspection is a monthly visual inspection of O&R substations to ensure the various components of the substation and its appurtenances are properly maintained and functional. All Substation maintenance programs, including Class One Inspections are further defined in the Company's Annual Service Reliability Filing to Staff (Case 90-E-1119).

¹² O&R also has five underground transmission manholes that are not part of the overhead program and will be inspected separately by Company personnel.

¹³ The Eastern Division is considered one region. The Northern Division consists of two regions, Central and West.

significant 34.5 kV underground subdivisions. The O&R infrared program prioritizes the severity of a defect based upon the temperature rise above ambient conditions and implements repair or replacement criteria based upon the level of severity. Non-Company labor conducted the infrared inspections of all facilities. Company personnel conducted all repairs. The infrared program began in April 2005 and was completed in November 2005. Equipment reviewed via the infrared program is not included in the population count towards the approximate 20% annual inspection requirement.

Underground

- Scope

The O&R underground distribution system consists of 16,634 structures. A total of 3,117 units of underground distribution equipment were visually inspected in 2005 – 19% of the underground distribution system. O&R prioritized identified defects in accordance with the requirements outlined in the Company’s Underground Work Procedure 2201, Inspection for Underground Distribution Structures and Equipment (“Procedure 2201”) set forth as Exhibit 4 to this Report.

- Inspection Procedure

The Company’s Underground Visual Inspection Program is administered in accordance with the Company’s February 18, 2005 Program filed with the Commission in Case 04-M-1059. The visual inspection of the underground distribution system commenced in August 2005 and concluded November 30, 2005. Non-Company labor conducted all inspections. The contractor worked within the guidelines established by Procedure 2201. An O&R Program Manager, Division Engineer and a Line Supervisor managed the contractor’s performance. The O&R Program Manager reports to the Company’s Director – Electric Operations.

The contractor’s field inspectors used O&R’s distribution system maps in conjunction with hand held electronic devices to record the inspections of each structure. O&R Visual Inspection Program personnel and the contractor collaboratively managed and maintained the inspection data. The contractor maintained the field data at its business office, utilizing an SQL database. O&R is currently in the design phase of a new database to support its Stray Voltage Testing and Visual Inspection Programs. It is anticipated that this database will be completed in the first quarter of 2006. Upon completion, O&R personnel will maintain and manage the distribution system annual inspection data.

The contractor, consistent with the Procedure 2201, categorized defects as Priority 5 (high priority) to Priority 1 (low priority). Priority 5 defects require immediate attention and permanent repairs to be completed within 24 hours. Priority 4 defects must be permanently repaired within seven days. Priorities 3 through 1 defects are scheduled to be repaired with normal routine work.

The QA Program randomly selected and reinspected nearly 800 distribution structures. This sample size selected for quality assurance was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for QA testing and is based on a lot size of 35,000 to 150,000 units. Of the nearly 800 units selected for reinspection, 275 selected (34%) were underground devices. QA noted that the contractor inspectors had reported equipment problems consistent with the requirement.

- Results

A total of 3,117 underground structures, 19% of the underground system, were visually inspected. Of the 3,117 structures inspected, 16 Priority 5 defects were located and repaired within 24 hours. Fifty-one (51) Priority 4 defects were identified and repaired within seven days. In addition, 254 Priorities 3 through 1 were found and are scheduled for repair with normal routine work. Examples of Priority 5 situations included padmount transformers knocked off their base and units without two levels of security (penta-head bolt and lock).

Overhead

- Scope

The O&R overhead distribution system consists of 136,854 structures. The equipment associated with 46,869 structures, 34% of the overhead distribution system, were visually inspected in 2005. The equipment visually inspected included poles, guy wires, grounds, risers, cross arms, conductor, and other appurtenances. O&R prioritized identified defects in accordance with the requirements outlined in O&R's Overhead Work Procedure 2200, Inspection Procedure for Overhead Distribution Structures and Equipment ("Procedure 2200") set forth as Exhibit 5 to this Report.

- Inspection Procedure

O&R's Overhead Visual Inspection Program is administered in accordance with the Company's February 18, 2005 Program filed in Case 04-M-1059. The visual inspection of the overhead distribution system commenced in August 2005 and concluded November 30, 2005. Non-Company labor conducted all inspections. The contractor worked within the guidelines established by Procedure 2200. An O&R Program Manager, Division Engineer and a Line Supervisor managed the contractor's performance. The O&R Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's distribution system maps in conjunction with hand held electronic devices to record the inspections of each structure. O&R Visual Inspection Program personnel and the contractor collaboratively managed and maintained the inspection data. The contractor maintained the field data at their business office, utilizing an SQL database. O&R is currently in the design phase of a new

database to support the Stray Voltage Testing and Visual Inspection Program. It is anticipated that this database will be completed in the first quarter of 2006. Upon completion, O&R personnel will maintain and manage the distribution system annual inspection data.

The contractor, consistent with Procedure 2200, categorized defects as Priority 5 (high priority) to Priority 1 (low priority). Priority 5 defects require immediate attention and permanent repairs to be completed within 24 hours. Priority 4 defects must be permanently repaired within seven days. Priorities 3 through 1 defects are scheduled to be repaired with normal routine work.

The QA Program randomly selected and reinspected nearly 800 distribution structures. The sample size was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for QA test and is based on a lot size of 35,000 to 150,000 units. Of the nearly 800 structures selected, 199 (25%) were overhead structures. QA noted that the contractor's inspectors had reported equipment problems consistent with the requirement.

- Results

A total of 46,869 overhead structures, 34% of the overhead system, were visually inspected. Of the structures inspected, 1 Priority 5 defect was located and repaired within 24 hours. 6 Priority 4 defects were identified and repaired within seven days. 5,586 Priorities 3 through 1 were found and are scheduled for repair with normal routine work. Examples of Priority 5 and 4 situations included a tree on the primary, detached riser pipes and a floating guy wire.

Substation

- Scope

During 2005, 100% of O&R's New York substations, a total of 45 distribution substations, three transmission substations, three transmission switchyards, and five Company owned substations serving single customers, were visually inspected pursuant to the requirements of the Safety Standards. These inspections were conducted in conjunction with Substation Operations's annual Class 1, Class 3 and Class 4 inspection programs.

- Inspection Procedure

O&R's Substation Inspection Program is administered in accordance with the Company's February 18, 2005 Program filed with the Commission in Case 04-M-1059. Company labor conducted all inspections and repairs. The Substation Operations Department manages the substation inspection and maintenance programs.

The QA Program randomly selected and reviewed inspection records for 26 Substations to verify that the inspections were completed as required. The sample size was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for QA testing . QA reviewed Class 1 inspections for the previous 12 months (May 2004 through May 2005) to determine whether the inspections were properly conducted. QA found that the Substation Operations Department effectively maintains accurate schedules and maintenance records for each substation reviewed.

- Results

All of O&R's substations were visually inspected. All significant defects identified during the visual inspections were properly mitigated.

Transmission

- Scope

The O&R transmission system consists of 3,675 overhead structures and five underground manholes. All of the overhead structures, 99.9% of the transmission system, were visually inspected in 2005. The overhead transmission equipment visually inspected included poles, towers, guy wires, grounds, arms, conductors, and other appurtenances. O&R prioritized identified defects in accordance with the requirements outlined in the Company's Transmission Line Maintenance General Specifications ("General Specification"), set forth as Exhibit 6 to this Report.

- Inspection Procedure

O&R's Transmission Visual Inspection Program is administered in accordance with the Company's February 18, 2005 Program filed with the Commission in Case 04-M-1059. The testing of the overhead transmission system commenced in March 2005 and concluded in July 2005. Non-Company labor, separate from the vendor employed for distribution inspections, conducted all the overhead inspections. At the conclusion of the 2005 program, approximately five contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager, Division Engineer and a Line Supervisor managed the contractor's performance. The O&R Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's TIMS as well as transmission plan and profile maps, in conjunction with hand held electronic devices, to record the inspection and location of each structure. O&R Inspection Program management, O&R Extra High Voltage ("EHV") personnel, and the contractor collaboratively managed the visual inspection data. O&R EHV management and Transmission Engineering staff maintained the field data at the Company's business office, utilizing proprietary data management software known as TIMS.

The contractor, consistent with the General Specification, categorized defects as Priority 5 (high priority) to Priority 1 (low priority). Priority 5 defects require immediate attention and permanent repairs to be completed as system contingencies allow. Priority 4 defects require permanent repairs as system contingencies allow. Priorities 3 through 1 defects are scheduled to be repaired with normal routine work.

The Quality Assurance program randomly sampled 50 of the 3,675 overhead structures. The sample size selected was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for QA testing. The reinspections verified the visual inspection results reported by the contractor. The QA Program also reviewed the TLM Program, from August 1 to August 31, 2005, as stated in the Company's TLM procedures. The review included records, interviews, field observations, and procedures. QA found that the Program effectively maintains the transmission lines to ensure reliability, by performing inspections and producing results consistent with established objectives.

- Results

A total of 3,675 transmission structures, 99.9% of O&R's New York transmission system, were visually inspected throughout Rockland, Orange and Sullivan Counties in 2005. 5,217 conditions were identified during the transmission visual inspections. Either through the use of O&R labor or non-Company labor, 845 repairs were made. The repairs included 2 Priority 5 and 23 Priority 4 deficiencies. The remaining 4,372 deficiencies do not compromise the integrity, safety or reliability of the O&R system and will be utilized to prioritize the Company's transmission line maintenance plans in 2006.

Section 4
Public Service Commission Performance Mechanism

As required by the Safety Standards and the Commission's July 21, 2005 Order issued in Case 04-M-0159, O&R stray voltage tested 100% of its publicly accessible underground electric system structures located in high pedestrian traffic areas and 100% of publicly accessible metal pole streetlights and traffic signals by November 30, 2005. Accordingly, O&R has met the stray voltage testing requirements for 2005 and is not subject to the revenue adjustment provided in the Safety Standards Performance Mechanism.

O&R visually inspected approximately 34% of its overall electric system equipment, including 99.9% of the transmission system, 34% of the overhead distribution system, 19% of the underground distribution system, and all substations by November 30, 2005. Accordingly, O&R has exceeded the 2005 performance goal for inspections and is not subject to the revenue adjustment provided in the Safety Standards Performance Mechanism.

Section 5
Certification of Program

Corporate certifications of the Stray Voltage Testing Program and the Visual Inspection Program are attached as Appendix 1.

Section 6

Analysis of Results

O&R visited 57,567 electrical structures to perform stray voltage tests as part of its stray voltage-testing program in its service territory during 2005.

Only three confirmed cases of stray voltage were identified by stray voltage testing. With such a small population of stray voltage cases, there are no major trends to analyze nor root cause to address. O&R addressed the circumstances of each of these three cases. One case involved a suspected case of theft of service. In that particular case, an energized service was found stapled to a pole. The second case involved a capacitor control base indicated 40.0 volts because the control clock was missing. The final case involved a seasonal outlet on a streetlight pole that had faulted and caused the stanchion to become energized.

O&R visually inspected 53,661 T&D structures, identifying 19 Priority 5 incidents and 80 Priority 4 incidents on its system. The one Priority 5 incident identified on the overhead system included a tree on the primary. The sixteen Priority 5 incidents identified on the underground system were either transformers knocked off their base or units without two levels of security (penta-head bolt and lock). The two Priority 5 incidents on the transmission system were a defective pole and a defective cross-arm. The small population of priority incidents reflects O&R's successful and continuing evaluation and maintenance of its T&D systems through circuit reliability initiatives, the vegetation management program, and its annual infrared and equipment maintenance programs. With such a small population of priority incidents there are no major trends to analyze nor root cause to address.

Section 7

Other Pertinent Information

Additional Stray Voltage Detection:

Daily Job Site Testing Requirements

- Overall Program

As required by the Safety Standards, O&R has incorporated daily job-site stray voltage test requirements into its routine work practices. This practice obligates O&R personnel to test each job site for stray voltage at the end of each day and before departing the site upon completion of the work assignment. The testing is in accordance with O&R's Procedure 2202, set forth in Exhibit 1 to this Report. O&R is not conducting this testing during major system emergencies such as storm response.

- Results

One case of stray voltage was identified in Rockland County during routine work. In this incident, voltage was identified on the control package for one of the Gas Department's remote operated valves upon energizing the service. After an extensive investigation, the situation was mitigated with the installation of a neutral isolator on the service. Gas Engineering is also reviewing this incident with the manufacturer of the control package to determine if there is a design flaw in the equipment.

Reports from the Public

- Overall Program

For 2005, O&R received 22 calls from customers reporting a stray voltage or shock hazard. Included in this count is a fatality suffered by a Pearl River, New York resident who died on July 18, 2005 while plugging an ungrounded extension cord into a garage outlet while standing in pooled water.

In compliance with the Order's Appendix B, Event Notification Requirements, O&R makes written or telephonic notification to the Office of Electricity and Environment in a manner prescribed by that Office.

- Results

A total of 22 incidents were reported; ten incidents proved to be unsubstantiated while twelve cases were validated. Of the twelve substantiated cases, three were attributable to O&R system problems while nine were due to third party problems.

The cases attributable to O&R were caused by a downed service wire, an open neutral at the service entrance, and voltage on a cable television wire due to poor electric service connections at the pole and service entrance.

The nine cases attributable to third parties ranged from a construction crane making contact with the primary distribution system to customer-owned service and grounding problems, including the July 18, 2005 fatality.

Quality Assurance & Quality Control:

Utilizing the resources of O&R's Operations Training and Compliance Department, the Company expanded its comprehensive QA Program for the Gas transmission and distribution system to include its electric system. In addition to assuring compliance with the requirements of the Safety Standards by those charged with implementing its provisions, the Company's electric QA Program is designed to promote the health and safety of the public; provide for the reliable and economical operation for the Company's electric system; promote compliance with applicable electric codes and regulations; and utilize Company resources in an efficient manner.

The O&R electric QA Program also includes a Corrective Action Documentation and Trending procedure¹⁴. The purpose of this procedure is to define the process by which Operations Training and Compliance will maintain a corrective action database and trend discrepancies identified by the QA Program. This procedure is applicable to personnel that implement the Quality Assurance review function of the QA Program.

O&R personnel implementing the electric QA Program are independent from the Electric Operations and Electric Engineering Groups and Company personnel responsible for the implementation of the Stray Voltage Testing and Visual Inspection Programs.

O&R's QA Program conducted the following audits for 2005:

- 05-001 Baseline Distribution Inspection Program

QA reviewed the Company's baseline distribution inspection programs from June 6 through July 25, 2005. The effectiveness of each program was measured through interviews, field observations, and an examination of records and procedural implementation. Quality Assurance found the distribution inspection program was effectively performed and producing results consistent with established objectives.

- 05-002 Transmission Line Maintenance

The QA Program reviewed the TLM Program, from August 1 to August 31, 2005, as stated in the Company's TLM procedures. The review included records, interviews, field observations, and procedures. Quality Assurance found that the Program effectively

¹⁴ Details on the O&R Electric QA Program and the Corrective Action Documentation were included with the Company's February 18, 2005 filing with the Commission in Case 04-M-0159.

maintains the transmission lines to ensure reliability, by performing inspections and producing results consistent with established objectives.

- 05-003 Stray Voltage Inspection and Visual Inspection Program

The QA Program has reviewed the Stray Voltage Testing Program and the Visual Inspection Program from August 2005 through year-end. A final report summarizing the effectiveness of the program is anticipated in the first quarter of 2006.

- 05-004 Overhead and Underground Construction Projects

The QA Program conducted a review of Overhead and Underground Line Construction Projects from October 1 to November 1, 2005. Quality Assurance reviewed construction projects completed by Company and Contractor crews since February 2005 for adherence to Company Electric Distribution Standards and Specifications. The review included mapping records, field observation, and adherence to construction standards. Quality Assurance found that the majority of work was completed to Company electric distribution standards consistent with project objectives.

Stray Voltage Initiatives:

As a result of continual experience and clarification provided by Staff, O&R modified its work practices and procedures for implementation of the Safety Standards. The Company's current work procedures are attached as Exhibits 1, 2, 4 and 5 to this Report. Attached as Exhibit 3 are revisions to the Company's Distribution Maintenance Manual, the original of which was included with the Company's February 18, 2005 Program filed in Case 04-M-0159.

O&R, as a subsidiary of Consolidated Edison, Inc. ("CEI"), has availed itself of the shared research and development ("R&D") activities of CEI's subsidiary Con Edison. Con Edison's R&D department is involved in several initiatives that may lead to a reduction in stray voltage or better detection techniques. Those activities relevant to the O&R system include:

- Mobile Stray Voltage Detector

The project has developed a vehicular sensor/system for detecting the presence of stray voltages on manhole covers, gratings, service boxes, light poles and other structures while driving over roadways. The development includes a three-axis version, optimization of detector sensitivity for field conditions, improved design of the capture, analysis and alarm electronics and prototype testing in field conditions. Con Edison has procured five mobile stray voltage detection ("SVD") systems from Sarnoff Corporation. These SVD employ three-dimensional electric field sensors to detect stray voltages or unshielded electric cable. Currently the SVD does not work in areas with overhead primary distribution, but test versions have been developed to work in areas with only

secondary distribution, and efforts continue to develop this tool for overhead primary applications.

- **Manhole Cover Monitoring System**

This project seeks to develop a sensor/system for real time detection of the presence of stray voltages on manhole covers, gratings, service boxes, light poles, and other structures. The system will have radio frequency communication capabilities.

The project has developed a sensor system and communication channel for detecting the presence of stray voltages on transformer gratings. This is an active program at Con Edison, and beginning in January of 2006, Con Edison will install monitors in transformer vaults where communication systems already exist. As the project is rolled out at Con Edison, O&R personnel will be monitoring its deployment and operation to determine its potential application at O&R.

- **Self Healing Cable**

Advances in polymer science have led to self-healing materials, which might be useful for secondary network cable and secondary URD cables. R&D is exploring the commercial availability of these materials and their potential for use in the Con Edison and O&R systems.

O&R has worked and communicated with the PSC Staff on the issues attendant with the implementation of the Safety Standards. O&R has attended several joint meetings with the other New York utilities and PSC Staff to seek best practices, employ lessons learned, and ensure a high degree of consistency in the implementation and execution requirements of the Safety Standards. Finally, O&R personnel participated in the development and presentation of stray voltage issues in a national stray voltage conference conducted by Con Edison this past summer.

Future Improvements:

O&R has initiated several programs and work practices to improve on stray voltage detection, data management, and maximizing the number of facility inspections performed. This section discusses these improvements.

- **Shunt Resistor**

Overhead lines are not shielded and can induce voltages on metallic surfaces. These voltages are normally not harmful, and they do not involve a failed component of the distribution system.

The HD stray voltage indicator and a digital voltmeter can falsely indicate a potentially harmful stray voltage condition in the presence of induced voltage. A digital voltmeter's very high input impedance is designed not to affect the circuit being tested. The design has the disadvantage of being unable to distinguish a stray voltage capable of

delivering a harmful electric shock, from an induced voltage with no current carrying capacity. A shunt resistor can be used in conjunction with the Fluke voltmeter to determine whether the voltage is produced by current (presenting the possibility for harm) or is induced (harmless).

O&R has utilized a 500-ohm shunt resistor in combination with the Fluke voltmeter when a potential stray voltage has been identified on the overhead system. O&R's Procedure 2203, details the use of the shunt resistor to identify induced voltages.

- HD Electric Test Shield

To minimize the number of false positives and reduce the need to continually test for induced voltages in extra high voltage environments, O&R has tested and begun the deployment of the HD Electric Test Shield. Based on tests conducted in transmission rights-of-way, the HD shield is over 70% effective at eliminating induced voltage recordings, significantly reducing investigation expense and allowing the field contract testers to conduct more tests per day.

- Electric Inspection Maintenance System ("EIMS")

EIMS, being developed collaboratively with the Stray Voltage Program management and O&R's Information Technology Department, is a data management tool designed to accept and retain all stray voltage program test information and follow-up mitigation. Furthermore, the system is being developed to become the central data management warehouse for all transmission and distribution inspection and maintenance programs. Phase 1 is expected to be completed in the first quarter of 2006 with subsequent releases bringing greater functionality, scheduled through the end of 2006 into 2007.