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October 29, 2009
By Overnight Mail

Hon. Jaclyn A. Brilling
Secretary
New York State
Department of Public Service
Three Empire State Plaza
Albany, New York 12223

Re: Case 99-E-0930 – Proceeding on Motion of the Commission to Investigate the July 6, 1999 Power Outage of Con Edison's Washington Heights Network

Dear Secretary Brilling:

Enclosed for filing are an original and five copies of the *November 1, 2009 Status Report on Recommendation Implementation Plans of Consolidated Edison Company of New York, Inc.* This report provides the status of Con Edison's actions to implement the recommendations made in the "Report on Consolidated Edison's July 1999 System Outages" issued on March 15, 2000 in this proceeding.

A copy of this filing is being sent to the City of New York, the Attorney General of the State of New York, and the New York State Consumer Protection Board.

Very truly yours,

Martin F. Heslin

Enclosure

cc: Attorney General of the State of New York
City of New York (New York City Economic Development Corporation)
New York State Consumer Protection Board

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

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Proceeding on Motion of the Commission :
to Investigate the July 6, 1999 Power Outage : **Case 99-E-0930**
of Con Edison's Washington Heights Network :
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NOVEMBER 1, 2009 STATUS REPORT ON RECOMMENDATION IMPLEMENTATION PLANS OF CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

In response to the Public Service Commission's May 26, 2000 and September 20, 2002 orders in this proceeding, Con Edison is filing with the Public Service Commission its November 1, 2009 status report on its plans to implement the recommendations made in the *Report on Consolidated Edison's July 1999 System Outages* issued March 15, 2000 in this proceeding.

As noted in the Commission's September 20, 2002 order, and as discussed in prior status reports filed by Con Edison, implementation of many of the recommendations is complete. Accordingly, as in the prior status reports, the attached report addresses those recommendations where implementation is ongoing.

Dated: November 1, 2009

Respectfully submitted,

CONSOLIDATED EDISON COMPANY
OF NEW YORK, INC.

By [signature]
Martin F. Heslin
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II-1 Con Edison should improve its cable rating methods to more accurately reflect actual thermal conditions and develop techniques to better model its network systems, especially those under multiple contingency conditions.

<u>Summary of Completed Actions</u>:

1. Cable Rating Methods:

Con Edison has developed a new primary cable rating thermal rating model. Network feeder cables in a duct bank occupied by different cables with different loadings and loss factors can now be modeled in the environment that they operate in. Factors such as actual duct-bank occupancy, variable soil resistivity, ambient temperatures, external heat sources, such as steam mains, and the thermal effect of secondary cables can now be incorporated into network cable ratings. The program incorporates load flow data to perform both steady state (normal) and transient (emergency) cable ratings. The model provides more accurate data on a cable sections ability to carry load and thus the need to reinforce the cable.

Con Edison has re-rated the normal and emergency conductor temperature limits of older paper insulated lead covered cable ("PILC"). The Company lowered the thermal rating of this cable to be more consistent with manufacturer ratings.

2. Network System Modeling

Con Edison has developed as Advanced Contingency Analysis (ACA) program for use in regional electric control centers. . ACA improved the existing WOLF (World Class Online Load Flow application) contingency analysis program by providing the company with the ability to better analyze feeder outages above second contingency design criteria. The original WOLF contingency analysis program relied upon a static load flow model created from the previous summer peak loads. The ACA program provides a near real-time dynamic demand model based on current loading at the transformers that provides analytical results during multiple contingency events. For example, if a third feeder opens automatically in a network, a new load flow model will be created based on real-time, corrected, monitored values at the transformers in the network, and the analysis tools then perform load flow analyses for the next worst-case scenarios. To support the ACA program, the company developed the Remote Monitoring Estimator (RME) to provide estimates for Remote Monitoring System transformer-load readings that are either missing or are determined to be incorrect. Whenever correct transformer load values are not available, RME-generated values are automatically supplied to the WOLF analysis engine for contingency analysis.

Con Edison has developed AutoWOLF Visualization program that provides the Control Center Operators and engineers with a display of our Auto WOLF analysis reports. The application uses the mapping information to display the current conditions as well as the next worst conditions based on existing contingencies. It is used principally in response to network feeder contingencies.

Con Edison developed the Distribution Primary Visualization System (DPVS) which creates a visualization environment for operators that displays the status and near real-time load of primary network components. DPVS information includes feeder configurations, network protector status, feeder outage status, and transformer load status. In addition, this visualization system provides a link to the Vault Central site, which offers the following information in support of vault monitoring, analysis and problem resolution:

- Current information - real-time RMS, RME calculations, Banks Off, Open Mains, peak loads
- Static information - nearby transformers, feeders, M&S plates, vault locations, sizes, ratings, models, install dates
- Inspection information - last vault inspection and stray voltage inspection, with links to historical inspections
- Switch checks - last switch check and links to historical switch checks.
- The Distribution Primary Visualization System is available for all regions.

Con Edison has completed development of the new application and database that allows detailed conduit and manhole information, previously available on paper drawings and maps to be converted into digital format and maintained and displayed in an electronic database. The application and database have been deployed in each of the Company's four Regions. Con Edison developed a five-year plan to convert New York City conduit maps to digital format to facilitate their maintenance, storage and retrieval

Con Edison has developed a computer model that models thermal characteristics of underground distribution structures. The manhole model has enhanced the company's understanding of the thermal environment in which feeder cables operate and provided a tool that can be used to model other underground distribution structures.

Service Demand Estimation Project

Con Edison has completed the development of the Service Demand Estimation (SDE) program as a tool to determine the location of customer load on the secondary system. This information assists in determining the load flow and voltage within the secondary grid in studies that are used for design and analysis of the secondary system. The SDE program distributes secondary demands to the service points of supply to customers for the company's network modeling programs. The project consists of three programs. The CuFLink application links the monthly billing information to the customer service points. The Service Demand Estimation application utilizes the CuFLink data extraction of monthly billing information for each customer and converts it to peak summer demand to be placed at each service point of supply. The Reconciliation application reconciles the actual Remote Monitoring System (RMS) load information recorded at each network transformer with the SDE output so that the calculated load flow at each network transformer approximates the real time measured points at the secondary bus of each network transformer reported by RMS. The SDE program has been integrated into the company's Poly Voltage Load Flow program is available to the Regions for their use. The purpose of this application is for engineering and design planning analysis of the secondary grid to prioritize the replacement and reinforcement of secondary mains and to optimize the designs of the network grids.

With the completion of the Cuflink, Service Demand Estimator, and Reconciliation software programs, the next phase of this project is the use of the Cuflink software to link and locate load information (monthly kilowatt hours and monthly peak demand) from the Customer Information System (CIS) onto secondary system service points maintained in the Vision Mapping (VM) database. The Company is working to identify and map load information to service points for six networks in three regional customer service areas.

After load information is linked to the service points throughout a network, the Service Demand Estimator (SED) software will convert the service-point monthly kilowatt hours or peak demand data into peak summer coincident demands during a single time period. Following this, the Reconciliation software will reconcile the actual Remote Monitoring System (RMS) load information recorded at each network transformer with the SDE output so that the calculated load flow at each network transformer approximates the real time measured points at the secondary bus of each network transformer reported by RMS. At that point, the Company will be able to run Poly Voltage Load calculations to determine load flows on the secondary mains in order to identify mains that are open and mains that require reinforcement.

Status Report (November 1, 2008)

Items 1, 2, 3, 4, 5, 7, 8, 9, 10 and 11

Completed per prior status reports.

Item 6

The Company has completed the five step standardized process to develop secondary models for an additional four networks since the May 1, 2008 update bringing the total to thirteen networks as follows: Riverdale, Cooper Square, Chelsea, Pennsylvania, West Bronx, Jamaica, Sheepshead Bay, Lenox Hill, Hunter, Sutton, Long Island City, Fordham, and Yorkville. Work to develop secondary models for additional networks is ongoing.

In order to validate the secondary model load flow results, the Company has been conducting case studies on summer heat contingency secondary events to develop a correlation between the secondary load flows against the real time events where secondary main burnouts occurred. The Company has completed three case studies in the Yorkville and Fordham networks for the summer heat events in 2007 and 2008. The percent of correlation between the modeling results and actual field burnouts has been over 65%. In addition, the Company is evaluating the data from the secondary monitoring units and comparing the real time data against the load flows. As of this update, the load flow comparison has been validated for 10 of the 25 devices that are reporting good data.

The Company has drafted the secondary model certification and load flow validation engineering operating procedure, and the procedure is currently being reviewed for comments by all the operating regions. The final procedure will be issued by the end of the year and will include criterion for secondary main load relief.

The Company is working on developing secondary model planning cases for the first seven networks completed in 2007 that include: Hunter, Sutton, Long Island City, Jamaica, Fordham, West Bronx and Yorkville. The secondary model planning case will provide loadings on all secondary main sections in a network under all possible combinations of first and second contingency for the 2009 forecasted network peak. Once the planning case models are complete, the load flow results will be used to develop secondary load relief layouts for summer of 2009.

Status Report (May 1, 2009)

Items 1, 2, 3, 4, 5, 7, 8, 9, 10 and 11

Completed per prior status reports.

Item 6

The Company has created models for an additional 17 models since the previous update bringing the total to 26 models as follows: Hudson, Chelsea, Pennsylvania, Lenonx Hill, Cooper Sq, Central Park, Grand Central, Sheridan Sq, City Hall, Washington Hgts, Sutton, Hunter, Yorkville, Plaza, Bowling Green, Greeley Sq, Riverdale, Fordham, West Bronx, Park Slope, Williamsburg, Ocean Parkway, Flushing, Long Island City, Jamaica.

In order to validate the secondary model load flow results, the Company continues to conduct case studies on summer heat contingency secondary events to develop a correlation between the secondary load flows against the real time events where secondary main burnouts occurred. We are also field verifying selected secondary main overloads in the 20 networks we completed at the end of last year.

The Company has completed the development of a comprehensive secondary model certification guide including a load flow validation engineering operating procedure.

We completed the planning models for West Bronx, Fordham and Jamaica and used them for primary load relief of feeders and transformers. As a pilot in the Bronx/Westchester region, we are field verifying secondary overloads as indicated by the models and are drawing layouts to address these in conjunction with existing work identified under the secondary rebuild program or the open mains program.

The Company is developing a model creation procedure with guidelines on using the new distributed modeling method for primary feeder and transformer load flow analysis for the 2010 summer load relief program.

Status Report (November 1, 2009)

Item 6

The Company has created models for an additional 9 models since the previous update bringing the total to 35 models as follows.

Flushing
Flatbush
Williamsburg
Crown Heights
Sheepshead Bay
Maspeth
Long Island City
Riverdale
Rego Park
Bay Ridge
Park Slope
Ocean Parkway
Jamaica
Yorkville
Sheridan Square
West Bronx
Fordham
Central Park
Sutton
Plaza
Washington Heights
Pennsylvania
Lenox Hill
Central Bronx
Lincoln Square
Cooper Square
Herald Square
Grand Central
City Hall

Hunter
Chelsea
Bowling Green
Hudson
Fulton
Greeley Square

The Company is using the new distributed demand models to create 2010 planning models for primary load relief. As of November 1, 2009 the Company has completed 26 planning models.

In order to validate the secondary model load flow results, the Company continues to develop a correlation between the secondary load flows and existing secondary grid conditions such as open mains. The Company field verified selected secondary main overloads above 200% of emergency in 20 networks in order to determine the factors contributing to the secondary overloads.

The Company issued EO-2155 "Standardization of Building Models in Poly Voltage Load Flow" on 9/30/09.

II-2 Con Edison should evaluate reasonable actions that can be taken to improve monitoring of its secondary system, including use of additional monitoring devices where feasible, and report to the Commission by June 1, 2000 on its findings.

Summary of Completed Actions

Con Edison undertook a project in 2000 to develop the next generation for system monitoring, called the Secondary Underground Network Distribution Automation System ("SUNDAS"), that would replace the Remote Monitoring System ("RMS") for monitoring network transformers and provide secondary system monitoring capability. In 1999, Con Edison's RMS provided the following network protector ("NWP") and transformer information: current of each phase, NWP status (open/closed), water levels in manholes, fuse status, open phases, and in a few cases, top oil temperature. In the SUNDAS R&D project, network protector microprocessor relays would provide this information as well as voltage, phase angle, relay status and diagnosis, and the capability for system operators to remotely change relay settings and operate the NWP. The SUNDAS R&D project was also designed to monitor the low voltage secondary system by the installation of sensors at intersections and mid-block locations to obtain three-phase voltage, current, and phase-angle data.

The Company achieved initial success and actually installed a working SUNDAS in the Hunter network. The SUNDAS technology entailed use of a high frequency PLC signal injected on the secondary network grid and used as a local area network ("LAN") two-way communications medium to communicate data from the network protector relays and the secondary sensors. However, the carriers providing the communications network, initially AT&T and then Verizon, discontinued providing the cellular digital packet data service necessary to operate the system. This rendered obsolete the modem hardware in the communications concentrators and made the data collection software inoperable. After investigating alternative communications systems, the Company concluded that a similar communications setback could occur again after the system was deployed and force resort to another costly alternative. The additional costs and effort related to the hardware and software redesign plus the anticipated very high deployment costs of the system, prompted the Company to abandon this project in 2004 and to focus on the enhancement of its existing RMS that uses the Company power cables to communicate transformer data to engineering personnel and regional control centers.

Beginning in 2004, Con Edison took advantage of then expiring original patents to promote RMS technology advances so it could replace outdated RMS equipment. The overall plan has been to improve the RMS technology and performance through the installation of higher-power transmitters and improved-sensitivity receivers that will provide enhanced data capability and functionality.

The new receivers offer increased sensitivity, improved data error correction, and remote diagnostic tools including pick-up coil testing to alert operators when critical components of the RMS system have failed. They are also designed with the ability the process more information from the field affording the opportunity to include additional status inputs from the RMS transmitters. The new transmitters offer a higher output capability, and are outfitted to offer three additional analog and digital sensory inputs for temperature and pressure transducers along with 3 phases of voltage and additional status inputs.

As of June 6th, 2007, all 62 RMS receivers on the system have been upgraded by installing new second generation receivers. Following the installation of the new receivers, there has been an improvement in RMS reporting rates.

In 2006, the Company, working with a consultant, conducted a study of secondary monitoring techniques for monitoring the secondary system under normal and multiple contingency event conditions. The study evaluated and benchmarked secondary monitoring technologies across the utility industry under three separate categories: sensor devices, communication devices, and data processor devices. In addition, the Company evaluated optimized sensor placement and examined secondary model validation techniques. The study determined that secondary monitoring presents a variety of challenges including the following:

- Secondary Monitoring across all utilities is limited to the network protector at the transformer. Currently no utility monitors the secondary system between the network protector and the service termination at the customer end.
- Due to limited commercial interest in underground secondary monitoring technologies, few vendors offer complete packages and further modifications/enhancements are required to devices currently available in the market before they can be reliably deployed in the underground networks.
- Development of the underground secondary monitoring technology has been limited by reliable communication techniques due to the harsh underground environment, solid structure covers, and physical constraints arising from limited underground space for device placement.
- The development of the secondary monitoring solution will vary by network composition factors such as load distribution, commercial vs. residential, distribution system type, underground vs. overhead, and load flow modeling techniques.
- The cost-to-benefit analysis cannot be performed or justified until the technologies are deployed and the accelerated life testing of the components is performed.

A secondary monitoring system consists of sensors, communication methodology and data processing. Deployment of such a system must be technically feasible, financially practical, and focused on specific deployment objectives. Deployment objectives include identifying best potential sensor locations and best potential monitoring technologies to: a) validate the network secondary distributed model for use by the Poly Voltage Load Flow (PVL) and World-class Operations Load Flow (WOLF) programs; and b) identify abnormal mains and blown limiters. The Company has identified the basic requirements for various secondary monitoring components and has developed a prototype of the secondary monitoring device that meets the basic secondary monitoring functionalities.

In order to validate the accuracy of the various uRTU device components and establish the technical feasibility of the prototype, the Company conducted extensive testing of the following parameters: elevated temperature test, effect of magnetic field induction on current transformer (CT), effect of variation of installation angle on CT's performance, transportation drop test, accelerated life test, and surge test.

The Company initiated a pilot deployment of the prototype secondary monitoring device in 15 locations in the Sutton Network. Based on the results of the prototype and pilot installations, additional locations will be selected, and the program will be expanded to develop a technical solution for the entire Sutton Network. Prior to the expansion of the initial deployment, the reliability of the communication with these devices has to be established. Once a technical solution is developed, state estimation techniques along with real time data will be used to improve the accuracy of the secondary models. A combination of secondary modeling results and real time secondary monitoring data will be used to asses the health of the secondary grid and predict abnormalities such as open mains and blown limiters.

Status Report (May 1, 2009)

Items 1, 2, and 7.

Completed per prior status reports.

Items 3-6.

Update on RMS Transmitter Installations

To date, we have installed approximately 11,450 third generation Remote Monitoring System (RMS) transmitters. As of April 1, 2009, we have installed Remote Monitoring System Pressure, Temperature, and Oil Level (RMSPTO) sensors on 3,927 transformers. In addition to field installations, we are installing RMSPTO at the Astoria Transformer Shop on new transformers due for field replacements and system reinforcement. To enhance work efficiency, we will install units during routine transformer inspections.

The new analog pressure sensor can locate transformers that have extremely slow tank leaks that could otherwise remain undetected during routine pressure tests. These sensors have proven useful in mitigating in-service transformer failures to enhance public and employee safety. Con Edison has de-energized 145 transformers for replacement since inception of the project based upon follow up inspections resulting from the sensor data readings.

For March 2009, the availability rate by region was as follows:
Manhattan: 98.8% (no network less than 90%)

Brooklyn-Queens: 94.5% (no network less than 90%)
Bronx-Westchester: 98.2% (no network less than 90%)

Update on Secondary Monitoring

In June 2008, the Company installed 92 secondary monitoring units (uRTU devices) in the Sutton Network. 32 units were installed in Bus Compartments, and 60 units were installed in manholes. The goal of the pilot project was to utilize the load flow data from these locations to validate the peak distributed demand generated by the network secondary models for summer 2008.

As of March 2009, the Company has been able to use data reported by only 13 of the 92 units for model validation. As of March 2009, 35 units have stopped reporting, and only 13 of the remaining reporting units are providing accurate data.

The Company has initiated the removal of all the units and has been targeting the removal of the 35 units that have stopped reporting. Based on the evaluation of the units that have been removed so far, the primary reasons for stopped communication has been intermittent wireless coverage and/or damage due to water ingression. The communication infrastructure for the pilot is reliant on Sprint/Nextel, and intermittent wireless coverage has prevented continuous data reporting from many of these units. The water ingression in the damaged units resulted from a break in the seal.

Of the remaining 57 units that have been reporting regularly, the Company has been able to use data from only 13 locations that were installed at bus compartments. None of the units installed inside manhole locations provided accurate data. Major reasons for inaccurate data quality include congestion in manholes and inability to identify the secondary main section in the manholes.

Typically in the underground structures the cable is racked tightly against the wall. Consequently, it makes it very difficult to place the current transformers (CTs) perpendicular to the sections of cable they are intended to measure and to install them in such a way that would prevent them from touching any sections of cable. As a result of this limitation, the data quality from uRTU devices installed inside manholes is limited.

The identification of secondary mains poses a significant challenge to successfully implement a comprehensive secondary monitoring solution. The correlation of the monitoring data from the uRTU devices against the load flows from the distributed secondary models requires reliable identification of the ends of secondary main section running from structure to structure so that a monitoring unit can be placed at each end of a particular section of cable. However, identification of the ends of a given secondary cable in each structure proved to be virtually impossible without destructive testing of the cable. As result, in most cases the units were not installed at each end of a given section as was originally intended. In the absence of reliable identification of the secondary main sections, it is impossible to correlate the monitoring data from the uRTU devices against the load flows from the distributed secondary models.

The bus compartment design also posed a major challenge for reliable communication and accurate data reporting. Because the fixed distance between the bus bars prevented perpendicular installation of CT's, data accuracy was compromised. Only 13 of the 32 bus compartment locations are reporting accurately.

The secondary monitoring technology has proven to be cost prohibitive. The final cost of the entire secondary monitoring solution for the pilot project, including the uRTU device, the CT's, and the cost of installation, was at $8,000/unit including overheads. The cost breakdown per location is as follows:

- Materials & Hardware: $5000 per Unit
- Communication & Data Hosting: $300 per Unit (recurring cost)
- Initial Testing & Installation: $1500 per Unit
- Maintenance: $1000 per Unit (second visit)
- Total Cost ~ $8000 per Unit

Status Report (November 1, 2009)

Update on RMS Transmitter Installations

To date, we have installed approximately 14,070 third generation Remote Monitoring System (RMS) transmitters. As of October 26, 2009, we have installed Remote Monitoring System Pressure, Temperature, and Oil Level (RMSPTO) sensors on 4,898 transformers. In addition to field installations, we are installing RMSPTO at the Astoria Transformer Shop on new transformers due for field replacements and system reinforcement. To enhance work efficiency, we will install units during routine transformer inspections.

The new analog pressure sensor can locate transformers that have extremely slow tank leaks that could otherwise remain undetected during routine pressure tests. These sensors have proven useful in mitigating in-service transformer failures to enhance public and employee safety. Con Edison has de-energized 165 transformers for replacement since inception of the project based upon follow up inspections resulting from the sensor data readings.

For September 2009, the availability rate by region was as follows:
Manhattan: 97.7% (no network less than 90%)
Brooklyn-Queens: 94.7% (no network less than 90%)
Bronx-Westchester: 97.8% (no network less than 90%)

Update on Secondary Monitoring

Sutton Pilot Status

As of November 2009, only 41 of the 92 units are communicating continuously and only seven units are providing accurate data. The Company is currently scheduling the removal of all the non reporting devices. The Company plans to monitor the remaining reporting units through summer of 2010.

The Company has concluded that monitoring secondary mains is not feasible because of the inability to correctly identify secondary mains in the network grid and the need for significant advancement in communication technologies to reliably communicate with devices inside underground structures. (See discussion of these factors in May 1, 2009 report)

LIC Smart Grid Pilot

In 2009, the Company initiated the secondary monitoring (model validation) project in the Long Island City Network as part of the LIC Smart Grid Pilot. The outline of the LIC Smart Grid Pilot and the Project Goals relevant to the Model Validation Project are listed below.

As part of Con Edison's Smart Grid program, the Company will be installing smart technologies in a select area in Northwest Queens in the Long Island City network to evaluate the benefits of Smart Grid in New York City's electric system. This Research and Development pilot will evaluate several innovative technologies including smart meters, outage management functions, and the integration of distributed energy resources. The smart grid demonstration will be implemented with a comprehensive and secure communication system.

LIC Smart Grid Pilot - Project Goals Relevant to Secondary Monitoring Project

Design and implement comprehensive communication network architecture to support all Smart Grid initiatives. The network will be designed to provide strong security, performance and scalability.

Design and implement infrastructure for secure end to end communications between control rooms with Smart Grid assets.

Install approximately 1,500 smart meters located in diverse commercial and residential locations: high rises, basements, and single family homes.

Utilize smart metering data to develop integrated customer load profiles for secondary model load flow validation.

Long Island City Secondary Monitoring (Model Validation) Project

Validating the network secondary models is an essential part of Secondary Network Monitoring. Firstly, model validation is needed to support the use of Poly Voltage Load Flow (PVL) and World-class Operations Load Flow (WOLF) programs on secondary network models. Secondly, real time monitoring combined with the modeling results shall identify abnormal mains, particularly open conductors, making it possible to take actions to prevent overloading of the remaining conductors.

The data obtained with the use of smart meters will provide additional known data points to assist in refining the distributed demand load estimations utilized in our network simulations created in the Poly Voltage Load Flow program. The known data points will account for unknown diversity in our grid and provide additional meter points for the reconciliation algorithm used to adjust the estimated demands for the peak summer day.

The basic requirements for various secondary monitoring components are as follows:

Data Sensors (Smart Meters):

- The sensors should be able to measure 3-Phase current/voltage, power factor, secondary harmonics etc.
- Easily deployable at customer end
- Two way communication capability
- Local data storage capability
- Non Proprietary

Communication Methodology:

- Two Way communication
- Reliable and Redundant
- Secure (benchmark against NERC and FERC communication security requirements where applicable)

Data Processing:

- Scalable & Secure
- Reporting by Exception
- Non Proprietary
- Compatible with existing systems

Project Schedule

The Company plans to install 500 smart meters in the Long Island City Network as part of the LIC Smart Grid Pilot.

Task	1Q	2Q	3Q	4Q
Install all meters for Model Validation	■	■		
Integrate data into PVL		■		
Collect and Monitor data to validate model			■	
Publish Results				■

Communication Infrastructure Details

The communication infrastructure development will be coordinated with the LIC Smart Grid pilot as it is a common communication system.

II-7 Con Edison should develop a program for eliminating stop joints with high failure rates that are still in service.

Summary of Prior Actions

Stop joints are used to connect one section of a feeder to another section. Stop joints have to be used when a section of paper-insulated lead-covered (PILC) cable is connected to a section of ethylene propylene rubber (EPR) cable or cross-linked polyethylene (XLP) cable so as to prevent the oil in the PILC cable from migrating to the other cable section.

Two types of stop joints were experiencing a high failure rate – Elastimold 2W/1W stop joints, and pre-1994 Raychem 3W/1W stop joints. Con Edison stopped installing Elastimold 2W/1W joints in 2000 and pre-1994 Raychem 3W/1W joints in 1994.

As the population of pre-1994 Raychem 3W/1W stop joints has been reduced through removals from 2000 to date, the failure rate of this type of joint has declined to an acceptable level comparable to the failure rate of the second-generation Raychem 3W/1W stop joints that replaced them in 1994. The failure rate of the pre-94 Raychem 3W/1W stop joints declined substantially because the problem was not the design itself but rather the assembly of the joint in the field, i.e., workmanship. The second generation (post 1993) Raychem 3W/1W included design changes that facilitate assembly of the joint in order to make workmanship errors less likely. (The process for heat shrinking the inner and outer insulating sleeves was made easier.) The failure rate of the pre-94 Raychem 3W/1W declined to acceptable levels because many of these joints with workmanship errors have failed and been removed, and the remaining population largely reflects the performance of the joints that were correctly constructed. As a result, the failure rate of pre-94 Raychem 3W/1W stop joints is now similar to the second-generation Raychem 3W/1W stop joints that replaced them. Thus, the Company no longer targets pre-1994 Raychem 3W/1W joints for removal but continues to remove these joints through normal work, i.e., high-potential testing, feeder and joint failures, feeder reinforcement, new business, interference work, and PILC cable removal. Con Edison estimates that there were 5,444 pre-94 Raychem 3W/1W joints in 2000.

Unlike the Raychem joints, the failure rate of Elastimold 2W/1W stop joints has remained high relative to other stop-joints on the system. The Company specifically targets Elastimold 2W/1W stop joints for removal so that by December 31, 2008, the failure rate will be improved to an acceptable level or these stop joints will have been eliminated from the primary network system entirely. Con Edison estimates that there were 2,458 Elastimold 2W/1W stop joints on the system in 2000.

Status Report (May 1, 2009)

Update on Stop Joint Removals

As described in prior reports, the Company uses a computer-assisted algorithm logic program in conjunction with the Company's mapping records (Vision cable database) to estimate the number and location of stop joints. The Company estimates that as of April 20, 2009 there are about 2,229 pre-1994 Raychem 3W-1W stop-joints on the underground distribution system. This is a reduction of 298 pre-1994 stop-joints from the estimated October 27, 2008 population. The Company estimates that all Elastimold 2W-1W stop-joints have been removed from the underground distribution system. This is a reduction of 30 joints from the estimated October 27, 2008 population. The summer period failure rate for these stop joints is as follows:

Failure Rate Trends - Raychem 3W-1W Stop-Joint Summer Oas / 100 Splices				
Year	3W-1W Pre 1994		3W-1W Post 1993	
	13kV	27kV	13kV	27kV
1999	1.198	0.725	*****	*****
2000	0.617	0.611	*****	*****
2001	0.460	0.542	0.345	0.227
2002	0.275	0.366	0.343	0.349
2003	0.483	0.440	0.488	0.305
2004	0.646	0.362	0.386	0.247
2005	0.727	0.603	1.035	0.863
2006	0.694	0.602	0.711	0.611
2007	0.382	0.198	0.660	0.603
2008	0.308	0.221	0.775	0.736

Raychem 3W-1W transition splices (stop-joints) Pre-1994:

- Population as of 10/27/2008 = 2,527
- Population as of 04/20/2009 = 2,229
- Difference since 10/27/2008 = -298

Failure Rate Trends - Elastimold 2W-1W Stop-Joint Summer OAs / 100 Joint Sets		
Year	**13kV**	**27kV**
1999	5.462	5.073
2000	1.683	3.460
2001	0.687	2.457
2002	0.912	2.861
2003	0.886	0.784
2004	1.000	0.335
2005	1.885	4.020
2006	1.706	4.132
2007	2.857	2.091
2008	2.778	2.410

Elastimold 2W-1W transition splices (stop-joints):

- Population as of 10/27/2008 = 330
- Population as of 04/20/2009 = 0
- Difference since 10/27/2008 = -30

Elastimold 2W-1W transition splices estimated to be currently on the system: 0

Status Report (November 1, 2009)

As described in prior reports, the Company uses a computer-assisted algorithm logic program in conjunction with the Company's mapping records (Vision cable database) to estimate the number and location of stop joints. The Company estimates that as of October 25, 2009 there are about 1,991 pre-1994 Raychem 3W-1W stop-joints on the underground distribution system. This is a reduction of 238 pre-1994 stop-joints from the estimated October 27, 2008 population (see table 1 for summer failure rates).

The Company estimated, and reported in the May 2009 update, that all Elastimold 2W-1W stop-joints had been removed from the underground distribution system. Despite the removal of Elastimold 2W-1W stop-joints from all their estimated locations, unanticipated Elastimold stop-joint failures in Westchester has promoted an additional search for these splices throughout the Bronx/Westchester operating region. The computerized method to search for these splices has been modified to be less restrictive in determining a possible location. The modified program produced an initial listing of approximately 400 structures that may contain an Elastimold 2W-1W splice. Although these structures will be inspected, over time, this supplemental search is not expected to discover many previously undetected Elastimold 2W-1W stop-joints. In addition, work crews have been instructed to inspect every structure they enter for Elastimold 2W-1W stop-joints. Additional Elastiomold 2W-1W stop-joints splices found through inspections will be logged in an inspection database and removed during an appropriate feeder outage.

Table 1

Failure Rate Trends - Raychem 3W-1W Stop-Joints Summer OAs/100 splices				
Year	3W-1W Pre 1994		3W-1W Post 1993	
	13 kV	27 kV	13kV	27 kV
1999	1.198	0.725	*****	*****
2000	0.617	0.611	*****	****
2001	0.460	0.542	0.345	0.227
2002	0.275	0.336	0.343	0.349
2003	0.483	0.440	0.488	0.305
2004	0.646	0.362	0.386	0.247
2005	0.727	0.603	1.035	0.863
2006	0.694	0.602	0.711	0.611
2007	0.382	0.198	0.660	0.603
2008	0.308	0.221	0.775	0.736
2009	0.539	0.433	0.403	0.425

Raychem 3W-1W transition splices (stop-joints) Pre-1994:

- Population as of 04/20/2009 = 2,229
- Population as of 10/25/2009 = 1,991
- Difference since 10/27/2008 = -238

II-9 Con Edison should implement its cable rejuvenation program associated with manholes and reassess its manhole inspection program.

Summary of Prior Actions

1. Manhole Ventilation Project

After the DPS Staff issued this recommendation, they told the company that their intent was for the company to improve the condition of equipment in manholes and mitigate manhole events (fires and explosions). "Cable rejuvenation" referred to a "self-healing" cable R&D project that the company was investigating at the time but found was not feasible. Staff concurred that the cable rejuvenation program need not proceed and asked the company to propose an alternative program. Con Edison conducted a large-scale evaluation of the impact of ventilating manholes and service boxes for mitigation of manhole events. The company designed a new manhole cover to provide both ventilation and protection from the inflow of debris, rock salt, and other liquids. The project demonstrated the potential for vented covers to mitigate manhole explosions. In 2005, Con Edison began installing vented manhole covers system-wide and expects to complete installation by the end of 2008.

2. Manhole Inspection Tracking

Specification EO-1184, "Periodic Inspection, Maintenance and Reporting of Distribution Underground Cables and Joints," was revised to require that, a structure (manhole, service box, or vault) inspection be performed as part of routine work by any qualified field crew prior to closing-up a subsurface structure, that minor repairs be performed during these visits, and that the results of the inspection and repairs be recorded in accordance with the procedures employed for regular inspections.

Con Edison also purchased portable computer equipment (133 units and associated accessories) to support the more effective entry of manhole inspection information into Con Edison's CIMOES data system. This portable computer equipment has allowed crews to accurately and expeditiously enter inspection and repair information while they are on location in the field. This information is downloaded directly into the main CIMOES database, which is used to track completed work and to plan future projects.

Status Report (May 1, 2009)

Update on Manhole Ventilation Program

Table 1 summarizes the replacement totals to date. A tabulated list of all replaced covers will be supplied in MS Excel format as an attachment to this report.

Region	Replaced as of March 31, 2009
Manhattan	13,989
Brooklyn	14,952
Queens	13,520
Westchester	3,250
Bronx	7,716
Staten Island	999
Total	54,426

Status Report (November 1, 2009)

Update on Manhole Ventilation Program

The table below summarizes the manhole cover replacement totals to September 30, 2009.

Region	Replaced as of September 30, 2009
Manhattan	14,128
Brooklyn	15,473
Queens	13,903
Westchester	3,250
Bronx	7,778
Staten Island	999
Total	55,531

II-10 Con Edison should accelerate its evaluation of alternatives to high-potential testing, such as low frequency AC testing, to determine their possible effectiveness and report to the Commission on its efforts by June 1.

Summary of Prior Actions

Staff stated that the Company's DC high-potential test program should continue but recommended that the Company explore new testing methods with less potential to damage cables being tested. The Company pursued the following three investigations for an alternative to high potential testing of feeders. :

1. Partial Discharge Testing

The Partial Discharge testing program investigation closed after it was determined that this method of detecting incipient faults is not a reliable indicator of potential feeder failure.

2. Thermal Testing

Simulation studies and analysis during the course of an R&D projects lasting over two years revealed flaws in the application of a thermal testing device to the network system. Studies showed that many existing network protectors would be cycled during the planned thermal testing in non-summer periods creating unacceptable local network contingencies and loads. Also, the ability of the test device to replicate summer ambient temperatures towards the farthest end of the feeder, as needed for effective testing, remained as an unresolved technical concern. Thermal calculations indicated that the device would not be able to thermally load the entire feeder. In addition, the test device was too big and too heavy, and would require a motorized pallet.

3. Very Low Frequency Testing

In 2000, Con Edison's initiated a pilot program to investigate the effectiveness of 0.1 Hz very low frequency (VLF) AC hi-pot testing on the performance of the primary distribution system. VLF high potential testing equipment was purchased, and a program was developed to test the primary feeders on both the 13 kV and 27 kV distribution systems. Test program results based on seven years of testing support the following findings:

- The 0.1 Hz AC hi-pot test has demonstrated the ability to flush out defects on solid dielectric primary distribution cables and joints.
- For the 13 kV system, the 0.1 Hz. AC hi-pot test out-performed the traditional DC hi-pot test. Results from over seven years of VLF testing show that after a successful VLF hi-pot test on a 13 kV feeder the average time until the next failure is over 1 year. This compares favorably to the average time to the next failure following a DC hi-pot which is six months.

- On the basis of its study, Con Edison has concluded that 0.1 Hz AC VLF hi-pot testing is an acceptable alternative to the DC hi-pot test for extruded solid-dielectric cable operating on the 13kV system.

- Although the results from the 27kV system are promising, due to the limited amount of available test data it is not yet possible to determine the effectiveness of VLF testing on 27 kV feeders. The Company is continuing the 0.1 Hz. AC hi-pot test validation program on 27 kV feeders. Based on the sampling criteria, an additional thirty 27 kV feeders will be included in the test program. Con Edison continues to work through the challenging logistics (primarily scheduling outages) of performing VLF hi-pot tests on the 27 kV to obtain additional test data.

Con Edison has revised its specification EO-4019, "Testing of AC Feeders Operating at 4 kV to 33 kV," to summarize the requirements for the use of VLF 0.1 Hz AC hi-pot tests where appropriate. The Company plans to continue the program using its current fleet of three AC test trucks and is ordering additional trucks and has also approved the Purchase and Test specification ES-4018 to purchase VLF 0.1 Hz AC hi-pot test sets for substation applications.

Status Report (May 1, 2009)

<u>Very Low Frequency Testing</u>

The Company has ordered 12 stationary Very Low Frequency (VLF) test sets for installation at various 27 kV and 13 kV substations. Currently, VLF test sets have been installed and are operating at North Queens, Corona, Rockview and Parkview substations. Test sets have been installed and are awaiting qualifications tests at Seaport, Brownsville and Trade Center substations. The substation selection for new test set installations will be based on the amount of solid dielectric cable installed as well the available space in the existing substations. The lead time for delivery of the VLF sets is approximately 6 months.

In addition to the three mobile test sets currently in use we are working on a revised design to install two additional VLF test sets in trucks in 2009.

Since the November 1, 2008 update five additional 27kV feeders have been subjected to an AC VLF Hipot test. The results are contained in Table 1, below.

Table 1

AC Hipot Test Data - November 01, 2008 Through April 20, 2009						
Network	Voltage Level	Network ID	Feeders Tested	Number of Tests	Number of Passed Tests	Number of Failed Tests
Long Island City	27 kV	1Q	2	10	1	9
Flushing	27 kV	7Q	1	3	0	3
Richmond Hill	27 kV	9B	2	7	1	6
Washington Heights	13 kV	1M	1	1	1	0
Harlem	13 kV	2M	1	1	1	0
Rockview	13 kV	2W	1	1	0	1
Yorkville	13 kV	3M	3	3	3	0
Northeast Bronx	13 kV	5X	4	11	4	7
Madison Square	13 kV	6M	2	2	2	0
Central Park	13 kV	17M	1	3	1	2
Harrison	13 kV	17W	1	3	1	2
Rockefeller Center	13 kV	19M	1	1	0	1
Sutton	13 kV	20M	1	1	1	0
Canal	13 kV	22M	1	1	1	0
Lenox Hill	13 kV	24M	2	4	2	2
Greeley Square	13 kV	26M	1	2	0	2
Herald Square	13 kV	28M	1	1	1	0
Hudson	13 kV	39M	1	3	1	2

Status Report (November 1, 2009)

Very Low Frequency Testing

The Company has ordered 17 stationary Very Low Frequency (VLF) test sets for installation at various 27 kV and 13 kV substations. Currently, VLF test sets have been installed and are operational at North Queens, Corona, Rockview, Parkview, Seaport, Brownville, Trade Center, Jamaica, W 110th, No.1, Astor, Newton and York substations. Test sets are scheduled to be installed at Elmsford, Greenwood, Waterstreet, W 50th, and the W 65th substations by year-end 2009. The substation selection for new test set installations will be based on the amount of solid dielectric cable installed as well the available space in the existing substations. The lead time for delivery of the VLF sets is approximately 6 months.

In addition to the three mobile test sets currently in use we are working on a revised design to install two additional VLF test sets in trucks in 2009.

Since the May 1, 2009 update four additional 27kV feeders have been subjected to an AC VLF Hipot test. The results are contained in Table 1, below.

Table 1

AC Hipot Test Data - April 21, 2009 thru October 25, 2009						
Network	Voltage Level	Network ID	Feeders Tested	Number of Tests	Number of Passed Tests	Number of Failed Tests
Crown Heights	27 kV	3B	1	1		1
Ridgewood	27 kV	5B	1	3		3
Jamaica	27 kV	5Q	1	1		1
Richmond Hill	27 kV	9B	1	1	1	
Harlem	13 kV	2M	1	1	1	
Yorkville	13 kV	3M	1	1	1	
Battery Park City	13 kV	18M	1	1	1	
Fulton	13 kV	27M	1	1	1	
Herald Square	13 kV	28M	1	2	1	1
Triboro	13 kV	44M	1	1	1	

II-15 Con Edison should monitor the loading of high-tension customers' transformers as part of its system modeling programs.

Summary of Prior Actions

The Company has been working on developing a high tension monitoring system since 2000. The monitoring of high-tension customer loads requires the development of a variety of components, including sensors to obtain the data in a format that can be transmitted directly into the Company's existing analytical and modeling programs, a communications platform to transmit the data to the control center, and sensors that can withstand harsh underground environmental conditions.

Major challenges must be addressed in order to develop a reliable high tension monitoring solution:

- Reliable Communications: The majority of the high tension monitoring locations are inside customer basements and sub basements that are constructed from steel reinforced concrete walls. As such, these locations naturally pose a challenge to the cellular based wireless communications. Moreover, using wireless communication technology from external carriers significantly limits the Company's ability to maintain a minimum reliability standard.

- Customized Solution: The complexity and physical conditions at each high tension location requires a customized communication solution that may require a combination of communication technologies such as cellular based wireless, optic fiber and power line carrier. There is no standard solution for all locations, and each location requires a preliminary field survey, engineering analysis and validation.

- Data Accuracy: Any viable high tension monitoring solution must provide a minimum data accuracy standard for billing purposes. Reliable and accurate data measurements are also necessary for primary modeling.

- Customer Equipment and Access: The majority of the high tension equipment is customer owned and requires customer permission and coordination. Getting access to the customer premises to install and test the monitoring devices has proven to be challenge; as unescorted access is prohibited by most customers due to security reasons.

The Company has tested various technologies that included modifying the existing Remote Monitoring System infrastructure to leverage power line carrier communication technology in conjunction with hardened sensors for installation in RMS-equipped structures. This initiative was unsuccessful as it relied on current transformers specifically designed to monitor the high tension load that proved to be unreliable and presented some safety concerns.

In 2006, the Company partnered with AMT to develop a high tension service data collection infrastructure called High Tension Monitoring Data Acquisition System (HTMDAS) and a communication interface using wireless technology. In 2007, the Company began to install the data collection backend of the HTMDAS. This initial deployment includes the installation of one dedicated T1 line that will be used to accumulate data over a dedicated server.

The Company initiated a pilot high tension monitoring program in 2007.

Status Report (November 1, 2008)

The company is still evaluating the issues related to reliable communications and customized solutions discussed in prior reports. However, with the latest software upgrade, data quality is no longer an issue. A number of locations require customized antenna installation solutions and/or an alternate wireless provider to insure continuous and reliable service. Access to these sites continues to be an issue since every field visit requires that the company first contacts the customer prior to the visit – access is depended on facility personnel availability to provide an escort. However, we will continue to work closely with our customers to streamline this process.

The Company is currently working to put in place the infrastructure needed to backhaul, and utilize the data for analytical purposes. However in the interim, the data is currently being collected and warehoused on a server provided by a vendor.

The Company recently validated the data collected from the 26 pilot units installed in Washington Heights and Yorkville, and plans to move forward with a system wide deployment. To meet the goal of monitoring all network supplied high tension customers within the next five years, the Company plans to install approximately 280 units annually starting in 2009.

Status Report (May 1, 2009)

The Company is currently engaged in the final phase of the process required to begin system wide deployment of the HT monitoring system. This process includes several critical items; such as, vendor approval, vendor negotiations regarding technical assistance, training, service contracts, warrantees, and pricing. The process is near completion and the Company plans to begin system wide deployment by July. The Company plans to install approximately 200 HT monitoring end points this year. The Company also plans to put in place and make operational the internal infrastructure needed to backhaul, integrate, and archive the HT data collected by November; in the interim the Company will continue to collect and warehoused the data on the vendor provided server.

Status Report (November 1, 2009)

Firmware problems have delayed equipment deployment and vendor negotiations regarding technical assistance, training, service contracts, warrantees, and pricing.

II-17 Con Edison should determine which recommendations in its report on the July 1999 outage, and in the report of the Review Board, need to be completed immediately to improve reliability for the summer of 2000 and implement them expeditiously. The company should report to the Commission on all of the recommendations, explaining its implementation plans and status.

Status Report (November 1, 2009)

Con Edison is submitting a November 1, 2009 status report on its Action Plan.