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March 30, 2007
By Hand Delivery

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

Re: Case 06-E-0894 – Proceeding on Motion of the Commission to Investigate Electric Power Outages in Con Edison's Long Island City Network

Dear Secretary Brilling:

Enclosed for filing are an original and 10 copies of *the Reply Comments of Consolidated Edison Company of New York, Inc. on The Report of Department of Public Service Staff on The July 2006 Power Outages in the Long Island City Network*. These comments are filed pursuant to your "Notice Extending Reply Comment Schedule" issued March 14, 2007 in the referenced proceeding.

Very truly yours,

Enclosures

cc. Judge Eleanor Stein (by hand and email)
Active Parties (by email)

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE 06-E-0894 - Proceeding on Motion of the Commission to Investigate the Electric Power Outages in Consolidated Edison Company of New York, Inc.'s Long Island City Electric Network.

Reply Comments of Consolidated Edison Company of New York, Inc. on The Report of Department of Public Service Staff on The July 2006 Power Outages in the Long Island City Network

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STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE 06-E-0894 - Proceeding on Motion of the Commission to Investigate the Electric Power Outages in Consolidated Edison Company of New York, Inc.'s Long Island City Electric Network.

Reply Comments of Consolidated Edison Company of New York, Inc. on The Report of Department of Public Service Staff on The July 2006 Power Outages in the Long Island City Network

I. Introduction

Consolidated Edison Company of New York, Inc. ("Con Edison" or "the Company") submits these Reply Comments to the Public Service Commission ("Commission") and Administrative Law Judge Eleanor Stein in this proceeding. Con Edison submitted its initial comments on *The Report of Department of Public Service Staff on the July 2006 Power Outages in the Long Island City Network*, issued February 2007 on March 2, 2007. The following parties have also submitted initial comments: the City of New York ("the City"), the Committee on Corporations, Authorities and Commissions, the Consumer Protection Board ("CPB), the Office of the Attorney General ("OAG"), the Public Utility Law Project, TransGas Energy Systems, LLC, the Utility Workers Union of America, Local 1-2, and the Western Queens Power for the People Campaign ("PFP").[1]

[1] The City's Initial Comments included the City's report on its investigation of the Long Island City outages, entitled *Investigation by the City of New York into the Northwest Queens July 2006 Power Outages*, dated March 2, 2007 ("City report"). The City's report includes 53 recommendations, and the other parties made about 90 additional recommendations in their comments. Con Edison's resources are engaged in

II. Response to Report and Initial Comments of City Of New York

Con Edison's initial comments stated that the lessons learned from the LIC outage, including the findings and recommendations from Staff's investigation, should prompt a forward-looking approach that focuses the resources and attention of Staff and the Company on improved service to meet the energy needs of the Company's customers through a strong and reliable system. The initial comments of the City of New York reinforce the importance of a focus on improved service and recognize that a prudence proceeding would run counter to that effort. (City comments, pp. 28-29) Con Edison continues to be of the view that the most constructive way to address the LIC events is through cooperation and constructive dialogue.

A. Con Edison Began Preparation for the Repair of the Secondary Grid at about Midnight on July 18

The implication in the City's discussion of Con Edison's restoration of the secondary grid is that the Company could and should have acted up to two days earlier, starting Wednesday morning, July 19, to begin repairing secondary grid damage. (City report, pp. 84-85, 89) The City goes on to say that the Company did not deploy significant personnel and resources until Friday morning, July 21, and only after the discovery of the 25,000 customer outages. This analysis is incorrect.

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implementing the recommendations of the Company's own report and those of Staff's report in this proceeding and its report in Case 06-E-1158 – both the short term actions to enhance system performance by summer 2007 and longer-term actions. The Company has not completed an analysis of the recommendations made by other parties and is not responding to each recommendation with which it disagrees. However, many of these recommendations are similar to those issued by Staff and the Company and are being addressed. The Company's response to particular comments made by a party does not indicate that the Company agrees with the balance of the party's comments.

On late Tuesday night at about 23:00 hours (not Friday morning as suggested), the Company assigned a General Manager to prepare a restoration plan for the secondary grid. Overnight, the GM conferred with the Brooklyn Queens Engineering Staff and prepared a plan that called for identifying the areas and the equipment to which field crews would be assigned to inspect for damage and make repairs. The plan called for reviewing and mapping the ECS tickets that were being received to identify these areas and equipment. (About 540 tickets had been received by midnight Tuesday, and an additional 1,400 tickets were received from midnight Tuesday to midnight Wednesday.) Implementation of the plan began on Wednesday, with engineering staff on the day and evening shifts reconciling and plotting the ECS tickets on network M&S plates (some 1,977 tickets had come in by midnight Wednesday) to identify the locations for crew assignments. Brooklyn Queens crews worked on secondary repairs throughout Thursday. On Thursday, work packages for crew assignments, based on the plotting of ticket locations, were completed, and the Company began to assign crews using the packages. Also on Thursday, the Company established three workout locations and logistical support for the restoration work. On the basis of the repair work anticipated for the 2,000+ ECS tickets, the Company realized that the resources of the Brooklyn Queens Region would not be inadequate, and the Company opened its Corporate Emergency Response Center early Thursday afternoon to marshal additional resources from all Company regions to restore the secondary system. From that time forward, the Company assigned increasing numbers Company work crews from other regions and crews from other utilities and contractors to the assessment of damage and repair of the secondary grid. The stabilization of the primary system was important for the repair of the

secondary system and to support the reconnected load. The network remained in a 7th to 10th contingency all day Wednesday and remained in a 4th contingency until 1:48 p.m. on Thursday. The discovery on Friday morning that the outage count was 25,000 was entirely coincidental to the restoration effort that the Company had already initiated.

Thus the City's statement that the Company did not begin secondary recovery work until Friday is mistaken as recovery work actually began late Tuesday night when the Company began preparing its restoration plan.

B. Con Edison Recovered a High Percentage of Component Failures for Autopsy

The City's comments criticize the Company for failing to collect for autopsy as many failed feeder components as possible. (City at 30-31)

During the LIC event, from July 17th through July 25th, the network experienced 24 feeder trips caused by component failures. The component failures included 7 primary cables, 15 joints and 2 terminations. The City's comments do not acknowledge that 11 actual failure specimens were collected and were analyzed by the staff of Con Edison's Cable Center. The 11 Cable Center specimens were collected and analyzed as standard Company practice before the outage event escalated and Cable Technology Laboratories ("CTL") was retained as a consultant. The results of the Company's analysis were made available to CTL, but the specimens themselves were destroyed in the normal course of the analysis process and were no longer available for CTL's analysis.

Nine actual failure specimens were made available to CTL for analysis. CTL was able to reach conclusions as to the cause of failure for eight of these nine specimens. The ninth specimen (Feeder 1Q15, 7/22/05, 0734 hours; CE ID 75641) was the failed "A"

phase splice of a two-way one-way joint. The complete joint did not fail, and only the "A" phase splice was replaced. The other splice was returned to service. Although CTL reported that it was not able to determine the cause of the splice's failure "because of insufficient components to examine," the failed splice was provided for analysis.

CTL reported two other specimens to be insufficient to perform analysis. One specimen (Feeder 1Q14, 7/19/06, 0851 hours; CE ID 75594) found insufficient was the cable end lug from a failed Elastimold joint. The failed splice was live end capped, and no part of the splice was recoverable and only the connector for the failed splice was available. The other specimen (Feeder 1Q15, 7/19/06, 1605 hours; CE ID 75598) that CTL reported as insufficient for analysis was a cable leg from a location where a live end cap had been suspected of failure but was found during field inspection to be intact and was left in place. The crew supplied a cable leg from the location because they suspected it might have been damaged by exposure to a manhole fire, but upon analysis by CTL in the lab the cable leg was not damaged. The actual failure location has not been determined.

As to the remaining two locations, one specimen was unavailable because field personnel initially reported a cable failure, and the actual failure point was later determined to be a termination. The failure specimen was no longer available. One specimen was inexplicably not retrieved.

Thus, Con Edison recovered actual failure specimens for 20 of 22 locations with recoverable specimens (91%) (specimens were not recoverable at two locations), and the cause of failure for each was analyzed and determined by Con Edison or CTL.

There are practical limitations that impact the retrieval rate of failure specimens. Often, a feeder can be quickly restored to service if field personnel remove only a conservative specimen. The restoration of service must be the priority in these situations. When cables are damaged by an external fire, the actual failure point is often consumed by the fire, or the failure point is abandoned in a damaged duct bank. In situations like these, when the actual failed components are not available, representative samples are retrieved as specimens. The representative samples provide valuable forensic data: manufacturer, age, and composition and are evidence of the mechanical, electrical, and thermal condition of the component at the time of the failure.

Con Edison recognizes the value of retrieving and evaluating failure specimens and does a very good job of this. Field personnel understand the importance of retrieving samples, but they do this subject to operational needs, which is usually the restoration of primary feeders. But, based on the foregoing, Con Edison achieved a reasonably high recovery rate of failure specimens given the circumstances.

C. Con Edison Has Implemented the PSC's Staff's 44 Washington Heights Recommendations

The Commission adopted the 44 recommendations made by Staff in its report on the Washington Heights event.[2] The City's LIC report reviews Con Edison's implementation actions for 20 of these 44 recommendations and concludes erroneously that Con Edison did not follow through or fully implement these recommendations. In addition, the City's Report and its comments, although acknowledging that the City

[2] Case 99-E-0930, Proceeding on Motion of the Commission to Investigate the July 6, 1999 Power Outages of Con Edison's Washington Heights Network, *A Report on Consolidated Edison's July 1999 System Outages*, dated March 2000 ("Staff Washington Heights Report")

cannot quantify the effects of not implementing these recommendations on the LIC event, speculate that some of the damage, the scope and/or the duration of the LIC outages would have been reduced had the recommendations been implemented.

The City's analysis of the Company's implementation of the recommendations is incorrect, and the City's statement that failure to implement these recommendations worsened the scope of the damage or the outages is not supported. The Company has implemented 19 of the 20 recommendations discussed in the City's report. In the case of four of these implemented recommendations, the implementation plan, for very good reasons, provides that the implementation shall occur over a period of time, and this was disclosed in periodic reports provided to Staff, the City, and the OAG beginning in June 2000 and continuing to November 2006. As for the lone recommendation that Con Edison was unable to implement (secondary monitoring), a technological solution has so far proved to be unachievable despite the expenditure of significant resources. The City groups the 20 recommendation into 11 areas. Each area and the associated recommendations are discussed below.

The implementation information discussed below is contained in the 17 quarterly or semi-annual reports that the Company has filed with the Commission detailing its implementation of the Washington Heights recommendations from June 2000 through November 2006. The Company sent copies of each report to the City and the OAG, and neither the City nor the OAG subsequently raised concerns about the Company's implementation.

1. PSC Staff Recommendation II-1 – Improve Cable Rating Methods and Better Model Network Systems under Multiple Contingency Conditions

> 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.

In support of this recommendation, Staff's Washington Heights report identified the following issues: (Staff's Washington Heights report, p. 24)

> A network feeder operating under a third, fourth, or higher contingency will be picking up load from feeders that have failed and may be carrying more load than it should. Generally, this causes increased temperatures in the cables. The outages in July 1999 demonstrated the serious effect that sustained high temperatures can have on cable performance and the importance of assessing real time conditions affecting the network in order to dynamically rate network feeders. Con Edison essentially operated the network without real-time information on the temperatures of cables. It did not actually know at what point feeders would be overloaded. This is not meant as a criticism of the company's operating managers – with the tools available, they did an effective job. The company, however, needs to improve its system for rating feeders to avoid this and similar problems.

Con Edison addressed Staff's recommendation fully by developing a new primary cable rating model and by developing a feeder contingency analysis program. In addition, the Company developed other programs to assist operators during multiple contingency conditions.

Con Edison developed a new primary cable thermal rating model called Underground Systems Ampacity Program ("USAMP"). Network feeder cables in a duct bank occupied by different cables with different loadings and loss factors are now modeled in their operating environment. 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 are now 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 section's ability to carry load.

Con Edison developed the Advanced Contingency Analysis (ACA) program for use in regional electric control centers to identify current and projected distribution equipment overloads (feeders and transformers) upon loss of any other feeder(s). 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. 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 also developed the AutoWOLF Visualization program that provides the control center operators and engineers with a display of 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.

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. In addition, this visualization system provides a link to the Vault Central site, which offers the information in support of transformer vault monitoring, analysis and problem resolution.

In commenting on the Company's implementation of Staff recommendation II-1, the City's report acknowledges that the Company improved its cable rating methods by its "upgrade" to the USAMP program. (City report, p. 117) The City's report also acknowledges that the Company now operates network monitoring programs that provide operators near real-time information about the status of network feeders and contingency condition analysis. (City report, pp. 55-56)

2. PSC Staff Recommendation II-2 – Secondary System Monitoring

> 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.

Con Edison conducted an ambitious, but ultimately unsuccessful R&D project to develop an advanced real-time, remote monitoring system for the secondary networks. In fact, no utility has yet developed a system to monitor secondary networks beyond the point of the network transformer.

In 2000, the Company began a demonstration project to field-test the system in its Hunter network. This Secondary Underground Network Data Acquisition System (SUNDAS) sought to monitor the 138 Hunter network transformers for three-phase current, voltages, phase angles, network protector position, and relay status and diagnostic, and to provide the capability of remote relay setting changes and remote

operation of the network protector. In addition, sensors were installed in the network secondary at intersections and mid-block locations to monitor secondary three-phase voltage, current and phase-angle.

The SUNDAS technology entailed the installation of multiple communication concentrators on the secondary network grid and the use of a high frequency power line carrier (PLC) signal injected on the grid and used as a local area network (LAN) two-way communications medium to communicate data from the NWP relays and the secondary sensors. However, the carriers providing the communications network, initially AT&T and then Verizon, discontinued providing the CDPD (cellular digital packet data) service. This rendered obsolete the modem hardware in the communications concentrators placed throughout the underground network and made the data collection software inoperable. After investigating alternative communications systems, the Company concluded that a similar communications setback could happen again after the system was deployed and entail resort to additional, costly hardware and software redesign. 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 the SUNDAS project in 2004. The above discussion of Con Edison's efforts to implement this recommendation was reported in writing to the City, the OAG and Staff on numerous occasions beginning in June 2000 and continuing through November 2006.

The City's report is incorrect in stating that Con Edison has deferred further work on SUNDAS due to funding availability. The SUNDAS project was cancelled because the communications technology platform for this technology proved to be unfeasible. The Company is not aware of any utility that is monitoring secondary network systems

beyond the network transformer. The City's argument that had SUNDAS been deployed, the LIC outages may have been prevented does not recognize the technology is not available. (City comments, p 8)

The City asserts that Con Edison failed to comply with recommendation II-2 because it did not maintain a 95% reporting rate for its remote monitoring system ("RMS"). The PSC Staff's Washington Heights report did not discuss Con Edison's remote monitoring system, and Staff's recommendation II-2 related to the condition of secondary cables.

> Con Edison should also improve its ability to assess the real-time condition of its secondary cable system. (Staff's Washington Heights report, p. 25)

RMS monitoring does not address the concern raised by Staff. RMS monitors the network transformers and provides network data at the transformer but not within the secondary grid. Yet the City asserts, "If the Company had complied with this recommendation, the Remote Monitoring System ("RMS") would have been reporting at a better rate than the 79.5% rate that it was reporting at when the LIC Outage began." The City is incorrect in the claim that RMS was related to this recommendation.

Con Edison has addressed Staff's concern above to a significant extent by reflecting all known open secondary main sections in its PVL data base for purposes of equipment ratings and WOLF and Auto WOLF calculations.

The Company has complied with Staff recommendation II-2 and has periodically reported in writing to Staff, the OAG, and the City the results of this project as well as its program to enhance the RMS system.

3. PSC Staff Recommendation II-3 – Examine Whether Higher Temperature Criterion is Appropriate

> II-3: Con Edison should examine its 86 degree Fahrenheit wet bulb/dry bulb design criterion to determine whether a more stringent criterion is appropriate for its distribution system. The study should estimate the costs of implementing various scenarios (e.g., one in five or ten year criteria).

Con Edison designs its network distribution system to sustain the highest electric loads that are forecast to result from a weather condition of sustained high temperatures and humidity over a three-day period that should occur in New York City on average no more frequently than once every three years. The standard used for weather assessment is referred to as the Temperature Variable, or TV. Specifically, the TV is calculated as a weighted average of the highest three-hour temperature and humidity readings for a three-day period. In order to capture the heat buildup effect, the current day's weather forecast is weighted 70%, the prior day 20%, and the day prior 10%.

The benchmark reference (or "design") TV for Con Edison's service area is 86°. The composition of the 86-degree TV typically consists of a 94-degree dry bulb temperature and a 78-degree wet bulb temperature, which corresponds to a relative humidity of 50%. In more easily understood terms, a TV factor of 86° is equivalent to a temperature and humidity heat index of 105°F. As noted above, this level is defined such that it is expected to occur in New York City about once every three years.

The temperature variable drives the system demand forecast that in turn drives the annual planning to reinforce feeders and transformers to meet the peak loads projected to result under such design weather condition. No utility installs equipment (feeders,

transformers, etc.) to handle the worst possible weather conditions and the use of a temperature variable is in line with reasonable planning principles.

Following the Washington Heights event, the PSC Staff recommended that Con Edison study whether the one-in-three year weather design criteria should be made more stringent. Because it is very costly to reinforce the electric system to meet the peak loads forecast under more stringent design criteria such as one-in-five years, Staff recommended that the Company examine the costs of increasing the design criteria.

The Company prepared five-year load forecasts and associated electric system (distribution, transmission, substations, and generation) reinforcement plans and costs to support temperature variable design criteria of 87, 88, 89, and 90 degrees which equate to temperature variables occurring, respectively, on an average of six years, twelve years, twenty-four years, and never occurred in New York City.

Con Edison concluded that an increase in the temperature variable design standard for its distribution system is not warranted and would not be cost effective. The Company determined that increasing the temperature variable design standard to 89° would improve network reliability in some networks, but concluded that the installation of alternative measures, such as sectionalizers, de-bifurcating network feeders, or replacing thermally sensitive joints, would achieve similar or better improvement in reliability at substantially less cost. The overall conclusion of the study was that an across-the-board, system-wide increase of the temperature design standard is not warranted and would not be cost effective. The results of this study were reported to Staff, the City and the OAG in November 2001, and no one expressed disagreement with the Company's conclusion.

It is not clear whether the City's report recommends that Con Edison study the issue of increasing the one-in-three criterion again or, similar to Staff's recommendation 60, study whether the 86° TV should be increased to a higher TV, e.g. 86.3°, that will not be exceeded on average more than one in three years. The City's report does not, however, take issue with the fact that the Company prepared the study recommended in Staff's Washington Heights report, despite indicating that this recommendation was not implemented.

4. PSC Staff Recommendation's II-6, II-7, II-8, and IV-1 – Removal of PILC Cable and Targeted Stop Joints

> II-6 Con Edison should establish clearer criteria for prioritizing the order in which paper cable should be replaced. Con Edison's unwritten policy of removing and replacing sections of paper/lead cable in both directions between splices when making repairs associated with stop joints or paper/lead cable, needs to be formalized.
>
> II-7 Con Edison should develop a program for eliminating stop joints with high failure rates that are still in service.
>
> II-8 Con Edison should accelerate efforts to better understand the susceptibility of various age groupings of paper/lead cables to failure to help prioritize the replacement efforts.
>
> IV-1 Con Edison should evaluate the further acceleration of its paper/lead cable removal program. The evaluation should include, at a minimum, an assessment of the cost and benefits of further acceleration.

The City's report discusses these four recommendations together. (City report, pp. 122-123) The report acknowledges that the Company created two new specifications to direct the PILC cable removal program and track stop joint replacements. This action implemented recommendation II-6.

The City's report discusses the Company's study of aged PILC cable to determine its susceptibility to failure. This action implemented recommendation II-8.

The City's apparent criticism of the Company's implementation of recommendation II-7 – to develop a program to remove thermally sensitive stop joints – is that stop joints failed during the Long Island City event. (City comments, p. 123) Following the Washington Heights event, Staff recommended that the Company accelerate the removal of thermally sensitive stop joints, and the Company committed to target for removal by December 31, 2008 both Raychem 3W/1W installed before 1994 and all Elastimold 2W/1W stop joints. As the City's report notes, the failure rate of the pre-1994 Raychem 3W/1W joint has stabilized (declined). As a result the Company no longer targets that joint for removal. The Elastimold 2W/1W stop joints remains thermally sensitive, and Con Edison continues to target that joint for removal. Con Edison estimates that there were 2,458 Elastimold 2W/1W stop joints on the system in 2000 and about 950 at the end of 2006. About 70% of the estimated stop joints in the LIC network were removed by summer 2006. The Company continues to remove Elastimold 2W/1W stop joints in compliance with its implementation plan for recommendation II-7, and the Company will remove the remaining joints from the system by the end of 2008.

The City's apparent criticism of the Company's implementation of recommendation IV-1 – to perform a cost-benefit study of accelerating the removal of PILC cable – is that PILC cable failed during the Long Island City event. (City report, p. 123) Nonetheless, Con Edison performed the cost benefit study requested by Staff's recommendation. Con Edison estimated the capital costs to accelerate the removal of all

PILC from the projected completion date of 2024 by 5 years (to the year 2019) or by 10 years (to 2014). Con Edison used its predictive reliability program to examine the effect on network reliability of removing PILC cables, as well as employing other measures intended to improve reliability, and to evaluate these benefits against the cost of the various measures. Comparison of the removal of PILC cable with other reliability improvement measures indicated that it was a less cost beneficial approach than other measures such as reduction of feeder repair time. Con Edison provided its study to Staff. In addition, the testing of vintage PILC belted and shielded cables indicated excellent resiliency when the cable lead sheath is not damaged and no moisture or water is penetrating the oil impregnated paper insulation layers. Con Edison concluded that there was no need to prioritize the removal of any particular type of PILC cable as PILC cable is being removed from the system through 2024.

At the time of the Washington Heights event in 1999, the amount of PILC cable on the network primary system was about 44%. By 2004, PILC cable had been reduced to about 32%, and currently PILC represents about 27% of primary system cable. In the LIC network, PILC cable had been reduced to about 13%. As stated in Staff's LIC report, the Company is committed to remove all PILC cable by 2024.

The City's initial comments state that had Con Edison "further accelerated" the PILC and targeted stop joint removal programs, these components would not have failed during the LIC event. (City initial comments, p. 9) The facts do not support the City's analysis. As discussed in Staff's report, the Company's reduction of PILC cable to 27% of the primary feeder system has in effect accelerated the removal program (Staff report, p 79), and the reduction of PILC cable to 13% in the LIC network has even further

accelerated the removal program in that network. The targeted stop joint removal program already had removed 70% of targeted Elastimold stop joints in the LIC network.

Con Edison has complied with all of Staff's Washington Heights recommendations related to the removal of PILC cable and thermally sensitive stop joints.

5. PSC Staff Recommendation II-10 – Development of Alternatives to Direct Current High-Potential Testing of Primary Feeders

> 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, 2000.

The City's report does not take issue with the fact that Con Edison has examined several alternatives to high-potential testing. It provides details of the Company's examination of partial discharge testing and thermal testing, both of which were found to be technically unfeasible, and very low frequency AC testing which continues to be evaluated on a sample population of feeders. The City does not take issue with the Company's compliance with Staff's recommendation, but suggests evaluation of other partial discharge systems.

6. PSC Staff Recommendations II-12 and II-18 – Low Voltage Effects on Customer Equipment

> II-12 Con Edison should evaluate the effects of low voltage on customer equipment as a result of the secondary network problems experienced in Washington Heights. As part of its evaluation, all equipment damage claims should be reviewed. The company should report its findings to the Commission by June 1, 2000.
>
> II-18 Con Edison should perform a formal review of the effects of low voltage (below the 8% voltage reduction level) on customers in the Cooper Square network and report to the Commission by June 1, 2000.

Con Edison fully complied with Staff recommendations 11-12 and II-18. Con Edison's implementation of recommendation II-12 entailed three projects. The first was a short-term project to document industry standards for motor protection. The second was a short-term project to study residential and commercial claims for property damage. The third was a long-term project that retained a consultant to evaluate the effect of very low voltage on residential and commercial customer motors.

Con Edison's consultant, Electrotek Concepts, Inc., prepared a report documenting industry standards for motor protection and stating conclusions concerning the effects of undervoltage conditions on motors. That report was filed with the Commission on June 1, 2000. Con Edison submitted the results of its review of property damage claims to the Commission on June 1, 2000. The Company's study of the effects of low voltage on residential and commercial air conditioning and refrigeration compressor motors, entitled "Effects of Prolonged Voltage Reduction on Motors Used in Residential/Commercial Sealed Compressor Units," was filed with the Commission on November 1, 2005 with copies sent to the City and the OAG.

To implement recommendation II-18, Con Edison conducted a load flow modeling simulation of the July 7, 1999 event in the Cooper Square network and submitted to the PSC its report of the Cooper Square Network Voltage Reduction Study and a map of the network showing study results.

7. <u>PSC Staff Recommendations II-13 – Relay Protection Schemes</u>

> II-13 Con Edison should review the design for all relay protection schemes on its network feeders similar to those on 1M05 to ensure proper relay operation.

Con Edison undertook a variety of actions to fully implement recommendation II-13. After a failure on Washington Heights feeder 1M03, a "Tempo" relay on a network protector for a transformer that electrically connected 1M03 with feeder 1M05 failed to operate in low voltage conditions to prevent current from 1M05 from supplying the fault on 1M03. A backup relay sensed the overcurrent condition on 1M05 and tripped its circuit breaker and took 1M05 out of service. To address the potential for such undesirable operation of a feeder breaker relay, Con Edison removed all Tempo relays from isolated and spot networks and in fringe areas (where low voltage can occur when multiple feeders de-energize) and installed ETI microprocessor relays which will operate in low voltage conditions. A total of 2,935 Tempo relays were replaced.

Con Edison also identified two substations - Sherman Creek and Hell Gate - where, due to the double secondary winding transformers, a 13 kV feeder fault causes the voltage to drop significantly on that side of the station, while close to normal voltage is maintained on the other side of the station. PVL computer simulations showed that this resulted in significant current flows both in and out of various 13 kV network feeders via the distributed network grid as well as through isolated networks. Time-current coordination studies for 13 kV overcurrent relays vs. 120/208 V. and 277/480 V. network protectors were performed to identify those feeders where relay settings were required to be modified to prevent reoccurrence of undesirable breaker operations. Con Edison completed the required modification of feeder relay settings at these stations.

In addition, PVL load-flow simulation studies for Sherman Creek, Hellgate, E. 63rd ST, and Leonard St substations determined that, under certain operating configurations, 13kV fault current contributions due to backfeed currents from the

120/208 Volt secondary distributed network could cause undesired tripping of 13 kV feeder overcurrent relays. This possibility can be eliminated by the application of directional overcurrent relays set to trip only for faults in the direction of normal load flow, and to not trip for backfeeding fault currents. These substations require directional relays because they are normally operated with their bus tie breakers open. When a three phase fault occurs it collapses the voltage only on one side of the bus tie breaker. On the other side of the bus tie breaker, the primary network voltage remains and provides the potential to contribute back-feed current to the fault. Directional relays would not operate since the fault current direction is opposite to the direction they are set to trip. This work has been completed at Sherman Creek, Hellgate, and East 63rd Street 1 and 2 substations and will be completed at Leonard Street 1 and 2 substations, installation, system conditions permitting, by the end of 2007.

8. <u>PSC Staff Recommendations II-13 – Emergency Operation Plans and Emergency Communication Procedures</u>

   II-14 Con Edison should develop, before June 1, 2000, formal plans for operating networks under multiple contingency conditions, including the identification of load relief measures available for each network.

   V-1 Con Edison should evaluate its emergency procedures in light of lessons learned from the July 1999 outages and modify these procedures as necessary.

   V-2 Con Edison should streamline and consolidate its emergency procedures to eliminate redundant and cumbersome material.

   V-3 Con Edison should implement a rigorous training program to ensure that all its employees are adequately trained in emergency procedures.

Con Edison fully implemented Recommendation II-14 in a variety of ways, outlined below, including modifying the control center emergency operation procedure

and providing the control center operators and engineering staff with new tools for operating the system under multiple contingency conditions.

(i) Revised procedure EO-4095, "Distribution System Operation under Contingency Conditions" to provide additional guidelines for actions by operators when conditions exceed design criteria (i.e., more than two feeders out of service).

(ii) Developed Advanced Contingency Analysis (ACA) to provide operators with the ability to better analyze feeder outages above design criteria. ACA improved the existing WOLF contingency analysis program by providing the company with the ability to better analyze feeder outages above second contingency design criteria. The original WOLF (World Class Online Load Flow application) 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 meaningful analytical results during multiple contingency events

(iii) Added a new program, AutoWOLF Visualization, which provides the control center operators and engineers with a display of 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.

(iv) DPVS (Distribution Primary Visualization System) creates a visualization environment for operators that displays the status and near real-time load of primary network components including 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 information in support of transformer vault monitoring, analysis and problem resolution (described below).

(v) Provided new guidelines for use of water spraying to cool transformers and the following new tools for monitoring transformer status:

a. A new version of VDAMS called NetRMS which is the application used to reflect the Remote Monitoring System (RMS) transformer data to our Engineering and Operations groups. The RMS information is still the same data however this newer view of the data has provided some additional functionality for the user. It provides some direct links to other applications, i.e., Net Reports, Watchman and the Data Warehouse

b. A new tool Vault Central which provides operators immediate on-line access to the Company's transformer inspection and maintenance records in support of transformer vault monitoring, analysis and problem resolution, such as assessment of the physical condition of a transformer when considering the method for cooling a unit. This tool also provides

- 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 via the Data Warehouse application
- Transformer switch checks information- last switch check and links to historical switch checks.

c. A new program SwitchCheck Database which is a tool developed to better control the workflow between Engineering and Construction. As Engineering analyzes system conditions and discovers a transformer which needs to be field checked, they enter the "switch-check" into this application. The Construction groups are notified in this system that a new switch check is required and a field crew should be dispatched. This tool has the functionality to access past inspection data as well as RMS loading and is able to record and capture field information.

(vi) Created an on-line database – Emergency Operations System (EMOPSYS) – that provides by network and individual customer the amount of available customer generating capacity and the amount of load reduction that the customer is able to achieve on a voluntary basis.

Recommendations V-1, V-2, and V-3 are provided in the section of Staff's Washington Heights report entitled, "Overview of Communications Procedures." Con Edison fully implemented recommendation V-1, by adopting four new procedures pertaining to internal and external communications during an electric distribution emergency by the Company's Customer Operations, Public Affairs, and Energy Services organizations. The Company also modified an existing procedure pertaining to communications during an electric distribution emergency.

Con Edison fully implemented recommendation V-2, also from Staff's communications review, by retaining a communications consultant to review the Company's procedures involving emergency communications and to provide recommendations. The consultant's team reviewed a total of 69 Con Edison Procedures,

Corporate Instructions, Policy Statements, and key procedures for System Operations, Steam, and Gas, and electric control room protocols. As a result, the Company made about 275 revisions to emergency communication procedures.

9. PSC Staff Recommendations II-15 –Monitoring of High Tension Load

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

The monitoring of high-tension customer loads has required 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. The Company developed a monitoring system that meets these criteria using the Company's existing remote monitoring system communication platform (power line carrier) in conjunction with hardened sensors for installation in RMS-equipped structures. However, recent technological advances in communication technology largely superseded the Company's prior efforts to use sensors and power line carrier communication technology, and the Company cancelled deployment that system last year. Newer wireless communication technology being used with customer demand metering will provide high-tension load monitoring capability at lower cost with greater reliability. The Company has opted to use this wireless communication, demand-metering technology to monitor high tension customer load and is planning full deployment to all of the approximately 900 locations over three years.

The City's Initial Comments, dismissing the Company's implementation actions as a "minimal pilot program," fail to acknowledge the technological and environmental

hurdles that had to be navigated before the wireless communication technology emerged. The effect on the LIC event according to the City was a lack of real-time loading information about the major LIC high tension customers. In reality, that was a problem more apparent than real. Con Edison was in close contact with these customers and was aware of their peak loads and their load reductions (some 100% by transfer to self-generation) during the event.

10. PSC Staff Recommendations V-12 – Call Center Staffing

> V-12 Con Edison should review non-business hours staffing levels for its Call Center during system emergencies.

Con Edison fully complied with recommendation V-12 by hiring and training 80 additional Customer Service Representatives ("CSRs"), by augmenting Call Center staffing by 15 CSRs from 5 PM to 9 PM weekdays, and by adding 15 CSRs to Saturday shifts.

11. PSC Staff Recommendations VI-1 – Compensation for Spoilage Losses

> VI-1 The Commission should direct Con Edison to show cause why, for distribution failures of 12 hours or more hours in a 24 hour period, it should not:
>
> a. increase the compensation for losses due to spoilage of food for lack of refrigeration for residential users from $100 to $350 per incident;
> b. increase the compensation for losses due to spoilage of perishable merchandise for lack of refrigeration for non-residential customers from $2,000 to $7,000;
> d. increase the liability per incident to a total of $10,000,000; and
> e. file a proposal to provide compensation to customers for verifiable damages to their appliance motors.

Con Edison fully implemented the recommendation to increase compensation for spoilage losses. On June 13, 2000, Con Edison filed tariff revisions effective June 23, 2000, increasing spoilage compensation levels from $100 to $350 for residential claims and from $2,000 to $7,000 for commercial claims, and increasing the liability per incident to $10,000,000. These revisions were made permanent in tariff revisions filed on March 1, 2001 implementing the Commission's March 1, 2001 "Order Concerning Tariff Provisions Governing Reimbursement for Food Spoilage" in Case 99-E-0930.

Con Edison's response to Recommendation VI-1 (d) explained that the Company should not be required to compensate customers for damages due to low voltage levels because processing claims of this nature would be highly impracticable, customer claims of low voltage conditions on the system are difficult to verify, the cause of equipment motor damage is often impossible to prove, customer equipment is typically protected from damage by a thermal cut-off mechanism, and the likelihood of great customer dissatisfaction with the claim process because depreciated value rather than replacement value would be provided. The Commission's May 26, 2000 "Order Concerning Responses to March 15, 2000 Order," noting the "highly technical report [filed by the Company] and the demonstrable difficulties in tracing the causes and value of motor damages" referred issues concerning compensation for damages to motors to Staff for further study.

On November 1, 2005, the Company submitted a study report entitled "Effects of Prolonged Voltage Reduction on Motors Used in Residential/Commercial Sealed Compressor Units." The low voltage study report demonstrated that the heat generated inside a compressor motor during 24 hours of continuous operation at the lowest voltage

at which it could operate without tripping would have a negligible effect on the life expectancy of the motor, even where the maximum winding temperature was exceeded. The Company also submitted its comments on the report and an explanation why the provisions in its tariff should not be amended to include provisions to compensate customers for damages to motors.

III. Response to Comments of the Office of the Attorney General

A. Con Edison Has Restored the LIC Network to Fully Acceptable Operating Condition for Summer 2007

Staff's report states that "[t]he Company, to this day, continues to make repairs to the Long Island City Network's damaged secondary system and, because much of the secondary cable is underground within duct banks, it is likely that some long-term damage exists that will only be discovered over time." (Staff report, p. 6) Based on this alone, the OAG appears to believe that severe damage still exists in the network (OAG comments, pp. 15-16) PFP commented that the LIC network is "still vulnerable." (PFP comments, p. 10) Staff's report may have contributed to these misperceptions in stating "Simply restoring service to customers and providing a few upgrades for expected load needs does not ensure that the system will be in an acceptable condition when the recovery work is complete." (Staff report, p. 126)

The Company has completed a network recovery effort that has placed the LIC network in acceptable condition for the summer 2007 peak season. Pursuant to thorough engineering analysis and a comprehensive inspection program conducted by a work force dedicated exclusively to the restoration of the LIC network, the Company has repaired or replaced all identified damaged secondary system components in the areas that

experienced outages in July 2006. Only 3.7% of the 120 volt secondary cables were damaged during the event. This effort also identified and repaired damaged components that may have pre-existed the July outages in these areas and reinforced (enlarged the capacity of) secondary mains in these areas where needed to accommodate the growth in customer demand. In all, the Company has replaced about 24,000 linear feet of secondary mains (cables), and all of the replaced cable was upgraded to new, improved-design cable that is more resistant to underground environmental conditions. There is no reason to believe that unidentified damaged secondary components exist to any degree that would make the network vulnerable to outages.

Since last July, the Company has inspected 90% of the transformers in the network and will have inspected all transformers by the summer. Any transformer found deficient has been replaced. The performance of the network's Remote Monitoring System has been boosted to 95%.

Con Edison added two new 13kV primary feeders to increase the reliability of the LIC network for next summer and is reinforcing all feeders to meet projected summer 2007 demands.

B. Con Edison Has Acted On the OAG's Washington Heights Recommendations

The OAG's Washington Heights outage report in 2000 contained 13 recommendations. Twelve of these applied to Con Edison, and one proposes action by the Public Service Commission. Most of OAG's recommendations were similar to recommendations issued by the PSC Staff or the Company's own recommendations in its

Washington Heights Action Plan. The Company implemented similar Staff, Company and OAG recommendations jointly.

The OAG asserts that Con Edison has not acted on six of these recommendations. These six recommendations, and the Company's actions to implement them, are discussed below. Con Edison has acted on four of the six recommendations. The Company strongly disagrees with the other two recommendations that propose that the Company revamp its tracking and reporting systems for expenditures and work crew dispatch.

1. The OAG recommended that Con Edison "ensure that equipment repairs are carried out as quickly as possible whenever there is any indication that a network or any appreciable number of customers are at risk of losing service."[3]

Since 1999, Con Edison has substantially reduced primary feeder restoration time during the summer and particularly during heat wave periods. Reducing feeder processing time is one of the most significant reliability improvements Con Edison has made, and the Company continues to look for ways to reduce feeder processing and restoration time. The Company's communication and process improvements (Rapid Restore System) and new guidelines and staffing practices have reduced primary feeder-processing time by about 50% during the summer and by about 65% during heat waves, and significantly contribute to reducing the number and duration of multiple contingency events. The three-year summer-time average for feeder repair (1997-1999) was about 34

[3] The OAG's comments mention that this recommendation "involves developing technology so that the Company can sense cable failures without having to go physically manhole to manhole to determine where along the line the fault has occurred." To begin, "manhole to manhole" is an inaccurate description of the Company's methods for locating a feeder fault. But putting that aside, the OAG's Washington Heights report made no reference to developing such a technology. Nonetheless, the Company has in fact developed such technology to assist in fault location and had been implementing the hardware by network throughout 2006. Although operational in the LIC network, it had not experienced sufficient historical network feeder failure data to provide fault location assistance during the July outages.

hours. For summer heat wave periods in 2006, the Company's target restoration time was 15 hours.

The Company informed the OAG of these actions in its periodic reports to the OAG on its implementation of a comparable recommendation contained in its Washington Heights Action Plan.

2. The OAG recommended that "Con Edison should improve its policies and procedures for alerting and informing its customers, government, institutions and the public during actual outages and when there is a serious risk of an outage."

Con Edison undertook many actions (noted below) that responded to this recommendation. As Staff's report recognizes, the Company has invested considerable resources and developed considerable expertise in its customer service and communication staffs. (Staff report, p. 34) These representatives were trained and ready and, in fact, communicated with and assisted customers throughout the event. Staff's Report observes that, through no fault of these representatives or their preparedness, they "did not have appropriate information" about the customer count or when service would be restored. (Staff report, pp. 4, 34) Nonetheless, they began communication activities early and communicated continually throughout the event.

- In 2000-01, Con Edison developed four new emergency communication procedures and streamlined and consolidated existing communications procedures making about 270 revisions to over sixty procedures across electric, gas and steam operations.

- The Company developed a one-day training program in emergency communication responsibilities and skills for (1) the Company's regional electric control center staff, (2) the personnel who run the emergency information center at the control centers during an emergency, and (3) personnel from the Company organizations that receive information from the control centers and initiate external communications with the public, community organizations,

governmental officials, and the media. All persons identified for participation in this program were trained.

- Communications requirements and responsibilities are reviewed and practiced during pre-summer electric distribution emergency drills conducted at each of the company's four electric operations control centers.

- The Company engaged a consultant to examine the Company's strategies for communication with the public through the media. The Company's Corporate Communications department redesigned its media relations command center to enhance media communications. Corporate Communication formalized a contact listing of over 1,300 elected officials, community boards, community organizations, and business organizations in its service area that will receive information in the event of an emergency.

- The Company established a customer outreach vehicle to dispatch Company representatives to a community affected by an outage to establish a presence and communications hub in the area.

- The Company hired and trained 80 additional Customer Service Representatives, augmented Control Center staffing by 15 CSRs from 5 PM to 9 PM weekdays, and added 15 CSRs to Saturday shifts.

- In addition to life sustaining equipment users, the Company expanded its listing of "at risk" consumers to those with medical hardships (persons who have been medically certified to have a medical condition that seriously affects well being). Customer Operations distributes weekly updated listings of LSE and medical hardship customers by county, zip code and network to Control Centers, the Distribution Engineering Command Post, and Customer Assistance Management. Con Edison has procedures for contacting LSE/medical hardship consumers when there is a pending system emergency. The pre-summer emergency drills conducted in the four regional distribution control centers include practice in notification of LSE/medical hardship customers.

- Con Edison updated its listing of large and critical customers, noted their accounts in the Company's Customer Information System as serving critical facilities so that customer service representatives receiving emergency telephone calls from these customers will have this information. The Company established a new on-line database of these accounts, the Emergency Operations System (EMOPSYS) that is designed to sort and identify such accounts by network and by feeder and is accessible by Distribution Control Center and Energy Services personnel during an emergency.

The Company informed the OAG of these actions in its periodic reports to the OAG on its implementation of comparable Staff recommendations.

3. The OAG recommended that Con Edison "develop a test to identify distribution equipment with impaired heat resistance."

The Company conducted an R&D project on alternative feeder cable thermal testing to simulate the thermal stress that might be experienced during contingencies on a hot summer day by increasing distribution feeder load to emergency limits via an angle-regulating test device connected to a feeder. The technology proved unfeasible because network protectors would be cycled during the planned thermal testing creating unacceptable local network contingencies and loads. In addition, the test device could not replicate summer ambient temperatures towards the furthest end of the feeder, as needed for effective testing.

The Company informed the OAG of these actions in this testing its periodic reports to the OAG on its implementation of a comparable Staff recommendation requiring evaluation of feeder testing technologies.

4. The OAG proposed that "Con Edison should amend its tariff to increase the amount of compensation a customer can receive for losses due to a power outage, expand the definition of "losses" for which compensation can be provided, and improve its policies and practices for submission of claims by customers who suffer losses attributable to a power outage."

In the proceeding before the Public Service Commission to increase compensation amounts, the OAG explicitly supported the Company's tariff filing increasing perishable merchandise reimbursements to the present levels of $350.00 (residential) and $7,000 (commercial). The Company improved its claims policies and practices, and informed the OAG of these actions in its periodic reports to the OAG on its implementation of comparable Staff recommendations.

In the claims compensation proceeding, the OAG urged that the Company amend its tariff to provide compensation for damage to electrical appliance motors. The Company, however, has opposed that recommendation and submitted to the Commission, the City, and the OAG in November 2005, a study demonstrating that the occurrence of low voltage supply, even if sustained over a 24-hour period, would not cause the failure of a motor that has been properly installed, operated, and maintained.[4]

5-6. The OAG proposed that Con Edison change its accounting and reporting systems to account for capital and O&M spending by network and to report work crew dispatch by network (listed as separate recommendations in the OAG's report but discussed as one recommendation in the OAG's comments).

The Company has continued to track expenditures and resource allocation by similar functional-category O&M and capital programs and projects that are conducted in each of its four operating areas. Within operating areas O&M and capital program resources are determined after all work is prioritized by functional categories on the basis of the following drivers: public and employee safety mitigation, emergency response, regulatory and environmental compliance, customer demand growth, and reliability/reinforcement. While the OAG's approach would allow total spending comparisons among networks by program, it does little, if anything, to demonstrate that each network is allocated the resources appropriate for the operation of the network in a particular year. Con Edison strongly disagrees that these two recommendations would improve network reliability.

[4] In a related recommendation, the OAG proposed that the Company retroactively compensate Washington Heights claimants up to the increased amounts ($350/$7,000). The Company's compensation is limited, however, to the amounts stated in its tariff at the time of an incident.

While the OAG mentions that some of its recommendations have been responded to, the OAG does not credit Con Edison for implementing the OAG's two lead recommendations – that the Company implement the recommendations of its Corporate Review Committee, embodied in the Company's Washington Heights Action Plan, or carry out comparable measures. This Action Plan consisted of 16 recommendations, many with several parts. The Company implemented the recommendations of its Action Plan, and sent the OAG periodic reports on its implementation actions. The Company also implemented the OAG's recommendation to improve the reliability of the Washington Heights network, not by splitting the network as the OAG recommended, but by increasing the number of feeders from 14 to 20 and removing thermally sensitive components from the network's backbone feeders.[5]

C. Con Edison Has Implemented the PSC Staff's Washington Heights Recommendations Including Each of the Four Discussed in the OAG's Comments

The OAG's comments are plainly wrong in stating that Con Edison has not heeded PSC Staff recommendations following the Washington Heights outage. (OAG

[5] The OAG does not reference its recommendation that Con Edison "should redesign its distribution system to ensure that underground components are not overcrowded into limited space, creating greater susceptibility to heat and to ensure that all portions of its system can carry the load to which they will be subject during a summer heat wave." While redesigning the distribution system in the sweeping manner suggested by the OAG is not economic or practical, every year Con Edison conducts a comprehensive program to prepare its distribution system for reliable operation during the upcoming summer peak load period. Con Edison conducts load flow studies that model the flow of electricity through its primary feeders to determine if each feeder is adequately sized to carry maximum predicted electric loads under normal conditions (all feeders in service) and under contingency conditions (one or two feeders out of service). Cable sections that have projected overloads are identified and reinforced by measures such as installing higher capacity feeder cable, upgrading or installing additional transformers, or transferring load to other equipment with available capacity. In addition, Con Edison improves system reliability through enhancements of system components based on tracking of performance and failure rates. Con Edison's current reliability programs include PILC cable/stop joint replacements, transformer inspection and monitoring, high potential testing, manhole inspection, and the secondary rebuild program. These efforts appropriately address the feeder overheating concerns stated in the OAG's recommendation.

comments, p. 4) As discussed previously in response to the City's report and initial comments, Con Edison has implemented each of the four recommendations discussed in OAG's comments. (OAG comments, p. 5-8) The Company's implementation plans and actions were provided in 17 quarterly or semi-annual implementation reports provided to the OAG beginning in June 2000 and continuing to November 2006. On no such occasion did the OAG express any disagreements with Con Edison's implementation plan or its progress in implementing the recommendations.

D. Con Edison Has An Aggressive Program to Reduce the Incidence of Corrosion on Network Transformers and to Remove Transformers When Corrosion Threatens Tank Integrity

Citing Staff's report on the removal of LIC network transformers due to corrosion, the OAG asserts that transformer corrosion is "widespread" in the LIC network, and the Company needs to improve its transformer inspections. (OAG comments, p. 9) The OAG has misinterpreted Staff's report on transformer corrosion in the LIC network.

Corrosion of 20 and 30 year old metal transformers installed in underground vaults exposed to the elements is a natural process and will occur over time due to the harsh environment. So long as the corrosion is monitored, the problem is manageable and allows customers to derive continued use life from the equipment. The success of the inspection program is evidenced by the fact that this naturally occurring condition resulted in only two of the 1,194 transformers failing during the event.[6]

[6] The City's report suggests that the rupture of one of these two transformers may not have resulted from external corrosion but rather from high dynamic pressures developed from a high level and high duration of fault current during an internal fault. In fact, this transformer failed on July 21, after the primary feeders

The primary reason for the routine (visual) inspection of underground transformers is to identify units that have corrosion. In 2005, Con Edison enhanced its transformer inspection process. Inspections have historically included a visual inspection and a pressure test to determine the structural integrity of the transformer tank. In mid-2005, gas-in-oil analysis (DGOA sampling) became a standard inspection requirement system wide. Also since 2005, the inspection process has included a complete cleaning of the transformer and vault to remove liquid residues that can promote exterior corrosion on transformers. In addition, all inspected transformers are retrofitted with sacrificial anodes for cathodic protection to arrest corrosion. The program will fully retrofit the system with cathodic protection by 2010, and has targeted the transformers with the highest risk for corrosion in the first few years.

During the LIC safety inspection program that began after the LIC event through March 23, 2007, the Company has inspected the transformers in 1,073 unique LIC network vaults (90% of 1,194 vaults) and removed a total of 118 transformers for various reasons. Of these, 49 of the inspected transformers (4.5%) were removed due to evidence of corrosion. System wide during 2006, Con Edison inspected 5,808 network transformers and removed a total of 876 transformers for various reasons. Of these, 438 of the inspected transformers (7.5%) were removed due to evidence of corrosion.

Accordingly, the OAG is incorrect in stating that transformers have not been properly maintained and that the Company's transformer inspection program is deficient, and this criticism should be rejected.

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had largely been restored to service and the network contingency level had been reduced to a first contingency.

E. Con Edison's Load Management Actions Reduced LIC Network Load Substantially and Were Crucial in Avoiding Network Shutdown

The OAG concludes that the Company's load reduction program and load reduction management are inadequate and proved inadequate during the LIC outages. (OAG comments, pp. 17-18) The OAG focuses on two load relief programs that are entirely voluntary and criticizes the Company because customers choose not to voluntarily forego power use, such as central air conditioning reduction, during peak cooling days. The OAG loses sight of the fact that the Company's load management efforts reduced load in the network quite substantially – by about 62.6 MW on July 18 and by about 97.3 MW on July 19 – and that these load reductions proved crucial for avoiding the shutdown of the network. (See Company October 12 Report, Section 4.7)

F. There Is No Basis for OAG's Speculation That Con Edison Contacts with Large Customers Were Unorganized, Late, and Ineffective

There are approximately 130 account records contained within the EMOPSYS database for the Long Island City network. Efforts were made to contact all of the customers represented by the account records during the incident.

We acknowledge that the customer contact file that was previously submitted does include a number of "no answer" comments. But thirteen of the eighteen "no answer" first call indicators were resolved by follow-up phone contacts. Many of the aforementioned "no answer" contacts may have been as a result of the time when the calls were made. For example, although emergency numbers are provided by customers for a specific location, there is no guarantee that customer personnel are available around the clock. Six Board of Education locations and three Cooling Centers are counted among the thirteen.

One of the five remaining accounts was no longer a viable facility - Eagle Electric Warehouse. The remaining four account records required updates.

Perhaps not apparent from the chronology, during a demand reduction event Con Edison routinely contacts the larger customers first. In addition, on-going efforts were made to stay in contact with the large customers in the Long Island City network. Constant communications were maintained with the Dept. of Corrections (20MWs), CitiCorp (9MWs), Department of Environmental Protection (8MWs), Port Authority (5MWs) and Metropolitan Life (3.5MWs). Focused efforts with these customers were driven by their summer peak load and the availability of emergency generation facilities and / or alternative supply feeders, as in the case of LaGuardia Airport. Furthermore, although not detailed in the "on-line" contact log, Company personnel maintained close contact with both Mt. Sinai Hospital and Memorial Sloan Kettering Research facilities throughout the event.

We believe that we had a good understanding of the demand reduction capabilities for the aforementioned customers. What was unclear was the unmeasurable overall demand reduction response for smaller commercial customers and the overall effect of public appeals in the targeted area.

G. There Is No Basis for OAG's Claim That Substation Equipment Has Not Been Maintained

OAG says that the manual implementation of voltage reduction and the failure of circuit breaker 34W to operate and clear a fault on feeder 1Q21 indicate a "deeper failure to maintain equipment properly." (OAG comments, p. 12) Neither event remotely supports this claim.

Con Edison inspects and tests all of its Automatic Voltage Reduction (AVR) circuits prior to each summer and initiates repairs as required and as permitted by safe and reliable scheduling of outages on transformers. In some cases, equipment and outage constraints do not permit a full repair of all the AVR systems prior to June 1. In these cases the Company utilizes either remote supervisory control from our energy control center or local substation control by the station operator to achieve voltage reduction. The circuitry at North Queens Substation was repaired in December 2006 when the AVR equipment outage did not impact system reliability and safety.

On July 17, 2006, breaker 34W failed to open and clear a fault on feeder 1Q21. Four months earlier, in March of 2006, Con Edison inspected and tested breaker 34W and the other three breakers in the same bus section. Operational testing was performed at that time to assure that both local and remote tripping capability was functional. These tests confirmed that these breakers tripped open from their associated protective relays. Subsequently this same feeder 1Q21, opened auto on April 18, 2006, and breaker 34W successfully cleared the fault at that time. The possibility of misalignment combined with the incorrect wiring of the trip monitoring circuit, not the failure to maintain the breaker, is what allowed the misalignment condition to go undetected and unaddressed after April 2006.

H. The OAG's Characterization of the Duration of the Outages Is Incorrect

Citing Staff's outage estimate derived from a 450 person survey, the OAG's initial comments state that 174,000 people experienced numerous power failures for a total of nine days. (OAG comments, p. 1) We understand that the OAG is not

representing that all or even most persons were out of service for the nine-day period from the first outages on July 17 to the restoration of the last outages on July 26. Nonetheless, some clarification is in order. On July 17, local secondary outages occurred, but Company forces repaired damaged secondary equipment, ran shunts, and restored service over the course of the night. Extrapolating from the rate of outage tickets and customer calls, the bulk of the service outages appear to have begun at varying times over the three days from July 18 to July 20. (Con Edison October 12, 2006 report, pp 4-69) Con Edison's repair crews restored about 80% of these outages over the period of July 21 through the end of July 23. (Con Edison October 12, 2006 report, pp 4-39)

The Staff's 174,000 outage estimate included "many customers" (not quantified) who reported low voltage. (Staff report, p. 32) The restoration of the primary feeder system and the re-energization of transformers support voltage levels on the secondary grid. Many customers likely had voltage restored by July 21 when the network contingency level had decreased to design levels with one or two feeders remaining out of service.

I. The Long Island City Network Has Not Been a Poor-Performing Network. The Jeopardy Program Index for the Long Island City Network Projects a Conflicting 4th Contingency Event (Not a Network Shutdown) Once Every 279 Years

Several of the parties simply misunderstand the significance of the Jeopardy program index and wrongly believe that it is an indicator of a near-term network shutdown.

Con Edison networks are the most reliable in the country, and Con Edison works at attempting to make them even more reliable. One program used to allocate resources is

the Jeopardy program – a program unique to Con Edison – that compares one highly reliable Con Edison network to another. The network rankings cited in Staff's report are produced by the Jeopardy program. (Staff report, p18.) The program analyzes a variety of factors specific to the performance of the feeders in each network to estimate the frequency that a "jeopardy event" might occur due to the performance of components in that network. What is important to keep in mind is that a "jeopardy event" is not a network shutdown. Rather it is a 4th contingency in which two feeders in the same band and two adjacent feeders are out of service simultaneously. This condition does not mean that the network will fail, but represents a condition that can lead to feeder cascading and a network shutdown. (Staff incorrectly cites these network rankings as a ranking of probability to failure.) The jeopardy program produces an index for each of Con Edison's 57 networks that is equivalent to the projected number of years between jeopardy events in that network. The jeopardy index for the Long Island City in 2006 was 0.00358 which equates to 279 years between jeopardy events.

None of Con Edison's networks individually has a significant risk of a jeopardy event, but each network is ranked relative to the other networks in the jeopardy rankings. Obviously even among good performers, rankings will create a hierarchy. Staff recognizes this when it says that the Long Island City "was not as good on average as the other networks." However, Staff's then shifts and confusingly equates a network that is "not as good" as other good performers to a "worst" network. The OAG's comments echo Staff's use of the word "worst." (OAG comments, p. 27) The fallacy is portraying those networks with the lowest indices/years to a jeopardy event, albeit a remote

occurrence, as "worst" networks. For example, even the network with the lowest score has a likelihood of experiencing a jeopardy event only once every 189 years.

What is a more significant and a direct barometer of a network's reliability is the outage rate in the individual network – the likelihood that a customer in the network will lose power. As measured by this more direct and significant index, LIC network customers have experienced a rate of reliability that is more than 400 times better than the average customer experience in New York State which places their network in the top quartile within the Con Edison system.

IV. Response to Comments of Consumer Protection Board

A. Con Edison Is Exceeding the Expenditures Provided In Rates for the Operation and Maintenance of the Electric System

The Consumer Protection Board asserts that Con Edison has a "powerful incentive to postpone or avoid other expenditures" in order to offset the costs of the LIC outages and that increased regulatory oversight is needed to "ensure that necessary expenditures, particularly operations and maintenance expenses which underlie the Company's rates, are undertaken." (CPB comments, p. 5) Con Edison's Electric Operations (distribution system) O&M expenditures from July through December 2006 have exceeded its budget by about $25 million even with the exclusion of both the LIC-related and Westchester storm (July and September) recovery costs. For the Company as a whole, O&M expenditures from July through December 2006 have exceeded budget by about $9 million even with the exclusion of the costs of those events. The monies being provided in rates are being spent to maintain the reliability of the electric system.

V. Response to Staff's Findings and Recommendations

A. Staff's Recommendation to Adjust the Fixed Ambient Temperature Used to Rate Transformers Is Unsupported

In establishing the normal and emergency load ratings of network transformers, Con Edison calculates the winding hot-spot temperature and top oil temperature, per its specification EO-2002, using a fixed ambient temperature of 79°F that reflects a 24-hour constant average summer ambient temperature. Staff report states that Con Edison should adjust its rating calculation to "reflect, based on historical data, the hottest periods of the day when the loading is the highest." (Staff report, pp 96-97) Staff's recommendation 45 asks the Company to study this suggestion:

> Con Edison should consider adjusting transformers' normal and emergency load ratings to take into account the actual ambient temperatures experienced within its service territory, instead of just using a constant ambient temperature. The feasibility of this should be evaluated and reported to Staff within 90 days of the issuance of this Report

Con Edison specification EO-2002 is the application and design specification for the manufacturing of network transformers. The winding hot-spot temperature and top oil temperature limits are established for the design of the equipment for general application under normal, first, and second contingency conditions. The 79°F ambient temperature represents the average 24-hour summer day temperature that is used to evaluate the designs of the equipment. This procedure is in accordance with national industry (IEEE) standards. It would be unreasonable to design the equipment based solely on the possible occurrence of extraordinary heat events as this would significantly reduce the utilization capacity of the equipment.

The fact that many transformers were overloaded above their second contingency ratings without failure during the extraordinary circumstances of the LIC event demonstrates the validity of the existing ratings. Over the past two years, 167 transformers failed in service, but the only transformers that failed due to overheating were the ten transformers involved with the LIC event. The City's initial comments also caution against the Staff's recommendation for adjusting transformer ratings. The City makes the point that "[w]hile transformers were overloaded and some failed, there were many more that also were overloaded but did not fail." (City comments, p. 32)

B. The Spoilage Compensation Provision's of Con Edison's Tariff Should Not Be Modified to Include Property or Consequential Damages

Staff and others recommend that the Company increase the amounts of and limits for compensation on claims for losses resulting from the loss of refrigeration, to reflect, at a minimum, the rate of inflation since the current amounts and limits were established in 2000. The Company will file shortly a tariff amendment consistent with these recommendations.

A number of parties have recommended that the provisions of the Company's tariff providing spoilage compensation be expanded to include property and consequential damage. These recommendations would reverse long-standing Commission policies concerning compensation for service outages.

Con Edison disagrees with parties' recommendations to provide tariff compensation for property damages and consequential damages such as lost business, lost

wages, and medical expenses.[7] The spoilage provisions of the tariff were designed to provide prompt and reasonable reimbursement for losses of food and perishable merchandise – losses clearly related to the occurrence of an outage exceeding 12 hours – without resort to the judicial system and proof of culpability by the Company. For reasons of public policy, rate moderation, and utility financial integrity that the Commission has long observed, Con Edison and all other utilities in the State are subject to a gross negligence standard for the recovery of damages related to the loss of utility service.[8] The Company's spoilage compensation tariff was established as a limited exception to that policy. Expansion of tariff compensation to award damages for any and all losses related to an outage would reverse this public policy. It is well-settled New York law that the courts resolve questions of damages, and the gross negligence standard applicable to utilities has been well-settled New York law and recognized by Commission policy for decades.

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[7] As discussed previously (infra pp 28-29), the Company has filed with the Commission reports and explanations addressing why it would not be reasonable or practical to provide tariff compensation for damage to electric motors.

[8] In PSC Case 3729, *Proposed Electric Tariff Provisions Re Compensation for Losses Due to Consolidated Edison Company Distribution System Interruptions*, issued February 26, 1973, the Commission stated, "It is desirable, however, to limit the liability of public utilities to instances in which recoveries will not be so large in the aggregate as to threaten the financial integrity of the company or require substantial rate increases. In addition to the limitations to exclude customers and expensive appliances with high vulnerability to power failures – conditions where it appears reasonable to require customers to protect themselves – the proposed amendment seeks to define with particularity the extent of power failure which will entitle a customer to reimbursement, and to exclude from the operation of this provision conditions beyond the control of the company. … It is anticipated that the proposed tariff amendment, if adopted, will be largely self-executing and that claims which cannot be settled by agreement of the parties could be processed expeditiously in small claims courts. The proposed provision does not preclude customers from seeking redress for damages resulting from willfulness or gross negligence in regular judicial proceedings, although the proposed provision would not apply in such cases. "

VI. Conclusion

Con Edison respectfully requests that the Public Service Commission and Administrative Law Judge Stein consider the Company's initial and reply comments in reviewing the issues presented in this proceeding.

Respectfully submitted,

/s/

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