STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

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 — **Case 06-E-0894**

INITIAL COMMENTS OF THE CITY OF NEW YORK ON STAFF'S REPORT

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COUCH WHITE, LLP
540 BROADWAY
P.O. BOX 22222
ALBANY, NEW YORK 12201
(518) 426-4600

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PRELIMINARY STATEMENT

The City of New York (the "City") hereby submits to the State of New York Public Service Commission ("Commission") and Administrative Law Judge Eleanor Stein its Initial Comments ("Initial Comments") in response to the report that the Department of Public Service Staff ("Staff") filed with the Commission on February 9, 2007, in 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 ("Staff Report").[1] The City commends the Commission for opening this investigation of the outages and has participated in this proceeding since it was instituted. The City also has conducted its own independent investigation into the events that caused the outages, as well as Con Edison Company of New York Inc's ("Con Edison" or "Company") response to the outages and, as part of these Comments, provides recommendations for the Company to perform in order to prevent or greatly reduce a similar event from occurring again.

STATEMENT OF FACTS

In late July, 2006, large portions of Con Edison's power distribution system began to fail when multiple primary feeders supplying its Long Island City ("LIC") network

[1] *Department of Public Service Staff Report on its Investigation of the July 2006 Equipment Failures and Power Outages in Con Edison's Long Island City Network in Queens County, New York* (Issued: February 9, 2007).

de-energized ("LIC Outage").[2] The primary feeder outages started on Monday, July 17, 2006 and ended on Friday, July 21, 2006 when all network feeders were restored to service. All customers were restored to service, either by restoration of the network or by alternative means, on Tuesday, July 25, 2006. It is estimated that the LIC Outage left between 25,000 and 65,000 customers without service or with degraded service (low voltage) for some time during this period.[3]

On July 26, 2006, the Commission instituted this proceeding directing Staff to conduct a "comprehensive examination of the circumstances surrounding the failure of the feeders and the outages, the events that led to the failures and outages, Con Edison's response, communication and restoration efforts, the need for changes to Con Edison's practices and procedures to avoid similar failures and outages in the future, and the costs incurred by Con Edison related to the failures and outages."[4] In response, Staff and other parties, including the City, have conducted voluminous discovery and attended several technical conferences, culminating with the filing of the Staff Report.

Con Edison also conducted its own investigations of the LIC Outage. The Company already has issued a report titled *Comprehensive Report on the Power Outages in*

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[2] Con Edison's Long Island City network is comprised of the neighborhoods of Astoria, Sunnyside, Woodside and Hunters Point.

[3] See, Staff Report, p. 23; Company's October 12th Report, p. 1-9.

[4] 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, "Order Instituting a Proceeding and Directing Staff Investigation" (Issued: July 26, 2006), pp. 1-2.

Northwest Queens in July 2006, issued October 12, 2006 ("October 12th Report") and commissioned a second report titled *Long Island City Network July 17-25, 2006, Incident Investigation Committee*, issued February 12, 2007 ("Committee Report"). In addition, the New York State Assembly Queens Power Outages Task Force issued its report on the power outages on January 30, 2007, titled *Concerning the July 2006 Power Outage in Consolidated Edison's Service Territory* ("Assembly Report").

THE CITY REPORT

The LIC Outage created many hardships for people in the affected areas. From the onset, the City was heavily involved in maintaining public safety, providing human resource services to affected residents, and assisting Con Edison in its recovery efforts. Once power was restored, the City began investigating the causes of the outages, with a strong focus on identifying improvements to Con Edison's system and its operating procedures to reduce the likelihood of such an event happening again.

The City's team of experts participated in Con Edison's testing of failed primary cables, joints, terminations, transformers and network protectors. The City's experts and counsel also interviewed Company employees, served the Company with hundreds of discovery requests, reviewed other parties' discovery, reviewed Company reports prepared in response to this event and Company manuals, procedures, and reports that were issued after

prior power outages, participated in the Company's technical conference and attended depositions conducted by Staff of Con Edison employees.[5]

The City's exhaustive investigation of the LIC Outage has resulted in a report entitled *Investigation by the City of New York into the Northwest Queens July 2006 Power Outages* ("City Report"), attached hereto as Appendix A. The City Report is intended to be an independent and technical analysis of Con Edison's electric distribution system, the events preceding the outages, including the Company's operating and maintenance practices, as well as the Company's response to the outages. The City Report includes 53 comprehensive recommendations (including numerous sub-parts) that the Company should consider adopting to correct or improve its operations and thereby assist in preventing similar events. The City Report is offered also to assist the Commission in its deliberations of the actions necessary to ensure safe and reliable operation of the Con Edison system.

The City applauds the excellent effort that Staff has put forth, culminating in a comprehensive Staff Report. In many instances, the recommendations set forth in the City Report are similar to those offered by Staff. However, in other instances, the City Report addresses issues that the Staff Report does not, or offers conclusions and recommendations that differ from Staff's. These Initial Comments will highlight these similarities and

[5] A detailed timeline of key events of the Long Island City event can be found in the City Report.

differences in the context of providing comments on how to improve Con Edison's operations.[6]

POINT I

THE CITY GENERALLY AGREES WITH STAFF'S CONCLUSION THAT BETTER PREPARATION AND RESPONSIVENESS BY CON EDISON COULD HAVE REDUCED THE LIKELIHOOD OF THE LONG ISLAND CITY OUTAGE AND DECREASED ITS IMPACT ON RESIDENTS AND THE COMMUNITY

Con Edison categorizes the factors that initiated the Long Island City power outages as being "precipitated by three unrelated events that combined to create an unprecedented set of circumstances and strain on the network system."[7] The Company identifies these three unrelated events as being: (i) a low-voltage cable that caused a fire in an underground conduit, causing two primary feeders to fail; (ii) a substation breaker failed when a third feeder de-energized, causing three additional feeders (two network and one non-network) to be isolated from the system; and (iii) when operators attempted to restore feeders to service, they experienced a phenomenon known as inrush[8] current that prevented feeders from being restored to service.[9] The Staff Report concludes otherwise:

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[6] The full scope of the City's analysis, conclusions and recommendations is set forth in the City Report.

[7] October 12th Report, p. 1-2.

[8] Inrush is defined as additional current many times a primary feeder's normal maximum load that occurs when a de-energized feeder supplying transformers is placed back in service.

> After reviewing the many factors involved, Staff concludes that, while those were contributing elements, the overriding cause of the Long Island City Network event, and the extensive and lengthy impacts for consumers, was the Company's failure to confront and resolve a multitude of issues associated with its operation, maintenance, and oversight of the network and to recognize and take effective action to limit the extent of the cascading system damage and the resulting consumer impacts.[10]

The City agrees that the scope and duration of the LIC Outage could have been reduced by better preparation and responsiveness by Con Edison. For example, in 1999, the Company experienced a severe power outage that was followed by an extensive analysis of Con Edison's operations and a series of recommendations to prevent a similar event from occurring again. As set forth in more detail in the City Report, many of the Washington Heights recommendations had not been fully implemented before the LIC Outages, almost seven years later.[11] If these recommendations had been implemented, the LIC Outages might have been less severe, and Con Edison's response would have been better.

In addition, the City agrees with Staff's overall conclusion that Con Edison's response to the LIC Outages was lacking in many respects. Con Edison's inability to accurately count or quantify, in a timely manner, the number of customers affected by the outages was wholly unacceptable and adversely affected Con Edison's response and the deployment of critical resources to City residents. Even if the Company could not have completely avoided these power outages, it should have better understood the damage that

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[9] October 12th Report, pp. 1-2, 1-3.

[10] Staff Report, p. 6.

[11] City Report, p. 116.

was occurring to the secondary system, correctly estimated the number of customers without service or experiencing low voltage and more appropriately responded to events as they occurred.

Although the City generally concurs with Staff's overall finding that Con Edison could have reduced the likelihood of the Outage and decreased its impact, the following sub-points highlight areas where the City's analysis and recommendations differ from those of Staff.

A. Implementation of Staff Recommendations From the 1999 Washington Heights Power Outages

Following the 1999 Washington Heights power outages, Staff issued a report that contained 44 recommendations to address weaknesses and concerns in Con Edison's network distribution system and operations. The Staff Report mentions the 1999 Washington Heights incident and its recommendations, but does not sufficiently address the impact that the Company's failure to fully implement the Washington Heights recommendations had on the scope and duration of the LIC Outages.

While somewhat different in origin and extent, there are compelling similarities between the Washington Heights incident and the LIC Outage. Both events occurred during periods of hot and humid weather, both involved primary feeders supplying networks that were subject to high loading and both networks experienced numerous equipment failures. Both events imposed disruptive and economically damaging harm on customers, residents and businesses. Unfortunately, many of the recommendations from the Washington Heights

event were not followed through or were not fully implemented. While it is impossible to definitively state what the impact would have been if all of the recommendations had been implemented, it is reasonable to conclude that some of the damage, the scope and/or the duration of the LIC Outage would have been reduced had they been implemented. To the extent that the Company failed to implement the full range of recommended actions, the Public Service Commission, in its supervisory role over the Company in the years since the Washington Heights event, also must bear some share of responsibility.

As an example, Washington Heights Recommendation II-2 directed Con Edison to evaluate reasonable actions that the Company can take to improve monitoring of its secondary system because the absence of information on the secondary system can result in the Company being unaware that secondary cable sections were being excessively overloaded.[12] 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.[13] Furthermore, had the Company deployed Secondary Underground Network Distribution Automation System ("SUNDAS") prior to the outage, it would have been provided with a "picture" of the secondary system, including valuable information with regard to voltage levels and overloaded secondary mains. These two improvements may have helped to prevent the LIC outages and certainly would have provided tools to manage it better.

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[12] City Report, p. 118.

[13] The RMS is designated by Con Edison for a reporting rate of 95%.

Similarly, Washington Heights Recommendation II-15 directed Con Edison to monitor the loading of high-tension customers' transformers as part of its system modeling programs.[14] This was not done beyond a minimal pilot program. As a result, during the LIC Outages Con Edison had no real time information regarding the loading at the major customer locations (e.g., La Guardia Airport, MTA traction Substations, Rikers Island, etc.). If the Company had this information, it may have made different decisions.

In addition, Washington Heights Recommendation IV-1 directed Con Edison to evaluate the further acceleration of its paper/lead cable removal program.[15] Had Con Edison further accelerated this program and its associated targeted stop joint removal program, this equipment would have been removed and would not have contributed to primary feeder failures during the LIC Outage.

Washington Heights Recommendation V-3 directed Con Edison to implement a rigorous training program to ensure that all its employees are adequately trained in emergency procedures.[16] During the LIC Outages, there were several instances where operators made decisions that prolonged the event. For example, the application of three

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[14] City Report, p. 127.

[15] City Report, p. 122.

[16] City Report Section 7.0, Recommendation 36. *See also*, Washington Heights Recommendation V-1 on Appendix 12 to the City Report. Although these recommendations are contained in the Communications section of the Washington Heights report, unlike other recommendations in that section they are not limited to communications.

phase grounds to clear backfeeds while there were severe low voltage conditions in the network was a common error.

Con Edison must be more proactive in identifying and removing the most failure prone components on its system. This is particularly true at the primary feeder level, where both the Washington Heights and Long Island City network events were centered. Con Edison also must have better monitoring systems in place so that it fully understands what is occurring on its electric distribution system at all levels. Finally, Con Edison must have appropriate systems deployed to better enable its operators to respond in a more effective and timely manner.

B. Supervision of Substation Contractor

On Monday, July 17, 2006, three primary network feeders and one non-network feeder were taken out of service resulting in the event escalating from a 2nd to a 5th contingency. The cause of these three feeders de-energizing was the result of a malfunctioning circuit breaker at the North Queens substation.[17] The breaker malfunctioned due to a misalignment of the control circuit contacts on the breaker cubicle and on the removable breaker element.[18] The circuit breaker's misalignment was not detected because of the faulty installation by a Con Edison contractor.

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[17] The North Queens substation supplies the Long Island City network through twenty-two 27kV feeders.

[18] October 12th Report, p. 3-15.

The Staff Report mentions contractor oversight briefly but the City Report addresses it in more detail, as contractor error was a contributing factor to the LIC Outage. Had the breaker malfunction not occurred, the Long Island City network would only have escalated to a third contingency instead of a fifth contingency, and this reduced level of stress might have avoided the cascading feeder failures.

The two breakers with inoperable trip circuits should have been revealed to the substation operators through a visual indicating light located within the North Queens substation control room. However, during the breaker retrofit process, this monitoring circuit was incorrectly wired so that no visible indication of the loss of this trip circuit to either of these circuit breakers was provided to the substation operators. Had a proper indication been provided to operators, it is believed that these malfunctions would have been corrected well in advance of the LIC Outages. While Con Edison's October 12th Report attributes this condition to the misalignment of the breaker-tripping control circuit contacts, the misalignment arose out of deficient oversight of the circuit breaker upgrade program.[19] The Company should review its contractor work inspection process.

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[19] *See*, October 12th Report, p. 4-27.

C. 2006 Summer Substation Preparations

The City Report concludes that the Company could have been better prepared for the 2006 peak summer load period.[20] First, prior to the 2006 peak summer load period 15 of the 22 feeder circuit breakers at the North Queens substation were retrofitted with rack-out breakers as part of a system-wide breaker replacement program. With the installation of these new breakers, new Ground and Test ("G&T") devices would permit the simultaneous processing of multiple faulted feeders within a bus section. In order to enhance and expedite the feeder restoration process utilizing the new G&T devices, all that was required was to DC high potential ("Hi-pot") test these units and perform current injection and trip tests in conjunction with a scheduled bus section outage.[21] However, at the start of the 2006 peak summer load period, these new G&T devices were not yet operational at the North Queens substation.[22]

In addition, the PQNode at the North Queens substation was only made operational on July 17, 2006, the day the event started.[23] It should have been made operational well in advance of the 2006 peak summer load period. Having the system installed at this late date provided no opportunity to make the Reactance-to-Fault ("RTF")

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[20] City Report, p. 67.

[21] DC Hi-pot testing works by applying high voltage to the primary feeder for a short period of time to determine if any incipient faults exist on the cable.

[22] City Report, p. 68.

[23] Company Response to Staff Interrogatory 253 (dated: October 23, 2006).

application operational for this network. The RTF functionality provides an estimate of the distance to a fault on a faulted feeder and this information would have expedited the restoration effort.

The Staff Report mentions the lack of the availability of the G&T devices but it does not recognize that if these units were operational during the event it could have significantly aided in restoring multiple faulted feeders to service simultaneously.[24] Additionally, the Staff Report does not mention the lack of functionality of the PQNodes and the RTF application. Had both of these systems been operational prior to the 2006 peak summer load period, as they were designed, the Company could have shortened the time it took to identify, process and restore feeders to service.

D. The Company's Use of Voltage Reduction

Con Edison initiated an 8% voltage reduction on Monday, July 17, 2006, when the Long Island City network was operating in a fifth contingency. The Company maintained voltage reduction on the system until Sunday, July 23rd, two days beyond when the network was restored to a zero contingency. Historically, utilities have used voltage reduction for peak load reduction in times of generation shortages or system emergencies. It is widely believed that in implementing voltage reduction to reduce power and reactive power, it will also result in reducing current. This is not always true. When voltage is

[24] *See,* Staff Report, p. 103.

reduced, the current flowing through the load-feeding circuits may either decrease or increase. This depends on several factors including:

- the real-load-to-voltage and reactive-load-to-voltage sensitivities;
- the load power factors; and
- the level to which the voltage is reduced

(City Report, pp. 79-80.)

At some load points during the LIC Outages, where the voltage was already below normal levels due to several primary feeders being out of service, additional voltage reduction resulted in an increase in reactive loads and equipment motors stalling because of low voltage.[25] Measurements of the primary feeder currents after initiation of voltage reduction during the LIC Outage showed that in 10 feeders the current increased and in 7 feeders the current was reduced.[26]

The Company's use of voltage reduction did not always reduce the currents going through the secondary system and/or the currents flowing through the distribution transformers. Additionally, with each loss of an additional primary feeder, the loading of the secondary circuits increased, causing the voltage to be decreased even more. While it is not possible to conclude that all low voltage problems were caused by the implementation of voltage reduction, it does suggest that the Company did not fully understand the impact the use of voltage reduction would have on its system and on its customers.

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[25] *See*, City Report, p. 81.

[26] Company Response to City Interrogatory 133 (dated: October 24, 2006).

Even assuming there are demonstrable benefits from reducing voltage, it took an inordinate amount of time to fully implement the 8% voltage reduction. The Staff Report adopts the Company's position that it took 55 minutes to institute an 8% voltage reduction.[27] However, data collected by the City shows that it took approximately 55 minutes to obtain an approximately 5.7% voltage reduction but several hours to reach 8%.[28] Such a delay in fully implementing the 8% voltage reduction must be corrected.

The timing of the removal of the voltage reduction and its impact on customers was not addressed in the Staff Report. As stated earlier, the Company removed the 8% voltage reduction on Sunday, July 23rd, two full days after the system was restored to a zero contingency. The continuation of voltage reduction after the network was returned to a zero contingency could have contributed to the continuing problems experienced by the network customers after the primary feeders were restored. Furthermore, once the Company decided to remove voltage reduction, it took approximately four hours to successfully do so. The delay in successfully implementing and disengaging voltage reduction must be addressed by the Company.

E. Operation and Maintenance of Equipment Prior to the Long Island City Network Event

A significant portion of the investigation that followed the Long Island City event involved examination of damaged and failed equipment. The equipment investigation

[27] Staff Report, p. 117.

[28] City Report, Appendix 10.

focused on cables, joints, terminations, transformers and network protectors. While the Staff Report discusses some observations and conclusions stemming from the inspection of failed and damaged equipment, the City Report uses the test results to broaden its recommendations to aid in better operation of the Company's equipment.

1. Cables, Joints and Terminations

While the Staff Report discusses some observations from examination of the cable and joint autopsies, the recommendations resulting from these autopsies were limited. For example, the Staff Report recommends that "the Company [should] continue to replace paper-insulated lead-covered cable at its current rate under each of the programs that replace such cable. Staff further recommends that paper-insulated lead cable in the Long Island City Network should be replaced by the end of 2012."[29] It has been well documented for years that the paper-insulated lead-covered cables have a higher failure rate than other cable types.[30] The high failure rate of these cables was even recognized following the 1999 Washington Heights event, where it also was recommended that these cables (along with specifically identified and targeted stop-joints) be replaced. It is for these reasons that the City recommends that the Company's programs to replace these cables should be accelerated.[31]

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[29] Staff Report, p. 80.

[30] Company Response to Staff Interrogatory 73 (dated: August 23, 2006).

[31] City Report, Section 7.0, Recommendation 2.

Con Edison has stated that one of the primary factors that caused the Long Island City event was a short-circuited low-voltage cable that resulted in a fire in an underground structure. While this and other secondary cable failures and resulting fires played a significant role in this event, the Staff Report does not provide any recommendations to aid in rectifying the situation. To address this problem, the City recommends the Company reconsider the incorporation of flame resistant construction concepts for insulation and jackets into secondary cables employed for future use in underground structures.[32]

2. Transformers

The Staff Report does not discuss that several of the failed transformers involved tank ruptures, and in one case stress corrosion, or the causes of these conditions. The City Report considers failures from these causes to be significant enough to warrant additional examination.[33] Accordingly, the City Report recommends that studies be performed on these failures to determine if transformers of a similar design and vintage are more prone to failure from these causes.[34]

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[32] City Report, Section 7.0, Recommendation 3.

[33] City Report, Section 7.0, Recommendations 10 and 11.

[34] *Id*.

The Staff Report does not address the difficulty, during the discovery process of this investigation, of obtaining accurate and complete transformer maintenance records. Maintaining accurate records is critical to effective maintenance and replacement of the Company's equipment. Therefore, the City recommends that the Company's equipment records should be subjected to random audits to ensure they are being properly completed and stored.[35]

3. Network Protectors

The Staff Report addressing network protectors focused on the operating voltage of the relays and the Remote Monitoring System ("RMS") reporting rate. In the Staff Report, it is recommended that a feasibility and cost study be performed on the replacement of the 13,000 non-microprocessor relays.[36] However, while this study is underway, the City recommends that the focus should be on assuring that operating personnel are informed of the existing operational limitations and instructed as to the actions to be taken for the various types of relays. Personnel also should have ready access to the equipment database so that they can easily determine the type of relay used at a particular location.[37]

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[35] City Report, Section 7.0, Recommendation 23.

[36] Staff Report, pp. 101-102.

[37] City Report, Section 7.0, Recommendation 25d.

Additionally, although the Staff Report makes no reference to it, the City Report reveals that Con Edison has specified that the microprocessor relays do not permit the network protectors to close if the network voltage is between 60 and 13 volts.[38] The City Report advocates that this limitation should be reviewed and that operating personnel should be informed of it.[39] This issue will become increasingly important as the number of microprocessor network protector relays increases.

Throughout the course of the LIC Outages, several of the network protector microprocessor relays showed evidence of damage due to transients during the event. While the Staff Report recommends that studies be performed to assess the potential replacement of non-microprocessor network protector relays, they make no mention of this potential problem or recommendations for the Company to correct the situation.[40] The City Report addresses this topic and recommends that the Company have additional transient studies performed to assist in determining if relay design changes are required.[41]

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[38] City Report, Section 7.0, Recommendation 25.

[39] *Id.*, at Recommendation 29.

[40] *See*, Staff Report, p. 102**.**

[41] City Report, Section 7.0, Recommendation 22.

F. Equipment for Network Visualization

The Staff Report correctly concludes that Con Edison needs to do a better job of assessing damage to the secondary system[42] and estimating the number of affected customers.[43] Con Edison's ability to visualize the network was hampered by the fact that the primary tool to assess the condition of the network, the RMS, was only operating at 79.5%.[44] There is no disagreement that the RMS reporting rate needs to be improved system-wide to its designated reporting rate of 95%.

In addition to improving the RMS reporting rate, Staff recommends examining the feasibility of replacing all RMS transmitters to third generation transmitters by 2010.[45] The City does not oppose this recommendation; however, the City believes that installing voltage sensors throughout the network to create a voltage profile should be given a higher priority.[46] The voltage at the transformers (i.e., RMS) is not the best indication of the condition of the network. Rather, installing voltage sensors throughout the network would

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[42] Staff Report, p. 14.

[43] *Id.*

[44] October 12th Report, p. 6-3.

[45] Staff Report, p. 102.

[46] City Report, p. 62, Section 7.0, Recommendation 32a.

better equip operators to visualize and obtain the "full picture" on the condition of the network.[47]

While the Staff Report discusses the Company's deficiencies with regard to obtaining accurate information on the status and condition of the underground network distribution system, it does not describe what operational tools are needed to correct this condition. The City Report specifically recommends that Con Edison should expand the use of visualization tools at its Brooklyn/Queens control center, as it has already been done in the Manhattan control center. In addition, the City Report recommends that the Company combine multiple information reporting systems at its Brooklyn/Queens control center and improve the way that critical operating information is presented to the control center operators, especially with regard to secondary network events and customer service problems (e.g., outages, side out, and low voltage).[48]

G. Alternative Means of Testing Primary Feeders

After a primary feeder's circuit breaker opens, and before it can be restored to service, it must be tested to determine whether there are any additional faults on the feeder. Con Edison traditionally has utilized DC Hi-pot testing to determine if any such faults exist on a feeder. Additionally, the Company uses DC Hi-pot testing on a regular basis to determine whether to remove weakened cable sections and joints prior to each summer. The

[47] City Report, p. 62.

[48] City Report, Section 7.0, Recommendation 43.

selected feeders are tested annually prior to each summer in an attempt to discover incipient faults before failure and to mitigate primary feeder outages. As noted in the Staff Report, DC Hi-pot testing remains controversial.[49]

Concerns associated with the use of DC Hi-pot testing include that it may not always identify the weakened section of cable and that the test itself may induce problems in un-failed cables that accelerate their future demise Examination of primary feeders within the Long Island City network using DC Hi-pot testing in the years leading to the 2006 power outages (i.e., 2004 and 2005) did not provide any guidance or advance warning of the feeders that failed during the event. This lack of predictive testing from the primary tool to determine feeder reliability indicates that alternative methods should be examined.

To address the limitations in DC Hi-pot testing, the electric distribution industry and Con Edison have been examining an alternative method known as Very Low Frequency AC high potential ("VLF") testing. The VLF testing is not believed to have a damaging effect on feeders as it operates on alternating current. The use of a non-DC based test is particularly important because it is believed that using a DC source for testing grades the electrical stress by a resistive (not capacitive) process that does not equate to in-service grading. This is especially significant for joints and terminations and is considered to be one of the reasons that DC testing does not detect certain deficiencies in joints and terminations. While VLF testing may not have detected all faults on feeders within the Long Island City network, its earlier adoption or use within this network may have alerted the Company to

[49] Staff Report, pp. 84, 85.

faults on feeders that ultimately failed and contributed to the severity of this event. Thus, the City joins Staff in recommending the introduction of VLF testing and differs only in the time frame for adoption.[50]

H. Training of Company Management and District and System Operators For Emergency Conditions

The Staff Report identifies the need for additional training of call center and customer service staff but fails to identify the critical need for additional operational training for Company managers and district and control center operators.[51] During the LIC Outage, there were errors by managers and operators that could have been avoided had they been better prepared to address the situation confronting them.[52] As an example, due to a district operator error a bus section was re-energized without clearing the faulted feeder, which significantly delayed feeder restoration.[53] Similarly, the Company used rapid restoration in attempts to quickly restore feeders to service; however, this caused several cut in open autos with faults being found at a later time**.** Proper training of operators could have prevented

[50] City Report, p. 25; Staff Report, p. 85 (the City recommends applying VLF testing to 5% of the Company's second tier of worst performing system feeders where Staff recommends applying VLF testing system-wide by the summer of 2007).

[51] Staff Report, p. 61.

[52] City Report, pp. 66-69; 72-73.

[53] October 12th Report, p. 3-20.

these actions.[54] These and other examples highlight the need for additional training to ensure managers and district and system operators are properly prepared to operate the system during emergency and stressful conditions. Specific areas where the Company should focus additional training include, but are not limited to, transformer cooling, application of three-phase grounds, use of voltage reduction during network multiple contingencies, rapid restoration, modified Hi-pot testing and VLF testing.

POINT II

STAFF'S POSITION THAT THE LONG ISLAND CITY NETWORK SHOULD HAVE BEEN SHUT DOWN IS UNSUBSTANTIATED

In its Report, Staff concludes that the Company did not make the right decision and acted incorrectly and unreasonably in maintaining the Long Island City network in service given the information it had available at the time of the incident.[55] Specifically, the Staff Report states that "[t]he sheer magnitude of manhole and service box events (manhole events) spoke volumes about the damage that was occurring to Long Island City Network's secondary system during the event,"[56] and that "[a]ny competent network operator would know the facts demonstrate that the Long Island City Network experienced severe damage in the secondary grid during the incident."[57]

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[54] City Report, Section 7.0, Recommendation 27d.

[55] Staff Report, p. 75.

[56] Staff Report, p. 68.

Con Edison has stated that it balanced five factors in deciding whether to de-energize the network: (i) number of primary feeders overloaded; (ii) number of primary feeders returning to service; (iii) number of transformers overloaded; (iv) electricity demand; and (v) damage to the secondary network.[58] Con Edison also maintains procedures in EO-4095 that specify the criteria for determining when to maintain or shutdown a network operating during a multiple contingency event.[59] The factors included in this procedure focus on operational and engineering parameters, and it is these parameters that Staff concludes the Company did not properly consider in making the decision to shutdown the network.[60] Staff specifically excluded the Company's assertion that "societal implications" supported the decision not to shut down.[61]

The City Report concludes that Staff's position that the Long Island City network should have been shutdown is not fully supported. As explained in greater detail in the City Report, the network shutdown decision was a complex one and even today, with the benefit of hindsight, it is not possible to say with certitude that the Company's decision was wrong. It does appear that the Company's determination not to take the network down was made without access to sufficient information. Specifically, the lack of an effective control

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[57] *Id.*, p. 69.

[58] Con Edison Technical Conference, October 26 and 27, 2006, pp. 830 – 831.

[59] Company Response to City Interrogatory 22 (dated: August 21, 2006).

[60] Staff Report, p. 75.

[61] *Id.*; *see also*, Con Edison Technical Conference, October 26 and 27, 2006, pp. 830-831.

center visualization tool that was capable of combining multiple information sources from currently available information on the secondary system, as well as the trouble ticket (ECS) system, resulted in management not having all the information it required to make a more informed decision.

In order to justify the conclusion that Con Edison was wrong, it is incumbent upon Staff to demonstrate that a different network shutdown decision would have yielded better results. Staff's conclusion assumes, but does not demonstrate, better results. For example, it is unclear when exactly a decision to shut down "should" have been made, or whether an affirmative decision at that time would have avoided the damage to the secondary system (i.e., had it already occurred?). Unless this question can be answered positively, and with reasonable certainty, upon restoration of the network, this damage still would have remained, with the consequences unchanged (except that more customers would have been affected).

Moreover, the Staff Report does not demonstrate that a network shutdown decision would have reduced the cumulative damage that occurred to the Long Island City network, the total duration of the outages, the impact on the system and equipment when the network was returned to service and the resources that would be required to reenergize the network. In sum, there is no analysis to support the conclusion that a total network shutdown would have resulted in a more rapid restoration of the initial outage area, or otherwise resulted in a "net benefit" compared to what actually occurred. Finally, Staff's investigation did not evaluate whether "societal implications" justified keeping the network up, as Con

Edison alleged.[62] In making a network shutdown decision, the utility should consider the net potential costs and benefits, including the impact of expanding the outage area and the number of persons affected.[63] It is difficult to understand how Staff could reach its conclusion regarding the shutdown decision without assessing the broader societal impacts. Thus, while the City Report agrees with Staff that Con Edison did not have all of the information it needed at the time that it decided not to shutdown the network, it does not believe that Staff has fully supported its conclusion that the decision not to shut down the entire network was wrong.[64]

The Staff Report also recommends that the Commission initiate a proceeding "to examine the prudence of the Company's actions or inactions that led to unnecessary expenditures of funds provided by ratepayers."[65] Similarly, the Assembly Report states that the Commission "should institute a formal proceeding on the question of Con Edison's prudence and gross negligence."[66] A prudence proceeding is authorized under the Public Service Law to allow the Commission to investigate the propriety of costs incurred by a utility.[67]

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[62] Staff Report, p. 75.

[63] City Report, p. 87.

[64] City Report, p. 89.

[65] Staff Report, p. 4.

[66] Assembly Report, pp. 10; 55.

[67] *See*, N.Y. Pub. Ser. L. §§ 66(12) and 72.

Due to steps taken by the Commission when instituting this proceeding, Con Edison already is isolating costs attributable to the LIC Outage. The Staff Report states that: "[t]o date, the Company has tracked costs totaling $91 million for activities related to the event."[68] The Company has already agreed to absorb all operations and maintenance expenses and claim payments attributable to the outages (currently, approximately $58 million).[69] Importantly, the Staff Report confirms that incident-related O&M expenses and all claims payments, whatever they end up being, will not be recovered from customers in electric delivery rates.[70]

With all expenses and claims payments isolated for the Company to absorb, there is less reason to recommend an immediate prudence proceeding. Staff justifies its recommendation for a prudence proceeding to ensure that: (i) incident-related expenses do not affect the shared earnings provisions of the existing settlement agreement governing Con Edison's rates; and (ii) incident-related capital additions to the Long Island City network remain subject to review and potential disallowance.[71] While the City shares Staff's concerns, it is equally concerned that the institution of a prudence proceeding at this time

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[68] Staff Report, p. 10.

[69] *Id.*

[70] Additionally, in accordance with the Company's last electric rate plan, the Company will be subject to a negative revenue adjustment of at least $9.3 million as a result of the metered customer outages (Staff Report, p. 8).

[71] Staff Report, pp. 140-142.

could distract Con Edison from completing the numerous, critical improvements that the City, Staff and others have recommended for immediate action prior to this summer.[72] In order to ensure that the Company is focused on its preparations for this summer, but also to preserve these important issues for further review, the City urges Con Edison to stipulate that the shared excess earnings calculations will be unaffected by LIC Outage expenses and that incident-related capital costs will not be subject to the tracking mechanism established in the last rate case.[73] Such a stipulation would permit the incident-related capital costs to be subject to a fair examination in the upcoming electric rate case without the burden of instituting a prudence proceeding now.

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[72] As noted earlier, Con Edison already has issued two comprehensive studies of the LIC Outage, the October 12th Report and the Committee Report. In addition to the Staff investigation culminating in the Staff Report, the Commission also instituted a separate proceeding to audit the Company's performance in response to outage emergencies Case 06-M-1078 – Proceeding on Motion of the Commission to Audit the Performance of Consolidated Edison Company of New York, Inc. in Response to Outage Emergencies, (Instituted: September 8, 2006), and that audit is ongoing. Finally, a comprehensive electric rate case filing by Con Edison is expected prior to May 1, 2007.

[73] Approximately $32 million of capital costs has been incurred by the Company to date, and Con Edison is proposing to recover those capital costs from customers over the useful lives of the equipment (Staff Report, p. 10). The Company could offer such a stipulation in its Reply Comments to the Staff Report.

POINT III

THE CITY AGREES WITH STAFF'S CONCLUSION THAT THE COMPANY MUST IMPROVE ITS PROCESS FOR RECOVERING SAMPLES FROM DAMAGED AND DESTROYED EQUIPMENT

An essential function following any major power outage is the ability to analyze and examine the equipment that failed. As with any outage, following the Long Island City event the Company initiated extensive autopsies and teardowns from failed and damaged equipment. Both the Staff Report and the City Report address the Company's failure to collect and track sufficient component failure samples for dissection and analysis to identify root causes for the in-service failures.[74] Although there is no disagreement between the City and Staff on this issue, the Company's failings in this regard are significant enough to highlight here.

The Staff Report discusses being unable to complete 25% of the planned autopsies due to the Company's failure to collect the actual failed sections of equipment.[75] When Con Edison is unable to collect actual samples from where equipment failed, it often collects nearby samples for analysis. The collection of "nearby" samples does not allow for sufficient analysis to be performed as the equipment did not fail. Staff considers the Company's sample recovery failure rate "unacceptable and far exceeds the historic level for

[74] City Report, p. 20; Staff Report, p. 79.

[75] Staff Report, p. 80.

such an event."[76] The City Report also recognizes that conclusions from the equipment failures for the Long Island City network event were very difficult to reach because of the very small number of actual failure specimens that were provided by Con Edison for examination and analysis.[77] Less than 50% of the possible cable, joint, and termination failures (11 of 25) were actually made available and some of them contained insufficient components to determine the cause of the failure.

As a consequence of the LIC Outage, the City joins Staff in recommending that the Company develop better procedures to effectively and efficiently collect and save failed component samples following major power outages. The lack of such samples greatly inhibits the Company's ability to determine the root causes of equipment failure or to identify necessary equipment changes or O&M modifications. The Company's sample recovery procedures should be revised immediately.

POINT IV

STAFF'S REPORT INCLUDES SEVERAL FACTUAL AND TECHNICAL ERRORS THAT SHOULD BE CORRECTED

The Staff Report includes several inaccuracies and technical errors that should be highlighted to aid the Commission in its deliberations. The City highlights these errors not with the intention of being critical of the Staff Report or the diligent efforts that Staff has

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[76] *Id*.

[77] City Report, p. 20.

put forth, but rather to highlight the need to have input from the Company and other interested parties before Staff's findings, conclusions and recommendations are adopted by the Commission.

In its Report, Staff discusses the situation where seven primary feeder cables were over their normal operating rating but below their emergency ratings and still failed.[78] Staff states that: "[s]uch [cable] failures draw into question the validity of the primary cable calculations and ratings derived by the Company."[79] This statement is not correct because loading histories of the cables also have a direct impact on and affect the calculation of a cable's loss of life. Thus, ratings are only part of the assessment of how long a cable can operate, and Staff's statement does not take account of how the loss of the ability to withstand voltage stress can contribute to failures.

Also, addressing normal and emergency loading, Staff states Con Edison should ". . . adjust its normal and emergency ratings for all of its transformers and factor those ratings into its planning to improve network predictability and reliability."[80] There is insufficient support for this statement. While transformers were overloaded and some failed, there were many more that also were overloaded but did not fail. Decreasing the ratings of transformers so that they will not fail is not supported by the data or the record. Additionally, many component failures, including transformers, occur below normal ratings.

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[78] Staff Report, p. 81.

[79] *Id*.

[80] *Id.*, p. 96.

The Staff Report also states that "Con Edison relies on the World-class Operations Load Flow ("WOLF") program as a real-time monitoring tool during contingency events."[81] The WOLF program does not provide real time monitoring. Rather, WOLF looks at the next worst case scenario. The RMS system, which is an input to WOLF, provides near real-time monitoring. This correction should be noted regarding one of the Company's primary tools for responding to multiple contingency events.

Staff's Report examines issues with current limiters and other protective devices and attempts to identify a potential flaw in their coordination. Specifically, Staff states that "[a]s in the case of the Long Island City Network event, under multiple contingency events, current limiters do not coordinate well with other protective devices and, thus, fail to adequately protect the secondary network system."[82] The only protective devices in the network other than current limiters are the network protector fuses. There is no evidence that current limiters and network protector fuses do not coordinate very well together.

Finally, the Staff Report also makes an error when describing the Company's relay settings. Specifically, Staff states that "[i]t is possible that equipment will operate beyond acceptable limits and thus would not be taken out-of-service in a timely manner."[83]

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[81] Staff Report, p. 88.

[82] *Id.*, p. 92.

[83] *Id.*, p. 106.

The relay settings do not protect for equipment overloads. Rather, they remove the feeder from service for a primary fault. Staff continues that "[r]aising the relay limits could cause equipment damage. Raising the settings to prevent one feeder failure, in and of itself, is not warranted."[84] However, raising the relay settings will ***not*** cause equipment damage. The settings were not raised to prevent a failure, but rather to avoid a cut in open auto problem (i.e., a situation that arises when a faulted feeder is returned to service and opens immediately upon re-energization).

[84] *Id.*, p. 106.

CONCLUSION

For all of the reasons contained throughout these Initial Comments and in the City Report, the Commission should review Con Edison's operating practices and procedures thoroughly and adopt the conclusions and recommendations set forth in the City Report to help to ensure that an event similar to the LIC Outage either does not occur again or, if it occurs, is responded to more effectively and promptly.

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Respectfully submitted,

/s/ Robert M. Loughney

Robert M. Loughney, Esq.
Moshe H. Bonder, Esq.
COUCH WHITE, LLP
Attorneys for The City of New York
540 Broadway
P.O. Box 22222
Albany, New York 12201-2222
(518) 426-4600

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