STATE OF NEW YORK
DEPARTMENT OF PUBLIC SERVICE

Case 12-E-0283

In the Matter of the Review of Long Island Power Authority's Preparedness and Response to Hurricane Irene

June 2012

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I. EXECUTIVE SUMMARY

The following report is the product of the Department of Public Service's (Department or DPS) review of the Long Island Power Authority's (LIPA or utility) August 2011 storm preparedness and restoration response to Tropical Storm Irene.[1] This review was performed in response to the Governor's request that DPS evaluate the storm preparation and responses of LIPA in conjunction with DPS's review of the response by the investor owned utilities within DPS jurisdiction to the same storm. In this way, the use of a relatively uniform set of procedures and standards would enable DPS to recommend modifications of Emergency Response Plans prepared by each of the utilities and LIPA and would promote identification and implementation of statewide best practices.

The Department's responsibility for oversight of the emergency response efforts by the investor owned electric utilities during and following Tropical Storm Irene is based on provisions of the Public Service Law (PSL). LIPA, however, does not fall within the general regulatory purview of DPS or the Public Service Commission (Commission).[2] Consequently, a Memorandum of Understanding (MOU) was entered into between DPS and LIPA for DPS to evaluate LIPA's storm preparation and service restoration efforts.

Vantage Energy Consulting LLC (Vantage) was retained to assist DPS in its review of the storm response related to Tropical Storm Irene on Long Island[3] The Department has endeavored to apply to this review the same procedures and standards that apply to the evaluation of the storm preparedness and responses of the investor owned utilities. Similar to the investor owned utility companies, LIPA prepared and submitted a report assessing its service restoration efforts undertaken on Long Island for Tropical Storm Irene. The LIPA report was received on November 21, 2011.

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[1] The storm experienced on Long Island as Tropical Storm Irene was experienced in some other locations as a hurricane, and it is referenced as such, for example, in the title of the case which is considering the response to the storm. Since the storm, when landfall was made on Long Island, was a Tropical Storm, it will be identified as such in this report.

[2] See e.g., exceptions in Public Authorities Law (PAL) §1020-s: §1020-cc and Public Service Law (PSL) §3(2).

[3] In addition, the work performed for this review is based on a Work Plan that was developed from a number of inputs, including: the MOU between LIPA and the DPS, Part 105 of the NYS Code; the Contract between LIPA, NYS DPS and Vantage (Contract); the proposal submitted by Vantage; discussions with DPS Staff; a thorough review of numerous reports and documents regarding Hurricane Irene filed with the DPS and other governmental bodies; the results of nearly 100 interviews of LIPA and NG personnel as well as site visits to several work locations; and analysis of 280 data responses submitted specifically for this assignment.

This report's description and analysis of the storm response for Tropical Storm Irene on Long Island is made more complex because LIPA currently contracts with and, at the time of the storm, contracted with National Grid Electric Services, L.L.C. (NG) to operate and maintain its transmission and distribution (T&D) system.[4] This work is performed pursuant to a Management Services Agreement (MSA) which requires NG to, among other things, (i) conduct virtually all day-to-day operations and maintenance of LIPA's electric system, including emergency repairs of such system associated with storm events, (ii) prepare and implement emergency response plans, and (iii) ensure appropriate customer contact through call centers.

It is important at the outset to recognize that references this report makes to LIPA and NG are references to two entities with sometimes distinct, but often overlapping responsibilities. LIPA is a public authority with approximately 100 employees. By design, it does not perform the hands-on day to day activities which would implement storm restoration initiatives. Rather, under the business plan implemented by LIPA, many of these responsibilities are assigned to NG and, by contract, NG has accepted this assignment. In describing the results of the Department's study, this report endeavors to refer to either LIPA or NG or to these two entities together, as appropriate, in order to describe the activities of each.

Similarly, in making recommendations, this report attempts, where possible, to describe those actions which should be undertaken by LIPA and those that would be expected to be implemented by NG. In certain instances, however, it may be unclear which entity should be appropriately referenced. In such cases, reference will not be made to either entity and, ultimately, in the course of implementing the report's recommendations, it will be incumbent upon LIPA to either assume the primary responsibility or assign it to NG.[5]

The Department's review examined: (1) the preparation for Tropical Storm Irene; (2) LIPA's performance in restoring electric service to those customers that lost service as a result of the storm; (3) LIPA's communications with its customers and with municipal and other government officials responsible for responding to emergencies during and after Tropical Storm Irene; (4) the performance of LIPA (and NG) in meeting the requirements of their Emergency Response Plans, and (5) whether modifications to the Emergency Response Plans are needed given their performance before, during and after Tropical Storm Irene. The report sets forth numerous recommendations developed in the course of this review. The recommendations identify actions to be taken by LIPA to

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[4] NG is a subsidiary of National Grid USA formed specifically for the purpose of contracting with LIPA to implement the transmission, distribution and related functions needed by LIPA to operate its electric system on Long Island.

[5] LIPA is in the process of replacing NG as the service provider for the LIPA electric system. As a result, recommendations for future actions which assign responsibility to NG for implementation could also apply to NG's successor. Wherever possible, this review and the recommendations have been developed to be applicable either to NG or to NG's successor, the Public Service Enterprise Group, Inc. (PSEG).

improve its future storm preparations and performance. Of necessity, the report is written to report the facts and circumstances at a particular point in time. The Department recognizes that LIPA and/or NG have undertaken or may be undertaking measures to address areas in need of improvement, including some of the measures recommended herein.

In its analysis of LIPA's or NG's storm preparedness and response, the Department considered the "best practices" it would expect to see from the New York investor owned electric utility companies. In that regard we identified (a) any obvious and material differences in electric emergency response planning, response, restoration and communications (including call center operations) that exist between LIPA and the New York utility industry, and (b) any opportunities for improvements (including but not limited to tree trimming, technical innovations, customer communications, and call center operations) in LIPA's or NG's practices and procedures that could assist in mitigating the effects of storms and unplanned outages, or reduce the magnitude and duration of such storm-induced outages.

Of the recommendations in the report, the most significant relate to LIPA's communication with customers and public officials. Some customers and public officials experienced difficulties in their efforts to reach LIPA by telephone during the storm and the restoration effort. In addition, the content of LIPA's messages to customers did not provide timely and accurate estimated restoration times (ETRs). This was an area of great concern to customers and local officials. As described in the report, the inability to get accurate restoration information was primarily driven by shortcomings in the Outage Management System (OMS) implemented by NG, including its age and the decentralization of the service restoration efforts. LIPA has already started replacement of the existing OMS. It has also implemented interim measures for developing ETRs until such time as the OMS replacement is complete.

Right of Way management and tree trimming practices also contributed to the severity of the outages caused by Irene. In particular, the regular cycle and frequency of vegetation trimming, and keeping to acceptable clearance distances, should be improved accordingly.

TROPICAL STORM IRENE

Irene produced heavy damage over much of New York. Much of the damage occurred due to flooding from heavy rainfall inland and storm surges in New York City and on Long Island. Tropical storm force winds left at least three million residents of New York and Connecticut without electricity. Large-scale power outages occurred throughout New York State including Nassau and Suffolk Counties and Far Rockaway on Long Island. Homes and businesses were without electricity due to the heavy winds knocking down trees, which in turn knocked out many power lines.

Irene hit Long Island during the late evening of August 27, 2011. Its winds of 40-60 MPH for a sustained period made Irene the most powerful and wide-reaching storm to hit Long Island since Hurricane Gloria in 1985. Tropical force winds, heavy rains,

flooding, downed trees, poles and power lines, caused 523,000 LIPA customers to lose their power.

Extensive utility service restoration efforts restored power to all LIPA customers affected by the storm in just over a week. In total, there were approximately 19,000 damage locations responsible for the 523,000 customer outages. In addition to the LIPA/NG workforce, 3,500 off-Island personnel provided assistance to the service restoration effort. To accommodate the expected off-island crews, the utility sought to secure hotel rooms. However, a scarcity of rooms available over the Labor Day Holiday period made this difficult. These difficulties were compounded by the start of the Hampton Classic and the ongoing US Open Tennis Championship. Consequently, with assistance provided by the Red Cross, three temporary shelters at Suffolk County Community College, the Nassau Coliseum and Bay Shore High School provided the capacity to bed over 2,500 line workers and tree trim crews. Numerous material handling sites, used to pre-stage materials, were established throughout Long Island; truck/vehicle staging locations were set up to enable the arriving off-Island line and tree trim crews to receive their safety briefings and their storm kits.

As part of the storm response and restoration effort, over 800,000 outbound calls were made to LIPA customers to manage expectations, to validate outage information, and to provide restoration information as it became available. Over the course of the outage restoration efforts, 900 poles, 1,000 transformers, 80 switches, and over one million feet of wire and cable were replaced.

OVERALL CONCLUSIONS

There are 100 findings and conclusions contained in this report. They describe LIPA's and NG's preparations and response efforts for Irene. There are 51 specific recommendations provided to enhance the emergency planning process.

The report looks at the outage management systems and the emergency planning in place before the storm. It also examines system maintenance practices, vegetation management, storm hardening and other practices necessary to both prepare for and to mitigate the impact of a major storm. During Irene and in its aftermath, much of the public criticism regarding the storm restoration efforts focused on communications with customers, with local emergency responders, and with local municipal officials. Our review indicates that while LIPA/NG performed a number of these communication functions well, performance was inadequate in some areas. Had better communications been achieved with customers and local officials, this criticism might have been dampened, and the positive aspects of the storm response efforts could have been better appreciated.[6]

[6] We note that LIPA/NG has conducted a self-assessment and is implementing system changes independent of the results of this review. The preliminary list of "lessons learned" was received during the preparation of this report.

Inadequate communication and response to customers and local officials is seen as a primary problem for the storm response and restoration effort. The root causes for these shortcomings are complex.

A major issue of public concern was the inability to provide LIPA customers and public officials with accurate and timely ETRs. Without credible ETRs, the communications process did not meet customers', public officials' and municipal expectations. Customers were not able to make adjustments to their day-to-day living requirements without electricity, nor did they have knowledge of when things would return to normal.

In the aftermath of a large storm that does significant damage to a utility's transmission and distribution system, the utility must determine, first and foremost, its strategy for the efficient and effective restoration of the electrical system. LIPA and NG appropriately chose a decentralized approach to restore service. It relied on local control at the substation level for those areas suffering the most damage. To generate ETRs, however, the utility must have good damage assessment information and an understanding of when and where crews are to be available. The ability to improve ETRs depends on better damage assessment information and clear visibility regarding crew deployment. As such, as restoration activities progressed, the ability to generate ETRs improved. LIPA/NG's decision to decentralize control of the restoration was the right decision from a restoration perspective. The lack of ETRs was due to process issues whereby information gathered in the field was not analyzed within the computer system that gathers and processes all outage related data. Essentially LIPA/NG did not have the necessary tools in place for developing ETRs for a storm of this magnitude. This limitation is being addressed temporarily through recent efforts to introduce a "Substation Dispatch Authority" (SDA).

The information contained in the storm report to the DPS reveals that the OMS would not have been able to function well even with a centralized service restoration effort given the high volume of activity and the need for the damage surveys to be completed to link the damage locations with customer locations. One of the most significant problems identified in this report is that the OMS is outdated and the capacity to provide ETRs during a catastrophic event does not exist. A study performed by Navigant Consulting in 2006 recommended that the OMS be replaced due to these very same failings. Despite the recommendation, the system replacement was not made. LIPA has since undertaken replacement of the OMS.

Another significant area of concern was the inability of a subset of customers trying to reach the Call Center and public officials to reach LIPA by telephone during the initial phases of the storm response due to Verizon central office system congestion caused by Irene. Public officials and municipal customers separately experienced problems when they tried to reach LIPA using a confidential, dedicated telephone number, commonly known as the "Muni Hotline". At some point, the hotline number was compromised and was given out to the general public. The unexpected increase in the volume of calls on the hotline meant that many public officials were prevented from contacting LIPA via the Muni Hotline to report road clearance issues and downed wires. In addition, they were unable to obtain current information on the restoration efforts.

The NG Call Center (Call Center) experienced two significant problems during Irene that affected its operations and contributed to customer dissatisfaction. First, a significant number of calls were blocked, early during the storm, from getting through the Verizon central office switch that routes calls to the Call Center. While many calls may have been blocked at the Verizon switch, there was no way of knowing how many were LIPA customer calls to the Customer Assistance Center (CAC). Some callers were unable to reach either the Interactive Voice Response (IVR) or a customer service representative (CSR) until this blockage was cleared. Second, since the Call Center was unable to provide ETRs to most customers, as a result of weaknesses in the process of relating outage information from substations in local control, customers whose calls did get through expressed substantial frustrations.

LIPA's Storm and Emergency Response Policy (SERP), and NG's Emergency Restoration Implementation Plans (ERIPs) had some sections which were in conflict with each other and out of date under the terms of the MSA, as amended.[7]

This review showed that vegetation management, and right-of-way (ROW) practices, contributed to the extent of the storm damage experienced. While outages from trees cannot be eliminated, the review found there are a number of steps that should be taken to lessen the effects of tree-caused outages associated with major storm events.

LIPA uses system reliability initiatives, at both the transmission and distribution level, that consider past data to help drive funding decisions and subsequent reliability program initiatives. The results of pole surveys are not used to establish storm hardening projects. Recommendations from the Navigant Storm Hardening Initiatives Report have been implemented slowly or incompletely. There remain many improvements that could be made at a reasonable cost.

Finally, while LIPA and NG do not appear to have implemented all the lessons learned from past storm experiences, in November 2011, LIPA and NG prepared an extensive, preliminary list of the lessons learned from Irene and immediately began to implement corrective actions. In addition, LIPA and NG reported that they have already conducted a tabletop exercise of their new communication command process in April 2012, and plan to conduct another exercise early this summer, prior to the annual major storm exercise scheduled for the end of July 2012.

RECOMMENDATION SUMMARY

Each chapter of this report contains specific findings and related recommendations. In addition to the chapter recommendations, presented below are the ten overall recommendations capturing the thrust of recommendations contained throughout this report.

[7] The Master Service Agreement identifies the responsibilities of LIPA and NG in providing electric service on in LIPA's service area. LIPA has total control over all customer relations, government relations and media relations functions

OVERALL RECOMMENDATION 1 - Communication with the public should be as high a priority as restoration. LIPA's Executive Management, independently and through its service provider, should drive improvement in the overall communication with the public and instill the increased emphasis on effective communication with the public across the LIPA/NG organization.

OVERALL RECOMMENDATION 2 – An increased focus should be placed on improving the procedures for obtaining and communicating accurate and timely restoration information to all stakeholders during major outage events.

OVERALL RECOMMENDATION 3 – LIPA should assure that the information technology systems used during an emergency, as well as for routine work, are updated to current industry standards.

OVERALL RECOMMENDATION 4 --LIPA should collaborate with municipalities to develop more proactive communications during storms in order to provide a unified message to the public regarding safety and restoration efforts prior to, during, and after an emergency event.

OVERALL RECOMMENDATION 5 – An efficient make-safe process that includes collaboration with utility officials, emergency responders, and public officials should be developed and implemented. Safe energy delivery should be added to the LIPA mission statement.

OVERALL RECOMMENDATION 6 – LIPA should reevaluate and modify its distribution tree trimming policy to meet industry standards. The current clearance and tree trimming cycle is problematic.

OVERALL RECOMMENDATION 7 – LIPA and NG should improve the transmission system vegetation management program.

OVERALL RECOMMENDATION 8 - LIPA and NG should integrate the SERP and the ERIP into one plan; the integrated plan should be reviewed and updated annually for changes in internal and external contact information, procedures, organization, and especially lessons learned from most recent storms. Changes to the emergency plans should continue to be communicated and drilled by employees annually.

OVERALL RECOMMENDATION 9 – LIPA should improve its process for prioritizing its Storm Hardening plan and implementing past storm lessons learned.

OVERALL RECOMMENDATION 10 - Make improvements to field operations as identified throughout this report and LIPA's own Lessons Learned.

II. ELECTRIC OPERATION STORM PREPARATION

In this Chapter, we discuss our assessment of LIPA's and NG's emergency management plans that support electric operations and the preparations that were in place for Tropical Storm Irene. We have asked ourselves the following questions, among others: Were resources and personnel in the right places at the right time? Were sufficient outside crews called in at the correct times? Was there a predetermined work methodology in place? Were there adequate LIPA and NG storm experts available and in place to lead the storm operations? In addition we have considered such things as how the plans were developed and updated; the storm severity levels addressed in the plans; the trigger points for plan activation; the relationship between NG and LIPA; the emergency organizational structures; the storm preparations; the pre-storm damage projections; and the storm training that LIPA and NG employees received .

A. OVERVIEW OF STORM PREPARATION ACTIVITIES

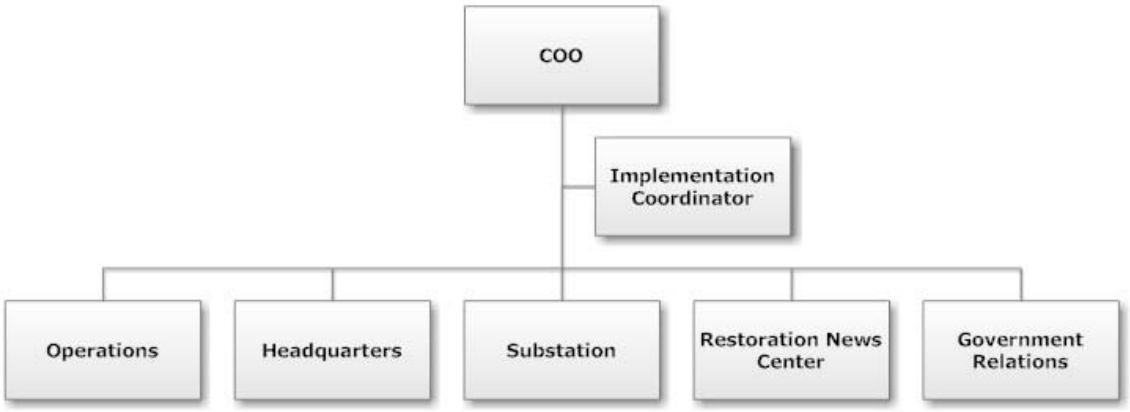
According to LIPA's report to DPS, NG began monitoring Irene on Saturday, August 20 and participated in the National Weather Service conference calls to obtain the latest Irene weather forecast. Irene was forecasted to hit Long Island by the upcoming weekend as a Category 1 hurricane with heavy rain and sustained winds greater than 74 mph. In preparation for the storm, required employees were notified to initiate and complete their pre-storm checklist. On Wednesday, August 24, NG began identifying available crewing and staffing level, and obtaining supplemental contractors. This was done approximately 24 hours in advance of the time required by its emergency plan due to the projected track of the storm and recognition of the anticipated demand for these resources from the other utilities in its path. Request for mutual assistance crews through the New York Mutual Assistance Group began on Thursday, August 25. In addition, the Edison Electric Institute's "Restore Power" website was used to find crews, contractors, and vendors. Verizon was contacted for additional pole setting crews and for a Verizon liaison to be placed in each division headquarters. For the remaining period prior to the storm arrival on Saturday, August 27, NG prepared its facilities to better withstand hurricane winds and rain; pre-storm briefings were held; emergency plans and procedures were reviewed; resources were relocated to best meet the projected needs of the system after the storm; work schedules were determined; and lodging and transportation arrangements were made.

B. EMERGENCY RESPONSE PLANS

LIPA, and NG Long Island acting as LIPA's service provider, both maintain emergency response plans. They are separate plans containing references to one another. LIPA's storm plans are contained in its Storm and Emergency Response Policy (SERP). The SERP contains an emergency organization structure with five primary areas of responsibility reporting to LIPA's Chief Executive Officer. They are:

- Operations
- Headquarters
- Substation
- Restoration News Center
- Government Relations

Exhibit II-1
LIPA Storm Organization



The SERP addresses LIPA personnel functions and responsibilities during electrical system emergencies. It is also used at other times when electric system problems emerge or as warranted to serve customer needs per the direction of LIPA's Chief Operating Officer (COO), with the approval of LIPA's President and Chief Executive Officer (CEO). Such situations may include (and are not limited to) the following:

- Hurricanes
- Ice storms
- Rotational load shedding
- Security alerts
- Other system emergencies

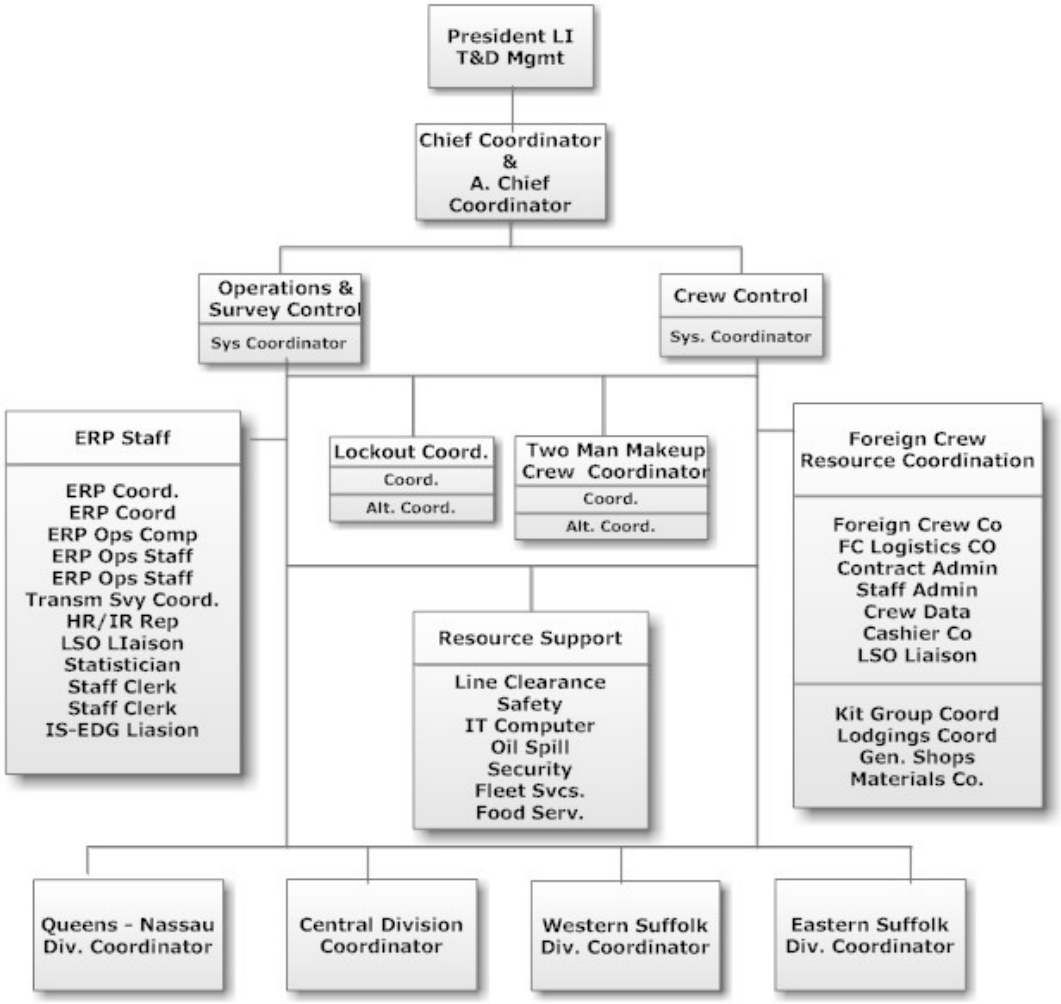
LIPA's emergency response organization does not provide field operations personnel. LIPA's organization and personnel includes its individuals who observe activities from substation locations.

NG's storm plans are contained in its Emergency Response Implementation Plans (ERIPs). These plans are approved by LIPA. NG is responsible for all field restoration activity, including restoration of transmission and distribution lines, customer service lines and removal of fallen trees that impede electric services. The ERIPs address three functional areas:

- Operations
- Communications
- Logistics Support

For Operations, the NG President of Long Island Transmission and Distribution Management is responsible for emergency restoration activities. Reporting to him are a Chief Coordinator and an Alternate Chief Coordinator who also serve in other related capacities. The Chief Coordinator serves as the Operations & Survey Control System Coordinator for the four Divisions. The Alternate Chief Coordinator is the Crew Control Lead System Coordinator. This is illustrated in the following exhibit.

Exhibit II-2
National Grid Storm Organization



Each of the four electric system Divisions (Nassau, Central, Western Suffolk and Eastern Suffolk) has its own Coordinators, Alternate Coordinators, and assigned personnel. The Divisions have Coordinators for:

- Operations Staff
- Line Staff and Crew Dispatch
- Line and Splicing Crew Coordination

- Two Man Make-up Crew Coordination

NG also has a separate U.S. Gas Distribution (GDx) Hurricane Plan. We have reviewed the GDx only as it pertains to the electric distribution system restoration activity related to Irene.

Finding - The SERP needs to be updated.

From its review of LIPA's SERP, Vantage has come to question whether this document has been adequately reviewed for accuracy even though LIPA states SERP is reviewed annually. The SERP makes multiple references to KeySpan, the predecessor to NG. KeySpan was acquired by NG in 2008. While the SERP's references to KeySpan do not, by itself, adversely impact its execution, the obsolete references do bring into question whether the SERP has been completely reviewed and kept current with each annual review.

Finding – The SERP's weather watch and warnings material should be improved.

The SERP has identified a list of actions required once an incident watch or warning has been declared by the Chief Operating Officer, with the approval of the Chief Executive Officer. The SERP's weather watch and warnings criterion (Appendix E.7 of the SERP) comes from the DuPage Meteorological Program. The weather criteria contained in the SERP does not customize or prioritize weather conditions for electric utility operations.[8]

Recommendation - The lessons learned from Irene, previous storms, and future events should be incorporate into the SERP.

The SERP should be updated to reflect the lessons learned from Irene and also those learned from the 2010 March Nor'easter. The SERP is a living document and, as such, should be continuously updated. There is no reason for not updating the plan to reflect LIPA's actual performances in recent situations. LIPA should establish a fixed timeframe (such as 90 days following an event) for including its lessons learned in the SERP.

Finding - The SERP does not adequately address LIPA's role in relation to NG during emergency events.

The SERP states its intended purpose as follow:

"This policy describes the actions that will be taken prior to and during events that could result in a shortage of electric supply, significant service interruptions or sustained high call volume due to system emergencies and other conditions. This policy has been developed with an Operations focus, and with the primary goal of deploying all available resources as quickly and efficiently as possible to respond to our customers' needs."

[8] LIPA SERP, Rev 14, July 2011

The SERP describes, in various places, LIPA's communications with NG personnel during an emergency. However, nowhere does the SERP identify LIPA's key decisions including the approval of supplemental crews for a storm emergency. Instead, these matters are addressed in NG's ERIPs and LIPA's SERP only makes a wide-ranging statement that the applicable NG ERIP should be reviewed as required. By reviewing LIPA's SERP, one would not obtain a full picture of the major responsibilities of LIPA prior to, during, and after an emergency event.

Recommendation – The SERP and ERIP procedures should be merged into a common document which would specifically address LIPA's role in relation to NG during emergency events.

An emergency plan should discuss by title and work group, the critical roles and decisions to be made before, during, and after an emergency. This is important to ensure that there is accountability, no important step is forgotten, no time is wasted on unnecessary activities, or confusion is present during what could be a stressful and time sensitive emergency response. In addition, due to the interdependence of LIPA and NG, the need for one integrated emergency plan to clearly and accurately state what each company's critical responsibilities become even more important. Therefore, the SERP and ERIP should be merged into one document and should adequately address LIPA's role in relation to NG during emergency events.

Finding - NG has modified its ERIP since Irene.

The electric operation changes NG has made to its ERIPs, since Irene, include:[9]

- A new dispatching methodology, known as Substation Dispatch Authority, is being incorporated into the ERIPs, as appropriate. Substation Dispatch Authority will enable damage repair orders from substations to relate to individual customer outages. This will improve NG's ability to provide job level messaging and ETRs to customers early as jobs are analyzed, dispatched and restored.
- NG is working with the State and Counties' OEMs to improve responses during major storm events to manage debris and roadway clearance, and wire down issues.
- An administrative update to the Headquarters ERIPs (Section 1.1) to reflect organizational and title changes. Storm anticipation checklists were also updated to more closely reflect current activities.
- The efficiency of the Foreign Crew Processing Operation is being improved by identifying and establishing a larger processing site and additional resources.

[9] IR 266, ERIP modifications based on IRENE

Recommendation - Develop a procedure to ensure that LIPA and NG employees fully understand the content and uses of the various Emergency Plans.

While the emergency plans are drilled and available to employees, the interviews Vantage conducted at LIPA and NG revealed confusion about the SERP's and ERIPs' plans, details and terminology. The checklists contained in the SERP and ERIPs were understood and used but the other contents of the plans were not.

LIPA and NG maintain a confusing array of emergency plans. In the storm report recently provided to DPS the following plans are identified and discussed:

- Storm and Emergency Response Policy
- Emergency Restoration Implementation Procedures
- Emergency Restoration Operations Manuals
- Emergency Communications Manual
- Logistics Support Emergency Plan

Finding - NG uses a single operations plan across all divisions.

To its credit, NG uses a single operational plan across its entire organization. All levels of the organization, including headquarters, divisions and staffed substations operate from a single plan.

C. EMERGENCY OPERATIONS CENTER PREPARATION

Finding - LIPA's and NG's emergency operations centers were fully operational before Irene impacted Long Island.

The emergency operation centers were open and the LIPA and NG emergency plans were initiated well before Irene's arrival to Long Island. Employees were on alert to make their preparations for extended deployments, to cancel vacations, and to arrange for family needs such as childcare.

NG and LIPA personnel began to monitor Irene on Saturday, August 20. On Monday, August 22, Irene was upgraded to Hurricane and projected to impact the Northeast and Long Island by the weekend of August 27th. Key personnel began to initiate their pre-storm checklists.[10] On Long Island, preparations were not only made for electric distribution but also electric generation and gas operations.

Finding - NG did a good job using written checklists for its emergency preparations but the process can be improved with an electronic checklist.

NG uses written checklists for a variety of its critical storm preparation related activities. The checklists document the actions taken and ensure that critical activities are accomplished under stressful conditions. The checklists are maintained on paper which

[10] IR 10, Actions taken prior to the storm

is an acceptable method. However, it would be better if NG were to use an electronic system that allows its management to view the checklist status, particularly in the field. The paper checklist system could easily be replaced with an electronic version where the entries would be instantly available to management for its review.

Finding - There was variation in the use of the ERIP checklists.

Vantage reviewed the ERIP checklists used by NG during Irene and found that there was considerable variation in the use of the checklists. This is especially true at the Division level.[11] Some Divisions did not complete and document various sections of the checklist fully while other Divisions completed the entire list. Some were completed days or weeks late and all checklists included variation in the terminologies used.

Recommendation - Consider using electronic format checklists during an emergency to facilitate broader management insights and to improve consistency in their contents and their completion.

Emergency event checklists should be used in an electronic format and hard copies should be used only for backup purposes. This would allow management immediate access to observe the checklists and provide it the means to address any inconsistencies in their completion by field personnel. Management could either limit or direct the entries to be made during an emergency event.

D. CREW RESOURCES

Rather than refer to internal and foreign crews which can create confusion, we use the terms on-island and off-island crews. On-island crews are those that perform work on the Long Island electric system daily, even if they are contractors.[12] Off-island crews include the crews that traveled from their normal work locations, even if they were NG employees, to work the storm emergency. NG gas employees who were on the island are considered as internal resources for purposes of this report.

Finding - The ERIP has a standardized damage assessment and resource matrix but it needs refinement.

An important part of emergency preparation is to have action items available that were reviewed well in advance of the event. One such critical item is the projection of the amount of resources that will be required due to various levels of damage. To its credit, NG has a standardized matrix that identifies the total amount of personnel required for any given level of system damage. However, the projected resource types are limited. Since heat, tornado, and snow events require different types of resources, the matrix should be expanded to take this into account.

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[11] IR 10, Actions taken prior to the storm

[12] We recognize that contractors can move on and off the island. This report differentiates between the contractors and crews who were on Long Island immediately prior to Irene.

Recommendation - Improve the ERIP damage assessment and resource requirement matrix by increasing the categorization of event and resource types.

The damage assessment and resource requirement matrix could be improved by adding additional event and resource types to the matrix thus making allowances for the different resource requirements that may be required. For example, a warm weather wind and rain event differs from an early snow or ice storm when there is tree foliage. This enhancement could provide a refinement of the mix and number of tree trimming crews and high voltage linemen. It could also address other resources such as crew guides, wire guards, safety personnel and survey personnel.

Recommendation - Expand the use of contracted resources beyond linemen and tree trimmers to include, for example, wire guards, flaggers, and damage surveyors if internal resources are insufficient.

Our report suggests certain changes that could very well require additional resources beyond those provided internally and considering all the employees on Long Island who provide restoration services to LIPA's service territory. NG should expand its use of contractors and consider additional functions that may be needed, including wire guards, flaggers and damage assessors.

Finding - Merely advancing the resource request timeline may not be sufficient action to secure emergency resources in the future.

During Irene, NG, with LIPA's approval, moved its resource request timeline back from 72 to 96 hours in an effort to secure additional outside resources. While making this a permanent procedure is helpful, it is unlikely to be sufficient in the event of another widespread event like Irene. All affected utilities (including LIPA) competed for the same resources during a widespread storm and they all are likely to move back their timing from having learned their lessons from Irene. As a result, in the next event, utilities will still be competing for the same resources, but even sooner.

Recommendation – LIPA and NG should explore alternative arrangements to obtain and guarantee the availability of additional resources.

LIPA may have to commit to crews even earlier than 96 hours, or arranging for pre-contracted crews on set terms and conditions. Under both of these scenarios, LIPA would incur additional costs whether or not the crews were ever used. The decisions as to when to request and when to deploy foreign crews presents a difficult balancing act for management. A perfect outcome is difficult to achieve for all such events.

Finding - LIPA and NG may be underestimating the potential for future hurricanes and tropical storms to strike Long Island.

During our interviews of LIPA's and NG's employees, we frequently heard that Irene may be a once in a career or lifetime event. It was stated that no storm like Irene had been seen since Hurricane Gloria in 1985. We note that Hurricane Bob impacted the island in 1991 and the period between Gloria and Irene is not a true reflection of the

pertinent history. In the years proceeding Hurricane Gloria, nine hurricane and tropical storms hit Long Island over the course of 31 years as seen in the next exhibit. Five of them resulted in more than 50 percent of the island's electric customers being out of service.[13] That Irene may have been a once in a career event for some employees reflects the storm cycle of recent (last 30 years) but there is no assurance that future storms may repeat a previous storm cycle or present new and differing conditions.

Exhibit II-3
Hurricanes and Tropical Storms Impacting Long Island

Date	Name of Storm	No. of Customer Interruptions	Percentage of Total Customers
08/54	Carol	358,000	82%
09/54	Edna	161,000	37%
10/54	Hazel	192,000	44%
08/55	Connie	215,000	46%
09/60	Donna	354,000	60%
09/61	Esther	351,000	58%
11/68	"X"	188,000	25%
08/71	Doria	350,000	44%
12/73	F e l i x	327,000	39%
08/76	Belle	533,000	61%
09/85	Gloria	750,000	78%
08/91	Bob	478,000	47%
08/11	Irene	523,000	48%

E. ALERT LEVELS AND DAMAGE PREDICTION

The ERIP includes three alert levels for the emergency responses:

- Condition "White" – Normal operations and/or minor storms. Long Island's Electric Transmission & Distribution (T&D) Operations are able to affect repairs to the system with minor assistance from the Overhead/Underground (OH/UG) Lines Department.

- Condition "Blue" – Long Island's Electric T&D Operations requires substantial assistance from other organizations.

- Condition "Red" – Widespread damage is anticipated or is actually occurring to the electric T&D system. The Emergency Restoration Organization (involving

[13] State of New York Department of Public Service, Hurricane Gloria and the Power Outage on Long Island, February 1986, Pg. 3

virtually all company personnel) needs to be mobilized and assistance from outside line crews (contractor or other utilities) will be required.

The "Condition Red" alert level activity, and the decision making process for LIPA/NG, is covered in ERIP 1.1.4 Command and Control. Responsibility for declaring a "Condition Red" resides with the President of LI Electric T&D. The Chief Coordinator makes the public declaration with the President's approval.

Finding - The alert levels in the ERIP are appropriate.

The three alert levels in the ERIP differentiate emergency conditions in a meaningful way. Each level triggers suitable activities and procedures. The SERP and the ERIPs identify the specific action items that should occur as a result of declaring a "Condition Red."

Finding - NG has a very rudimentary damage prediction model.[14]

NG has a basic damage predication model that relies on the history of past storm and the company's experience. The model uses the restoration times achieved in past storms to estimate the potential damage impact and gross restoration times for various storm levels. The inputs to the damage predication model are shown in the exhibit below.

[14] See, IR 61, Damage Prediction Model.

Exhibit II-4
NG Storm Prediction Inputs

Storm Name/Type	Dates	Customers	% Customer Affected	Duration (Days)
Hurricane Doria (Cat-1)	8/28/71	349,000	44%	3.5
Hurricane Belle (Cat-1)	8/9/76	533,000	61%	4.7
Tropical Storm David	9/6/79	216,000	23%	2.5
Hurricane Gloria (Cat-1)	9/27/85	750,000	78%	11.6
Tropical Depression Hugo	9/22/89	107,000	11%	1.7
Hurricane Bob (Cat-2)	8/19/91	478,000	47%	4.7
Tropical Storm Floyd	9/16/99	149,000	14%	1.5
Tropical Depression Ernesto	9/2/06	134,000	12%	2.7
March Storm	3/12/10	269,000	24%	7

This approach adds an objective assessment to the damage prediction process. The approach could be significantly expanded, with no incremental cost, by using existing public and internal data.

Recommendation - The content and source components of the damage prediction model should be expanded.

The data content and information sources for the NG damage prediction model should be expanded. This can be accomplished by using historical data for Long Island and internal records. The model could include additional weather events; categories of events (ice, wind/rain); and, the actual damage experienced to the electric system for items such as poles, transformers and wires. The use of this additional information is simply an extension of the existing spreadsheet. Vantage is not suggesting that any more complicated or expensive model be used. To the contrary, we would recommend against using a complicated algorithm and systems analysis. While some very sophisticated models are currently being developed, it is unclear at this time whether they provide any better predication capabilities than the kind of model that NG currently employs. The model's use should also be stated in the ERIPs as part of the standard processes.

Recommendation - Continue to monitor damage prediction model developments.

Vantage does not recommend either the purchase or implementation of a sophisticated damage prediction model, at this time. However, advancements are continuously being made and they may coincide with other improvements being considered for the LIPA distribution systems (i.e., Geographic Information System, Outage Management System, smart grid and others). These other system upgrades and improvements could enable LIPA to leverage and obtain a sophisticated damage prediction model in the future. We

recommend that LIPA track such developments and consider whether any such system leverage should be achieved.

III. STORM RESPONSE

After assessing the pre-storm planning, storm preparations and the emergency structure for an adequate storm response, we examined how well the plans were executed. The result of this examination is presented in this Chapter. We considered such questions as: Was field checking commenced immediately? Did advance training prove to be effective? Did outside crews receive proper and timely briefings on material locations and delivery procedures? Were tag out and clearance procedures adequately addressed? Were there predetermined work methodologies, such as circuit sweeping? Was the productivity of the work crews measured and did they meet the expected levels of performance? Were there adequate numbers of LIPA and NG experts available to lead external crews? Were there any safety issues or injuries incurred by workers or the public?

In this Chapter, we also consider the effectiveness of LIPA's OMS which was used to manage outages and to establish the best plan for returning the greatest number of customers to service as soon as possible. The algorithm (artificial intelligence) used by the OMS was evaluated for its effectiveness. We also considered whether there was any need for a back-up procedure for the OMS.

A. OVERVIEW OF RESTORATION ACTIVITIES

After Tropical Storm Irene left Long Island on Sunday, August 28, 523,000 customers lost power and a small portion of which was restored immediately through switching activity. As shown in the Exhibit below, the Eastern and Western Suffolk divisions had the most customers without service.

Exhibit III-1
Customer Outages and Damages by Division[15]

Division	Total Number of Customers Served	Total Number of Customer Outages	Percentage of Customers Outages	Damages
Queens-Nassau	207,652	62,630	30%	1,601
Central	286,808	119,607	42%	6,950
Western Suffolk	314,954	175,401	56%	6,026
Eastern Suffolk	274,782	165,362	60%	4,349
Total	**1,084,196**	**523,000**	**48%**	**18,926**

Damage assessors were dispatched accordingly to determine the extent of the damage to LIPA's system on Sunday, August 28. Contractors and crews that were staged from

[15] LIPA report to DPS

Saturday, August 27 were also dispatched and assigned jobs by priority level and to quickly restore the most customers. Combinations of on-island, off-island, mutual assistance, Verizon, and Long Island Rail Road crews allowed NG to restore all customers by its global estimated restoration time of Monday, September 5 or in approximately nine days. There were 61 transmission lines out of service causing the loss of energy supply to 22 substations. In total, there was damage to approximately 900 poles, 1,000 transformers, and 80 switches. Over one million feet of wire and cable were replaced. Many damages to the system were caused by down limbs or trees. There were no reported major injuries to the public or to field personnel as a result of LIPA's facilities.

B. DAMAGE ASSESSMENT AND WIRES DOWN

Damage assessment is essential to accomplish a safe and efficient restoration. The assessment is the first field mobilization effort that follows a storm event when it is safe to begin outdoor operations. Damage assessment typically occurs in multiple stages. In its initial stage, the field personnel quickly ascertain the amount of damage and the locations where available resources can be applied quickly to restore electricity to the maximum number of people. In a second, and sometimes a third survey, ongoing efforts continue to identify the damage incurred on the electric system.

The Operations and Survey Control Group within the Emergency Response Organization is responsible for the damage assessment surveys. This group was activated on Sunday afternoon, August 28, to perform damage surveys. LIPA, in its report to DPS, states that 1,400 field damage assessors/survey personnel were deployed. However, LIPA's response to Vantage Information Request 32 indicates that only 1,185 assessors/surveyors were assigned on August 28 and no more than 1,056 of them were actually deployed.[16] Helicopter patrols began on Monday, August 29, and continued on Tuesday, August 30. These patrols focused primarily on the transmission system.

The damage survey performed by LIPA and NG was conducted using two-person teams that traveled in vehicles and on foot. The survey teams collected the damage information for the primary and secondary conductors on the circuits. Their surveys recorded the damage locations and identified the materials and equipment needed to repair the damage at each location. The damage information is recorded on documents that are then entered into CARES (Computer Assisted Restoration of Electric System). CARES is a part of the OMS used by NG. The total survey personnel, deployed by day and by Division, are shown in the Exhibit below.

[16] IR 32, Survey personnel by day and division

Exhibit III-2
Survey Personnel by Day and Division[17]

Date/Time	Queens	Central	Western	Eastern	System-wide
8/29/11 6:00	231	296	288	241	1056
8/30/11 6:00	206	300	284	239	1029
8/31/11 6:00	227	292	268	230	1017
9/1/11 6:00	219	287	275	221	1002
9/2/11 6:00	124	315	241	188	868
9/3/11 6:00	89	304	215	142	750
9/4/11 6:00	92	303	226	112	733
9/5/11 6:00	99	265	229	115	708

Damage assessment initially performs a rapid survey to:

1. Quickly locate the first fault affecting a feeder that is not in service to which a crew is dispatched as its initial assignment.

2. Swiftly locate the first load-side fault on an energized circuit that caused an Auto Sectionalizing Unit[18] to operate.

3. Locate the damages on each distribution circuit's three-phase main and branch lines without fuses to allow the Electric Service Department to direct repairs or decide to turn a substation to local control.[19]

NG's procedures for damage assessment are contained in various sections of the ERIPs including:

- ERIP 1.3.1 Activations and Preparation for Survey and Local Control
- ERIP 1.3.2 Conduct of Rapid Survey – Substation
- ERIP 1.3.4 Conduct of Emergency Restoration Survey
- ERIP 1.3.8 Survey Team instructions
- ERIP 1.3.10 Reporting and Documentation – Forms

The wire down process is also presented in ERIPs 1.3.2, 1.3.4 and 1.3.8. Guarding down wires are handled by survey crews.[20] NG does not have any personnel dedicated

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[17] IR 32, Survey Personnel by day and division

[18] An Auto Sectionalizing Unit is a device, usually a switch, which detects faults and automatically isolates a section of the system.

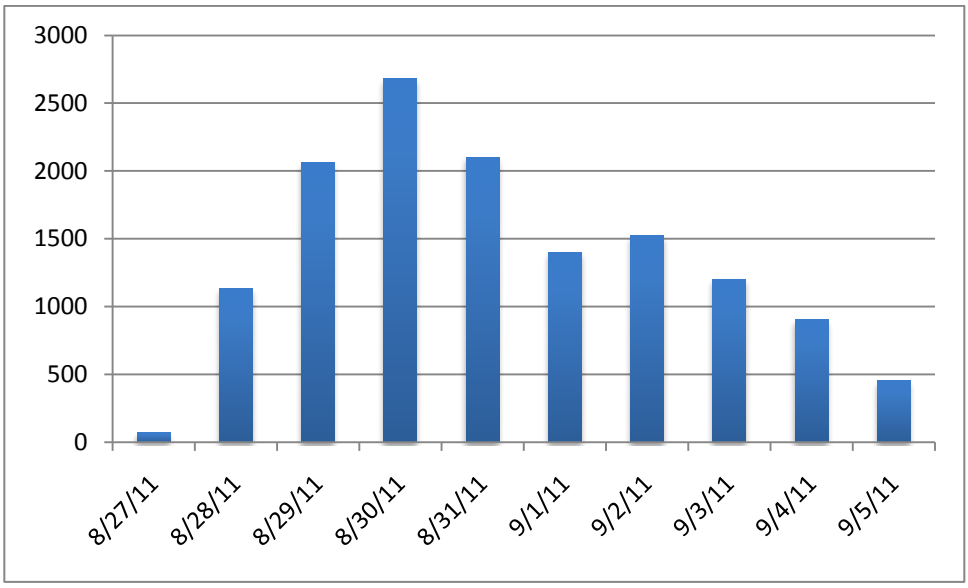
[19] IR 7, ERIP 1.3.2

[20] IR 27, Management of Wires Down

exclusively to wire guarding even though eliminating unsafe conditions is the first restoration priority listed in the ERIP. [21]

In total, NG received 13,544 reports of wire down. Only 5,953 of them were electrical wires. The others were either telephone or cable wires.[22] The wire down reports peaked on the August 30 and they declined steadily thereafter. The following Exhibit shows the reports of wires down by day.[23]

Exhibit III-3
Total Wire Down Jobs by Day



With safety being paramount, customers are strongly encouraged to report all incidents of wires down. Police, fire fighters and municipal employees are trained to assume that a downed wire is energized. The following Exhibit shows that on August 30 and 31 over 1,300 non-outage wire down calls were received.[24]

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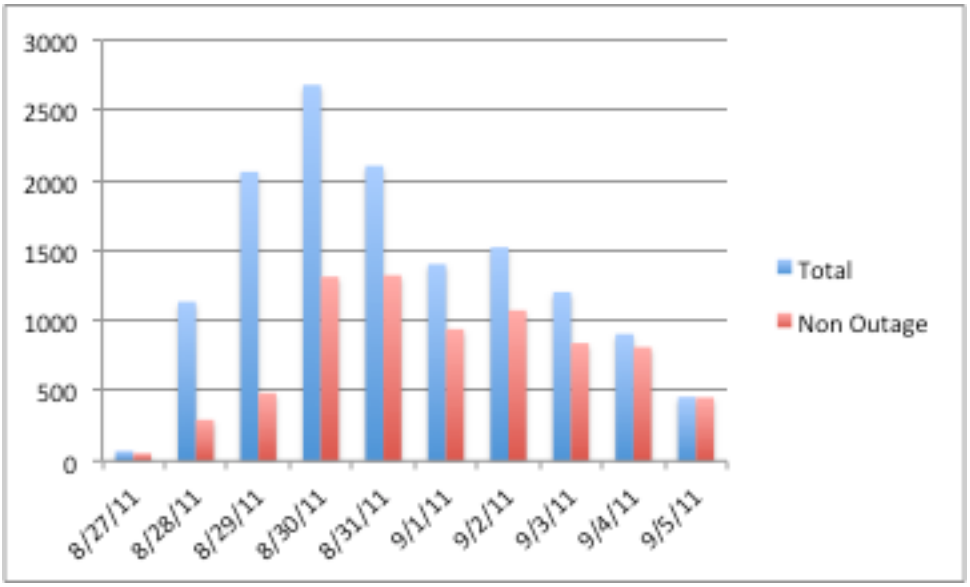
[21] ERIP 1.2.8 and 1.3.6

[22] IR 33, Number of wires down

[23] IR 33, Number of Wires Down

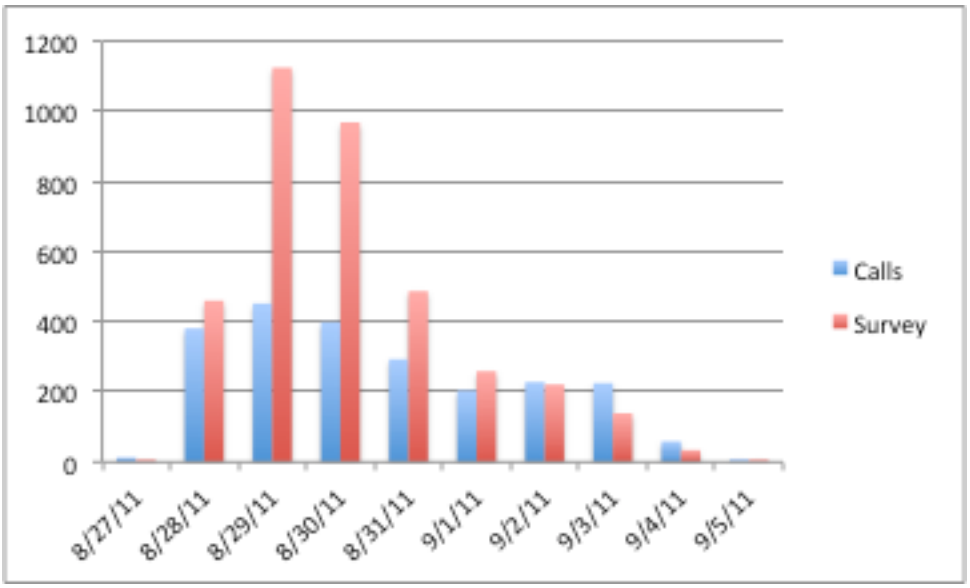
[24] IR 33, Number of Wires Down

Exhibit III-4
Non-Outage Wires Down and Total Wires Down



The outage jobs generated by customer calls and the results of surveys are shown in the next Exhibit.

Exhibit III-5
CARES Outage Jobs Created



Finding - The damage survey process was deficient.

Following Irene, damage assessment delays occurred. In various instances, the delays were due to failures in the execution of the restoration plan. Oft times, multiple and compound performance failures contributed to the delays.

The greatest hindrance to the damage survey process was due to LIPA's and NG's failure to use a clear and well-defined wire down and debris removal process. Ideally, cutting tree limbs and clearing them from electric facilities—coupled with wire guarding and flagging operations – enables survey personnel to remain focused on and dedicated to their damage survey work. During Irene, the damage surveyors who came upon hazardous conditions had to remain at the danger points until they could be relieved. Additionally, surveyors relieved first responders, police officers or fire fighters, when they came upon such damage. There are several problems with this process:

- It inserts first responder responsibilities into the damage assessment process;
- Damage assessments halt until a wire guard is positioned on site;
- Damage assessors, in some instances, do not have the proper training and experience needed to assess hazardous situations properly;
- Damage assessors sometimes do not have any caution tape to use to mark off danger areas even though the ERIP instructs them to have this inexpensive and easily stocked item as long as it is available; [25]
- Damage assessors remain responsible to complete their surveys on time;
- Damage surveyors delayed the submission of their damage findings due to blocked roads. At times, the roads were blocked because local municipalities were waiting for electric wires to be cleared from tree debris on the road.

Damage survey personnel work two per team for safety and to allow for a patrol of many of the LIPA T&D system along highways. While this practice can provide some efficiencies—particularly when surveys can be performed by a moving vehicle—this practice essentially reduces available survey staff by half. We question the wisdom of this approach when there are insufficient survey teams to patrol all circuits; even if damage is found on highways, it is necessary at times to pull over to fully record all damage at a location; additional safety measures can be put in place to ensure the safety of surveyors as is done by other utilities that use individual damage surveyors; and surveyors productivity is hindered by also assuming a site safety role.[26]

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[25] ERIP 1.3.2, Section 5.1.2(h).

[26] ERIP 5.1.3 states: "Assign each Survey team a circuit. There are typically fewer Survey teams allocated to each substation than circuits. Assign those circuits with lockouts or major outages first. Survey team members will split up and leave one member on site in particular circumstances. "This essentially halves the number of survey crews.

Finding – The need for wire guard resources slowed damage assessment efforts.

With NG's practice requiring damage surveyors on patrol to remain with and not leave a hazardous situation until relieved by a NG employee or a municipal officer, damage assessments efforts were delayed when damage surveyors (usually a two person crew) comes upon a dangerous situation. Few damage surveyors have the technical operations experience needed to address hazardous conditions.

Recommendation - Implement a process and staffing for a wire guarding function to relieve survey crews of this function.

NG should have a wire guarding/flagging process in place with associated personnel to relieve survey crews from performing this function, thus enabling them to focus on the damage survey. Flaggers and wire guards can be provided either by employing contractors or by switching from two-person to one-man crews. These persons could then serve as wire guards without impeding progress on the damage survey.[27] If contractors are employed, they would need to receive safety training and process briefings. However, the training required for wire guards is far less extensive than that for survey crews. The benefits to be obtained from planned enhancements to the damage survey process will be partially negated if survey crews continue to be required to serve as wire guards.

In addition to the creation of a wire guard position, a procedure should be adopted to incorporate the cut and clear process and the wire guarding functions into the emergency management plans. Following the Incident Command Structure, this would likely mirror existing operations in that wires down would be a division function that could also operate at a substation level with reports ultimately up to the Emergency Operations Center.

Finding - There is confusion about the purposes served by the various types of surveys identified in the SERP and ERIPs.

There are at least five damage assessment survey terms identified in the ERIPs. They are:

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[27] Wire guarding is the common term used in the electric industry and also throughout this report even though the ERIPS describe indirectly, in several places the position as wire watching:

ERIP 1.3.4.5.5.4: If adequate steps cannot be taken to exclude people from the area, one member of the Survey team, as a precaution, should stand by the hazard to warn the public of the situation. There is no formal wire watching pool to draw upon. Wire down tickets are created at the Division headquarters and sent to the substations either manually or through messenger per ERIP 1.3.5. These are then assigned to a survey team.

ERIP 1.3.5.5.5.2b: For those with an immediate hazard, assign to a Survey team.

ERIP 1.3.4 5.5.6: If necessary, use any available person in the substation to replace the Survey team member that is standing by the hazard.

- Localized Severe Damage Survey ERIP 1.2.22
- Standard Storm Survey ERIP 1.2.22
- Rapid Survey ERIP 1.3.2 and 1.3.8
- Detail Survey ERIP 1.3.2
- Restoration Survey ERIP 1.3.4

There is a different survey terminology that is used for Condition Blue and Condition Red incidents. The last two surveys listed above are used during Condition Blue events when surveys are not handled through substations. The last three surveys are used during Condition Red events when surveys are handled through substations staffed with Substation Area Coordinators (SAC) and by Alternate Substation Coordinators (ASAC). The LIPA SERP makes references to these ERIP damage assessment surveys.

Not surprisingly, the SACs, ASACs and damage assessors expressed confusion with the purposes and intents of the various surveys, even the surveys listed above that would be handled by these personnel.

Recommendation – Clearly define and train employees on the damage survey and restoration processes.

The damage survey, and other restoration processes detailed in the emergency response plans, should be described better, and the terms used for the processes should be combined or better differentiated to avoid confusion. Field emergency personnel should be trained on the improved procedures and the correct terminology.

Recommendation – Employees should be surveyed for sources of potential confusion about damage surveys to inform and improve future training.

A simple questionnaire regarding the damage survey process should be administered to all survey personnel to address apparent confusion about the types of surveys and their uses. A questionnaire administered to all survey personnel would quickly determine if there is any true confusion that should be corrected by additional training and changes that could be made to the ERIPs terms.

Finding – LIPA and NG can make better use of technology to improve the damage assessment process.

The damage survey process relies on the use of paper documents and maps. Manual processes are employed to enter survey data from paper documents into the OMS. The data is entered into the system by an operator at a substation or at a division control center. NG does not use handheld devices, smart phones or tablets either to input data or to provide maps to surveyors. LIPA and NG have not leveraged any Geographic Information Systems (GIS) capabilities into the existing OMS. The system continues to rely on paper maps and the internally developed grid system.

Recommendation - Use available technology to interface handheld electronic devices with the new OMS project.

LIPA is implementing a new OMS as part of a broader system. The new OMS is due to be implemented by the end of 2012. LIPA should maximize the use of new technology and available interfaces with the new OMS. Specifically, it should make use of hand held devices or tablets for survey data. By inputting data directly into the handheld device, it can either be uploaded in real time or be stored for future processing. LIPA should further investigate the use of such electronic devices by surveyors with information including maps, ERIPs, and system and component descriptions.

Based on preliminary descriptions and interviews, the new OMS[28] has the capability to utilize these features.

Finding – NG had no "cut and clear" or other make safe process during Irene.

In response to Vantage Information Request (IR) No. 9, LIPA states that "there are no procedures for "cut and clear" operations…."

Instead, a piecemeal approach is used internally and with municipalities to address these types of jobs. The lack of a coordinated process to address wire down reports is a dangerous practice. It is also inefficient and contributes to customer frustration and poor coordination with municipalities. Inefficiency was evident following Irene by the fact that wires down reports continued to be received long after the event occurred.

Other electric utilities place a high degree of emphasis on clearing wires down. For example, Consolidated Edison's report to DPS states:

> "*Con Edison typically utilizes Control Center emergency operations personnel (Troubleshooters) to perform the vital public safety function of clearing downed wires. Due to the severity and quantity of tree-related damages to the electric distribution system and blockage of vital public thoroughfares, all Company crews, including overhead and line clearance crews, were initially assigned to clear downed wires and to coordinate rapid restoration opportunities (switching) prior to effecting full reconstruction and restoration work.*"[29]

Recommendation – LIPA/NG should develop a comprehensive wires down process making it a top priority.

LIPA/NG should develop a process to collect, manage, and dispatch the assets needed to address wires down. Wire down jobs should be either assigned to a crew/service man or be given to a wire guard. Also, there must be coordination among location and the status of wire guards to ensure that tickets are cleared and guards are provided relief. There should be a centralized point of contact with local police and fire departments, and municipal road crews requesting that lines down be cleared. The

[28] OMS is a function contained within a much larger system being implemented.

[29] Consolidated Edison 16 NYCRR – Part 105 Compliance Filing, Attachment A, and pgs. 13-14

practices and procedures for wires down should be documented and detailed in the SERP and the ERIPs. Resources should be allocated to clear wires down as the top priority.

C. Line and Tree Trimming Resources

NG used five different field personnel for the storm restoration process.

1. High voltage overhead personnel install, maintain, and repair the transmission and distribution system. They are considered line workers.

2. Electric service personnel maintain and repair the electric distribution system only. They are considered line workers.

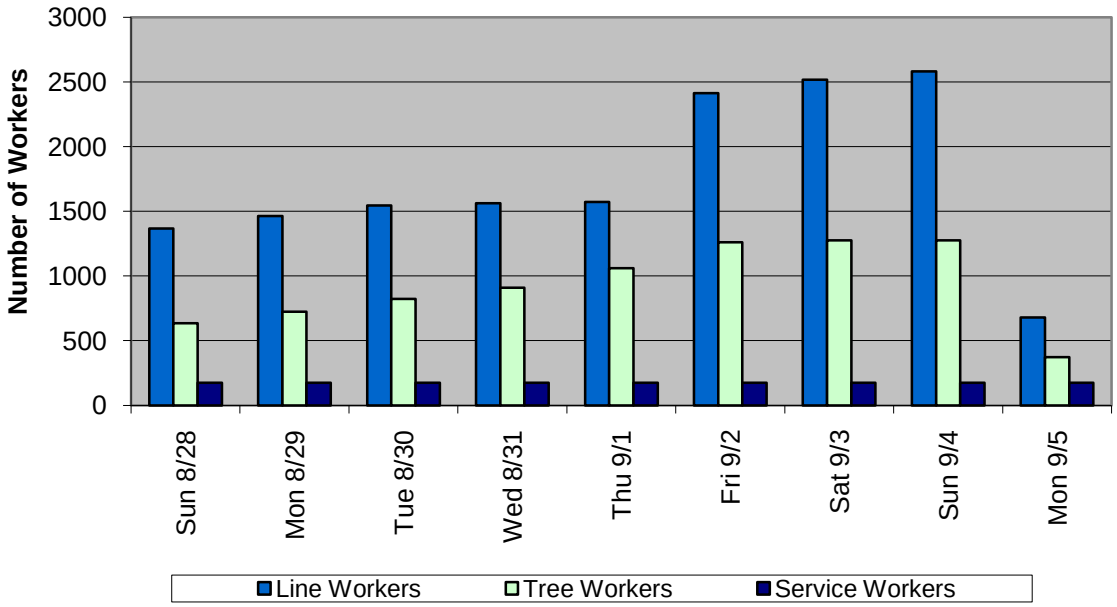
3. Underground personnel repair the high voltage and low voltage overhead distribution system during storm restoration. They are considered line workers.

4. Two man make-up/secondary personnel repair and replace overhead house service drops. They are considered service workers.

5. Tree trimmers remove damaged trees from the transmission and distribution system.

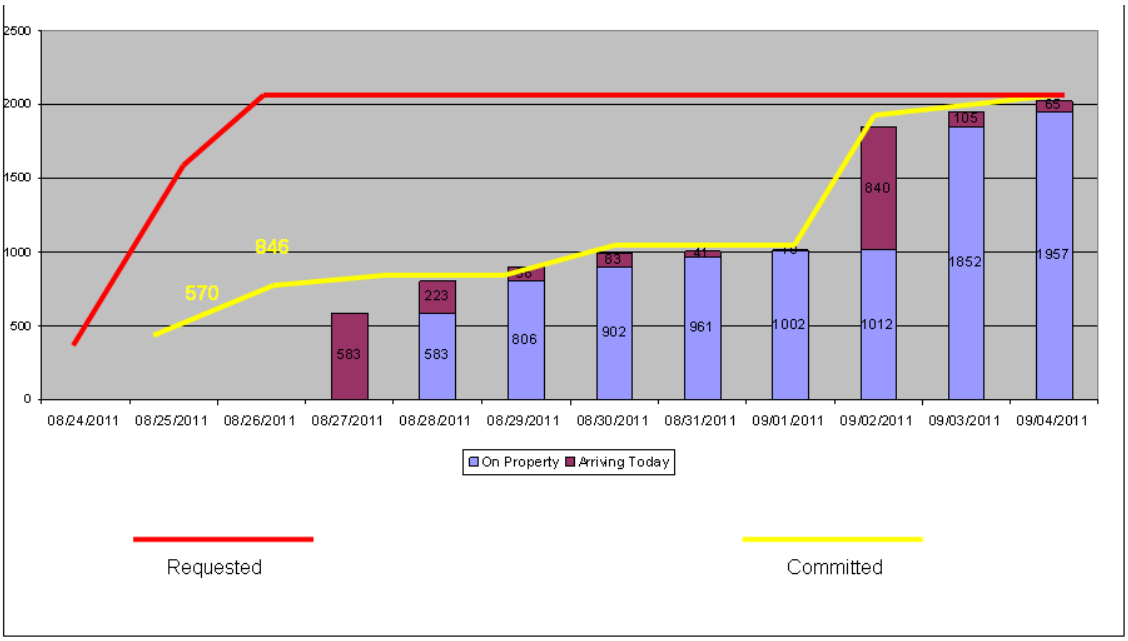
NG mobilized approximately 4,050 of these field personnel. Only about 950 of them were on-island personnel (764 linemen and 184 tree trimming) and about half were foreign linemen as illustrated in the two Exhibits below. Although NG requested over 2,000 foreign linemen on Friday, August 26, majority of these linemen did not arrive until the last few days of restoration when utilities began to release more field personnel.

Exhibit III-6
Restoration Personnel Available to LIPA[30]



[30] IR 38 and follow-up email on June 20, 2012 to DPS staff.

Exhibit III-7
Foreign Crew Linemen[31]



Finding – LIPA and NG made efficient use of other NG on-island resources that may not be available after the NG contract expires.

During the storm, NG used its other personnel on Long Island who do not normally work on the electric transmission and distribution system to assist in the restoration effort. The personnel came from its natural gas operations, shared services organizations, and from NG's electric generating stations. The staff was put to work in the Call Center; they worked as two-man make up crews; played the role of SACs, ASACs and PC Operators; and in logistics and in pole delivery. In addition to the advantage of their proximity, these personnel were pre-trained in the restoration process and were familiar with the geographic areas if not with the electric system.

Finding - Two-man make up crews have different skill sets that provide an effective resource but their capabilities need to be specified to improve planning and deployment.

Two-man make up crews are assigned primarily to work on low-voltage facilities. They are staffed by personnel who do not normally receive electric distribution assignments. This is an efficient use of an available resource; however, there are considerable differences in the skill set of these crews**.** Some crews, such as those familiar with

[31] LIPA report to DPS

substations, are highly skilled. Others, such as those coming from the natural gas operations, are not as skilled but they are well trained. Thus, not all crews are capable of performing the same types of work. Further crew differentiations would aid in the deployment of the makeup crews to where they can be most useful.

Recommendation - Differentiate the two-man make up crews by their skill sets to make for a more effective deployment.

The two-man make up crews should be differentiated by their respective skill sets to allow for a more effective deployment.

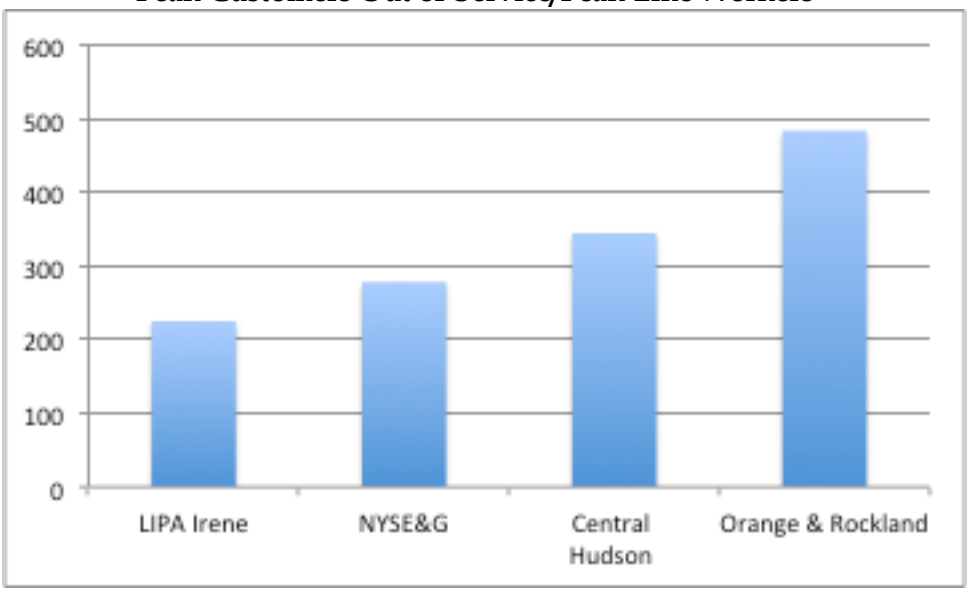
Finding - LIPA had authorized a large number of line resources available for the number of peak outages.

Considering the number of line workers deployed and number of customers out of service at the peak of the outage, LIPA had authorized more line workers than three other New York utilities that were also impacted by Irene. However, approximately half of these resources were not available until later in the restoration period. This is shown below in tabular and graphic form, in the next two Exhibits.

Exhibit III-8
Peak Customers Out of Service per Line Worker

	LIPA	NYSE&G	Central Hudson	Orange & Rockland
Customers out per line worker	225	278	345	484

Exhibit III-9
Peak Customers Out of Service/Peak Line Workers[32]



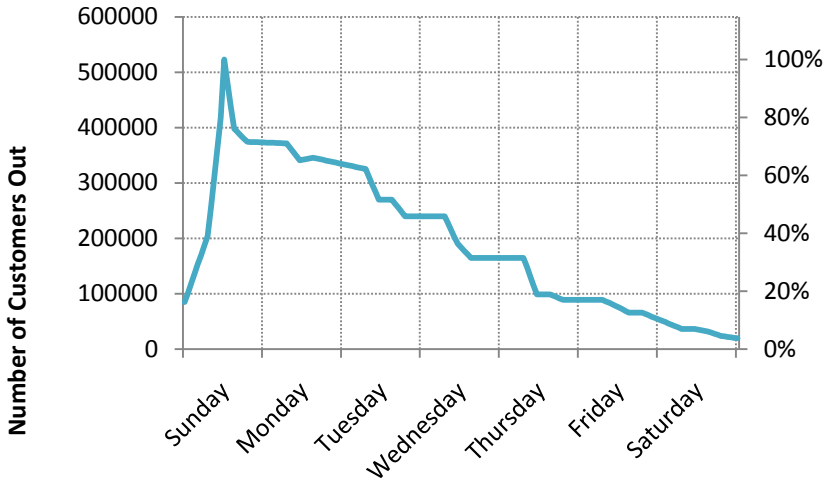
D. RESTORATION PROCEDURE

The NG restoration process was based on the priority levels set in its emergency plan. Transmission level repairs were among the first priority and were done in conjunction with distribution level repairs. In general, according to NG emergency plan, restoration work should be prioritized by safety concerns, feeder outages, and the return of the maximum number of customers to service. In addition, when possible, critical facility customers receive restoration priority in the following order: hospitals; other medical facilities; sewer pumping stations and treatment plants; police, fire and water companies; and life-sustaining device customers.[33] Of the 523,000 customers that lost electric service, approximately 90 percent of LIPA customers were restored by Friday, September 2 and all customers were restored by Monday, September 5. The next Exhibit shows the number of LIPA customers without electric service for the main restoration period of the Tropical Storm Irene event.

[32] Consolidated Edison's electric network operates in a fundamentally different environment than those of the other New York utilities. As a result, its statistics are not included here.

[33] ERIP 1.2.8 and ERIP 1.3.6

Exhibit III-10
LIPA Customers Affected by Day[34]



Finding - Customers unfamiliarity with NG's restoration approach and practices during Irene contributed to customer anger and frustration.

During Irene, NG kept to a standard industry practice which was to restore service to the greatest number of customers as quickly as possible. This process involves the continuous repositioning of crews to ensure they are working on a job attributed with the largest number of outages. This means that work crews could be in a neighborhood to restore a primary conductor and they would leave when the job was completed to work on another primary in another area. Customers in the first area where the primary was restored may still be without service if their outage were also the result of damage that remained to be addressed on the secondary system. This approach, seeking to restore the greatest number of customers as soon as possible, maximizes work efforts on primary facilities responsible for serving large areas.

As a result, customers whose outages are also the result of secondary or service damage, and not only primary, will see crews leave their area while they remain without power. This is a source of frustration and confusion for customers.

Recommendation – LIPA and NG should educate customers on its approach for performing restoration in major events.

LIPA and NG should alert customers, early during a major event, to the most significant outage causing locations and inform customers about their approach to restore service quickly to the greatest number of customers. The use of this approach would require significant amounts of upfront communication with local officials and education for the

[34] IR 89

public. Information must flow to customer service representatives who respond to customers. They must be aware of the locations where crews are working a circuit sweep and where they are not. Municipal officials must be made aware, in ongoing discussions, of how the service restoration process will work. This level of education and communication would reduce the likelihood of customers and municipal officials calling the utility to ask why trucks and crews are leaving without having restored their service.

E. DIVISION AND LOCAL CONTROL

Day to day outages affecting a small number of customers or slightly more extensive emergency events are managed at the Division level control center. The four Division control centers (Nassau, Central, Western Suffolk and Eastern Suffolk) are designed to keep system management spans of control over geographic areas at a reasonable level. Survey and repair crews are dispatched from the Division control center with full functionality from the OMS.

NG may elect to manage major service restoration activity for some portions of the system by transferring restoration control to substations when Division level control becomes unmanageable. This is referred to as "local control" and it is employed for those areas where there is extensive damage and off-island crews are to be deployed. In these instances, it would be impractical to use their OMS in Divisions to control all crews and jobs. The decision to place a substation in local control must be approved by the Chief Coordinator or group coordinators at the Division. Local control substations are managed by a SAC and by ASACs who can either assist the SAC or assume responsibility as a need arises. Substations can be manned and yet continue in Division control.

Finding – Division control centers had limited ability to provide estimated restoration times until damage surveys were completed and jobs dispatched.

The primary outage management system (CARES) used in Division control centers can be used to help associate jobs with customer outages. The process is referred to as polygoning. Polygoning is the process of looking for a pattern of customer outages and grouping the customers with the same assumed cause of outage. This function is performed by dispatchers in the Division control centers manually.

For the restoration jobs managed by the Division control centers, the Division had limited ability to determine estimated restoration times for customers until damage surveys were completed and hand polygoning was able to link the repair work locations with customers without electric service. The work assignments were entered into the CARES system, crews were dispatched, and completed work was entered into the system. In many instances, this process was not completed until the fourth or fifth day after significant repair work had begun. About 75% of the LIPA system was managed by the Division control centers.

Even when only a small number of outages and jobs are experienced, LIPA's OMS is not able to predict the causes contributing to the outages. The information that CARES

provides is just the starting point for a crew to begin to locate the cause for an outage. Neither does the OMS provide actual customer information associated with an outage. As stated above, dispatchers must do their polygoning manually. This is in contrast to a more modern OMS that does such work automatically. The newer systems enable dispatchers to provide ETRs when they assign jobs and adjust as needed once a crew arrives on site and have assessed the damage.

Finding - Substations in local control had very limited ability to communicate estimated restoration times to customers.

Local control substations could not provide ETRs to customers. The substations assigned work by damage locations. These locations could not be identified with individual customer outages. Even when a substation was in a position to estimate the time of completion for the work location, with the inability to polygon in substations, there was no way for the substation to tie this information to actual customers without electric service. In addition, the CARES substation module did not communicate with the primary system. [35] This prevented the Division control centers, and the customer service representatives, from readily knowing the status of the jobs being managed by the substations in local control. Until restoration management was returned to each of the four Division control centers (when repair work significantly decreased), obtaining estimated restoration times for customers served by the substations under local control was not possible. Thirty-six of the distribution substations in the LIPA system, or 25% of the system, were under local control and unable to provide ETRs until day 7-8 of the restoration.

The following Exhibit shows the number of substations in local control, by day. These substations were in the Suffolk and Nassau counties.

[35] CARES stands for Computer Assisted Restoration of Electric System. This 25 year old outage management system is discussed in greater detail later in this Chapter.

Exhibit III-11
Substations in Local Control[36]

Date	Local Control
8/28/11	22
8/29/11	41
8/30/11	41
8/31/11	41
9/1/11	36
9/2/11	36
9/3/11	34
9/4/11	1
9/5/11	0

Finding - Many substations only had dial-up internet access.

Many substations only had dial-up internet access that did not provide sufficient bandwidth to send and receive data to and from the substation. Some substation coordinators used their own company issued aircards to send and receive information. In those instances in which substations did have Ethernet access, it is not clear which of them was given the highest priority to receive high speed data. Internet access to the substations was also impeded by the fact that many of the company's aircards had expired which rendered them useless. Improvement in this area was a Navigant recommendation from 2006.

Finding - Ancillary equipment at some substations was inadequate.

Equipment, such as printers and fax machines, were not always available or working at some of the substations in local control. This interfered with the paper ticket process used in the restoration efforts. One substation coordinator reported having to purchase a printer from a local office supply store.

Recommendation - Communication links and ancillary equipment used for SAC duties should be updated and maintained at all substations.

LIPA and NG have undertaken to upgrade the communications facilities located at the substations. This is a high priority item that should be completed before the upcoming hurricane season. In addition, a complete inventory of printers, faxes and related supplies should be kept and should be upgraded and replaced, as necessary.

F. OUTAGE MANAGEMENT SYSTEM

The CARES OMS that was in place at the time of Irene is a mainframe based, COBOL language, legacy program that is approximately 25 years old. CARES plots customer outage and field survey damage information on a graphical map of the network. During

[36] LIPA report to DPS

normal operating conditions, and minor storms, telephone calls providing outage notifications with similar outage times (and a common protective device) are grouped together to create the outage jobs that can be dispatched. As survey damage information becomes available it is linked to the job to which it is associated. The outage jobs are arranged in a dispatch system by job type and they are assigned to crews.

As storms intensify and produce large numbers of damage locations and customer service outages, this outage identification and response method becomes unmanageable. During a major storm event, it is not uncommon for customers to lose their service due to multiple damage locations. Also, separate damage locations may affect customers in close proximity to one another in the same neighborhood. During such events, the primary method used to create dispatch jobs is to link groups of customers by their common protective devices. For the major storms, field survey information is needed to identify the protective devices since customer telephone calls do not fully aid the process.

In response to Irene, surveyors were mobilized and they patrolled 9000 miles of circuitry to complete a damage assessment of the entire system. According to NG, in all cases (both areas in local control and those managed at the Division), damage information was entered at the substation. In the areas where the crews were managed by the Division, damage information was analyzed and then used to dispatch jobs at the Division control center. For those areas in local control where restoration activity was managed at a substation staffed with restoration crews, the damage tickets provided by the assessment crews were received by the substation. The damage information was used to dispatch jobs from these substations. In the latter part of the storm restoration, when the remaining amount of work had become more manageable, the damage data from the substations was consolidated within the OMS used by the Division control centers. This permitted increased public access to the outage data. [37]

Finding - The CARES outage management system lacks many features required to manage a large scale event.

CARES has been modified and customized over its many years to serve LIPA's and NG's requirements. As with many older OMS, it may have been adequate for day to day operations and small scale outages. However, as demonstrated by Irene, it lacks the ability to manage large scale outages and it is not a platform that can take advantage of current advances in technology. For example:

- There is no GIS connectivity even though LIPA and NG now have GIS data for its system.
- The system is a mainframe based COBOL application. Mainframe based systems are rapidly being replaced because its main programming language used is COBOL. COBOL programmers are increasingly difficult to locate given the age and obsolescence of this computer language.

[37] IR 58

- The system was patched together over many years and was not designed as a comprehensive system.

Finding - The CARES system did not cause restoration delays but it contributed to communications issues and the lack of estimated restoration times.

The CARES system is outdated; it lacks expansion capability and it needs to be modernized. However, the system, by and of itself, did not cause service restoration delays. CARES, like many OMS of its generation, is essentially a trouble ticket reporting and dispatch system. In a major event, the restoration process put into place for damage assessments minimizes the use of the system. Nonetheless, CARES contributed to the problems with estimated restoration time problems and communications with the Divisions, headquarters and others. Most notably, customer specific ETRs were not available until well into the restoration efforts.

The Interim Solution – Substation Dispatch Authority

Substation Dispatch Authority (SDA) is the term that has been used to describe the changes and enhancements that have been made to the CARES system following Irene. The primary objective of the SDA has been to enable substations in local control to provide customers with job information, including ETRs when available. It has also included the provision of reverse messaging capabilities providing the ability to verify customer service restorations and to make broadcast telephone calls when jobs have been dispatched and completed from a substation. Additionally, the Customer Assistance Center will now be able to access outage information and respond to customers using the screens and views that are available to them during routine operations.[38]

Finding - Substation Dispatch Authority is a positive interim step to improve ETRs but training and education is required.

The SDA should remove one of the problems encountered by NG during Irene—the substations in local control that could not provide customer level ETRs. During our interviews, we detected some misunderstandings and confusion about SDA. NG and LIPA should address any such confusion over SDA as part of training and drilling on the new process.

The New OMS

A new OMS is currently being customized and implemented. It is part of LIPA's Enterprise Information Management strategy and Technical Design Architecture. This is an integrated and standards-based approach being used for a multitude of critical systems and related infrastructure. The vendor for this project is EFACEC ACS and LIPA is using its PRISM OMS solution. ACS operates on a worldwide basis and it provides a variety of information system solutions in areas related to a modern OMS,

[38] IR 255 CARES Modifications

including supervisory control and data acquisition (SCADA), Distribution Automation Energy Management, and Simulation and Optimization.

The new OMS is expected to improve outage restoration efficiency during normal and severe operating conditions. It is also expected to enhance customer communications. The expected improvement to outage restoration include better damage assessments based on field surveys and better quality information to optimize crew assignments, material needs, and to report business intelligence.

Among the customer communication improvements that are expected from the new OMS are the ability to provide customers, and key stakeholders, detailed restoration information, including damage cause information, ETRs, and crew status. The new OMS will be an integral part of a broader LIPA solution that will provide customer access to relevant information through the media of their choice, including service representatives, IVR, the Web, text, mobile, and social media. The enhanced communications system will provide information on the extent of the outages and number of customers impacted. It will have the ability to sort information by local municipalities, and manage access to information by various users, including the media and municipalities. The new OMS will be able to interface with existing customer outage communications technologies, including IVR, texting, iFactor outage maps, customer callbacks for accurate restoration estimate, and two-way mobile data systems so field crews can transmit updated data to the OMS. Thus, the OMS should be able to sort and report outage information by local towns and villages and not just by circuits.

The new system will deliver all the existing CARES functions and enhancements to process all system-related electric service requests related to outages, non-outages, flicker, wires down and tree trimming activity. It will also have a customer complaint tracking system that will be delivered after the initial deployment. The new functionalities to be provided by the system include the detailed modeling of connectivity; automatic customer outage groupings (based on calls or field survey); more accurate identification of affected customers to better prioritize restorations and track crews; map overlays; extended reporting for improved customer information and restoration; and, support for substation surveys, restoration, and mobile survey technology (to follow in a later phase).

The new OMS project is currently under development. The project schedule is as follows:

Exhibit III-12
LIPA's Initial OMS Implementation Timeframe[39]

Development	Jan 2011 – Jun 2012
(Vendor and Service Provider detailed Requirements and Specifications, Preliminary and Detailed Design, Modeling 980 feeders)	
Mobile solution	Mar 2012 – Jul 2012
Factory Testing (FAT)	Feb 2012 – Jun 2012
Mobile solution	Jun 2012 – Jul 2012
Site Acceptance Testing (SAT) Note: Schedule subject to be adjustment based on results of FAT	Jun 2012 – Aug 2012
Transition	Aug 2012 – Oct 2012
Production	Nov 2012 – Dec 2012

Finding – The lack of a modern, fully automated Outage Management System meeting industry standards was one of the biggest shortcomings in the storm restoration effort. It precluded the proper communication of restoration information to customers and government officials. Navigant consultants, in 2006, recommended the implementation of a new OMS but it was not done.

Finding - LIPA is taking steps to minimize the risks associated with introducing a new OMS implementation; however it will likely take several years to be fully functional.

The new OMS project will impact and involve a number of related systems and processes. The description provided in budget documents, in part, states:

> The new OMS is designed to share with other critical systems, for example, integration infrastructure, Network Model Management module, new Outage Database, Switching module/functionality, Visualization module/functionality, Business Intelligence tools/solutions, and other modules and functionalities required for system operation.[40]

[39] IR 215

[40] IR 216, OMS Budget

The concept and approach being used by LIPA is consistent with the use of modern outage management systems which are, in fact, modules rather than stand alone systems. This implementation involves a number of system changes and interfaces, all of which must ultimately mesh. This presents some degree of risk to LIPA which it acknowledges and is managing. As LIPA states the implementation strategy includes steps to minimize risks of accelerated deployment; for example, leaving CARES largely intact as a fallback.[41]

Finding - Major problems in the outage management process need to be addressed.

There are major issues concerning the outage management process that contributed to the communication problems seen during Irene. The process problems, if not corrected, will minimize the effectiveness of any new outage management system regardless of its capabilities. These problems include:

- There were physical communications failures at various substations.
- There were delays experienced in the damage assessment process.
- There was inconsistent information provided in damage reports.
- A manual, paper-driven damage assessment and work assignment system was used.
- There were no computerized work management capabilities available, such as a Resource Management System, or an electronic Damage Assessment System and Damage Inventory system integrated with the new OMS as recommended by Navigant in 2006.

Recommendation - LIPA should adopt estimated time of restoration guidelines similar to those advanced by the Department of Public Service.

The DPS has established minimum requirement guidelines for electric utilities for global and more granular estimates of ETRs. As part of the SDA project and the new OMS implementation, LIPA should adopt minimum requirements similar to those advanced by DPS and should include them in its emergency plans and procedures.

[41] IR 215

IV. COMMUNICATIONS

A. BACKGROUND

This Chapter reports on outbound and external communications - media relations, government relations and customer communications. While some inbound and internal communications matters are touched upon in this Chapter, they are fully addressed in the next chapter.

Effective communications are essential when a utility is confronted with a major outage. Good communications are critical to the successful restoration of power following a storm. Communication links must be established with individual customers, customer groups, government officials, emergency management offices and first responders, and with the media. Each of these segments presents unique requirements for message contents, timing and frequency. Customers want to let the utility know that they are without power and they want to know when their power will be restored. Likewise, utilities require the customer information to adequately understand the full extent of an outage. Local public officials also help to report wires down and road clearing issues and thereby promote public safety. They also want to know when the utility is going to restore a safe environment for their constituents. And, the media wants regular updates on the utility's restoration efforts.

LIPA's communication activities during Irene included:

- 876,644 customer calls received between August 28 and September 2[42]
- 7 press conferences[43]
- 11 press releases
- 22 operations calls[44]
- 1,594 calls processed by Room 210 (the location where public officials' calls, critical care facilities and major accounts are handled)
- 6,200 calls received at LIPA headquarters[45]
- 673 contacts from 42 media outlets
- 194 media calls made
- 871,934 visits logged to LIPA's website
- 789,851 interactions posted on Facebook
- over 1,000 Twitter tweets

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[42] DR #111

[43] DR #6

[44] DR #49

[45] DR #101

For a storm like Irene, it is imperative that a well-integrated communications organization be quickly assembled and that the staff has the capability to address and manage the activities listed above. Well established and fully documented emergency communication policies and procedures are necessary to differentiate roles and to set individual responsibilities. Due to a fire in LIPA's Hicksville offices, the communications for Irene had to be performed at three locations (two in Hicksville and one in Melville). As it did prior to the fire, the Restoration News Center or "media room" operated out of National Grid's Hicksville office.

The Customer Contact Center operated out of the Melville Call Center. The Customer Contact Center managed customer messaging. LIPA's senior management for customer relations, who are responsible for the messages conveyed to the public, operated out of the Customer Contact Center.

The Communications Coordination Center (informally referred to as "Room 210") operated out of this Hicksville office. This group was responsible for maintaining communications with public officials, critical care facilities and major account customers. Temporary space had to be added to Room 210 during the outage. Not all the personnel assigned to this location could be accommodated and two adjoining rooms were needed. The dispersion of the three communication operations to three separate locations added to the challenges that management had for this crucial function.

Communication preparedness began with the approach of Tropical Storm Irene. The pre-storm procedures are provided in the following NG ERIPs:

- 2.1.1 - Chief Communications Coordinator Room 210 Implementing Actions
- 2.1.2 - Communications Group Room 210 Notifications
- 2.1.3 - Activation and Deactivation of Room 210
- 2.1.4 - Activation and Operation of Government Affairs in Room 210
- 2.1.5 - Room 210 Customer Relations Operations
- 2.1.6 - Emergency Communications to Electric Accounts
- 2.1.7 - Major Storm Communications Coordination
- 2.2.4 - Communications with Life Support Apparatus Customers
- 2.3.1 - Activation and Operation of the Customer Assistance Center During Emergency Conditions
- 2.3.2 - Call-Out Administrator Instructions

LIPA's pre-storm messages to customers focused on safety and they advised customers how to best prepare for the upcoming hurricane and an extended outage. These messages were provided using several communications media. They were posted on LIPA's website; safety information was reinforced during the storm event.[46] The website also provided hurricane preparation tips.[47] In addition, LIPA sent faxes to

[46] DR #6 and 137

[47] DR #137

customers and placed telephone calls to public officials and government agencies to advise them of the approaching storm and the need for them to maintain contact with LIPA during the event.[48]

Phone calls were also made to customers on life support equipment to advise them of the need to take precautions and make plans in the event of a power outage at their residence.[49] Major account and critical care customers were contacted and advised to make hurricane preparations and to promote safety.[50] Utility workers received emails and phone calls providing their schedules and work assignments in the event of an extended outage.[51] The pre-storm communications and messaging were performed in accordance with established procedures, with one exception—the communications with customers on life support equipment. This matter discussed further below.

During the outage, LIPA's messages to customers emphasized safety and provided updated information on the service restoration efforts. By participating in the utility's operational calls, the employees responsible for developing the messages obtained useful information to share with customers. The operational calls typically began with a safety reminder and they proceeded to a weather update; a report on the number of customers out of service; and, the current status of resources deployed. In addition, telephone participants for the functional areas involved in the restoration efforts provided updates for their respective organizations. These included the following areas:

- Generation
- Natural Gas
- Information Services
- Logistics
- Major Accounts
- Call Center
- Government Relations
- Emergency Preparedness
- Media
- Employee Communications
- Environmental, Health and Safety

Seven operational calls were conducted before the storm and all functional areas participated in the calls.[52] The pre-storm calls allowed LIPA to coordinate and manage its efforts in preparation for the approaching storm. During the restoration effort, operational calls were conducted twice daily. In total, eighteen calls were held during

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[48] DR #135

[49] DR # 138, 139 and 140

[50] DR #124 and 265

[51] DR #124

[52] DR #49

this period.[53] These calls were the principal means used to coordinate the restoration effort and to keep all groups informed on the status of the restoration effort. Thus, the information gathered during the operational calls provided the basis for the development of LIPA's messages to customers.

Approximately one-half hour after each operational call, a communications coordination call was held. The participants on this call included representatives from the Call Center, media relations, Employee Communications, Operations, Information Systems, government relations, major accounts and others assigned to Room 210. The primary purpose of the communications coordination call was to ensure that the communications team received the operational information and a consistent message could be developed and communicated to everyone outside of the utility organization.[54]

During the restoration efforts, LIPA headquarters employees received and responded to telephone calls placed to its 1-877-ASK-LIPA telephone line. Similarly, LIPA headquarters employees received and responded to telephone calls placed to its main office general number. During this period, LIPA Headquarters received and answered over 6,200 calls.[55] Most of the calls came from customers who wanted to report their service outage and wanted to obtain an ETR.

The Call Center is a key component of the communications process. It is located in Melville and it can accommodate up to about 320 positions. To assist the Call Center in processing of the anticipated call volume due to Irene, the high volume Interactive Voice Response (IVR) system provided by 21st Century Communications (TFCC) was activated.[56] On Sunday, August 28, the Call Center received over 350,000 calls; for the period from August 28 through September 4, 909,250 calls were received.[57]

The Call Center served as the hub for LIPA's active outbound calling effort that was used to notify customers of restoration activities and to provide updated ETRs when they became available. The outbound calls were generated by 21st Century IVR and Global Connect[58]; however, the messages were generally prepared by NG and approved

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[53] DR #49

[54] Interview #1 and 14

[55] DR #101

[56] DR #102

[57] DR #111. In the following chapter of this report, we discuss how the Call Center functioned throughout the storm response.

[58] Both 21st Century and Global Connect are third party vendors that supply telecommunication services to LIPA.

by LIPA. The following table shows the volume of outbound calls and the basic messages that were provided.[59]

Review of LIPA Response to Tropical Storm Irene

Exhibit IV-1
Outgoing Calls

Date	Message Summary	Calls	Call Success
8/29 - 8/30	Aware of the outage, crews working in the area and expect most customers in the area to have power restored by end of the week.	108,819	75,075
8/31	Aware of the outage, crews working in the area and expect most customers in the area to have power restored by end of the week.	473,653	361,975
9/1	Power has been restored but if not call the LIPA 1-800 number.	154,761	121,206
9/2	Power has been restored but if not call the LIPA 1-800 number.	22,222	17,973
9/3	Power has been restored but if not call the LIPA 1-800 number.	24,017	21,280
8/28 - 9/4 CARES Calls	Your power has been restored.	31,124	20,993
8/28 - 9/4 CARES[1] Calls	The job to restore your power has been dispatched and your power is expected to be restored within 6 hours.	136	94

[1] CARES is the acronym for Computer Assisted Restoration of Electric Services which is the outage management system.

A "call success," as shown in the table above, is either a personally answered call or a call where a message was successfully left for the customer. Approximately 76% of the outbound calls were successfully delivered.

LIPA maintained extensive communications with public officials in its service territory. The service territory consists of two counties, 13 towns and 194 villages, including two areas within the political boundaries of New York City.[60] LIPA was assisted by NG and it adhered to established emergency procedures for its communications with municipal officials. Communications with local counties, cities, villages and towns are set forth in the following NG emergency procedures:

[59] DR #95

[60] DR #5

- NG ERIP 1.1.9 - Information Reporting to Communications Organization, LIPA and RNC
- NG ERIP 2.1.1 - Chief Communication Coordinator
- NG ERIP 2.1.2 - Communication Group Room 210 Notifications
- NG ERIP 2.1.3 - Activation and Deactivation of Room 210
- NG ERIP 2.1.4 - Activation and Operation of Government Affairs in Room 210
- NG ERIP 2.1.7 - Major Storm Communications Coordination
- NG ERIP 2.2.3 - Receiving and Processing Municipal Calls
- NG ERIP 2.4.1 - Communications Group Organization
- LIPA SERP

Communications with local government officials began a few days before Irene reaching Long Island. NG ERIP 2.1.4 provides a checklist for the Director of Government Relations. One of the Director's designated actions is to provide the LIPA and NG Government Relations' staffs their instructions for calling their assigned contacts whose names are maintained on a list used for this purpose.[61] The information included in the messages sent to the local government officials was approved by LIPA.

In addition to the pre-storm calls made to the government officials, a letter from the LIPA Chief Operating Officer was faxed to the local officials.[62] The letter contained information on Irene's progress and it described the manpower and supplies that were ready for service restorations. The letter also advised public officials to have their constituents call the LIPA 1-800 number to report an outage. Further, the letter informed the public officials that LIPA would activate its Communications Coordination Center, Room 210, on the morning of Sunday, August 28. The hotline number for municipal officers was provided, cautioning that the number was for use only by public officials and it was not for the general public to use. This proviso was reiterated in the subsequent letters that LIPA faxed to the public officials and municipalities. During the restoration effort, regular communications were maintained with public officials and municipalities through the use of daily faxes containing updated information on the current efforts.

B. LIPA'S COMMUNICATION ORGANIZATIONS

LIPA and NG closely coordinated their communications to customers and other stakeholders to ensure continuity and consistent messages. LIPA had ultimate responsibility for customer relations, government relations and media relations. NG provided valuable assistance with tactical customer messaging and technical message content.

Ideally, management of the system restoration efforts needed for a major outage event, like the one caused by Irene, should be placed into an Incident Command Structure, which we consider to be the preferred approach. Key information used to manage and

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[61] DR #132

[62] DR #135

report on the restoration efforts should flow to a centralized location that is also responsible for all storm-related communications functions. This arrangement provides synergies and the ability to manage these functions well. It ensures that a consistent message is communicated.

The NG ERIPs recognize that LIPA Executive staff for Operations and Customer Service directly participate in all of the overall Storm Response activities conducted, and that LIPA has direct responsibility for approval of messaging through the key communication channels. NG has responsibility for providing essential background information, assistance in crafting the messaging, delivery of the messaging, providing technical content for messaging and detailed message content and development (e.g. CSR talking points). A communications group taken from both LIPA's and NG's personnel was assembled to perform the communication duties specified in Section 2 of the NG ERIP.[63] The ERIP provides reporting relationships among the assigned personnel. Three key NG communication positions have responsibilities that include coordination with LIPA representatives. They are the:

- Chief Communications Coordinator
- Director, Government Relations
- Emergency Planning Room 210 Liaison

LIPA also maintains a Storm and Emergency Response Policy (SERP) for remaining personnel working in LIPA's headquarters to manage calls that LIPA may receive, as well as field oversight functions, media and government relations. The SERP states the LIPA personnel's primary functions and responsibilities during an electric system emergency. The SERP requires all LIPA storm personnel to familiarize themselves with the relevant NG ERIPs and to perform their duties in compliance with their procedures. LIPA personnel are assigned to one of five teams and each team has an Executive in Charge (EIC). The following are the five teams and their functions:

- The Operations Team obtains the latest available information on the status of the electrical system, including the number of customers out of service, for use in the updates made to the core message.
- The Headquarters Team maintains such normal business operations as payroll, accounts payable, and wire cash management.
- The Substation Team is responsible for checking the status of substations, the NG regional operation centers, and staging areas. It reports their condition to LIPA's senior management.
- The Government Relation Team provides updates to state and local agencies. During Condition Red, this team shares information and receives inquiries from elected officials as well as highway/DPW and other operational departments of townships and villages. It responds to inquiries from the agencies and maintains contact with Emergency Operation Centers (EOCs) that are staffed by NG

[63] The communication section of the ERIP consists of eighteen items. The number 2 starts each item, *e.g.*, ERIP 2.4.1, entitled "Communications Group Organization," lists the positions in the organization and describes the responsibilities of each position.

representatives to coordinate assistance and the allocation and placement of restoration resources. NG staffs the New York City, Nassau and Suffolk County OEM's with personnel mostly from its legal department.

- The Restoration News Operation (RNO) Team develops, in concert with LIPA senior management and the Chief Communications Coordinator, a core message for distribution to all LIPA Teams. The RNO Team is also responsible for responding to media inquiries, conducting news briefings, monitoring news sources for accuracy, and updating restoration news and the information that appears on the LIPA website. The RNO also assists the Government Relations Team to maintain contact with state and local government agencies.

Finding - LIPA's requirement to review and approve all messages hindered effective communications.

LIPA is ultimately responsible for the customer relations, government relations and media relations and the effective performance of these functions during a major outage event is crucial. However, LIPA's requirement to approve all communications with customers, government officials and media creates a bottleneck through which all communications must pass. This practice ensures a high degree of coordination and consistent messages but it is also inflexible and can hinder the flow of useful information to customers.

Finding - The command structure for the storm communication function is not clearly delineated or understood by some who have significant communication roles.

During the course of our review, we were provided LIPA's SERP, NG's ERIPs and a document describing the NG Emergency Restoration Organization.[64] The following two charts are from NG ERIP 2.4.1 and page 5 of the NG Emergency Restoration Organization document, respectively.

[64] DR #3

Exhibit IV-2

ERIP 2.4.1 Communications Group Organization

(July 2008) Attachment 2, Revision 9

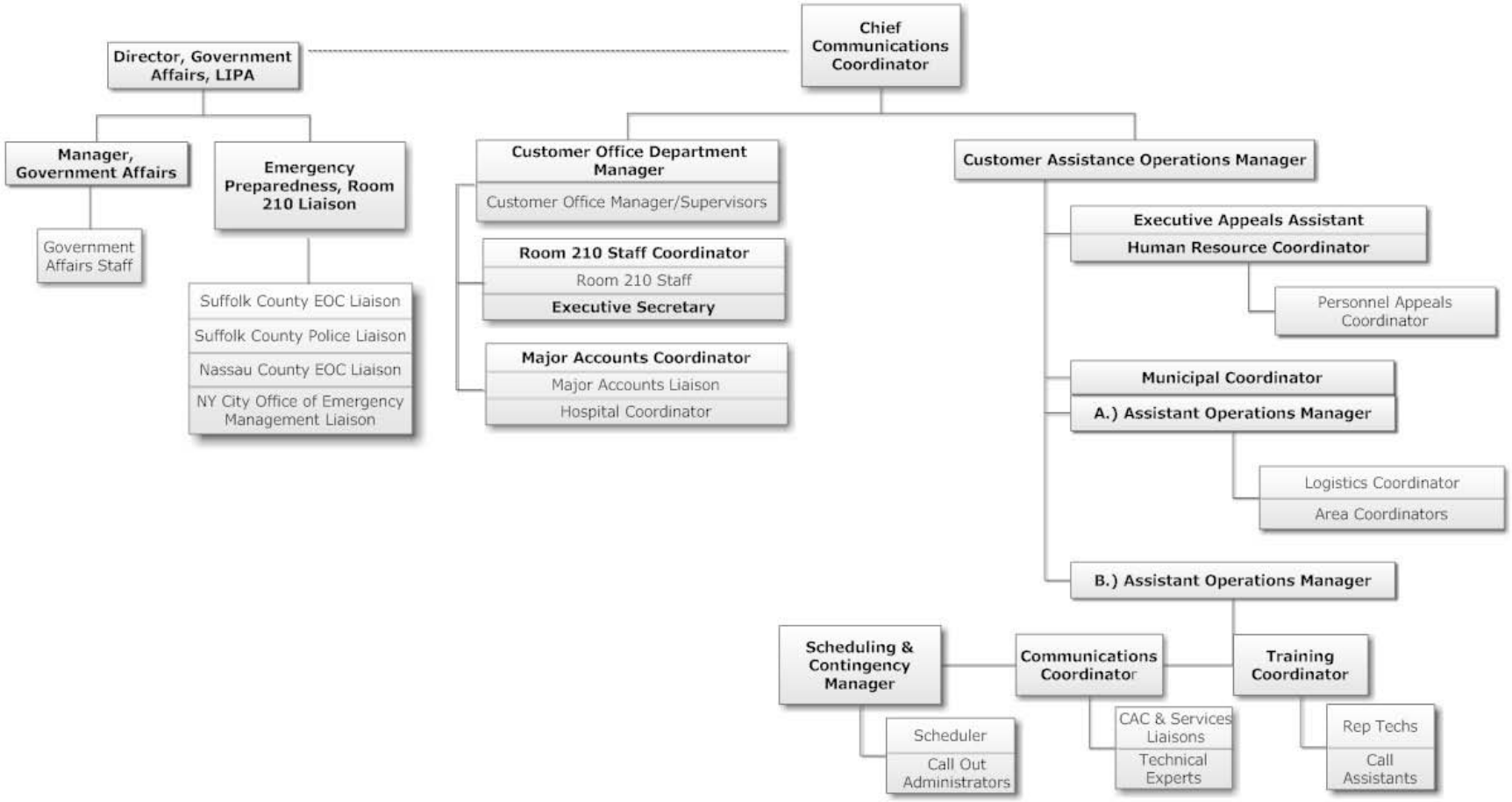
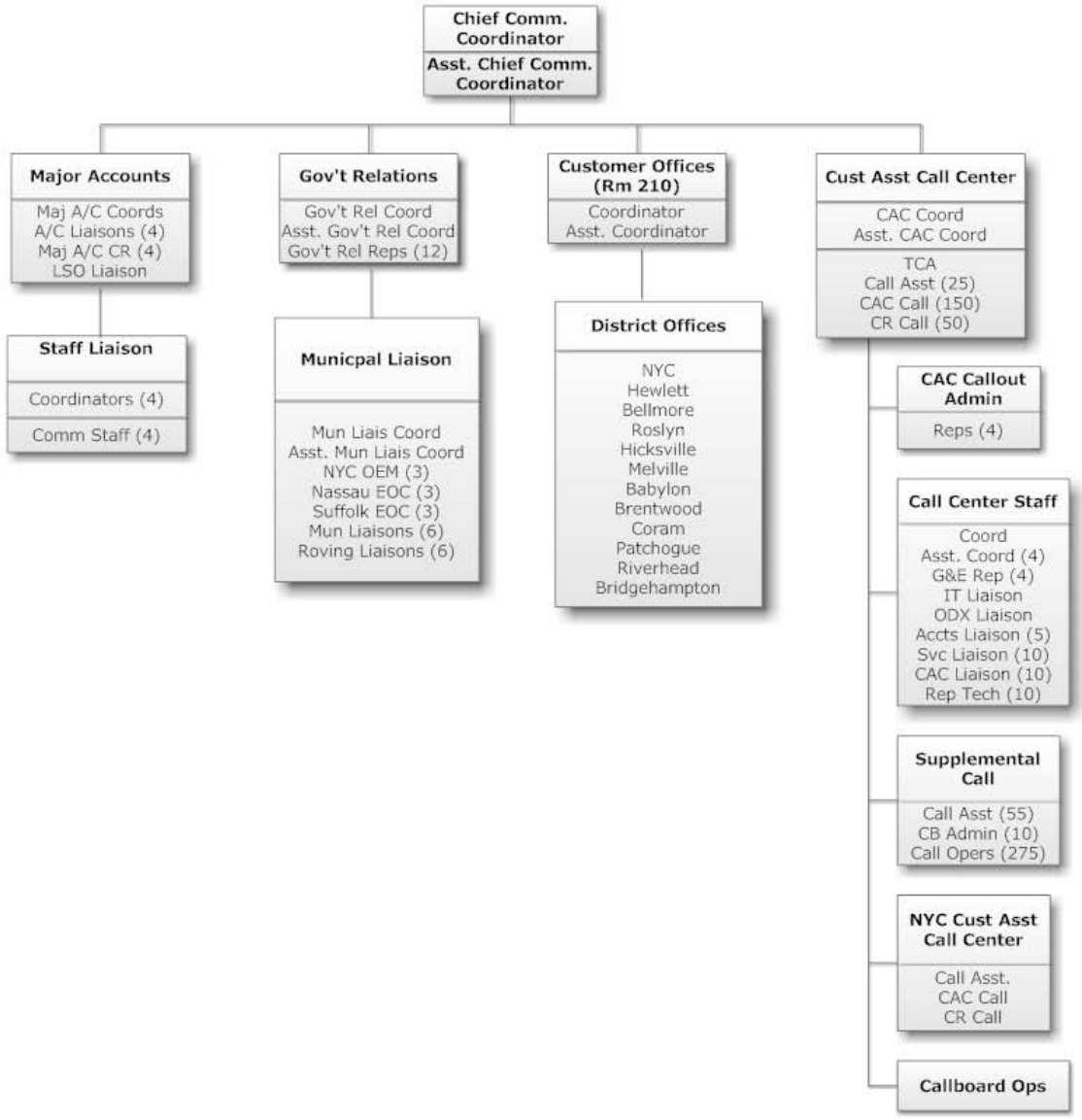


Exhibit IV-3 (DPS Draft 6.1.12 3:00 p.m.

Communications Control – Emergency Restoration Organization – Chart 500



The first chart was approved in July 2008; the second was approved in July 2011. Given the date of the latter chart, we would have expected the NG Emergency Restoration Organization (ERO) chart to have replaced the earlier document and have been used to guide the organizational structure used for the Tropical Storm Irene event. However, this was not the case. During the Irene event, the first chart from E.R.I.P. 2.4.1 reflects the communications organization that was used. While the second chart is more recent, it does not reflect the communications organization used during the Irene event.

Recommendation – Notify all affected personnel periodically of the changes and updates made to the emergency restoration procedures and organization for the storm communications function.

LIPA and NG should establish a formal procedure to share and exchange changes and updates made to their emergency procedures and organizations. The procedures should require affected employees to acknowledge receipt of the revisions and commit themselves to their use.

Finding - The qualifications and requisite experience for the Chief Communications Coordinator are not specified in the NG ERIP.

Arguably, the most important communication role during a major outage event is executed by the Chief Communications Coordinator. The qualifications and requisite experience for this position should be addressed by the ERIP. A good understanding of utility operations should be a requisite for this position.

Recommendation – A section should be added to the NG ERIP 2.1.1 specifying the qualifications, training and experience required of the Chief Communications Coordinator.

To be effective as the Chief Communications Coordinator, the person in that position must possess a broad knowledge and a good understanding of the communications function, and the business and operational functions of the utility. The successful performance of this position is critical to the management of good communications during a major outage event. The ERIP should explicitly state the qualifications for this position. An amendment to ERIP 2.1.1 specifying the qualifications for the position of Chief Communications Coordinator would provide an assurance that the assigned person is capable of performing the role.

C. CUSTOMER COMMUNICATIONS

On Sunday, August 28, and on Monday, August 29, congestion in the Verizon network between the Farmingdale and Brentwood central offices (COs) resulted in a significant number of blocked calls to the Call Center (calls to both the local and toll free number were impacted). Those customers who were unable to get through were forced to repeat their calls before they could get through to report their electric outage.

Finding - Some customers were unable to get through to the LIPA 1-800 number during the early stages of the outage.

The volume of calls received during the early stages of the outage created problems for the Call Center. Immediately after Tropical Storm Irene passed, the limitation on Verizon's service was discovered.[65] This problem resulted in many calls being blocked. The high volume of calls to LIPA headquarters is an indication of the frustration experienced by the customers who could not get through on the 800 number.

Finding - LIPA was unable to provide its customers accurate, detailed, and credible estimated restoration times.

LIPA decided to decentralize control of the service restoration efforts and this limited its ability to provide ETRs from a central location. LIPA and NG chose an approach that relied on local control at the substation level where the most damage was suffered. The local control approach presented serious customer communication issues considering the inadequacy of the outage management system and its processes. The most significant communication concern relates to the fact that there was no direct link between the individuals who were responsible to develop an ETR and those responsible for the work needed to restore service. As a consequence, LIPA could not provide customers and public officials with specific outage restoration information. The lack of ETR information created a source of tension between the utility and its customers and others.

After initial storm damage assessments were completed and beginning on August 30, a global ETR was provided to customers in the hard hit portions of the service territory.[66] The global ETR stated that LIPA expected to have service to most customers restored by the end of the week. Beginning late September 1, specific ETRs were provided to customers for those jobs dispatched through the outage management system.[67] The job specific ETRs were typically 6 to 8 hours from the time the repair crew was dispatched.

The customer service representatives (CSRs) were kept apprised of the ETRs through the Customer Accounts System for those customers whose substations were not under local control.[68] The Customer Accounts System is a data base containing such customer information as account numbers, locations of service, outage and billing information. The customers served by the substations under local control were provided a global ETR through outbound communications and the LIPA website. CSRs used talking points and were provided call handling tips for presenting the global ETR to customers who were without service for extended periods and for whom no specific ETR was available. The basic message was "We do expect to have most customers restored by Friday, or sooner. I really appreciate your patience,

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[65] The technical aspects of this limitation are discussed in greater detail in the next chapter of this report.

[66] DR #84

[67] DR #88

[68] DR #115

and can assure you we are doing everything we can to restore your electricity as soon as possible."[69] For a customer who has been without power for several days, this message may have provided little comfort.

Recommendation - LIPA should develop a capability to provide customers accurate, detailed and credible ETRs.

We have previously discussed the advantages of a new outage management system to help provide reliable and credible ETRs. Also, we have discussed the changes being made to the existing Outage Management System and the Substation Dispatch Authority that will enable dispatchers to develop job level information, including individual customer ETRs.[70] These system upgrades should not be delayed, and they should be accompanied by process improvements that ensure the ETR information is given to the employees who provide external communications.

Finding - Some customers on life support equipment did not receive sufficient communications from LIPA during the restoration effort.

LIPA has 5,029 customers on life support equipment (LSE) in the Critical Care Program.[71] Beginning on Thursday, August 25, and continuing through Friday, August 26, the Call Center CSRs called the critical care customers.[72] During this campaign, 69 customers could not be reached because of incorrect or out-of-service telephone numbers. On the initial attempted phone call, there were no answers for 1,160 customers. Some of these customers were contacted on a second attempt.[73] The following script was used by the CSRs for the pre-storm calls to LSE customers:

> *Hi, this is _____ calling from the Long Island Power Authority. We are contacting our customers who rely on critical health care equipment as we track Hurricane Irene, which is likely to impact Long Island this weekend. The storm is currently forecasted to bring heavy rain and strong winds throughout the weekend.*
>
> *Storms like this can cause power outages, and we want to make sure you are prepared in case you do lose power. Please reach out to relatives, friends, and neighbors. LIPA will be prepared to respond to any outages that could occur, but hazardous weather and driving conditions can cause delays in our response time. Electric emergencies including power*

[69] DR #94

[70] DR #255

[71] DR#138

[72] DR #139

[73] DR #140

outages can be reported to LIPA at anytime at 1-800-490-0075 or online at www.lipower.org."[74]

The two attempts made to contact LSE customers were prior to the storm event. No additional targeted calls were made during the event.[75] In addition, the CSR talking points indicate that if a customer explained that there was a person in the house on oxygen or an apnea machine, the CSR should respond "we are asking anyone with a critical facility to make other arrangements as we are not guaranteeing service to critical facilities."[76]

The content of the pre-storm message placed to LSE customers, and the failure to contact customers during the outage event, do not comply with ERIP 2.2.4 - Communications with Life Support Apparatus Customers. It states that this procedure defines the process for "notifying and maintaining communications" with LSE customers. The checklist in Attachment 1 of the ERIP instructs the Call Center manager to "ensure periodic calls" are made to LSE customers. The checklist does not instruct the caller what to do if the utility is unable to contact the LSE customer. A referral procedure to ensure that the utility or an emergency entity contacts the LSE customer should be included in the ERIP.

The pre-storm message shown as Attachment 4 to the ERIP is considerably different from the message used during the Irene event. The message in Attachment 4 of the ERIP states:

Good morning/afternoon, this is_____ representing the Long Island Power Authority (LIPA).

Our records show that you or a member of your family relies on an electrically operated life support device. We are calling to verify that this is in fact still true and that you have the special confidential phone number to use to contact us if you have a problem. That number is _____.

We are issuing a severe storm warning in anticipation of _____. At this time we are asking all our Life Support apparatus customers to contact friends, relatives, or neighbors to assure that help is available, if needed.

Any customer, who will face a life-threatening crisis if they lose their electric for an extended period, is being advised to contact the local police and fire authorities now if they will be forced to remain in their homes. To the greatest extent possible, such customers should seek alternative housing arrangements and constant companionship until the storm is over and the extent of damage is known.

We will call you back after the storm has passed to update you and to provide you with an assessment of how long it will be before all customers' electricity is restored.

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[74] DR #264

[75] DR #141

[76] DR #124

Again, please use this opportunity to take whatever measures you can so that you will be prepared in the event that electric service is interrupted for a number of days."

The differences between the message actually provided to LSE customers and this message are significant. No reason has been given for deviating from the ERIP.

Recommendation – LIPA should develop procedures for addressing the LSE customers who it is unable to contact and should ensure compliance with the documented procedure for notifying and communicating with LSE customers.

The procedure and the pre-storm message for LSE customers provided in ERIP 2.2.4 are proper and consistent with the practices of other utilities. The procedure is lacking in that it does not address the follow-up situation of what to do in the event that the utility is unable to contact the LSE customer. The practices for other utilities specified by the DPS state in the event that a company is unable to contact an LSE customer, or the LSE customer requires other assistance, such cases should be referred to an emergency entity that can assist with the customer contact and that the utility should consider establishing a process to confirm that such contact has been established with the LSE customer. ERIP 2.2.4 should be amended to include such a referral process. LIPA should require NG to comply with the established emergency procedures for messages and communications with LSE customers should be maintained.

D. COMMUNICATIONS WITH LOCAL, STATE AND FEDERAL EMERGENCY AGENCIES

Pursuant to ERIP 2.1.7, during an electric emergency, NG's Emergency Planning personnel are responsible for communications with the Nassau Emergency Operations Center (EOC), the Suffolk County EOC, the New York City Office of Emergency Management (OEM), the New York State Department of Transportation and New York State OEM Region One. During the pre-storm period of August 24 through August 27, NG Emergency Planning personnel initiated communications with the emergency agencies. They made 31 contacts during this pre-storm period to the following groups:

- NYC OEM
- NYS OEM
- National Weather Service
- Suffolk County OEM
- Nassau County OE;
- NYS Thruway Authority
- Pennsylvania Highway Authority
- New Jersey Highway Authority
- Long Island DOT
- MTA & Staten Island Bridges
- Red Cross of Nassau County

- Red Cross of Suffolk County[77]

The pre-storm calls provided notifications and updates regarding the approaching hurricane. The participants on the calls discussed storm preparation issues, potential evacuation strategies, the coordination of road and bridge closures, the arrival of foreign crews, Red Cross shelters, downed tree coordination, and other preparations.

During the Irene restoration period from August 28 through September 5, the NG emergency personnel maintained on-going communications with the emergency agencies. Many of the post-storm problems were communicated through the utility's Nassau and Suffolk County EOC Liaisons. These liaisons were NG personnel assigned to the emergency agencies. They were the conduits for the flow of information between the EOCs and the utility's storm control center.

Finding - LIPA does not have an established protocol for the management and prioritization of road clearance requests from public officials.

NG's EOC liaisons worked with local authorities to resolve road clearance issues. This would seem to be an efficient means to resolve such matters; however, it can create a perception of favoritism to those public officials who do not receive the same attention for their similar problems. We heard such criticisms during interviews with some public officials.[78] The development of and adherence to an established protocol for road clearance requests would mitigate such concerns.

Recommendation – LIPA should implement emergency procedures for a transparent process to prioritize road clearance requests.

NG and LIPA should develop a process for prioritizing road clearance requests. It should state objective criteria for establishing the importance of a road for access to other facilities, such as hospitals, fire departments, schools, shopping, etc. It should also state the number of crews required to clear the roads of wires, and the estimated time to provide sufficient clearance to allow access. The prioritization process should be sufficiently transparent so that others reviewing the decisions made will understand the process.

Finding - Some NG personnel assigned to the EOCs lacked an understanding of the outage procedures and did not have the authority to assign resources.

During our interviews of public officials, concerns were stated regarding the knowledge, understanding and authority of the EOC Liaisons. In one instance, an attorney was given EOC liaison responsibilities. Public officials expressed a concern that the individual did not understand the problems they were facing and the person had little or no authority to resolve problems. While the EOC Liaison is primarily a conduit for information between the EOC and

[77] DR #6

[78] Interview Public Officials

the utility's storm control center, some public officials may have expected more and, as a consequence, their confidence in the restoration effort ebbed.

Recommendation – EOC Liaisons should receive appropriate training and authority.

The EOC Liaisons are the "front line" contacts at the EOCs. EOC Liaisons serve an important role as a source and conduit of information to the storm operations center. EOC Liaisons should fully understand the restoration process and their role. NG should provide additional training and should delegate a degree of authority to the personnel assigned to the EOCs. Also, LIPA and NG should consider the development of a procedure that would provide EOC Liaisons the ability to commit some level of resources to local restoration efforts.

Recommendation - The outage reports forwarded to the New York State Department of Public Service during the Irene restoration effort lacked meaningful information.

During the Tropical Storm Irene outage, utilities throughout the State submitted reports to the Department on a required form.[79] The form states that the following information should be provided:

- Listing of localities served
- Number of customers in each locality
- Number of customers out of service in each locality
- Estimated restoration date and time for each locality, operating division and county
- Company-wide restoration date and time
- Company-wide number of customers out of service

The reports are filed four times a day. Of the 33 outage reports that LIPA and NG filed with the Department, the only information that varied after the first day was the company-wide number of customers out of service. The four reports filed on August 28 listed a company-wide restoration date of day's end August 31. The first report on August 29 listed a company-wide restoration date of day's end September 5. In the remaining 29 reports, the restoration date and time remained fixed at September 5 for every locality, operating division and county. The only other change seen in subsequent reports was the gradual reduction in the number of customers out of service.

Recommendation - Provide meaningful reports to the DPS.

As discussed throughout this report, LIPA and NG were unable to provide realistic ETRs to customers and other stakeholders. Without meaningful outage information, DPS was not adequately informed of the status of the restoration effort. The Company believes that a new outage management system currently being implemented will produce ETRs quickly, accurately, and more consistently for municipalities and counties. LIPA should include ETR features in its new outage management system.

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[79] DR #89

Interaction and communication with local villages, towns, cities and counties is a critical component of the restoration process. The activity at the Communications Coordination Center in Room 210 was hectic. Due to a fire at the Hicksville offices, the usual Room 210 space was not available during Irene. The Room 210 operations were temporarily relocated to two small conference rooms. During a major outage event, up to 21 personnel are assigned Room 210 responsibilities. The two conference rooms could not accommodate all the assigned personnel and some neighboring office space also had to be used.

Room 210 was activated on Sunday, August 28, at 6 a.m. and deactivated on Monday, September 5, at 2 p.m. The staff in Room 210 came from both LIPA and NG. The LIPA personnel were from the Government Relations and Customer Relations Departments. The NG personnel worked with the LIPA personnel to deal with the emergency preparedness agencies, critical care facilities and major accounts. During the Irene event, Room 210 handled 1,594 calls and emails.[80] The calls presented a variety concerns; some of the significant matters included:

- road clearance and trees down
- downed wires
- customers on life support equipment
- traffic lights out
- critical care facilities without power
- refrigeration for medicine
- ETRs[81]

In addition, public officials required ETRs to advise constituents and plan work in their communities. As noted above, LIPA and NG were limited in their ability to provide ETRs due to the decision to restore the electric system using a decentralized or local control approach. Large outages, such as those caused by substation problems, affect thousands of customers across municipalities. LIPA's outage management system, at times, assigned outages inaccurately to a single locality.[82]

Finding - The hotline for municipalities was compromised. A large volume of non-municipal customer calls overwhelmed the hotline's ability to effectively communicate with municipal officials.

After being without power for several days, many customers who could not get through to the LIPA 1-800 number were desperate for restoration information. Many of the calls made to the municipal hotline were not from local public officials. As a result of customer calls flooding the municipal hotline, public officials with pressing needs (including problems related to public roadway access, debris removal, downed wires and traffic signal restoration at critical

[80] DR #6

[81] DR #136

[82] DR #90

intersections) could not get through.[83] Unfortunately, a back-up number was not available for the public officials to use. This presented a potentially serious safety concern. After the storm restoration, a letter was sent to the public officials providing them a new municipal hotline number and emphasizing the need to refrain from sharing the number with the general public.[84]

Recommendation - Develop procedures to preclude unauthorized access to the municipal hotline and to limit its use to the public officials for whom it is intended.

Providing a new municipal hotline number to public officials does not necessarily solve the underlying problem.[85] One available option would be to limit access to the hotline through the use of security codes. Another could be to install a process similar to the one used to maintain communications with major customer accounts. Similar to major accounts process, several government relations liaisons could each be assigned a manageable number of municipal and elected officials to contact. Direct contacts over the liaisons' individually assigned numbers could be used for these communications. This would limit the damage resulting from a compromise of any of these individual numbers. This approach would provide greater assurance that important calls would get through to LIPA. It could also potentially improve communication and government relations.

As a precaution, a back-up number for the municipal hotline should be maintained. The number should be maintained internally and only distributed for use by public officials in the event the municipal hotline is compromised or experiences a technical problem.

Finding - Outreach to public officials and local municipalities was unsatisfactory.

While LIPA made efforts to maintain communications with municipal officials before and during the Irene event, it could have done more. LIPA did not initiate any municipal conference calls during the outage but it did participate in the conference calls between the municipalities and the County EOCs.[86]

Recommendation - Develop an approach and strategy for improving communication, coordination and relationships with public officials.

LIPA recognized its shortcomings in this area and it now plans to be proactive in its communications with public officials and municipalities during major outage events.[87] A new ERIP for municipal conference calls has been developed, LIPA ERIP 2.1.10 - Activation and

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[83] Interview Public Officials

[84] DR #252

[85] DR #252

[86] DR #134

[87] Interview #9

Operation of Coordinated Municipal Conference Calls.[88] The implementation of this procedure is a positive step in the right direction for maintaining communications with public officials and for improving government relations. LIPA has recently conducted a trial municipal call consistent with the revised procedure. LIPA should approve and implement the new procedure so that it can be rehearsed during upcoming drills and in advance of the next severe weather season.

LIPA has met with municipal and public officials and seeks ways to better communicate and coordinate with them while also providing forums to register their concerns and to ease tensions generated by the Irene event. LIPA has created and filled District Manager positions in its four operating districts. The District Managers' responsibilities include the improvement of LIPA's standing in the local communities and the establishment and maintenance of working relationships with public officials. These are good steps that in part address the problems experienced at the local level.

LIPA also needs to examine its relationships with public officials and resolve some fundamental questions:

- How can LIPA better serve the municipals?
- What is the resource commitment needed to provide an appropriate level of service?
- What messages does LIPA want to send the public officials and what messages do the public officials need to receive from LIPA?

We see from the Irene experience, LIPA did not meet the expectations of the public officials and the municipals. LIPA needs to ascertain the local public officials' expectations and decide to apply the resource commitment needed to meet those expectations. An earnest and dedicated approach and strategy is needed to accomplish a better working relationship with public officials to better address the serious safety issues involved in a storm restoration.

Finding - LIPA does not have an established procedure for distribution of dry ice during an outage.

Among the calls made to Room 210, several were from callers that were concerned about keeping their medications refrigerated.[89] Such calls could have been avoided if LIPA had a program for the distribution of dry ice during extended outages.

Recommendation - Develop procedures to supply dry ice and bottled water during electric system emergencies.

LIPA should reconsider its previous decision not to supply dry ice to customers during an extended outage. It could contract for dry ice supplies and bottled water, as it currently does for the services provided to foreign crews, similar to the practices of the New York IOUs. The

[88] DR #253

[89] DR #136

IOUs secure adequate dry ice supplies[90] in advance of a major outage event. Customers are provided distribution information, i.e., locations and times, and the IOUs often include this information on their websites and in press releases. LIPA has six customer service offices throughout its service territory that could be used to distribute dry ice and bottled water.

E. MEDIA, WEB AND SOCIAL MEDIA COMMUNICATIONS

Media communications is the responsibility of LIPA's Media Relations group with information, input, and support from NG's Media Relations personnel. Beginning Wednesday, August 24, the LIPA Media Relations department began to receive media inquiries. By Saturday, September 3, it had responded to 194 inquiries.[91] During the period August 24 through August 27, several pre-storm communications were posted on LIPA's Storm Central website, and releases were distributed to radio, television and the press. These communications consisted primarily of safety messages and storm preparation tips. During the period August 28 through September 5, numerous storm communications were issued by LIPA. On Saturday, August 28, an e-mail was sent to 673 media contacts advising them of the approaching hurricane and how to remain apprised of the storm and receive status updates on the service restorations.

For Irene, 11 press releases were issued and 7 press conferences were held.[92] The press conferences were at the Hicksville offices. The podium at the conferences was shared by LIPA's Chief Operating Officer and NG's President of Long Island Operations. At the press conferences, updates on the storm restoration efforts were provided as well as operational updates. The press briefings focused on accomplishments achieved, the number of crews working and the number of customers who still needed to have their power restored.

> Over the duration of the outage, there were over 800,000 visits made to LIPA's website. The website provided the status of the restoration and continued to offer safety messages and outage tips. The media team also disseminated information using social media by posting outage information on Facebook and by providing information to over 3,500 Twitter followers.[93]
>
> **Finding – The pre-storm messages provided customers safety reminders and tips for preparing for the storm outage. During the system restoration, LIPA was not effective in communicating to customers the extent of damage, the duration of the outage, and the efforts required to restore service.**

In general, the public does not have a good understanding of electric system outages and the efforts required to restore service. Many customers, before Irene, likely had not experienced an outage that lasted much longer than a day. LIPA needs to employ its best efforts to educate

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[90] Part 105 requires the IOUs to distribute dry ice only.

[91] DR #6

[92] DR #6

[93] DR #6

customers about the possibility of an extended outage and how to prepare and plan for such events. The pre-storm messages that LIPA issued prior to Irene did not adequately inform customers of such possibilities.

Recommendation - Implement ongoing education to inform customers about the potential damage to the electric system from a major storm and the efforts required to restore electrical service.

LIPA should manage customer service expectations using an on-going educational program. There are many ways to inform customers about the damage that severe storms can do to an electrical system and the substantial efforts needed to restore the system. Short videos can be prepared and posted on the website. Presentations through a speaker's bureau can be developed and offered to the public. As the storm season approaches, LIPA can provide information on its website, in bill mailings, on Facebook and Twitter.

From the Irene experience and previous storms, there are certain points that should be considered for inclusion in an educational program, including the following:

- An overview of the complete restoration process;
- Why crews may not remain in one area to continue to work to restore the area;
- Why the public should not enter substations;
- How estimated restoration times are developed;
- How a new outage management system will improve the process of estimated restoration times;
- How road clearings and dealing with downed wires fits into the overall restoration process;
- Addressing critical care facilities and critical care customers during a major outage event;
- The duration of an outage following a major storm or other disruptive event; and,
- Why it is important for customers to call to report an outage.

Finding - The media relations staff responded to a large number of social media queries.

LIPA had in place a Twitter account and a Facebook listing prior to Irene. Its Facebook account was originally established to serve as an avenue to share energy efficiency and conservation information with customers. With the arrival of Irene, customers eager for current outage information used Twitter and Facebook to get whatever information was available through these means. The resulting volume of social media activity was substantial. During the period August 24 through September 5, LIPA had 3,567 followers on Twitter.[94] The media relations

[94] DR #6

group logged more than one thousand tweets.[95] Also, there were more than 780,000 Facebook interactions; the media relations group logged 38 pages of Facebook postings.

Recommendation - Develop a strategy to make better use of social media to communicate with customers during a severe outage.

LIPA's use of Twitter and Facebook to communicate during the Irene event evolved as a reaction to the desire of many customers to receive real-time outage information about the storm restoration activity. Many utilities are becoming more sophisticated in their use of social media to receive outage reports; to advise customers of receipt of their report; and, to inform them of changes in the status of the restoration. The social media require a commitment of personnel and information technology (IT) resources. LIPA should investigate these possibilities and, as appropriate, should develop a plan to implement the use of social media in its storm restoration plans.

F. LESSONS LEARNED SINCE THE STORM OF 2010

Finding - The "lessons learned" from the March 2010 Nor'easter Storm were not adequately implemented.

The lessons for LIPA and NG from the August 2011 Tropical Storm Irene are remarkably similar to those gleaned from the March 2010 storm. The following is the list of communications-related "lessons learned" from the March 2010 Nor'easter Storm Report.[96]

- As customer expectations continue to grow, it is becoming even more imperative that LIPA evolve the way in which they communicate with their stakeholder groups to provide timely, accurate and above all, useful information. Advances in technology have made many new avenues available and LIPA should continue to exploit the capabilities of their current means of communications while exploring the adoption of a variety of communication techniques across different mediums to ensure that information is provided in a manner that best suits the needs of its affected stakeholders.
- Opportunities exist for enhanced communications with Towns, Municipalities and elected officials. Given the ever-growing appetite for information, there may be merit in increasing proactive updates of communications, especially in instances where county Emergency Operations Centers (EOCs) are not activated. Consideration should be given to providing a "municipal briefing" on a scheduled basis, either through a conference call, e-mail communication or web site update.
- Efforts should be made to continue to improve the process relative to outbound customer calls. Specifically, a determination of the appropriate timing of customer messages should be investigated (i.e., exact timing of customer calls relative to expected restoration), as should the merit of expanding the use of such calls (i.e.,

[95] DR #137

[96] DR #83, page 45

planned intentional interruptions).

- Opportunities exist for the continued evolution of accuracy of customer lists. This should include not only Critical Care customers, but lists for those other customer segments potentially requiring targeted communications during storm restoration efforts (i.e., schools).
- Given the introduction of new roles and personnel to the communications process, there are opportunities to improve overall efficiency by providing clearer guidance and definition of LIPA and NG's roles in the communications process (i.e., more clearly defined roles and responsibilities, elimination of duplication of effort).

The communications-related lessons LIPA has learned from Tropical Storm Irene are listed in its August 2011 report as follows:

- The impact of changing customer expectations and technological advancements with regard to communications must be continuously reviewed, analyzed and incorporated in restoration process as appropriate. Opportunities exist to expand our operational approach to include a more encompassing view of customer needs. Efforts should be made to continue to acknowledge technological advancements that provide opportunities for expanded and enhanced communications with customers and build upon current efforts in these areas (i.e., cell phones, texting, social media, etc).
- Investigate means to provide additional and enhanced information to customers. Develop methods to adapt how we provide "normal day" type of information to our customers in an event of Island-wide damage. These opportunities include better communication of field intelligence gathered at substation level as well as consideration of improvements across both the restoration process and supporting information systems to address this deficiency. A key enabler for improvements in customer communications is new Outage Management system that more effectively maintains system connectivity. This would enable a more efficient association of system damage to the affected customers which would lead to better estimates and messaging.
- Opportunities exist to enhance the process to provide additional information to elected officials. Proactive education campaign (pre-storm) with elected officials to better communicate restoration process and set expectations. LIPA should implement NG's existing policies for communicating with public officials that utilize such tools as daily "Municipal Calls" prior to the onset of the weather event as well as for the hosting of continued and regular and daily update calls throughout the weather event, reference materials on what we do during storms and relevant contact information and data sources for use when responding to their constituents.
- There is a need to adopt an agreed to protocol on the management of "Special Requests" from elected officials, including publication of a new municipal telephone number, impressing upon municipal officials need to not share this number with individual customers.
- The initiation of regular communications with field employees through the use of field talking points provided a means for timely and consistent messaging. Opportunities exist for better coordination of such talking points to enhance this field messaging (i.e.,

timing, level of detail, frequency, etc) and should be investigated. [97]

A comparison of the "lessons learned" in each of the two storm reports reveals four trouble areas that recur that can be grouped as follows:

- Management of customers' expectations
- Communications with public officials
- Effective communications with customers
- Understanding of communications process and roles during outage events

Recommendation - Prepare action plans to implement the communications-related "lessons learned" included in LIPA's Tropical Storm Irene Storm Report.

After Irene, LIPA and NG prepared a list of opportunities for improvement.[98] The list also identifies those things that worked well. The list was identified as a draft dated November 28, 2011. The opportunities for improvements are prioritized either as "must haves" or "nice to have." The list contains over 500 such items; over 100 of the items are communications-related. Twenty-five of the communications-related opportunities are denoted "must have" to provide a material improvement in customer communications, restoration time or safety. We recommend that LIPA and NG implement these recommendations.

A formal process should be established, with detailed action plans, to implement the communications-related recommendations found on pages 72 - 73 of the LIPA Tropical Storm Irene Storm Report and those listed in the response provided to Vantage Data Request Number 289. Recommendations should be implemented within 90 days, if possible. LIPA should provide quarterly progress updates to its Board of Directors until all the recommendations are completed.

[97] LIPA Tropical Storm Irene Storm Report, November 18, 2011, pages 72-73

[98] DR #289

V. CUSTOMER SERVICE

A. BACKGROUND

This Chapter addresses the performance of the LIPA and NG Call Center functions and external resources used during Tropical Storm Irene. It focuses primarily on the inbound communications from customers and includes consideration of the outbound calls made to customers by the Call Center to provide them restoration information and to contact special needs customers.

The Call Center, and the customer service function overall, is critical to communication during an outage because they are the main communications conduit between customers and the company. LIPA's emergency restoration efforts depend largely on customers reporting their outages via the Call Center. Early in a major emergency event, when the primary feeders are locked out, companies are aware that customers on the affected circuit lack power. However, as portions of the circuit are re-energized, customers must continue to report their outages to help identify the damage impacting smaller sections of the system. Nested outages are a problem for all electric utility companies as well as for LIPA.

Like the emergency response planning for the transmission and distribution operations, the Call Center's planning process includes: the need for a realistic emergency plan; drills and training for using the plan; mobilization procedures; logistics and plan implementation. Specific to the Call Center emergency response are such matters as its staffing, hold over and call outs, call training, customer systems, policies and procedures were. We have examined these matters and items from the perspective of how they are intended to perform in actual operations under the strain of a major event.

B. LIPA AND NG CALL CENTER OPERATIONS

LIPA's primary customer call center is located in Melville Call Center and it is operated by NG. The Call Center is a stand-alone operation and is does not operate in tandem with any other NG call centers either during normal or overflow conditions. All LIPA customer service calls are answered in the Melville Call Center. Before and during Irene, the Melville Call Center was also receiving NG Long Island gas customer service calls.

Normal business hours for the Melville Call Center are 8am to 8pm, Monday through Friday. Emergency calls are handled 24 hours a day, 7 days a week. During normal operations, all call center representatives are universal representatives which means that they are trained to take any available call.[99] For normal operations, the Call Center is staffed with 155 full time representatives. This includes 122 Full Service Representatives and 33 Associate

[99] Trainees may be assigned to limited call types during their training period.

Representatives.[100] Associate Representatives are new to this position and have not yet completed their training.

LIPA/NG does not outsource any live agent calls. However, LIPA uses the services of 21st Century Communications (TFCC) to handle its emergency call overflow. TFCC provides outsourced Call Center solutions for utilities and other industries. Many companies throughout the utility industry use TFCC for both inbound and outbound communications.

Leading up to Irene, the Call Center began to increase its staff at 5:00 p.m. on Saturday, August 27. By 12:30 p.m. on Sunday, August 28, the Call Center had tripled its regular staffing and it was using every desk on the floor. During Tropical Storm Irene, the staff at the Call Center reached a peak of 320 employees who stayed on the phones for the duration of the storm event. The Call Center operated continuously 24 hours a day, 7 days a week, throughout the storm restoration.

LIPA's Headquarters, located in Uniondale, also performed call related activities in support of the storm restoration process. In anticipation of, and/or a major storm, customers are encouraged to call the Melville Call Center for service related issues. As such, LIPA's customer service function exists to respond to customer-escalated inquiries; it does not maintain a customer service call center. The call center service function is handled, in its entirety, at the NG Melville office location. The LIPA headquarters team answered over 6,200 customer calls placed to the 1-877-ASK-LIPA telephone line. Most of the calls received on this line were from customers seeking estimated restoration times. Some were also seeking to speak with LIPA management. The LIPA headquarters team reported to work for the storm on Sunday, August 28, at 6:00 a.m. The LIPA customer service group was staffed continuously, 24 hours a day, through Friday, September 2. It continued to provide support beyond normal business hours through September 4.[101]

C. CUSTOMER SERVICE EMERGENCY PLAN AND ORGANIZATION

Finding – The NG Customer Service Emergency Plan requires updating.

The CAC does not maintain an emergency plan separate from the electric field operations. The emergency plans for the Customer Call Center operations are contained in the communications section of the ERIP. The sections pertaining strictly to the CAC operations include ERIPs 2.1.2, 2.3.2, 2.3.3., and 2.3.4. These ERIPs, as they pertain to the emergency operation of the CAC, are summarized below.

ERIP 2.1.2, NG – Communications Group Room 210 Notifications. This section provides directions to ensure the notification of the Communications Group Staff in Room 210 and the CAC Command Center Staff during storm emergencies. Call lists are to be updated twice per year. The decision to put the customer service emergency plan into effect is made by the Chief

[100] IR 207

[101] IR 101

Communications Coordinator who considers such things as: the storm conditions; the number of customer calls dropped at the CAC; the number of government, hospital or other major account calls coming into the CAC; the anticipated shortage of electrical supply; or, any major event affecting LIPA/NG facilities or equipment that requires communications between LIPA/NG and electric customers and/or local government officials.

ERIP 2.3.2, NG – Call Out Administrator's Instructions. This section describes the steps for notifying and activating the personnel who will report to the CAC and the Command Center upon the declaration of a storm or other electric emergency. It provides directions to assure the notification of additional CAC staff needed for an emergency event. The intent of this policy is for the CAC to maintain sufficient staff to answer all emergency calls in an efficient, courteous, and responsible manner.

ERIP 2.3.3, NG – Call Assistant Instructions. This section describes the actions to be taken by the Call Assistants who supervise telephone representatives during a storm restoration or other electric system emergency. It provides instructions for and defines the responsibilities of the Call Assistants to assist the call representatives.

ERIP 2.3.4, NG – Telephone Representative Instructions. This section describes the call representatives' responsibilities and duties during a storm restoration or other electric system emergency. Upon reporting to work, the Customer Telephone Representatives (CTRs) locate their assigned seats and report to the designated Area Coordinator or Training Coordinator. They become familiar with the current storm status and the information released to the CTRs to provide to the public.

There are several aspects of the CAC portion of the ERIPs that can be improved:

1) The plans have not been updated since 2008 and they do not contain current personnel names.
2) The plans lack specificity in some instances. For example, ERIP 2.3.3 states that the call center will "...maintain sufficient staff to answer the greatest possible number of emergency electric and gas calls in an efficient, courteous and responsible manner." However, there is no guidance as to what those staffing levels should be or what efficiency levels should be achieved.
3) CAC operations ERIPs are comingled with those for the Room 210 Communications Group.

Finding - NG Customer Call Center properly implemented a previous lesson learned.

The Customer Call Center implemented "Condition Red" which requires all customer service representatives to report to work. This action proved to be beneficial during Irene which occurred just prior to a three day weekend. Previously, and as recent as the 2010 Nor'easter, some of the call center employees did not arrive at their required posts. NG has corrected this shortcoming.

Finding – The SERP contains requirements that burden NG employees during electric system restorations.

Vantage has determined that the SERP contains procedures that add unnecessarily to the burden of overextended NG personnel. Such instance includes:

1. SERP D.3.6.11 - Respond to customer calls and relay customer outage information to NG's Customer Assistance Center (CAC).

LIPA does not make direct entries into the CARES system. Customer information received by LIPA is forwarded to the NG CAC where it is entered into the system by a NG representative working at the CAC. Customers also have the option to call the CAC directly by using the primary customer service number which places them in the CAC queue. Calls received by LIPA also go into a CAC queue and LIPA's processing of the customer assistance call introduces yet another step in the process.

Recommendation - Update and modify the Call Center Emergency Plans to reflect lessons learned and address storm levels, staffing, TFCC and CAC operations.

The emergency plans should be examined and updated to reflect the lessons that LIPA and NG have learned from the 2010 March Nor'easter and from Irene. The plans should also specify, where possible, efficient staffing levels and when to use TFCC. Further, the Call Center ERIPs should show separately and distinctly the CAC operations with suitable references made to the Room 210 Communications Group.

D. CUSTOMER SERVICE COMMUNICATIONS

Finding - LIPA controls the content of all key messaging during a major outage.

During a major service outage event, like Irene, LIPA controls all communications with the public. The NG Melville Office only provides customers information available within the system that has been vetted by LIPA. When a customer calls into the Melville CAC either to report an outage or to request outage information, the information the customer telephone representative (CTR) shares with the customer was prepared in advance and disseminated by the Communications Group Room 210 organization in the Hicksville operations center. During Irene, the conference room in the CAC was also used for communications coordinators, LIPA and the Communications Liaison to further coordinate and control all the communications. This group prepares the scripts that are used by the CAC CTRs, the IVR, TFCC and for email blasts.[102] The CTRs also have access to the PRO-LIPA page on the intranet that lists the approved customer communications to be provided during the storm.[103]

[102] Interview #49

[103] Interview #77

LIPA has a command and control structure for communicating its messages to customers with one voice; however, customers were frustrated during Irene by the lack of any specific information regarding ETRs. Employees in the communications organization were also frustrated by the lack of information to disseminate to customers concerning the service restoration times.[104]

Finding - LIPA/NG appropriately used outbound communications to identify embedded outages.

Smaller outages embedded in a major outage are the bane of many electric utilities. Embedded outages are the small groups or individual outages that remain even after an area has been largely restored. Electric utilities, including LIPA, lack the ability to remotely determine if power is available or unavailable at an individual meter site. Consequently, embedded outages can only be identified by customer out of service reports provided after an area has been restored. Sometimes, customers are unaware that their power should have been restored, especially during daylight hours when street and house lights are not obvious indicators. Customers sometimes require a notification from the electric utility of an area restoration to prompt and encourage customers to report that the power is still out at their premises. LIPA/NG make such calls as part of their Campaign 2 callout program, which utilizes both 21st Century and the internal Global Connect feature of the IRV.[105] This call out process still remains the most effective approach.

Finding - LIPA/NG have the processes and technology to make outbound calls to identify embedded outages. The lack of accurate estimated restoration times hampers the use of this location based messaging.

The process and technology exists for customer service to make outbound notifications to customers of service restorations, but this approach to identify embedded outages is hampered by the inability to provide customer specific ETRs. The CAC has a process for informing and educating customers during an emergency. It consists of several call campaigns. The first campaign sets customer expectations; over 580,000 calls were made with a success rate of 76 percent. The second campaign is a call out to customers where restoration efforts are essentially complete; about 201,000 calls were made with an 80 percent success rate. This campaign is designed to identify the embedded outages. The third and final group of automated callbacks are for (1) the customers to whom LIPA had sent a dispatch, (2) customers who called to report an outage, and (3) customers whose power is believed to be restored. About 22,000 calls were made the first two categories in this final grouping, with a success rate of 68 percent. Over 31,000 calls were made to the last category of this final grouping, with a success rate of 67 percent.[106]

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[104] Interview #49

[105] IR 95

[106] A third group of 136 customers received a job based message indicating a status change.

E. PRE-STORM PREPARATION AND PERFORMANCE

Finding - LIPA has appropriate practices to keep its supplemental staff trained for emergency events.

LIPA/NG must have additional personnel ready and trained to staff the additional stations required at the CAC to handle customer calls during a major outage event. Call Center pre-storm preparations include on-going training for supplemental Call Center representatives. LIPA performs this training at regularly scheduled intervals. This training is provided to the temporary Call Center employees on an annual basis every May using e-learning.[107]

Finding - The supplemental call out list was not updated by the NG Emergency Planning Department prior to Irene and it contained errors.

The Call Center personnel stay abreast of weather situations and they receive periodic updates in the case of an impending storm.[108] A decision was made prior to Irene to fully staff the Call Center and to activate the supplemental representatives in addition to the full complement of regular call representatives. Supplemental callout lists are used to contact the extra personnel needed for a condition red event. Each week, human resources provides current information to update the call out matrix. This list provided by human resources shows newly hired employees and employees on leave or retired.[109] When the call out matrix available for Irene was checked, it was determined there about 25 people on the list should not have been there. The storm assignment matrix for the Call Center had not been kept up to date as it should have been, particularly given the start of the storm season.[110]

Finding – NG should establish procedures to ensure that the supplemental employee emergency call out list is properly kept up to date.

A process need to be implemented to ensure that that the supplemental call out list is continuously and accurately kept up to date at all times.

Finding - LIPA Headquarters' receipt of inbound calls may have added confusion and contributed to the CAC burdens.

LIPA's Headquarters also provided call related activities to support the storm restoration process. The headquarters team answered over 6,200 customer calls to the 1-877-ASK-LIPA number. Most of the calls were from customers looking for estimated restoration times; some were from customers who wanted to speak with LIPA management. Callers requesting restoration times were told to call the CAC customer service number. LIPA headquarters did

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[107] Interview #13 and Interview #77

[108] Interview #55,

[109] Interview #68

[110] Interview #5

not have the information to provide to these customers. Headquarters also did not have the ability to place these customers into the CAC queue.

Recommendation - LIPA should revise the integrated SERP/ERIP for call handling at its headquarters during emergencies.

LIPA should perform a full assessment of the contact numbers available to customers and their intended uses. In its assessment, LIPA should consider whether they all should remain active during an emergency event and whether any telephone calls should be redirected and forwarded directly to the call center. LIPA should also consider whether the multiple phone numbers available to customers during an emergency event should be consolidated. At a minimum, LIPA should obtain the ability to transfer customer calls to the call center directly rather than require customers to redial the call center for themselves. LIPA should consider whether there are advantages to shutting down the LIPA number during major outage events and have all customer calls transferred directly to the call center.

Finding - The Call Center properly outsourced and contracted resources to handle the emergency call overflow.

Utility call centers cannot provide the staff levels needed for the call volumes experienced during major emergency events, even with the supplemental staff that is available to them. Utilities have increasingly turned to outsourced call centers as a cost effective means to address the emergency call overflow. LIPA/NG appropriately used TFCC as its emergency call backup and thus ensured that the maximum customer calls were handled and served.

Finding - The Call Center made over 8,000 outbound calls to critical care and life support customers prior to Irene.

On the Wednesday and Thursday before Irene hit, the Call Center made over 8,000 outbound calls to 5,029 customers with critical care equipment.[111] The calls were made by personnel who were reassigned to the CAC for emergency preparedness.[112] The calls informed customers who rely on critical health care equipment of the approaching storm, the likelihood of a power outage, and that hazardous weather and driving conditions could cause delays in LIPA's response time during an extended outage. The customers were encouraged to be prepared in case an outage occurred.[113] LIPA reports that it had 5,029 LSE customers and it had incorrect or out of service phone numbers for 69 of them. Initially, there were 1160 calls made with no answers but a portion of them were contacted on a second attempt.[114]

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[111] LIPA's Response to VEC Information Request #264.

[112] ERIP 2.2.4, National Grid – Communications with Life Support Apparatus Customers, Revision 8, July 2008.

[113] LIPA's Response to VEC Information Request #264.

[114] LIPA's Response to VEC Information Request #140.

Finding - Account managers kept in contact with major account customers during the Irene storm event until their services were restored.

NG contacted LIPA's major account customers and critical care facilities before and during Irene using the procedure described in ERIP 2.2.4. Critical care facilities are those deemed critical to public health and safety, including hospitals, nursing homes and airports; sewage, plumbing and treatment facilities; and fire and water districts. The call list identifying the personnel responsible to contact these customers is provided in ERIP 2.1.2. These customers were contacted and advised to be prepared for the pending storm.

On the Friday before the storm, the responsible Major Account Executives (MAE) either telephone called or e-mailed the hospitals and other critical care facilities and provided them the contact telephone numbers for the Communications Coordination Center (CCC), Room 210, to use should they experience an interruption in service during the storm. Throughout the day, beginning on Saturday, the MAEs were in touch with the facilities updating them on LIPA's preparation plans. These critical care customers, in turn, kept the MAEs informed of their preparations. Throughout the weekend, and continuing into the storm restoration period, there was two-way communication between the MAEs and critical care facilities.

The MAEs continued to advise them of the status of the restoration efforts and the critical care customers continued to provide the MAEs updates on how well their emergency back-up systems were doing. This two-way communication continued until normal power was restored to the critical care customers. After all the hospital and managed critical care customers had their power restored, efforts were made to contact the remaining non-managed critical care customers. Calls were made to assess if there were outages or issues to which the utility should direct its resources.

With respect to all other managed accounts, Account Managers kept in touch with their respective customers and monitored outages using telephone calls, email, text messages and, in some cases, field visits. Customers were apprised of the severity of the damage to the electric system and the service restoration times when this information became available. The Account Managers kept in constant communication with representatives at the CCC, who, in turn, were in communication with operations personnel to obtain any available customer specific information and to address the customers' specific needs.[115]

Finding - The CAC was successful in its Customer Service preparations. It made appropriate calls to employees to staff the CAC.

The Call Center had plans and was organized to effectively manage the increased number of CTRs needed to man the telephones for the storm. The Call Center operates on a 24-hour basis; in the case of a storm, or other major electrical emergency, the operations are expanded using additional personnel. The Call Center seeks to maintain sufficient staff to be able to answer the

[115] *Id.*

greatest possible number of customer calls in an efficient, courteous and responsible manner.[116] The preparations for the storm event involved the cancellation of scheduled vacations and a recall of the staff that were on vacation. By Sunday, 325 employees had reported to work at the Call Center.[117]

Finding - Preparation and organization of the CAC was adequate to minimize any delay in employees reporting to work and in the provision of supervisory assistance.

The assignment of customer representative to work stations for each shift was accomplished in an orderly fashion. Color coding was used in the Call Center; it was also divided into grids. A meeting place was designated for new employees who, when they reported to work, could find their work station on the grid layout posted to the walls.[118] Red flags were used by the service representatives to obtain a supervisor or call assistant to help on a given telephone call, as necessary. The representative would simply wave the red flag to get their attention. Supervisors wore red shirts to be easily identified.[119]

F. TECHNICAL PREPARATION AND PERFORMANCE

Finding - The CAC took adequate steps to prepare for emergencies.

Prior to an anticipated storm that may cause major outages, LIPA's personnel verify that standby generators are fueled and operational.[120] Storm Anticipation Meetings are held to make certain that all pre-storm preparation activities are conducted. Meetings among the key CAC and Customer Service Center (CSC) staff are held for briefings, to make strategy decisions and to verify operational communication links between Room 210, the CAC and CSCs. The telephone and fax lines between Room 210 and the County Emergency Operations Centers (EOCs), and the New York City Office of Emergency Management (OEM), are tested to ensure they are operational. If not, steps are taken to correct any communication issue.[121]

Finding - The Interactive Voice Response had adequate capability and was not the source of any problems or call blockage.

The Interactive Voice Response (IVR) that was used to process inbound telephone calls (and to provide outbound messages to customers) has an outage application that interacts with

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[116] ERIP 2.3.3, National Grid – Call Assistant Instructions, Revision 7, dated July 2008.

[117] Interview #5.

[118] *Id.* ; Interview #77

[119] Interview #77 and Interview #55.

[120] Interview #55.

[121] ERIP 2.1.4, National Grid - Activation and Operation of Government Relations in Room 210; Revision 11; July 2008.

Customer Information and CARES systems. The application allows customers to report an outage; to obtain an estimate for the outage (if available); to request a callback when an outage estimate becomes available; or to request a callback when service is restored. The IVR has 240 shared ports providing the capability to handle 240 simultaneously. The IVR can also redirect customers who dialed a general telephone number to the proper department based on their response to certain queries (or scripts). The CAC was utilizing Verizon's Centrex telephone system when the IVR was installed in mid-2003. The IVR was modified to operate from the private branch exchange (PBX system) the CAC converted to in July of 2004 that was in service during Irene.

Finding – Prior to the major call blockage event that occurred, LIPA did not coordinate with Verizon to verify that the design and capacity of the Verizon network was sufficient to handle the expected call volume generated due to CAC centralization and the potential doubling effect of overflow calls being redirected from the CAC to the TFCC locations.

A bottleneck occurred at the Verizon central office that serves the LIPA Call Center. It was brought about by the Irene call volume being routed through one central office. This was brought about by the centralization of the CAC. Prior to centralization customer outage calls were directed to eight district offices and callboards across the Verizon network. The bottleneck at the Verizon central office resulted in a significant number of customer calls being blocked. Upon discovery of the saturation causing busy signals, NG worked with Verizon to implement a change in the calling service which allowed a much greater call decentralization throughout the Verizon Long Island network which removed the bottleneck. However, this was a foreseeable event as blocking had occurred during prior storms due to limited capacity of telephone facilities and could have been avoided by coordinating with Verizon to ensure customer calls would not continue to be routed to the Farmingdale office once the TFCC IVR was activated. Also, due to a geographical restriction (leveling or gaping), certain cellular telephone calls to the LIPA/NG 1-800-490-0025 number were not completed. [122] Had these matters been analyzed and considered before Irene, the call blockage and cellular telephone calling problems may have been identified and avoided.

Finding - Enhancements made to the systems used by the CTRs have reduced the amount of time needed to handle customer calls. The enhancements, however, were not fully implemented for Irene.

The CAC previously utilized five different computer systems to process customer reports of service outages. The CTR previously would have to access several (or all) of the different systems to obtain the information needed to complete an outage report. The CTRs now utilize Agent Desktop, a Graphic User Interface (GUI) that communicates with the legacy systems. When answering a telephone call, the CTR brings up the home screen provided by the Agent Desktop. The CTR just clicks the proper tab to access the needed information. This Agent Desktop allows the CTRs to handle customer calls quickly, freeing up lines for other customers

[122] The recommended solution to this problem is identified later in this chapter.

to get through. While the Agent Desktop was put to good use during Irene by the regular CAC staff, it was not used by all the supplemental staff because they were not trained to use it.[123]

Recommendation - Provide supplemental staff with additional training on Agent Desktop.

Agent Desktop is a major innovation for the CTRs. The use of this system could be further leveraged during major events by increasing the training for the supplemental Call Center staff. Refresher courses for supplemental staff on the use of this system should be provided in preparation for a major storm event.

Finding -The staffing and facilities for the initially handling customer calls during Irene were adequate. Redundancy was available in case the primary facility was incapacitated.

At the NG Call Center 212 operating stations are staffed under normal conditions; they can be ramped up to 332 stations in the event of an emergency.[124] Under normal conditions, the Call Center handles on average 12,000 to 15,000 calls a day.[125]

NG also maintains an alternate Call Center in Hewlett that has approximately 56 functioning stations with the capability of expanding to approximately 79 stations for taking customer calls. The Hewlett location is not intended as a supplement to the primary Call Center; it is a back-up contingency site should the Melville Call Center be unable to function. It has been used for training purposes and is activated when maintenance on the Melville system is required, but it has never been activated during a storm or any other emergency.[126]

Based on call volumes experienced during Irene, it was determined that the Hewlett Call Center did not need to be activated.[127] The Hewlett location is served by five dedicated T-1 telephone lines that run to the facility. Should the Hewlett location be activated during a storm, Verizon's Custom Redirect Service (CRS) would have route calls to the Hewlett facility from the Verizon Farmingdale office. In the case of Irene, any use of the Hewlett location would not have solved the blockage problems that were encountered early in the event.[128]

The Call Center at the Melville location has some redundancy by being served by two different Verizon central offices. The telephone facilities that serve Melville are physically separate and

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[123] Interview #77.

[124] IR #105.

[125] Interview #5.

[126] Interview #69.

[127] Interview #77.

[128] Interview #71

they come from two different directions. A major cable cut or some other catastrophic failure on one of the two paths would not isolate the CAC. Customer calls would still be able to reach NG.[129]

Finding - LIPA has improved its provision of customer information.

A major challenge to the CAC is customer demands for real time information about a major power outage.[130] LIPA has attempted to meet this challenge, and satisfy customers, by providing information using social media and other technology. Before Irene, LIPA successfully completed a testing which demonstrated that customers could text message a service outage to the CAC. This improvement was made available to the customer just prior to the storm. LIPA's website now provides instruction on how to use a text message to report an outage. If requested by a customer, service status updates will be provided via text messaging.

The methods available to customers to report a service outage include the Interactive Voice Response (IVR) system, customer service representatives, text messaging, LIPA's website and 21st Century when it is activated. In addition, customers may obtain the most recent information on LIPA's progress during a storm by watching Twitter, Facebook and more traditional media.[131]

Finding – There is not adequate documentation for the different telephone numbers available to the public to contact NG and LIPA.

There are several different telephone numbers available to customers to contact LIPA either directly or through the NG Call Center. It is difficult to determine the exact number of public telephone lines; the purpose that each line serves; how the calls are routed; and how the numbers are published to the public. There are private and non-published numbers that have a purpose, i.e., for government officials, municipalities, major accounts, critical care facilities and LSE customers. However, it is not clear how these numbers are provided; and, it appears that these calls arrive on the published, main numbers to the CAC and have to be redirected to the proper department or person.

There is a toll free number (1-800-490-0075) and a local number (631-6000) that are published numbers for all customers to use to report an electric outage. As part of storm preparations, customers are encouraged to utilize the 1-800-490-0075 phone number to report outages. Another number (1-800-490-0025) is the general number for all other purposes. These numbers are provided to LIPA customers in both the telephone directory and in the customers' bills. Spanish speaking customers and gas emergencies each have a unique number to reach the CAC. The majority of calls to the CAC come in on the 0075 and 0025 numbers. There is also the LIPA

[129] Interview #71.

[130] Interview #11.

[131] Interview #77

Headquarters number (1-877-ASK-LIPA) that is published and used by customers who escalate issues to LIPA.

The number that a party uses to reach the CAC will determine the routing of the call to the IVR. Under normal operations, calls made to the CAC numbers come into the PBX and then go to the IVR.[132] The general 0025 number places callers at the front of the IVR to hear a script that seeks to determine the purpose of the call. If the caller needs to report an outage, they are provided that option. Calls made to 0075 go directly to electric service and bypass the introductory scripts. Calls made to the number for reporting a gas emergency bypasses the IVR entirely as do fire, police and life support customers. Calls from critical care facilities are handled by a major account representative.

Recommendation – All telephone numbers used for emergency operations should be inventoried, documented, and their necessity assessed.

The variety of numbers provided to customers to contact LIPA should be assessed to determine the support for having all the different numbers. LIPA should consider having one general number for customers. All justified telephone and contact numbers should be listed and documented. The detailed information should include each number's purpose; whether it is private or public; how the number is provided to customers; how it is routed within the organization, whether it is to the CAC or Room 210, directly to the IVR, a CTR or a call administrator. To avoid compromises of the non-public numbers, they should be controlled and kept secured.[133]

Recommendation - LIPA should consider the elimination of its 800 number for emergency events and should transfer all storm-related calls to the NG CAC where the staff resides to assist customers.

LIPA's 800 number reaches its Uniondale offices where LIPA's staff resides. LIPA's personnel do not have the ability to process customer outages. Customer calls that require escalation must be sent to the NG CAC and all customer outage information must eventually be entered into the CAC system. The additional LIPA number can potentially frustrate customers who require CAC services.

Finding – A large number of customer calls to the CAC were blocked during Irene due to changes in the Call Center telecommunication infrastructure and operations along with the increased call volumes.

Two major differences are observable in the Call Center Operations, and telecommunication infrastructure, between the time of Hurricane Gloria in 1985 and Irene in 2011. One has been the implementation of the interactive voice response (IVR) system that allows a much greater number of customer calls to be handled. With the IVR, the maximum call volume is no longer

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[132] *Id.*

[133] Consider implementing IV-R3 if LIPA keeps all contact numbers.

restricted to the number of CTR stations that are active at any given time. The IVR also has the capability to recognize customers' phone numbers and automatically provide information about know outages and restoration times. This feature can sometimes eliminate the need for human intervention by the CTR. It reduces the total amount of time necessary to handle the customer call.

However, even with the IVR at the CAC, there is still the limiting factor of the capacity of the telephone facilities between the Verizon central offices (COs) and the CAC. Calls are routed to the Melville CAC through the Verizon Farmingdale and Huntington central offices. The Farmingdale office is the primary route; the Huntington office provides redundancy and overflow capacity.[134] There were 575 circuits to the CAC from Verizon at the time of Irene—325 circuits from the Farmingdale office and 250 from the Huntington office.[135] Thus, when Irene hit, the capacity to handle calls at the CAC was limited to 325 CSR stations. The total capacity, including the calls handled through the IVR or placed on hold, was limited to the 575 circuits to the center. If either the Farmingdale or Huntington office were to go down, that calling capacity would be reduced to 325 or 250, respectively. LIPA has effectively eliminated this total capacity limit by contracting with 21st Century, an IVR vendor. It provides LIPA the ability to handle 15,000 additional calls through the 21st Century facilities in Omaha, Nebraska and in Denver, Colorado. [136]

At the time of Irene, Verizon's network was designed to trunk transferred calls to TFCC from the Farmingdale office to an AT&T point of presence via the Brentwood Central Office. During Irene, management had the discretion to transfer none, half or all of the incoming calls made to the 0075 LIPA number from the Farmingdale office to 21st Century.[137] This decision was made based on the current hold times, the number of calls coming in and the exhaustion of the 575 circuits into the Call Center. Once 21st Century is activated, calls made to 0025 number (the non-outage number) still come into the CAC IVR. If the caller hit the prompt associated with an outage, the CAC had the ability to redirect the call to 21st Century. By Sunday, this feature was set up to automatically switch the incoming calls to 21st Century.[138]

The other major change in the CAC since Hurricane Gloria has been the centralization of the CAC. When Hurricane Gloria hit Long Island in 1985, customer calls reporting service outages were made to district offices and to local callboards instead of to one central location as was the case for Irene. The local callboards handled approximately 70% of the customer call volume; the other 30% was handled by the district offices. This spread the customer call volume across

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[134] Interview #71

[135] Interview #69

[136] The 21st Century facility where the call is processed is invisible to the caller.

[137] It was later learned in Interview 71 that it is the Custom Redirect Service ('CRS') that allows 21st Century to offer the ability to transfer calls at 0%, 25%, 50%, 75% or 100% of call volume, LIPA only utilizes 0%, 50% or 100% capability.

[138] Interview #69.

the entire telecommunications network covering Long Island to at least four different telephone central offices. With the centralization of calling to the Call Center, all calls are directed to the Farmingdale Central Office and from there they can be redirected to Huntington or to 21st Century. This resulted in Farmingdale being on the critical path for all calls to the CAC. Not only was the total call volume consolidated at this location, this also occurred when 21st Century was activated. The volume of calls through Farmingdale, and the subsequent overload conditions, resulted in numerous calls at the beginning of the Irene event being blocked from completion. Customers either received a busy indication or got a recording that their call could not be completed as dialed.[139]

From the lessons learned from Gloria, LIPA should have had concerns about the capacity of the Verizon central office in relation to the storm emergency call volumes and the potential need to ship 15,000 calls to 21st Century. At the time of Gloria, customers who placed calls to the Riverhead district office had great difficulties getting through to the company because the call volumes exceeded the capacity of the central office. Call blocking due to limited phone company facilities was a major issue then as it was during Irene. LIPA should have had some questions about the ability of Farmingdale Central Office to handle its company-wide call volumes and should have taken steps to anticipate and eliminate the problem.

Finding - NG effectively managed the call volumes to the CAC by having as many calls as possible be directed to the CAC personnel.

On the Monday and Tuesday following Irene, all 325 stations at the CAC were taking calls. NG constantly monitored the call volume at the CAC and directed calls to 21st Century as needed, but the goal in mind to have as many calls as possible answered by the CAC. Early Sunday morning, 100% of calls to 0075 had already been directed to 21st Century. Even with the activation of 21st Century, there were still some instances when the call volume to the CAC reached 100% capacity due to customers calling the 0025 number. But this lasted only a few minutes in each instance. Throughout the days following Irene, NG constantly monitored the call volumes and varied the percentage of calls sent to 21st Century (between the 0-50-100 percent levels) and took as many calls as possible at the CAC without exhausting its maximum capacity.[140]

Finding – There were customer complaints of "ring no answer" when they attempted to call. However, "ring no answer" would not apply to customers dialing the published phone numbers for the CAC.

There were customer reports of getting a ring but no answer when attempting to reach LIPA. NG insisted that customers who had this experience could not have been dialing any of its numbers directed to the CAC because the "ring no answer" does not apply in a blocking situation. Also, either the CAC IVR or the 21st Century IVR would have answered a call to the

[139] Refer to IV-F25 for the resolution of the blocking issue.

[140] Interview #69.

CAC, unless the call was blocked. Customers who had this experience may have called the LIPA Headquarters contact number[141] which was not staffed 24/7.[142]

Finding - LIPA and Verizon coordinated actions to resolve the blocking situation and other call issues were resolved as they were identified to reduce customer impacts.

There were three primary causes for the blocking of customer calls to the CAC which led to three different corrective measures being taken.[143]

1. Farmingdale Congestion

NG acted quickly to resolve the blocking of customer calls to the 0075 (both toll free and equivalent local number) outage number. On Sunday morning, it was determined that calls to the CAC were getting busy signals. Both proactive testing and customer complaints confirmed the blocking problem. Test calls were also made from cell phones and from the CAC. Room 210 in Melville also reported getting a busy signal when it tried to call the CAC. Verizon was contacted to further identify the source of the problem.

The CAC became aware, through conversations with Verizon, that the calls to the CAC were hitting the Farmingdale Central office before going to 21st Century, thus creating the bottleneck. At 3:00pm on Sunday, Verizon implemented Alternate Central Office Triggers (ACOT) in each of its offices covering in the LIPA service territory on Long Island. This transferred every call made to the CAC local outage number and 0075 directly to 21st Century from the originating central office and eliminated the use of the Farmingdale office.[144] This action significantly reduced the volume of calls to the Farmingdale and Huntington Central Offices.[145]

2. Regional 800 Number

Test calls from cell phones, and customer complaints of receiving a recording that their "call could not be completed as dialed," alerted the CAC that there is another blockage issue. Specifically, calls to the 800 outage number made by customers using their cellular phones disclosed another issue with the routing of cellular calls and the type of 800 number service used by LIPA.[146]

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[141] PSC's Office of Consumer Services' staff verified that the RNA problem was experienced by those customers who called the LIPA Headquarters number, 1-877-ASK-LIPA. This problem occurred in the late morning of August 30 and lasted approximately three hours.

[142] Interview #69.

[143] Interview #71.

[144] Interview #69.

[145] Interview #71.

[146] Interview #69.

NG's 800 number provided toll-free calling for customers within the Local Access and Transport Area (LATA). However, the number was not accessible to calls originated outside the LATA. The thought at the time when LIPA obtained the 800 number was that only LIPA customers located in the geographical boundaries of the telecommunication provider's LATA would be reporting an outage. Therefore, it was thought that an intraLATA 800 number would suffice.[147] However, cellular calls are routed through cell phone towers that can be outside the local calling area due to a multitude of reasons. In addition, many customers have moved from other areas and they have ported their numbers and they may use cell phones identified with other LATAs. Customers calling from those cell phones would not be able to complete their call in the same way. This issue was resolved by LIPA switching from a regional to a national 800 number. This action did not result in a new 800 number; it removed the geographical restriction on the existing number.[148]

3. Leveling

Leveling, or call gaping, was yet another issue identified with the 800 number. The 800 number was first set up in the early 1990's. Leveling was set up then by Verizon to control call volumes to 800 numbers and to protect Verizon's central offices from being overloaded.[149] This is a common telecommunications practice and it is not unique to either Verizon or LIPA. NG was able to have Verizon increase the level, or gap, and open the threshold, thereby preventing the blocking of calls to the center.[150]

Recommendation – Telecommunications carrier should be contacted prior to and during an event to ensure that there is adequate switch capacity for all incoming calls.

The primary telecommunications carrier should not only be contacted prior to an anticipated event but also during the event to maintain quality service. Incoming telephone calls remain a vital link to customers.

Finding - The Call Center data provided in the report made to the DPS is accurate; however, it does not reflect calls that were blocked.

The NG Call Center is able to monitor the call volume to the CAC on a real time basis.[151] The Call Center data is available for analysis. The Call Center statistics during the storm were reported in the November 18 report submitted by LIPA to the DPS. Call Center performance in that report shows a very good Average Speed of Answer (ASA) even during the early stages of

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[147] Interview #71.

[148] Interview #69.

[149] Interview #71.

[150] Interview #69.

[151] Interview #69.

the storm.[152] However, the statistics do not show the blocked calls that occurred. This appears to be due to the fact that the calls were blocked prior to reaching the Melville Call Center where the calls are measured.[153]

[152] The ASA are as follows: Saturday, 08/27, was 163 seconds; Sunday, 08/28, was 68 seconds; Monday, 08/29, was 61 seconds; Tuesday, 08/30, was 29 seconds; Wednesday, 08/31, was 100 seconds; Thursday, 09/01, was 131 seconds; Friday, 09/02, was 149 seconds; Saturday, 09/03, was 19 seconds; Sunday, 09/04, was 2 seconds; Monday, 09/05, was 186 seconds.

[153] NG cannot confirm how many customer calls were blocked from reaching the Call Center during the early stages of Irene. An attempt was made to formally get this information from Verizon but as of the date of this report, the information has not been provided. NG personnel through internal discussions with Verizon personnel estimated about 194,000 calls were blocked in the Farmingdale office on Sunday and most of the blockage involved the outbound calls switched to 21st Century.

VI. EXECUTIVE MANAGEMENT

This Chapter examines the role of LIPA's executive management team before and during Tropical Storm Irene. Vantage has evaluated how management reacted to the changing and unanticipated circumstances that occurred during the storm event and how well management responded to the questions and inquiries posed to it by governmental bodies, regulators, and emergency response groups.

LIPA has a unique organizational structure that differs from other utilities in New York. LIPA outsources most of its operational activities to another entity, National Grid. The respective roles and responsibilities of LIPA and NG are set forth in a Management Services Agreement (MSA) that provides for the day-to-day operation and maintenance of the transmission and distribution system in accordance with the policies and procedures established by LIPA. Because of the significant role that NG played during the storm, Vantage examined the contractual relationship between LIPA and NG, as set forth in the MSA, including performance requirements; budget and funding; the cost recovery mechanisms for expenses incurred during the storm; operational control during emergencies; load shedding protocols; and key decisions and actions. Vantage also looked for any service level indicators contained in the MSA to evaluate NG's performance during this major storm.

A. ORGANIZATION STRUCTURE

Normal Operating "Blue Sky" Conditions[154]

LIPA has approximately 103 full time employee positions, including eight executive positions.[155] LIPA employs experienced support personnel to assist the senior management team. Many support functions are executed by outside consultants and professional service organizations. During blue sky conditions, LIPA's employees perform the activities normally associated with their job functions.

Major Storm "Grey Sky" Conditions[156]

During grey sky conditions, such as those associated with Tropical Storm Irene, the normal management structures at NG are transformed in accordance with an Incident Command System (ICS). While many employees continue to perform their normal duties—a lineman, for example, continues to install or repair power lines—the organization is in fact restructured and various employees, with suitable training, are assigned a different role to support the service restoration efforts.

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[154] LIPA characterizes normal operating conditions as "blue sky" conditions.

[155] The LIPA President and Chief Executive Officer position has been vacant for over a year. The former Vice President of Operations is currently serving as LIPA's Chief Operating Officer.

[156] LIPA characterizes major storm conditions as "grey sky" conditions.

NG executes many of the responsibilities for operating and maintaining LIPA's electric transmission and distribution system. Prior to and during a major storm, NG plays a critical role. The following exhibit shows the ICS leadership positions filled by NG employees.

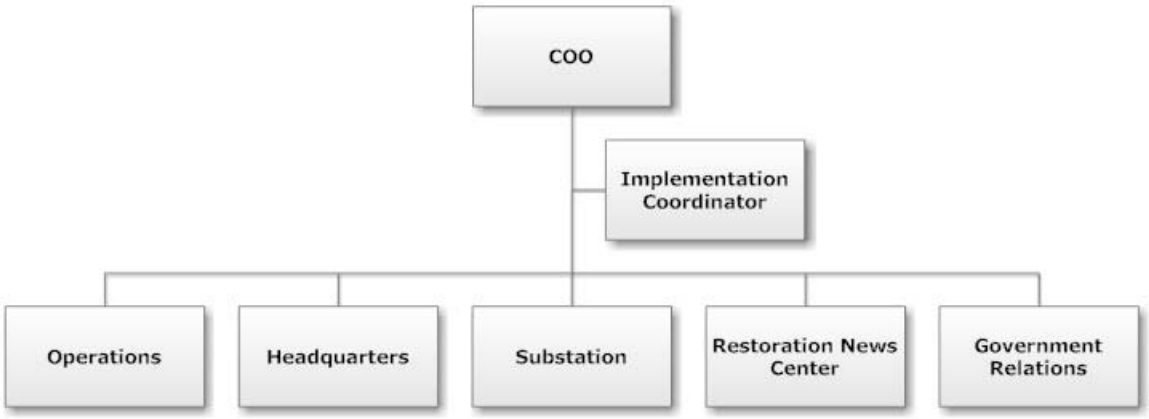
Exhibit VI-1

ICS Leadership Roles

Affiliation	Normal Role	Restoration Role
NG	EVP Chief Operations	Officer System Incident Commander
NG	President LI T&D	Incident Commander - LI
NG	VP Customer Services LIPA	Communications Officer - LI
NG	VP Operations Support	System Logistics Officer

While LIPA only employs about 100 employees, its role during a major event is also significant. LIPA's primary responsibilities include restoration oversight, government relations and news dissemination. LIPA's organization is restructured during a major event and most of its employees take to alternate roles. In general, LIPA's executive management team is restructured into the five functional areas as shown on the following organizational chart. LIPA's staff is integrated into an overall response team comprised of both LIPA and NG employees. LIPA employees staff the customer support desks and answer customer calls at LIPA's Executive Headquarters. Those LIPA employees with utility operational experience (e.g., some of LIPA's employees worked at the Long Island Lighting Company, LIPA's predecessor) were mostly assigned to work at substations.

Exhibit VI-2
LIPA SERP Organization



B. ROLES AND RESPONSIBILITY PURSUANT TO THE MSA

LIPA relies on NG, its Operator, to operate and maintain the transmission and distribution system in accordance with the policies and procedures established by LIPA. The first MSA was entered into between LIPA and KeySpan. When KeySpan was acquired by NG, the KeySpan responsibilities pursuant to the MSA were assumed by NG and an Amended and Restated MSA was executed.[157] The MSA provides transparency and establishes LIPA's control over the Operator. Prior to the current MSA, KeySpan was responsible for certain storm restoration costs. In 2006, the storm restoration costs became a pass-through to LIPA. The MSA expires on December 31, 2013.

NG's responsibilities under the MSA include, but are not limited to:

- the day-to-day operation and maintenance of the T&D system, including emergency repairs, customer service, billings, and meter readings;
- routine facility additions and improvements, including customer connections, procurement of goods and services from third parties, and inventory management;
- preparing and monitoring budgets, developing load and energy forecasts, and the acquisition, maintenance and use of power resource models and plans; and,
- maintaining an operation and maintenance manual for the T&D system.

LIPA's responsibilities under the MSA include, but are not limited to:

[157] The Amended and Restated MSA currently defining the relationship between LIPA and NG will be referred to as the "MSA".

- setting rates and charges;
- establishing line extension policies;
- establishing service rules and regulations;
- approving long-term strategic plans ;
- establishing customer service programs;
- approving annual budgets;
- approving the Operator's load forecast and power resource models and plans;
- establishing all energy efficiency, conservation and load management policies and plans;
- governmental relations and reporting;
- overall compliance with legal requirements;
- overseeing KeySpan's operations and performance;
- community and public relations; and,
- approving the appointment of the Operator's key personnel.

By the terms of the MSA, the Operator is responsible for storm response and storm restoration programs. During restoration efforts, the Operator uses, as necessary, its trained personnel who are not normally assigned to field duties (natural gas and generation department personnel) to perform electric distribution emergency restoration services. The use of these personnel increases the available field forces to restore service to customers. The Operator, on behalf of LIPA, also calls on the electric utility industry mutual aid programs whereby the neighboring and other utilities provide emergency assistance to serve one another in the event of a widespread outage due to a major storm. LIPA exercises controls over NG's performance through the use of performance standards contained in the MSA for non-emergency conditions. These standards include adherence to capital budgets, the frequency and duration of outages on the T&D System, and customer satisfaction. The MSA contains penalties for failures to perform within specified performance metrics.

On June 3, 2010, LIPA issued a request for proposals seeking operation and management services for the Transmission and distribution system beginning on January 1, 2014. LIPA is currently in contract negotiations with PSE&G of New Jersey to replace NG using a new and different type of service agreement. LIPA plans to assume greater management oversight and to increase transparency between itself and the new Operator. It appears that LIPA will play a greater role in planning and budgeting the operation and maintenance of the system.

C. FINDINGS AND RECOMMENDATIONS

During major storm events, especially one as significant as Tropical Storm Irene, the executive management of the utility should transition to an Incident Command Staff (ICS) structure. The ICS structure should be determined in advance of the storm and be kept with the utility's emergency preparation and storm restoration procedures. The decision to include LIPA's executive managers in the senior incident command staff, and the positions they occupied, was not made in advance of Tropical Storm Irene and during the development of the Storm and Emergency Response Policy and Plan. The establishment of such procedures prior to an emergency event is an accepted best practice by both the Federal Emergency Management

Agency (FEMA) and the electric industry. Once the ICS is activated, the oversight and decision making for the storm event should reside exclusively with the ICS.

Executive management oversight, as it relates to the use of a pre-defined Incident Command System, should be improved. There is no reason that LIPA's executive managers should not be part of the senior incident command staff; however, such decisions should be made by LIPA well in advance of the storm event.

Finding - LIPA's organizational structure is unique among the municipal and investor owned electric utilities.

With its relatively small professional and administrative staff, LIPA outsources not only the operation and maintenance of its transmission and distribution system to NG but it also retains a large number of consultants to complement its internal staff with technical and legal support. It is beyond the scope of this analysis of LIPA's preparation and response to Tropical Storm Irene to assess the effectiveness of this unique management structure. Nonetheless, this particular arrangement does have a bearing on how decisions are made that affect storm preparation, mitigation, and response. It should be thoroughly examined to ensure that it does not impede the goals discussed throughout this report.

Finding - The contractual relationship with NG, and the need to assign personnel without direct experience to new tasks during emergency conditions, resulted in problems.

During a major storm event, such as Tropical Storm Irene, it is paramount that control and leadership of the storm preparedness and restoration be highly synchronized and precisely managed under a well-defined ICS. The managerial duality of LIPA and NG provides the opportunity for LIPA's storm response to be less than fully effective. Ineffectiveness can include impaired communication and delayed responses to priority actions.

Finding - LIPA's executive management team was actively involved in the development and execution of the external communications plan.

The sharing of executive management between LIPA and NG, even under blue sky conditions, can contribute to inconsistencies and conflicting objectives. Under the terms of the MSA, NG is prohibited from communicating with certain LIPA constituents, e.g. governmental, media and customer relations; however, NG provides services and interfaces with consumers. Under blue sky conditions this restriction is not a perceived problem; however, under grey sky conditions, shared management runs contrary to placing full control in the hands of the Incident Commander which is an industry best practice.

Finding - The MSA provisions for the communications with NG before and during storms are not well defined or transparent.

As discussed above, the MSA does not address storm events—it focuses on routine utility operations. The MSA does not specifically address how significant outage events will be managed. The MSA addresses storm cost recovery but not storm performance.

The MSA terms appear to provide NG adequate flexibility to enable it to respond to the unforeseen circumstances resulting from storms and other natural events. The MSA does not specify terms and conditions for NG's performance during a major storm event. Thus, it provides the opportunity for LIPA and NG to exercise some latitude and flexibility.

> **Recommendation – The MSA should be revised to address operational responsibilities and performance expectations for emergency preparation and storm restoration management.**

By addressing emergency preparations and storm restoration management, the MSA can clarify the role of LIPA and the Operator in these circumstances and contribute to greater effectiveness. LIPA should consider whether the performance targets and financial incentives contained in the MSA for normal operating conditions are in conflict or are inconsistent with the goals and objectives to be achieved for major outage events. LIPA should consider whether the MSA should be modified.

VII. VEGETATION MANAGEMENT

A. INTRODUCTION

High voltage transmission lines bring electricity from generation plants and distant locations on the transmission grid to the substations serving local communities where the voltage levels are lowered to travel on the distribution system that runs along streets and roads to serve customers. The electric system is much like the roadway system with its interstate, state, county and local roads—all of which provide different capacities for vehicles. LIPA has easements for its transmission and distribution lines that must be cleared of trees on a continuous basis.

During Irene, 61 transmission lines tripped out of service and caused about 180,000 customers, or about one third of LIPA's customers, to lose their electric service. In many cases, the lines were struck by trees from outside the easement. They are typically referred to as hazard trees. LIPA has little control over them and must obtain landowner permission to clear the hazard trees.

These circumstances were even more of a factor on distribution system with its much narrower easements (20-30 feet). Significant damage to LIPA's facilities occurred when thousands of trees outside the right of way fell into the electric lines due to strong winds and rain-soaked soil conditions. Thousands of other outages occurred due to limbs on trees within LIPA's easements coming in contact with the lines. Even though tree-caused outages during non-storm conditions are low for LIPA, there are approximately 20 annual storms on Long Island that are capable of producing outages that can affect larger numbers of customers. Thus, there is an ever present need for LIPA to perform easement trimming to reduce storm outage events.

LIPA and NG employ a Vegetation Management Strategy. They hire five contractors, who submit lump sum bids, to trim 1600 distribution circuit miles and 200 transmission circuit miles a year.[158] With a $10 million annual budget for this work, the average cost to trim the transmission circuits has been $9,200 per mile and $5,600 per mile for distribution circuits, stated in 2010 dollars. The previous year's outage performance reliability indices are reviewed by LIPA's and NG's reliability engineers and they determine which distribution circuits will be scheduled for trimming. The number of circuits trimmed is established by the size of the budget. In 2012, 97 of the 836 overhead circuits were trimmed. Roadside transmission circuits are not included in the trimming performed for the under-built distribution circuits that reside on the same poles.

Overall, the vegetation maintenance budget is $15.75 million. In addition to the $10 million budgeted for scheduled trimming work, $2 million is budgeted for storm hardening. This amount is used to remove hazard trees from various circuits; this work is performed on a unit cost basis. Additionally, $3 million is spent for "hotspot" tree work that is requested by homeowners, municipalities and by LIPA/NG linemen and trouble servicemen. Another

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[158] IR-153

$750,000 is spent annually for right-of-way (ROW) management. This work includes the mowing of transmission right-of-ways, herbicide treatments, and grounds maintenance at 140 substations.

B. TRANSMISSION RIGHT OF WAY MANAGEMENT

Finding - The current transmission system vegetation management program is inadequate.

During Irene, out-of-service transmission lines accounted for about 180,000, or about one-third, of the customers who lost electric service. Most of the outages were due to hazard trees, especially those on the sub-transmission lines where there are narrow easements. Transmission lines are constructed to withstand storm impacts because of their importance as the backbone of the electric system. However, higher transmission system reliability cannot be achieved without a supporting vegetation management program. The tree population and density on Long Island inhibits right-of-way widths. Also, many sub-transmission lines are located near highways and they have distribution lines under built on them. This leaves very narrow clearance corridors.

LIPA's overhead transmission system extends 986 miles; it includes voltage at 138 kV and the sub-transmission voltages—69 kV, 33 kV and 23 kV. These lines, reportedly, are trimmed to an 18-foot clearance below, and to the sides of, the bottom conductor at mid-span and at maximum sag. The amount of clearance expands to 25 feet from the woodland edge on remote ROW locations. Some transmission ROWs are crowded with multiple circuits, and some are located along railroad ROW where clearances are limited. Nevertheless, all branches that overhang transmission conductors are supposed to be removed.

Vegetation on the floor of the transmission ROWs is managed using three techniques depending on land ownership, usages and the type of soil:

- Approximately 1/3 of the transmission ROW system is fee-owned and is managed using selective herbicide treatments. This 600-acre portion of the system is mostly located on the north side of the island where the soils are richer. About 100 acres receive herbicide treatments annually.

- Approximately 1/3 of the transmission facilities are in the Pine Barrens and are located on poor, sandy soil on the east-central end of Long Island. This land is mowed on a six-to-eight year cycle. Mowing is used instead of selective herbicides to honor the utility's agreement with the Suffolk County Central Pine Barrens Joint Planning and Policy Commission, a New York State regulatory body.

- Approximately 1/3 of the lines are located in urban settings and they are mowed three times annually to maintain the grass and to discourage any dumping of trash. This portion totals about 375 acres.

The high number of outages experienced on LIPA's 69 kV system during Irene point to the need for improved clearances to prevent similar outages in the future.

Recommendation - Develop an integrated vegetation management program for the necessary maintenance of the transmission system ROW for reliability purposes.

To direct the growth in the ROW laterally and away from the transmission facilities, and to prevent branches from blowing into conductors during high wind events, transmission circuits along roadsides (with under built distribution facilities) require lateral cuts performed below the height of the transmission conductors. An ongoing program to identify and remove hazardous trees, and weak-wooded species, in close proximity to transmission facilities should be a priority.

Transmission facilities that run alongside railroads, and cross-country circuits, should be entirely clear of any vegetation that can grow in the energized space, or can inhibit access to the ROW for emergency and maintenance crews. An ongoing program can be used to keep this space free of vegetation.

The New York State Public Service Commission (Commission) looked closely at vegetation management following the 2003 Northeast blackout. LIPA should review the Commission's Order in Case 04-E-0822 issued June 22, 2005, and a subsequent Order in Case 10-E-0155 issued on May 27, 2011 to determine if there are any lessons to be learned from what other New York utilities are doing.

Finding - The current transmission system vegetation management program budget is below the amounts spent by other utilities and industry guidelines.

About $1.84 million is currently spent annually to trim transmission facility ROWs; additional funds are spent for annual aerial patrols of the equipment across the entire transmission system. During these patrols, any instances of hard contact are noted and subsequently remedied. Approximately 200 of LIPA's total 986 circuit miles of transmission ROWs receive trimming maintenance annually at an average cost of $9,200 per mile. In addition, $763,000 is spent annually on ROW floor maintenance and grass/bare ground maintenance at 140 substation sites.

Recommendation - Increase the transmission system vegetation management program budget.

A detailed aerial inspection of the entire transmission system should be performed to identify vegetation management deficiencies. This could cost an estimated $1,300 per mile for a one-time $1 million expenditure.[159]

[159] The cost of an aerial patrol is determined using linear miles and not circuit miles. This estimate is based on 770 linear miles.

Transmission system tree trimming is currently performed on 200 miles each year; however, the transmission system requires reclamation and not just trimming. Similar to the recommended reclamation of the distribution system, reclamation of the transmission system would initially increase costs by between 50% and 250%; the cost per mile would be in the range of $13,800 to $32,200. Using an estimate of 770 linear miles, the total cost would be between $10.6 million and $25 million for the entire system. This one-time cost would insure the integrity of the system and establish the require amount of periodic trimming and the future removal of hazardous trees. It is recommended that the transmission system be patrolled aerially twice a year.

The cost of floor management would decrease over time using this approach instead of tree toppings and three-times annual mowing, and brush-hog mowing in the Pine Barrens. Selective herbicide applications cost less than $500 per acre and they need only be performed only once every 4 years. Given the available information, it is difficult to determine the total floor acreage affected; however, using 770 linear miles and an average 50-foot wide ROW, approximately 4700 acres would require management. At a rate of about 1200 acres per year, this annual cost would be $600,000.

C. ANALYSIS OF DISTRIBUTION VEGETATION MANAGEMENT

As mentioned above, during Irene trees caused thousands of outages on the distribution system. Two types of situations were present: trees and limbs within the LIPA easements caused outages; and, trees outside of the easements also caused interruptions.

It is important to remember that with distribution vegetation management, tree trimming is not only a matter of system reliability, it is also a matter of public safety. Electrical lines present dangers when they are not well maintained. Trees and tree limbs can bring down electric lines and can cause line faults that melt conductors. Both of these conditions must be avoided when possible to minimize the dangers to customers and the general public and not to expose to the risk of injury or death. The establishment of a strong and effective vegetation clearance program serves these purposes. During Irene, 13,544 reports of wire downs were received; 5,953 of them involved electrical wires. Fortunately, there were no injuries sustained.

Finding - A six- foot clearance around distribution facilities is used in LIPA's service territory that is well below the industry standard of a ten-foot clearance to either side of the pole and/or maintenance of conductor with ground-to-sky clearance.

Finding - There is no proactive and consistent tree trimming cycle for distribution circuits in LIPA's service territory.

There are 9,034 miles of overhead primary distribution circuits on Long Island. Approximately 65% of the distribution system runs along roadsides, as does most of the utility's three-phase system. The other 35% of the distribution system is located in rear lots and this portion is mostly single phase.

Distribution tree trimming work is determined by a system reliability performance analysis and prevailing field conditions. The work is coordinated by a Vegetation Manager and eight Line Clearance Supervisors (LCS). The tree trimming cycle runs on a 3, 5 or 7-year cycle given the growth rate of the vegetation at various locations on Long Island. The system's average rate is 5.6 years for all circuits, but some circuits are not trimmed for up to 8 years at a time. Approximately 25% of all system outages are related to tree incidents.

Distribution tree trimming clearance practices vary across the nation. A common industry clearance guideline is 10 feet below and to the side of a conductor, and 10 to15 feet above the conductor.[160] Many utilities that have experienced storm related tree outages clear "from ground to sky" for the main, three-phase portion of their distribution circuits.[161]

The line clearance specification is six feet of clearance measured as a radius around the distribution line. None of the LCSs interviewed could provide any reasons or explanations for this clearance specification. We believe this standard could be due generally to the narrow width of the LIPA easements and the dense Long Island population that desires tree-lined yards.

Lines located in the highway limits, which is very typical for LIPA, present further control limitations and increased public pressures to minimize trimming. For the three-phase lines, this clearance standard means that there is only eight feet for phase wires and only six feet for space on either side of the line—equaling a 20 foot clearance profile for use in a 20-foot easement. The LCSs explained that they had considered changing the six foot clearance specification to ten feet, but they hesitated to do so because of perceived public opposition to increased tree and vegetation pruning and also, perhaps, due to legal limits on the size of the easements. Ten-foot clearances could work on the single-phase lines that are mostly located in back lots; however, it would not work for the three-phase lines that are along roadsides in a 20 foot easement.

The use of a six-foot clearance specification limits the removal of encroaching branches below, adjacent and overhanging the conductors. This limits the reliability benefits of the distribution system tree trimming program. Only trimming six feet sideways and above lines allows overhanging tree limbs and branches to remain a major threat. These branches can sway and break into the electric conductors during high wind storm events, or under the weight of snow or ice. Studies have estimated that 15% of tree-caused outages are due to trees growing into the conductors, with the vast majority of outages caused by branches and trees falling onto the conductors from outside the maintained corridor.[162] The risk of overhanging branches is especially significant for the three-phase portion of the electric system. Falling branches can

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[160] Granite State Electric Company d/b/a/ National Grid, December 2008 Ice Storm Review, *Responses to Staff's First Set of Data Requests* – February 27, 2009, Exhibit 1-32©, 11pp.

[161] Schenk, R. 2008. *After the Storms*. Transmission & Distribution World, June 2008, 9-12.

[162] Guggenmoos, S. 2009. Managing Tree-Caused Electric Service Interruptions. *Energy Pulse.Net.* 11/16/09.

easily cause a phase-to-ground, or a phase-to-phase outages. Since the three-phase portion of the distribution system serves a large number of customers, the risk of falling tree branches here has a higher potential for creating an adverse impact on system reliability.

While ground clearing within easements is optimal, public pressure to have tree-lined yards and streets has limited such clearings. These tree trimming limitations produces minimal and short-lived reliability results, as pruned trees can sprout back in the next growing season. With growth of two to three feet per year, the very best cycle time for tree trimming is two to three years. However, this can be expensive and it may not be entirely necessary.

Currently, LIPA is on an average system cycle of 5.6 years. Some trees may not get trimmed for seven to eight years. Due to the factors discussed above, LIPA needs to formally establish a shorter trimming cycle in which every line section is addressed and no segment is bypassed in favor of performing work on other worst-performing sections. A reasonable improvement would be a formal four-year cycle for all three-phase lines and a formal five-year cycle for all single-phase lines. This shorter, formal cycle could reduce the need for hot spot trimming by 30-50% which could help fund the new cycle by reducing the hot spot budget.

Distribution Circuit Reliability Trimming

The LIPA and NG engineers who are concerned about system reliability use statistical measures to select the worst performing circuits for the upcoming year's tree trimming maintenance work. Typically, about 100 circuits are worked per year; in 2012, the budget for this scheduled work was $10 million. The LCSs receive their designated circuit assignments in their respective areas; they mail customers a notice of the upcoming work about two weeks prior to the contract crews being dispatching. The LCS will check field conditions to note any hazardous trees for removal. The pre-planner who accompanies the LCS then attempts to obtain customer permission to remove the trees. The authorized tree removals are marked on paper maps that are given to the contractors who perform the work.

Four contractors have provided the workforce for distribution; two operate nationally (Asplundh and Lewis) and two firms are local (IPS and Harder). The contracted tree crews are made up of two to three persons; they are dispatched to perform this tree work equipped with bucket trucks and chippers. Rear lot trees are typically trimmed by physically climbing the trees with ropes and saddles; work performed at curbside is done with bucket lift trucks parked at the curb. Vines are also cut when found--sometimes by a designated vine crew. If the vines are entangled with the conductors or equipment, a Serviceman will follow-up and remove the vines at a later date. Trimming back lot lines in a scheduled manner is much more efficient than during outages often times in the dark when the source of trouble must be located first.

Work on the three-phase portion of the circuit is performed before the work on the single-phase lines in a geographic area. Tree removal work sometimes necessitates a return trip to an area particularly when there is a delay in obtaining custom approvals for tree removals. Customer refusals for trimming or removal are pursued up to the point of creating a poor customer experience.

Trees and brush are supposed to be cut at the same time the circuit is trimmed; however, this standard is not strictly enforced. Contractors are paid a unit price for tree removals (six inches wide or larger); there is no incentive for the removal of smaller trees and brush not captured by the lump sum price. Herbicides are used to treat stumps and brush to prevent sprouts and return growth.

As stated above, tree branches are pruned away from the electric conductors to obtain six feet of clearance at the time of pruning. The six feet is the cleared radius around the conductor which is the same standard for under, alongside and overhanging branches a; no differentiation is made for tree species. The clearance standard is the same for bare wires and Hendrix tree cable.

Storm Hardening/Hazard Tree Identification & Removal

About $2 million annually is budgeted for storm hardening tree work. This work mostly involves the three-phase portion of selected distribution circuits where potentially hazardous trees are identified for removal. Customers are typically contacted to obtain their agreement for the tree removals; contractors perform this work on a "unit cost" basis determined by the tree diameter. This work is performed in addition to the tree trimming work on entire circuits. Given the extent of damage caused during Irene, additional funding from the storm hardening program, that has been under-expended in recent years since 2006, should be considered for use in this program.

Hotspot Tree Work

Each LCS is provided two hotspot tree crews and a pre-checker to perform the line clearances needed on individual trees, as requested by homeowners, municipalities and utility personnel. The LCS' goal is to respond to these requests within two days of a request. An annual budget of $3 million is provided for hotspot tree work; this work can total 10-15 requests per day for each LCS. Hot spot tree work is reactive to individual problem spots or line sections. It does not generally provide substantial benefits to overall reliability. Some hot spot trimming is necessary, but it should be minimized. The budget for this should be reduced if change is made to a shorter formal cycle schedule trim.

Recommendation – Where easement widths allow it, the clearance around distribution lines should be ten feet on each side of the poles and the conductor, with clearance provided from ground to sky.

Recommendation - In concert with better clearance zones, LIPA should implement a shorter, formal tree trimming cycle of four years for all three phase lines and five years for all single phase lines. This will provide better defined cycles and maintain an effective clearance zone between trimming cycles.

Recommendation - Undertake a study using outside resources to determine the best way to manage the urban forest in LIPA's service territory and to review if efficient changes were implemented based on past Vegetation Management studies.

Finding - The vegetation contracting pricing in use does not provide good incentives for managing the urban forest well.

Routine trimming of the electric circuits allows incompatible and hazardous trees to remain in place. This means that additional trees can be added to this tree inventory with each passing year. Work performed on an average cost/mile basis only encourages contractors to trim the minimum required to meet specifications. Minimal planning (one to two weeks before the work is performed) does not allow enough time for permission to be obtained from property owners for the removal of their trees.

While the line clearance contracts specify that small "volunteer" trees are to be removed as part of tree trimming work, there is no financial incentive for the contractor to adhere to this specification. Only designated removals of trees with six- inch diameters at breast height, or above, are compensated on a unit price basis. Contract bids are provided on an average cost per mile basis—there is an incentive using this approach to prune trees as quickly as possible, none to remove them.

Trees marked for removal during circuit trimming is also limited when tree removal permission is attempted by pre-planners only one or two weeks prior to the work. Even when the trees are removed, the benefit may be short lived; the contracts do not specify herbicide treatments for the cut stumps to discourage sprouting.

Recommendation - Revise the vegetation management program to inform customers of pending tree trimming operations well in advance.

Approximately two months before line clearance work is initiated on a circuit, a mailing to homeowners should alert them to the upcoming tree work. This should be followed up with a customer contact from a professional arborist to plan the tree work; to obtain the property owner's permission for tree removals on or adjacent to the ROW; and, to map the intended work using GPS technology to produce electronic maps that can be included in the work orders and the line clearance contracts.[163]

The arborist and planner can explain to the land owner the electric system reliability problems caused by various tree species and their relative position and condition. This person provides the necessary notification and obtains the permission needed to perform the work that continuously improves system reliability. In addition to obtaining permission for tree removals, the arborist can explain, as necessary, the need to apply herbicides to cut stumps immediately following clearing, and that small trees and brush must be removed or receive herbicide treatments to prevent future problems.

A contract for the line clearance can be issued to perform the work as planned, using a cost structure that takes into account the difficulty of tree trimming three-phase and single-phase construction; voltage differences; access issues; tree removals by location and diameter size class; and, herbicide treatments.

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[163] Dow AgroSciences. 2000. *Mapping out a Right-of-Way*. Arbor Age, January 2000; pp 32-36.

Finding – The reliability indices for each circuit are analyzed to choose the circuits trimming work with limited input provided by the LCSs.

The utility's reliability engineers choose the circuits to be trimmed on the basis of reliability indices. According to the LCSs that were interviewed, this approach does not take into consideration a previous year's outages caused by tree uprootings and trees that fall over. Fallen trees can no longer cause another outage; simply reacting to a statistic, without understanding the root cause or source, may simply chase a phantom problem. Circuits not targeted by outage statistics may, nevertheless, be at risk due to existing hazardous tree conditions. They may be allowed to remain unattended and they can adversely impact reliability during an upcoming storm event.

The LCSs interviewed by Vantage stated that their objective is to complete line clearance tree trimming for 1600 miles of distribution and 200 miles of transmission a year. They appear to have not much ownership in the selection of the chosen circuits to be worked. The circuits are initially chosen by the reliability engineers; and then with some input from LCSs, the targeted circuits for the coming year are finalized.

Finding - Casual attempts at customer notification to obtain permission for tree removals do not provide effective management for the urban forest.

Line clearance tree work is the most visible utility maintenance activity to consumers and the only activity that homeowners can contribute directly to improve system reliability. Understanding the need for improved line clearance, and the relative impact of various tree species on electric service reliability, should be communicated to customers by the utility and its vegetation management professionals. These professionals should explain to landowners the impact on system reliability that various tree species can have due to their position in relation to the electric circuits and facilities.

Recommendation - Develop an education and outreach campaign to communicate to customers the need to maintain the distribution system using a long term vegetation management program.

An effective vegetation management program requires a dedicated arborist to plan the targeted portion of a circuit span-by-span; to note and mark the recommended tree removals in the field and on maps; to mail notifications to affected land owners; to obtain permissions for any tree removals; and, to note that the cut stumps and small saplings that should be treated with herbicides. As an incentive for them to allow the removal of hazardous trees, land owners should be offered compatible replacement trees, as needed. A voucher program in cooperation with local area nurseries could aide this effort.[164]

Planning for tree removals should be performed far enough in advance to allow land owners to response to the utility's requests. After-hour visits should be offered, when necessary, to

[164] Flowers, D.E. and H.D. Gerhold, 2000. *Replacement of Trees Under Utility Wires Impacts Attitudes and Community Tree Programs.* Journal of Arboriculture 26 (6): 309-317.

explain the necessary work and to secure permissions. After the planning activity for a circuit is complete, work should then be scheduled and awarded to contractors on a unit-cost basis.

Communication should not begin and end with individual land owners; it should include communication and notifications provided to municipalities and neighborhood associations. A two-way communications program can contribute a vital interface for vegetation management activity in the urban forest and support "Tree City USA" communities. As a "Tree Line USA" utility, the work performed on LIPA's system could assist municipalities on Long Island to meet their tree care goals and objective in a National Arbor Day Foundation sister program.

Finding - Budgeting for vegetation management is not performed in a holistic manner.

The design of the electric system's circuits should determine and control the performance sequence for the line clearance activity. The main backbone, three-phase portion of each circuit should be addressed first, beginning at the substation and proceeding to the first sectionalizing device before work is performed on the single--phase portions of the circuitry. This approach also applies to the storm hardening efforts currently in use on selected circuits; however, it uses should be expanded and applied to all three-phase segments of the distribution system. Establishing the priority for this work can include use of the previous year's reliability indices; however, the root causes for the tree-related outages should be ascertained. Also, priorities should be established considering the number of customers served by a circuit and other factors.

Hot spot tree work is determined by the external and internal requests that the utility receives and it is dispatched using individual "trouble tickets." This work promotes good public relations by attending to trees of concern to land owners and municipalities although it is unclear how the treatment of these selected trees improves overall system and circuit reliability. The hot spot practice can be a drain on available resources. Rather than expand any such activity, this work should be kept to a minimum. Dispatching crews to work on a single tree proximate to a circuit can be up to three times more expensive than when such work is performed in a systematic manner for an entire circuit.

Recommendation – Establish a budget for distribution vegetation management that systematically and strategically provides for improvements in the methods used for this program.

Initially, it is reasonable to expect the cost for distribution vegetation management to increase as reductions are achieved in the built-up stock of incompatible hazardous trees and overhanging branches.[165] It is not unusual for a utility to remove 40% to 70% more trees during its first reclamation cycle.[166] This amount of increased work can increase program costs by 50% or more. Some utilities have reported increased costs up to five times greater than the amounts

[165] Johnstone, R.A. 1988. *Economics of Utility Lateral Trimming*. Journal of Arboriculture 14: 74-77.

[166] Neal, M. 2008. *The Right Tree in the Right Place*. Transmission & Distribution World, June 2008 pp4-8.

they previously spent.[167] Some of the cost increase can be partially absorbed by combining the budgets for storm hardening and circuit reliability tree trimming.[168] Hot spot tree work can also be restricted to devote greater funds to the distribution vegetation management program.[169]

The prioritization of circuit work, as outlined above, provides a means to improve the utility's vegetation management program. The implementation of this approach will require support from Executive Management, Engineering, and Line Departments. Call Center operator education will also be needed.

[167] Maryland Public Service Commission Case No.9240; Order No. 84564, December 21, 2011.

[168] Schenk, R. 2008. *After the Storms*. Transmission & Distribution World , June 2008, 9-12

[169] Good communications provided by the utility's arborists can help curtail hotspot work. Customer requests can be evaluated to determine whether the tree is a threat to system reliability. Also, customers and land owners can be advised that the work they have requested can be performed along with the other tree trimming work on the circuit when the circuit is due for its work.

VIII. ELECTRIC SYSTEM DESIGN STANDARDS & STORM HARDENING

A storm hardened electric network is protected against unnecessary system failures due to the age of the electric facilities, their physical condition and the impact of severe weather. Storm hardening is accomplished by making timely investments in capital projects and by designing the electric system to standards that anticipate and preclude excessive ageing and destruction from storms. The pre-storm condition of an electric system can either guard against or invite significant amounts of storm damage, add to the duration of a system outage and to the costs to restore the system. Vantage reviewed LIPA programs in place to maintain and enhance the electric system reliability.

A. THE ELECTRIC SYSTEM PLANNING PROCESS

Finding – System reliability initiatives at LIPA, at the transmission and distribution level, are generally condition-based and not anticipatory.

LIPA has several active programs that it uses to address the performance of the electric distribution system. The programs address known problems identified by an analysis of interruption data and customer complaints. The programs are effective; however, they are implemented after the fact and they do not anticipate the need for system improvements that could reduce damage caused by storms. It is important to avoid any pockets of aged infrastructure, be they large or small, that can become vulnerable to the impact of storms. Targeted investigations are an important tool used to provide clues as to system aging and to enhance system resistant to storm damage.

The major LIPA condition-based programs include the following: [170]

Circuit Improvement Program (CIP)

The objective of the Circuit Improvement Program is to address poorly performing electric circuits. On average, each circuit serves about 1300 customers. Circuits are selected based on an analysis of interruption data and a comprehensive field survey is used to identify the possible causes for the circuit interruptions. Annually, the CIP identifies the 40 worst performing feeders for LIPA to address.

Vantage analyzed a representative sample of LIPA-provided CIP worksheets.[171] The forms used by the system surveyors provide them appropriate field prompts. Vantage's study of the forms attested to their completeness, an adequate level of review by the surveyors and to competent work having been performed by them.

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[170] IR-180

[171] IR-268

Vantage examined a small sample of 188 distribution poles for which 295 substandard items were identified. Many of them were minor, such as missing animal guards being the most prevalent condition. But some were capable of compromising the ability of the circuit to withstand the impacts of bad weather. Examples of such items include rotted or split top poles (5); deteriorated fuse links (17); broken cross arms (11); missing or broken anchor guys (3); overloaded transformers (5); and older style automatic splices that needed to be replaced with compression splices (37).

Multiple Interruption Program

The Multiple Interruption Program has a narrower focus than the CIP. It analyzes and addresses single-phase laterals and secondary networks that serve about 40 customers, on average. These facilities are identified for a review when they experiencing three or more interruptions a year. The likely causes for the interruptions are identified and repaired.

Transformer and Fuse Load Management

The Transformer and Fuse Load Management Program drills down even deeper. Transformers serve from ten to twelve customers and they can become overloaded and less reliable as they age. This program analyzes customer data and field reports of transformer overloading conditions due to overheating or the activation of a red light indicator. These transformers are provided a high priority for replacement. The transformers with loads exceeding 170% of their ratings are the primary targets. To proactively address aged out transformers, LIPA provided supplemental funding for this program in 2011.

Targeted Overhead Enhancements

Technically, LIPA's targeted overhead enhancements are not so much a "program" as it is applied, as needed, to respond to municipal and customer complaints. This program addresses problem centers in geopolitical areas such as a village or a neighborhood community. An area of this size, with a number of supply circuits, can have complex causes for any outages experienced and the remedies can also be complex. A CIP field survey, concentrating on the main lines, is the primary investigative tool used and major capital project(s) may be required to improve the overall reliability for such areas.

Transmission Line Prioritization Program

In 2007, LIPA began an initiative to prioritize its transmission line projects using service interruption data and the results of semi- annual physical inspections and observations. Criticality transmission facilities were an important consideration in this program. In 2008, LIPA finalized its storm hardening guidelines that apply to new transmission facilities and major system upgrades.

Pole Wrap/Reinforcement Program

LIPA has been targeting for pole inspections those areas on the system where interruptions are abnormally high. NG has aggressively replaced poles as part of this system reliability and

storm hardening initiative. NG replaced poles as part of the system reliability and storm hardening initiative. However, LIPA/NG has stopped funding its distribution pole inspection program as part of its pole replacement or reinforcement strategy. With many poles approaching or exceeding their design life expectancy, and additional loadings from telephone and cable TV (CATV) attachments, it is important that LIPA resume this program as planned in 2013.

The above listed programs have contributed to the reliability of the transmission and distribution system. In addition, Vantage believes that system failures can be avoided and their associated damage can be minimized by LIPA including a formal, preemptive pole inspection program in its system planning process. From examining LIPA-provided photos of the damage sustained from Tropical Storm Irene, Vantage has seen instances where an effective preemptive pole inspection program would have identified issues for resolution

Recommendation - Implement a storm hardening program that integrates the current reliability programs with a formal pole inspection program to replace danger poles before an outage and to add a proactive component to the planning process.

LIPA performs transmission line installations and it has a storm hardening process in place. Transmission poles are being replaced as components of the transmission lines require upgrades or reconfigurations. What is missing is a detailed structure inspection program covering both physical conditions and providing structural analysis. Such an inspection program was recommended in the Navigant Storm Hardening Initiatives report; Vantage does not believe that such an inspection has been completed.

According to budget documents, LIPA's Structural Inspection/Enhancement Towers/Poles Program was put on hold in 2008 pending the outcome of a pole replacement study. Funds were budgeted in 2010 but they were subsequently deferred to 2011. The plan was again deferred in 2011. Vantage has been advised that a pole wrap/reinforcement study is planned for the transmission inventory in 2012. Spending on transmission pole replacements decreased from $2.680 million in 2006 to $757,000 in 2011. The Navigant study suggested that $4.250 million be provided annually for 20 years to address just the poles that fail inspection. Substantial additional funds would be required to address other structures. This detailed inspection is needed if system enhancements are going to be funded and completed over a reasonable period of time.

A common and good utility practice is to inspect all wood poles on a schedule. For distribution this is often set up on a 10 year cycle with older poles inspected first. Transmission pole lines are typically inspected more frequently. Over time these surveys have become more sophisticated and they offer substantial benefits to utilities. Typically, a contractor is engaged to perform these surveys. At one point in time, such inspections focused on pole health at ground line and at core. Today, these inspections can provide strength and loading analysis, life cycle data, remedial options, and customer connectivity data for utilities converting to GIS based outage management systems. There are reinforcement alternatives for pole replacements that can result in significant savings, as much as 75% compared to the cost of a new pole. With its back yard infrastructure, the repair options (pole wraps) for LIPA would have many

applications. There are several firms that provide pole inspection services. One of the most recognized is Osmose Utilities Services Inc.

The Pole Wrap and Reinforcement Programs at LIPA have been inactive for several years. The last spending we noted in the review of the Capital Budget was $32,000 in 2006; there was no budget or spending through 2011. Vantage was advised that the programs were suspended pending the results of a pole asset management study. The resumption of the inspection programs is long overdue. Vantage learned that transmission lines are scheduled for inspection in 2012. The plan is to catch up by inspecting 100% of the wood poles. The distribution inspections are not scheduled to resume until 2013 with a survey of LIPA's 350,000 solely owned poles scheduled to be completed in 2022.[172] Vantage believes there are enough indicators that an increasing number of poles are at or past their useful life and they should be replaced. Substandard poles contribute to the amount of storm damage and to the number of customers affected by severe weather conditions. Additional pole replacements will add durability and resilience to the electrical system. Postponing this survey, and the actions it prompts is indicates, is not in LIPA's long term best interest.

B. STORM HARDENING PROGRAM

Finding - LIPA has been slow to implement the recommendations from the Storm Hardening Initiatives Report, dated July 2006.

Recognizing that additional storm hardening and system durability initiatives would be required, LIPA commissioned Navigant Consulting to develop a long range plan to address this need. The study was completed in 2006 (Navigant Storm Hardening Initiatives Report) and it identified many opportunities for LIPA to improve system performance and address severe storm events. The study used a category III hurricane as its test case; the three focus areas it identified were:

Durability - To minimize damage caused by severe storms

Resilience - To minimize the impact of storm damage

Restoration - To minimize outage times.[173]

The following are some of the recommendations contained in the Navigant Report:

- Reduce the impact of tree contact on non-R.O.W. transmission circuits at voltages 69 KV and below
- Enhance pole inspection programs to reduce structure failures from mechanical overloads
- Leverage distribution automation

[172] Note, there are approximately 150,000 additional jointly owned poles. (Ref. Interview No. 75)

[173] Ref. IR-183.

- Improve voice and data communications channels
- Improve the damage assessment process
- Implement an electronic damage inventory system
- Upgrade the Outage Management System
- Improve the restoration management system
- Reconfigure substations to avoid equipment damage from flooding and high winds
- Apply spacer cable construction
- Develop restoration plans addressing various storm conditions
- Improve the logistics process
- Ensure that all contracts address contractor storm response

LIPA has been highly selective in implementing parts of these recommendations. It has not clearly indicated which of them it will and will not be performing. As noted above, Navigant identified the need to upgrade the OMS system in 2006. Had that been done, LIPA and NG would have been able to better communicate with its customers following Irene. While that alone might not have addressed all of LIPA's issues regarding communication, it would have helped.

LIPA should do a more complete analysis of the recommendations and develop a comprehensive implementation program. LIPA is addressing some of the durability and resiliency recommendations but has been slow to adopt those addressing restoration. The bulk of the storm hardening (durability) money is used to fund upgrades in other planned projects. The upgrades are improved design standards that protect against wind and flooding. The stand-alone initiatives include: Increasing the strength of selected transmission pole lines along the LIRR corridors and at major highway road crossings; increasing pole strengths at substation exit riser poles, automated sectionalizing points and key equipment poles.

LIPA budgets other funds that address improved restoration. The dominant program in this category is the Distribution Automation Program that increases the number of automatic sectionalizing devices, and remote controlled switching devices, available to expedite full or partial restorations. Storm hardening, as a component of normal expansion and rebuilding of the system infrastructure, will be a protracted endeavor. More stand-alone storm hardening projects would help to prepare the system to deal with the impacts of severe storms. LIPA should consider increasing the funding level for this program to accomplish a reasonable amount of storm hardening improvements.

Recommendation - Consider a more aggressive implementation of the transmission and distribution initiatives detailed in the 2006 Storm Hardening Initiatives Report.

There were a number of recommendations made Navigant in the 2006 Storm Hardening Initiative Report that should still be considered for implementation. While their total cost, $2.951 Billion, is large and not likely acceptable from a ratepayer perspective, and several of the recommendations would not appear to be cost effective, others have merit and should be considered. Many of the recommendations can be implemented over 10 to 20 years. While Vantage has not analyzed the impact of these recommendations to LIPA's O&M and capital budgets, it notes that there are funds budgeted for many of these activities and their

incremental cost would be reduced accordingly. Further, several others are simply modifications to existing programs, that increase or re-direct funds. While some of the costs are capital, many are included in the category of normal O&M expenditures.

Finding - LIPA has not budgeted or spent amounts recommended and committed to a storm hardening program.

During various interviews, LIPA has stated a strong commitment to its storm hardening program. The Storm Hardening Talking Points that LIPA presented to the Board of Trustees in January 2012, LIPA identified a 2006 commitment to budget $20 million per year for storm hardening. Vantage's review of the actual amounts spent on storm hardening initiatives for the past 5 years indicates that the average annual expenditure of $12.5 million, as shown in the Exhibit below. LIPA has stated that a portion of its storm hardening work is done in conjunction with other work; however, LIPA was unable to provide specific dollars associated with that work. It is reasonable to expect that a more aggressive implementation of the storm hardening plan would have resulted in less damage to the transmission and distribution system and the associated customer outages.[174]

Exhibit
Storm Hardening Budget Profile

Year	Budget	Actuals
2006	$4.2M	$7.6M
2007	$14.0M	$13.9M
2008	$17.2M	$14.4M
2009	$19.8M	$17.4M
2010	$11.0M	$9.4M
Annual average	$13.2M	$12.5M

Recommendation - Develop a transparent and programmatic approach to storm hardening and fund it appropriately.

The Storm Hardening Initiative Report should be revisited and updated to account for the hardening process work that has been completed and for changes made to the system infrastructure due to Tropical Storm Irene. In addition, to accurately determine the current integrity of the infrastructure, funding for the transmission and distribution pole survey should be accelerated. LIPA should have a planned program to accomplish this work.

Finding - Current engineering standards do not include the use of aerial spacer cable (Hendrix Cable) in tight ROW's with minimal vegetation clearances.

Based on Vantage's review of the T&D Engineering Standards (and Interview No. 4a) it has noted that LIPA does not use spacer cable as its preferred option in heavily treed areas. It is in

[174] IR 182.

their "tool box" but seldom used. Selected applications of spacer cables, at the 33 kV and 13.2 kV levels, would reduce exposure to tree and wind damage.

Recommendation – Consider installing spacer cable systems in heavily treed and congested areas where vegetation management options are limited.

An example of a system design enhancement would be the selective application of spacer cable technology. These systems are effective in heavily treed environments. They are more expensive than standard cross arm supported conductors; but spacer cable installations are significantly less costly than the undergrounding option. The installation of spacer cable in conjunction with pole replacements, and other circuit improvement programs, would improve the overall durability of some sections of the system.

LIPA has its unique challenges; its tree conditions are well documented. In addition, space for dedicated rights-of-ways for transmission and express distribution circuits is scarce. The Navigant Report estimated that of the 355 miles of the 69 kV, and below, transmission facilities constructed on public rights-of-ways, half is in heavily treed areas. These sections of line are more exposed to traffic risks; congestion from multiple pole attachments; and, limited ability to perform the trimming and remove danger trees to protect these critical facilities.

The Navigant Report recommended the use of spacer cable to address both transmission and distribution durability issues. The 69 kV option has been identified subsequent to the 2006 Report and it may present another option to undergrounding. The commitment of funds for all the tasks identified by the Navigant Report would require additional resources from LIPA and its rate payers, but the initiation of these programs, and testing the effectiveness, is within LIPA's ability to control. Storm hardening funds should be allocated for the installation of spacer cable in a variety of circumstances, including: critical mainlines; problem prone rear lot laterals; heavily treed areas; and, in multi-circuit arrangements common to the road side 69 kV infrastructure.