JACOBS CONSULTANCY

Investigation of the Service Response and Communications of The Connecticut Light and Power Company Following the Outages from the Severe Weather over the Period of March 12 through March 14, 2010

Prepared For

Department of Public Utility Control on

October 26, 2010

JACOBS™ Consultancy

JACOBS CONSULTANCY

Investigation of the Service Response and Communications of The Connecticut Light and Power Company Following the Outages from the Severe Weather over the Period of March 12 through March 14, 2010

Prepared For

Department of Public Utility Control

For Jacobs Consultancy

Frank DiPalma
Director, Utilities Practice

October 26, 2010

Table of Contents

Table of Figures

1 Executive Summary

Background

On March 12, 2010 through March 14, 2010, a severe rain and wind storm struck various portions of Connecticut causing more than 100,000 homes and businesses to be without electric power. The storm-related damage resulted in lengthy outages and the need to replace or repair a significant amount of the distribution system. Given the events that occurred, the Department of Public Utility Control (Department or DPUC) retained Jacobs Consultancy to conduct an investigation of the service response and communications of Connecticut Light and Power Company (Company or CL&P) and The United Illuminating Company (UI). This report deals specifically with CL&P.

Objective and Scope

The purpose of this investigation was to provide technical expertise to the Department staff in areas pertaining to electric distribution company action and response to a significant power outage. The scope of this assignment entailed: analysis of pre-filed testimony, preparation of discovery requests, auditing CL&P's procedures, examination of the evidence, cross-examination at public hearings, and providing the Department with a write-up containing conclusions, findings, and recommendations, which can be used in drafting the Department's decision in this docket.

Approach

The Jacobs Consultancy team conducted this investigation employing a review process consisting of four principal stages: 1) Project Initiation - which involves initial discussions to provide a thorough understanding of the Department's expectations; 2) Investigation, Data Gathering, and Fact-Finding - a detailed review of CL&P's emergency operation plans, controls, systems and processes relative to the March storm; 3) Analysis - use of quantitative and qualitative assessment techniques of information gathered through documents and interviews; and 4) Reporting - regular project updates in addition to the Draft and Final reports. We reported our results in terms of findings, conclusions, and recommendations.

Conclusions

Using our proven methodology, Jacobs Consultancy conducted its investigation in seven focus areas: Emergency Planning, Preparedness, Restoration Performance, Mutual Assistance, Post-Storm Activities, Best Practices and Other. What follows is a brief summary of our conclusions and recommendations in each of these areas.

Emergency Planning

The Emergency Response Plan is adequate and makes use of key emergency response concepts including: Incident Command System, escalation decision points, restoration priority based on customer and/or circuit criticality, decentralization provisions, and communication protocols. In addition, training as defined in the plan appears to meet industry standards. However, one area where the Company was not fully following the plan was in conducting its after action/lessons-learned activities. Employee involvement does not extend to the Supervisor of Distribution Lines (SDL), Field Supervisor Lines (FSL), or field worker levels.

Preparedness

Since this particular event was exacerbated by unforeseen severe weather conditions, we examined and found CL&P's procedures for obtaining weather forecast information properly dependent on a variety of sources and adequate. Also, CL&P actively participates in mutual assistance groups and makes use of their resources. However, CL&P's communications and contact plans were reactive relative to cities, municipalities, and state agencies. CL&P has since enhanced its protocols for external communications, and has added internal resources to augment Account Executives and Liaisons in providing correct levels of communications, and support to the municipalities and cities. In addition, it is essential completed work be communicated to the emergency operations center so crews are not assigned to work already completed. CL&P experienced a backlog of completed work assignments for entry into the work order/OMS system causing inefficiencies in closing out outage records.

Restoration Performance

CL&P appears to have been well prepared for the restoration efforts by working two shifts with the vast majority of its workforce scheduled to work more effectively during daylight hours. In addition, a significant number of employees worked beyond 16 hours and there was good material availability throughout the event. The call center was adequately staffed and responsive throughout the storm. CL&P's safety policies appear to be effective given the small number of very minor injuries reported. However, CL&P's field forces indicated that the level of experience and capability was lacking in some of the damage assessors, resulting in analysts and work planners not having a complete understanding of all the materials required for restoration.

Mutual Assistance

CL&P did a good job in using mutual assistance resources and in their management of these resources during the restoration process. Due to the geographic area and intensity of the storm, CL&P contacted and requested out-of-state mutual assistance crews. These crews were on site by Monday, March 15th. The Company was resourceful in its approach to birddog the foreign crews.

Post-Storm Activities

In general, CL&P's post-event processes are effective in improving future performance, determining the root causes of undesired outcomes, and gaining an understanding of key stakeholder expectations. From the March storm lessons-learned, CL&P was able to document and implement strengthened external communication procedures. As discussed earlier, one significant shortcoming in the post-event process is CL&P does not formally include union workers on lessons-learned.

Best Practices

In general, CL&P has successfully embraced many industry best practices for elements of its major event emergency response process. These include: use of Incident Command System, dedicated emergency operations staff and facilities, appropriate estimates of damage based on known information, prepositioned and mobilized 25% of the restoration workforce, effective distribution of materials, able to escalate contact with and obtain mutual aid groups, extensive use of nontraditional employees, and gather and implement lessons-learned.

There are several other best practices that are embraced, but there is still room to improve. These include: CL&P's Emergency Response Plan is a thorough internal communications plan that was followed; however, the Company has identified the need for a more proactive outreach to the towns and municipals; due to the severity of the storm, CL&P's outage management system's initial restoration times were overly optimistic, and in order to avoid field reporting issues, more mobile data terminals are needed.

By using benchmarking data from comparable utilities, we were able to assess the reasonableness of certain work practices. These include: CL&P's crew work scheduling of 16 hours work with 8 hours of rest and providing crews flexibility to work beyond 16 hours is in conformance with industry practice; however, the Company's working beyond 16 hours policy is not universally applied by supervision. Also, CL&P initiated utilizing the concept of a "tent" facility for field staging and meal provision; however, its use has generated a number of employee issues that need to be addressed.

Other

During the interviews, we heard discussions from CL&P's Locals 420 and 457 indicating a lack of trust and collaboration with the Company. We encountered two instances where this lack of trust may impact outage recovery operations. First, on Sunday, March 14, 2010, numerous call outs were required to get an additional 20% employee response rate, and second, in order to assure adequate staffing for unknown weather events, CL&P chose to preschedule staff for anticipated outages beyond its normal staffing requirements.

Summary of Recommendations

Based on our investigation and analysis, we conclude CL&P did many things well in its response to the March 2010 severe rain and wind storm. As highlighted in the previous section, given the uncertainty of the storm's severity and its eventual destructiveness to the distribution system, there were many positive accomplishments in the areas of Emergency Planning, Preparedness, Restoration Performance, Mutual Assistance, and Post-Storm Activities. However, as also noted, there are a number of concerns or areas in need of improvement that also surfaced as a result of our investigation. Jacobs Consultancy's three primary recommendations are:

1. Continue to develop enhanced communications capabilities with cities and municipalities.

The Company's communications and contact plans, in place at the time of the March 2010 storm, were reactive relative to contact with cities, municipalities, and state agencies. To their credit, CL&P has subsequently enhanced its protocols for external communications to emphasize a more proactive posture in establishing continuous communications with these agencies, in particular, municipals and cities to assure that they are aware of the event circumstances and the availability of Company resources to support their Emergency Operation Centers.

2. Formally expand the after action/lessons-learned reviews to include direct input from field workers and first and second levels of field supervision, Field Supervisor Lines (FSL), and Supervisor of Distribution Lines (SDL).

The Company is not fully following its Emergency Response Plan when conducting its after action/lessons-learned activities. The perspective that field employees bring is unique and represents an opportunity for input from the viewpoint of those directing and performing restoration operations.

3. CL&P and union leadership should identify any high-priority issues of disagreement and develop and implement a plan to work through those areas of disagreement with the goal of improving their relationship.

The Company's relationship with its union locals is strained from the Company's and the Unions' perspective, and is starting to impact call-out response as evidenced by the need to preschedule. CL&P and their unions should be striving to work together and address areas of disagreement that are negatively impacting their relationship.

In addition to the above recommendations, we make a number of other recommendations throughout the report; these have been summarized in the Appendix Section under 9.1

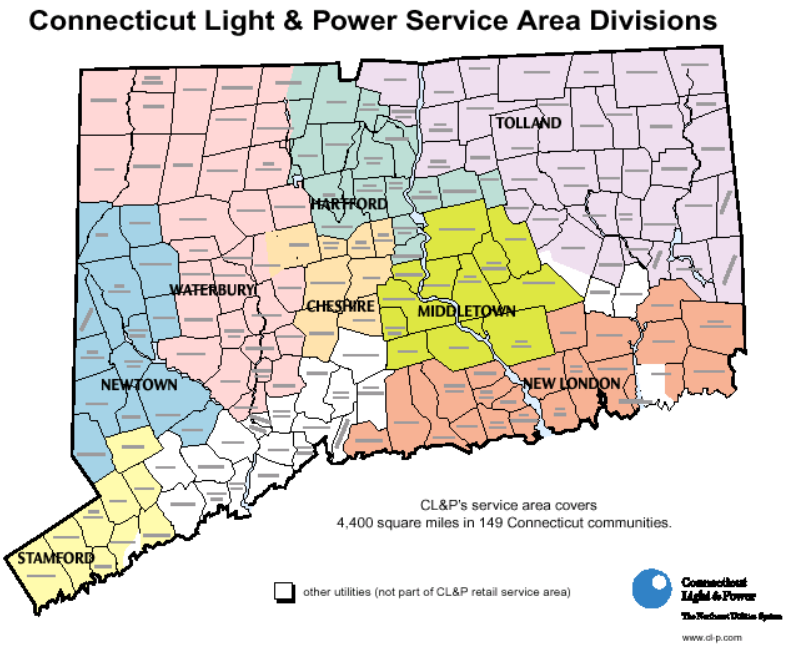
2 Background

On March 12, 2010 through March 14, 2010, a severe rain and wind storm struck various portions of Connecticut negatively impacting the provision of service to electric customers. It is estimated that in excess of 100,000 homes and businesses lost electric power as a result, with both The Connecticut Light and Power Company (CL&P) and The United Illuminating Company (UI) service areas being affected. As a result of this storm, lengthy power outages for various customers in the service areas occurred. The storm-related damage resulted in a need for CL&P and UI to replace or repair a significant amount of the distribution system in the areas affected. Given the events that occurred, the Department is seeking a Consultant to act as an extension of Staff regarding Docket No. 10-03-08, Investigation of the Service Response and Communications of The Connecticut Light and Power Company (CL&P) and The United Illuminating Company (UI) following the Outages from the Severe Weather over the Period of March 12 through March 14, 2010. This report deals specifically with CL&P, while a separate report deals specifically with UI.

CL&P provides residential, municipal, commercial, and industrial electric service to approximately 1.2 million customers in 149 cities and towns in Connecticut as shown in Figure 1.

As the largest electric utility in the State of Connecticut, CL&P receives annual revenues exceeding $3.6 billion per year.

Figure 1 - CL&P Service Territory



3 Objective

The purpose of this consulting assignment was to provide technical expertise to the Department Staff in areas pertaining to electric distribution company action and response to a significant power outage that occurred as a result of severe weather on March 12, 2010 through March 14, 2010, in the CL&P service area.

4 Scope

The specific scope for this assignment is to provide expert assistance to the Staff and will be responsible for:

- The analysis of pre-filed testimony.
- The preparation of discovery requests.
- Auditing the Company's procedures.
- Examination of the evidence.
- Cross-examination at public hearings.
- Attending staff meetings and providing the Department with a detailed write-up and findings on the entire outage matter to be used in drafting the Department's decision in this docket.

5 Methodology

Jacobs Consultancy employed a workflow process to accomplish the investigation in an efficient and concurrent approach that minimized disruption to Connecticut Light & Power Company (Company or CL&P), while uncovering key issues concerning emergency storm response and restoration. The Jacobs Consultancy team conducted this investigation employing a review process consisting of four principal stages: 1) Project Initiation, 2) Investigation, Data Gathering and Fact-Finding, 3) Analysis, and 4) Reporting.

Project Initiation Stage

This stage involved the initial conference call/meetings with the Connecticut Department of Public Utility Control (Department or DPUC) and CL&P and was intended to provide Jacobs Consultancy with a thorough understanding of the Department's expectations as well as introductions, logistics, and orientation at each subject company.

Investigation, Data Gathering and Fact-finding Stage

Based on the detailed work plan and schedule as mutually determined in the Project Initiation Stage, Jacobs Consultancy began its detailed review of CL&P to opine if the appropriate emergency operations plans, controls, systems, and processes were in place and if CL&P properly executed its plans relative to the March storm. This process includes:

- Collecting data and metrics, including pre-filed testimony.
- Conducting interviews with CL&P personnel.
- Identifying current key processes, policies, practices, and procedures for the functional areas related to emergency response and restoration.
- Providing ongoing communications and project status as mutually determined with the Department.

Analysis Stage

Our analysis makes use of quantitative and qualitative assessment techniques:

- **Quantitative Assessments** are based on the information gathered through our review of documents.
- **Qualitative Assessments** are based on the information gathered during interviews with knowledgeable individuals and the professional experience of our consulting team.

Reporting Stage

This is an ongoing process consisting of regular project updates and status reports in addition to, the Draft and Final reports. The written and verbal status reports include a summary of completed activities, next activities, and project issues. Jacobs Consultancy developed and prepared findings, conclusions, and recommendations in a report format approved by the Department.

Following the completion of the Analysis Stage, we reported our results in terms of findings, conclusions, and recommendations to the Department.

- **Findings**—represent facts supporting strengths, weaknesses, opportunities, and threats that can be directly tied to documents, interviews, or observations.
- **Conclusions**—summarize the findings and suggest necessary improvement actions.
- **Recommendations**—represent our comments regarding proposed improvements, alternative standards, or solutions. Recommendations will be well defined.

Figure 2 - Timeline

Date	Event
7/6/10	Project initiation teleconference with DPUC
7/8/10	Project initiation conference call with CL&P
7/19/10 to 7/23/10	Interviews at CL&P
8/2/10 to 8/6/10	Interviews at CL&P
8/6/10	Briefing at DPUC
8/31/10	Interim Report
10/07/10	Draft Report
10/26/10	Final Report
TBD	Hearing Participation as needed

6 Data Requests

In addition to the data requests issued by the DPUC, numbering 12 for Electric and 11 for Customer Service, we developed additional data requests to focus in areas of interest based on our experience. Also, during the interview process, we developed additional data requests to further quantify and clarify our findings. As per agreement with DPUC, we assigned priorities to our data requests: Priority 1 to be satisfied within five working days and Priority 2 to be satisfied within ten working days. We issued the five data requests comprising a total of 48 specifics requests. CL&P was very responsive in fulfilling the specific data requests. A log of the data requests is shown in Appendix 9.4.

7 Interviews

We conducted a total of 21 individual or group interviews with 51 management, supervisory, and craft workers at CL&P, as well as union management representing Union Locals 420 and 457. The results of these interviews helped formulate areas for storm response investigations and produced additional data requests. CL&P was very helpful in arranging the interviews and providing suitable interview space. The interview schedules for CL&P are shown in Appendix 9.5.

8 Procedural Analysis

Consistent with our proposal, we have divided our investigation into six focus areas, and we have added one supplementary section – "Other" for additional findings, conclusions, and recommendations:

1. Emergency Planning
2. Preparedness
3. Restoration Performance
4. Mutual Assistance
5. Post-Storm Activities
6. Best Practices
7. Other

For each focus area we first identify key supporting considerations and then the findings and conclusions appropriate to CL&P. In addition, as warranted, we make a number of recommendations that once implemented, will improve CL&P's storm response and communications.

We also conducted a survey with five electric utilities located in the North East, Southern States, Middle States, and Western States in order to gather standard and potential best practice information relative to storm crew scheduled work hours, night work practices, safety emphasis, and exceptions to practices, staging area usage, and job ticket completion criteria. The survey was conducted telephonically with the appropriate knowledgeable personnel in each utility. We posed a total of 13 questions with a 14th reserved for other comments. The detailed survey results are shown in Appendix 9.6 with a comparison to CL&P's current practices.

8.1 Emergency Planning

Our review of this area includes:

- Adequacy of emergency planning documents.
- Review of emergency planning in routine storms including activation thresholds.
- Training and preparedness of organization in emergency planning.

In order to evaluate the ***adequacy of emergency planning documents***, we reviewed CL&P's Emergency Response Plan (ERP)[1] which is a component of the Northeast Utilities Emergency Response Plan (NUERP). The plan is updated annually or upon completion of an after-action report and the plan is filed on a five-year basis with the DPUC; the next filing date is June 2011. The NUERP is comprised of three sectional documents: Basic Plan, Division Plan and Emergency Response Organizations. The table of contents for the Basic Plan is shown below:

Figure 3 - CL&P ERP Table of Contents

TABLE OF CONTENTS

[1] DR-12, EL-8

The topics covered and content of this plan is comparable to other leading electric utility emergency response plans and appears to be comprehensive. The plan embodies the Incident Command System (ICS) concept, which is consistent with leading utilities and federal and local government requirements.

In particular, the Plan establishes specific activities to assure preparedness both internally and with external organizations at the state, municipal and community level.

The Plan is further detailed at the divisional level (the Division Plan), which further elaborates the plan for decentralized operation and protocols, and at the organizational level (the Emergency Response Organizations), in which the role of the Emergency Operations Group and its responsibilities are defined along with a clear definition and role under the ICS.

Escalation is an important element in an ERP and sets the stage for how major events are handled and how control is assured for the benefit of efficient restoration. CL&P and Northeast Utilities (NU) have developed an escalation matrix, shown below, that adequately addressed relevant phases on electric power disruptions. This matrix is consistent with similar escalation procedures in place in other electric utility emergency plans.

Figure 4 - CL&P Emergency Event Escalation Matrix

EMERGENCY LEVEL DESCRIPTION AND ACTION MATRIX

DESCRIPTION			ACTION					
Emergency Level	Emergency Level	Estimated Times to 99% Restoration	Senior Officer Involvement	Operating Mode	EOC	Divisional ICS	Line Crew Sources	Corp Center Support Personnel
Level 1	Scattered T'storms; Wind Storms 35 to 45 mph; Minor icing 1/8 to ¼ inch; 3 to 5 inches wet snow	0 - 1 day 30,000 OOS	Informed through normal reporting procedures	Centralized control at Division level	Small Staff 2-3 employees	Divisional ICS staffed according to existing situation None to partial	Local Division, Adjacent Divisions Local line contractor 2 crew/District On-call	Wire Down (WD) <10% of 385 Feeding & Lodging (F&L) and CSC phones: N/A
Level 2	Severe T'storms w/ numerous lightning, gale force winds 32-63 mph; heavy wet snow 6-10 inches, icing ½ to 1 ½ inches	1 -3 days 90,000 OOS	Informed through periodic reports	Decentralized to Division level and satellites as required	Reduced Level System EOC partial staffing 5-8 employees	Affected Division ICS fully staffed	Local Division, CL&P Divisions System Projects Local line contractors 30% line crews On-call	WD: 30% of 385 F&L: 10% of 240 CSC: 20% of 150
Level 3	Hurricanes, Severe T-storms w/ possible tornadoes; heavy widespread icing 2 – 3 inches	3+ days +150,000 OOS	Active participation	Decentralized using satellite concept	Fully Full staffing of System EOC 15-20 employees	Full staffing of Divisional ICS	All NU crews Line contractors Other utility crews All Crews On-call	WD: 100% F&L: 100% CSC: 100%
Level 3	Capacity Deficiency (Implementation of ISO NE Operating Procedure No. 7)	Not Applicable	Active participation	Centralized control	Reduced Level System EOC partial staffing	None to partial	Local Division Electricians Test Department Local line contractors	None

The Plan includes sections on ***training***, drills, and the post-storm critique.

8.1.1 Findings

- The Company employs an ICS throughout the emergency plan, both at the corporate level and in decentralized command centers.
- Twice yearly, the Company participates in mock storm drill exercises at the State of Connecticut's Department of Emergency Management and Homeland Security.
- The Company provides training for wires-down and analyzer personnel.
- The Company is enhancing training for the Planning and Operations Chief; currently this training occurs during mock storm drills and on the job.
- While the Plan specified training and drills, we found that there is a gap in training at the Area Manager level, particularly for decentralized operations.
- The CL&P ERP is a component of the NUERP, which sets forth standard plans, organizations, and escalations.
    - The NUERP is reviewed annually.
    - As part of the review, towns are solicited for their input.
    - A revised plan is filed with the DPUC on a five-year basis.
    - The last revision to be filed was June 2006, and the next is due June 2011.
- The NUERP is comprised of three sectional documents: Basic Plan, Division Plan and Emergency Response Organizations.
- The NUERP Damage Assessment states:
    - Patrols are made up of Divisional and Corporate employees, who receive annual training.
    - Patrols utilize a Damage Assessment Patrol Report, Report 760, and are sent to Planning Chief and Analyzing Teams at the control location, decentralized or centralized, depending on the level of decentralization.
    - Analyzing Teams use patrol information and the OMS to determine the extent of damage and to prepare job package specifications.
- When the Emergency Operations Center (EOC) is activated, Area or System commander must notify:
    - Selected state agencies.
    - NU executive management.
    - Operating company organizational management.

- The Divisional Incident Commander(s) is responsible to ensure that liaison is established with NUERP local, town, municipal agencies.

- The NUERP requires updating of local, town, and city contact numbers.

- Conference Calls internal to CL&P: the Plan specifies the participants and frequency, depending on the severity.

- The NUERP After Action Reports requires after-action reporting within a specified time window, specifies participants in developing the report and that employees and support personnel are solicited prior to the after action meeting.

- However, the After Action process does not include a formal "bottom-up" solicitation of input from the field worker level. Involvement stops at the Area Manager level.

8.1.2 Conclusions

8.1.2.1 The training as defined in the Plan appears to meet industry standards.

8.1.2.2 The CL&P ERP is consistent with other plans we have reviewed in terms of:

- Use of Incident Command System.
- Escalation decision points for routine outages handled by division work groups and larger outages follow ERP Incident Command System.
- Contains decentralization provisions.
- Embodies communication protocols for internal, external media, and external localities town and state.
- Safety and rest time work rules focused on maximizing daylight[2] hours for restoration efforts by adopting a 16 hour on and an 8 hour rest period.
- Although 8 hours of rest is mandated; the CL&P ERP provides flexibility for work completion beyond 16 hours. Working beyond 16 hours is discretionary and determined at the FSL[3] and SDL level.

---

[2] Daylight shifts run from 7:00AM until 11:00PM and night shifts run from 3:00PM to 7:00 AM.

[3] FSL is the acronym for Field Supervisor Lines and SDL is the acronym for Supervisor of Distribution Lines. These positions represent the first and second levels of field supervision.

8.1.2.3 The Company is not fully following the Plan in conducting its after action/lessons-learned activities as the specification of “employee” involvement does not extend to the SDL/FSL/Field worker levels.

8.1.3 Recommendations

8.1.3.1 Formally expand the after action/lessons-learned reviews to include direct input from field workers and first and second levels of field supervision, Field Supervisor Lines (FSL), and Supervisor of Distribution Lines (SDL). Refer to Conclusion 8.1.2.3

8.2 Preparedness

Our review of this area includes:

- Adequacy of overall resources.
- Procedures for obtaining assistance.
- Weather information.
- Collection of data regarding outages and effectiveness of existing systems and procedures.
- Communication plans for customers, local officials, state agencies, and the public.

We examined a number of data requests and information developed from the interview process to evaluate CL&P's overall preparedness; specifically:

We examined the ***adequacy of overall resources*** by evaluating the ERP's provisions for on-call resources and the specified escalation levels for increasing event severity. On Friday, March 12, 2010, based on the latest weather forecast of sustained winds and rain, CL&P's System Restoration and Emergency Preparedness group conducted a conference call with the Company's management team to define the Company's readiness plans. During this call, and based on the forecast at the time, CL&P decided to place 25% of all CL&P district line workers on call for a 24-hour period from 6 p.m. Saturday night to 6 p.m. Sunday night. Given approximately 160 total line crews across all of CL&P, 25% of the Company's line crews represent approximately 40 crews. Based on past events and responses, the Company's management team believed additional line resources from the Company's Districts and System Projects groups would be available on Sunday to respond, if needed. In addition, CL&P verified the staffing and readiness of key storm restoration functions, such as its Emergency Operations Center (EOC) and System Operations Center (SOC), to ensure adequate leadership and support was readily available.

We reviewed CL&P's ***procedures for obtaining*** assistance from local and other CT-based, utilities, contractors and municipalities and from other external or remote utilities. CL&P belongs to the New England Mutual Assistance Group (NEMAG), a grouping of local New England utilities. CL&P also belongs to the Edison Electric Institute's (EEI) RestorePower mutual assistance service, which provides access to utility resources regionally and nationally.

Since this particular event was exacerbated by unforeseen severe weather conditions, we examined CL&P's procedures for obtaining ***weather forecast information***, its sources, and accuracy. CL&P monitors weather reports from a number of sources, both paid and free, on a local, regional, and national level. The primary paid forecasting service is provided by Weather Service International[4]. CL&P has utilized Weather Service International successfully for a

[4] DR EL-2

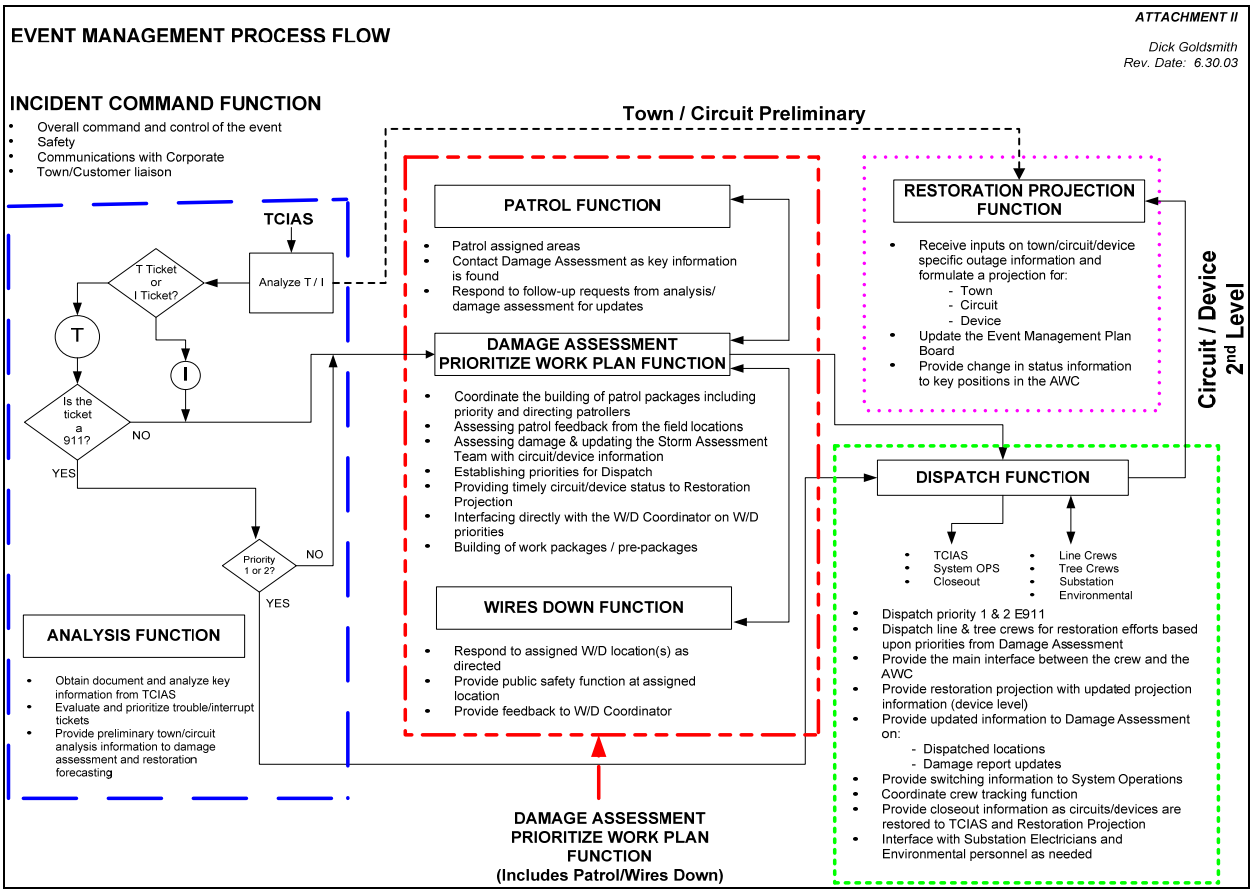
number of years. In addition to Weather Service International, CL&P monitors local and national television stations as well as Internet weather services. The weather forecast as received by the Company at 7:03 a.m. on March 12, 2010, is quoted below and the Company prepared accordingly:

"It will be breezy late Saturday morning through Monday night with a period of widespread alert level wind gusts of 35-45 mph likely from Saturday midday through Sunday morning with highest gusts along the coast and across the higher elevations. There could be a 6-hour period before daybreak on Sunday when gusts along the coast could approach 50-55 mph. The winds will diminish slightly during Sunday afternoon with alert level winds of 30-40 mph continuing across the southeastern corner of the state. Rain up to 3-4" is possible across Connecticut with greatest rainfall in the southwest."

A key component of preparedness is assuring the ability to ***collect data regarding outages*** on an accurate and timely basis during an event. We examined the Event Management Process Flow[5] as depicted below to ascertain how priorities are assigned and work dispatched with appropriate linkages to and from relevant information systems:

[5] EL-001 Attachment 4

Figure 5 - CL&P Incident Command System Flow Chart



In anticipation of this pending weather event, the Company deferred several computer system upgrade and maintenance activities that were scheduled for Saturday evening, March 13, 2010, in order to ensure that supporting information technology infrastructure and assets would be fully operational and ready, should the storm materialize and cause system interruptions.

The Company utilizes an Outage Management System (OMS) to track all system outages and repairs in accordance with its Emergency Restoration Plan. The prioritization of the outage and trouble calls is in accordance with the Emergency Restoration Plan, Operating Procedure, Interruption Ticket Analysis and Processing. After-storm repairs are managed and tracked by the restoration notes provided to each district storm room upon completion of the restoration or temporary repairs. CL&P uses the final storm patrol as a quality assurance review to ensure the distribution system is returned to a normal state.

A final, but crucial component of preparedness is the ***communication plan for customers, local officials, state agencies, and the public.***

The System Emergency Operations Center (EOC) and the Divisional Incident Command System utilize CL&P personnel to coordinate with municipal and town officials and with major industrial and commercial customers to provide a point of contact between the municipality and/or customer and CL&P to provide periodic updates regarding restoration status.

The level of coverage by a municipal and customer liaison is determined on a case-by-case basis. It is ultimately up to the affected customer as to the frequency and level of information required. Methods of delivery for the information may also vary from having an Account Executive[6] or Liaison at the customer site (i.e., a town hall or emergency center), or in the respective division EOC relaying information by telephone.

The Director of Division Operations has the ultimate responsibility to ensure that the customer base has communicated the applicable emergency restoration information through the liaison personnel. Liaison personnel are under the control of the Town/Customer Liaison Coordinator when the Incident Command System organization is established at the Division.

Communications personnel coordinate with CL&P officials and communicate information to media sources that disseminate this information to the public.

Specific preparations for the March 2010 storm are summarized in the following extracts from data requests[7]:

"Wednesday, March 10, 2010 through Thursday, March 11, 2010: Starting March 10th, by utilizing the Company's contracted weather service, WSI, and the National Weather Service forecasts, the Company was aware of the potential for a wind and rain event for the weekend of March 13th, similar to the past three storms in Connecticut. The Company continued to monitor the forecast developments for the potential March 13th storm and discuss any operational concerns to prepare for the weather event. In anticipation of this pending weather event, the Company deferred several computer system upgrade and maintenance activities that were otherwise scheduled for Saturday evening, March 13, 2010. This was done to ensure supporting information technology infrastructure and assets would be fully operational and ready should the storm materialize and cause system interruptions.

Friday, March 12, 2010: On March 12th, based on the latest forecast of sustained winds (35 to 45 mph with gusts to 50 to 55 mph from midnight Saturday to 6 a.m. Sunday morning on the coast) and heavy rains, CL&P's System Restoration and Emergency Preparedness group conducted a conference call with the Company's management team to define the Company's

[6] Account Executives are CL&P employees who are assigned to major customers. At the time of the March Storm, the Account Executives were also called Liaisons. Subsequent to the storm, CL&P added resources as Liaisons working with the Account Executives, especially for municipal and town coordination.

[7] EL-001

readiness plans. During this call, and based on the forecast at the time, CL&P decided to place 25% of all CL&P district line workers on call for a 24-hour period from 6 p.m. Saturday night to 6 p.m. Sunday night. With approximately 160 total line crews across all of CL&P, 25% of the Company's line crews represent approximately 40 crews. Based on past events and responses, the Company's management team believed additional line resources from the Company's Districts and System Projects groups would be available on Sunday to respond, if needed. In addition, CL&P verified the staffing and readiness of key storm restoration functions, such as its Emergency Operations Center ("EOC") and System Operations Center ("SOC"), to ensure adequate leadership and support was readily available."

8.2.1 Findings

- CL&P actively monitors weather services, both those contracted for, such as Weather Service International, as well as the National Weather Service, local television channels, and other Internet-based weather services.
- In addition to normally assigned on-call staff, during emergencies, and as specified by the ERP discussed above, CL&P will increase the number of on-call staff in anticipation of a known event's potential escalation.
- CL&P belongs to Northeast Mutual Assistance Group (NEMAG) and Edison Electric Institute's RestorePower. The Emergency Response Plan has specified escalation points and provides for protocols for contacting respective agencies depending on the severity of the emergency.
- CL&P makes use of decentralized emergency centers depending on the location of the outages and severity. In these cases, Incident Command is correspondingly decentralized.
- CL&P's outage information is grouped through the Outage Management System (OMS) based on customer calls, System Control and Data Acquisition (SCADA), and Dispatch. Wires-down calls from customers or emergency agencies are not rolled into the OMS initially by the call recipient, but are passed directly to the dispatcher for action, and these are later input into the OMS by the Dispatch staff.
- Once CL&P determines to open its EOC, it informs the State of that action and if the State EOC is opened, CL&P provides a resource on site at the State EOC. CL&P, however, waits for notification from the cities and municipalities that they have opened their own EOCs and, at that point, CL&P will provide a representative, if requested.
- CL&P utilizes a circuit prioritization system, based on critical customers, total number of customers, and other factors to plan the restoration work.

8.2.2 Conclusions

8.2.2.1 CL&P's procedures for obtaining weather forecast information utilized a variety of sources and were adequate, despite the unforeseen severe conditions.

8.2.2.2 CL&P's policy of handling wires-down calls and notifications immediately, followed by logging in the OMS system represents an industry best practice that ensures public safety.

8.2.2.3 CL&P actively participates in mutual assistance groups and makes use of their resources.

8.2.2.4 CL&P utilizes the Incident Command System. They follow the National Incident Management System (NIMS) incident commander protocol, which is mandated by FERC for utility companies that own transmission.

8.2.2.5 CL&P's communications and contact plans, in place at the time of the March 2010 storm, were reactive relative to contact with cities, municipalities, and state agencies.

8.2.2.6 CL&P has enhanced its protocols[8] for external communications subsequent to the March 2010 storm to emphasize a more proactive posture in establishing continuous communications with these agencies, in particular, municipals and cities to assure that they are aware of the event circumstances and the availability of company resources to support their EOC operations. We believe that these enhancements are effective based on reported improvements in communication during the June 2010 storm.

8.2.2.7 CL&P has added or reassigned internal resources to augment the Account Executives and Liaisons in order to provide sufficient resources to assure correct levels of communications and support to the municipalities and cities in their service territory.

8.2.2.8 Completed work was not always communicated to the EOC or decentralized dispatcher in a timely manner. So, crews were occasionally assigned to work already completed causing inefficiencies in closing out outage records and not having a clear view of what work is actually still outstanding.

8.2.3 Recommendations

8.2.3.1 Continue to develop enhanced communications capabilities with cities and municipalities. Refer to Conclusions 8.2.3.5, 8.2.3.6 and 8.2.3.7.

---

[8] Refer to DR-14, 2nd and 3rd items

8.2.3.2 Consider accelerating programs intended to provide mobile data terminals in line trucks. Refer to Conclusion 8.3.2.8.

8.2.3.3 Until mobile data terminals are in most line trucks, provide more Supervisor of Distribution Lines (SDLs), Field Supervisor Lines (FSLs) with laptop or equivalent computers equipped with air cards to streamline the process of closing work order tickets and enhance the ability of the dispatcher and analysts to effectively and efficiently plan and direct the remaining work efforts. Refer to Conclusion 8.3.2.8.

8.3 Restoration Performance

Our review of this area includes:

- Activation of emergency procedures.
- Effectiveness of managing and deploying overall resources.
- Effectiveness of procedures for obtaining assistance.
- Effectiveness of data collection process for determining extent of outage.
- Effectiveness of reporting relationships and internal communications.
- Effectiveness of communications with customers, local officials, state agencies and the public.

To evaluate these items, we carefully reviewed the timeline of restoration activities developed by the Company and undertook additional analysis of staffing//crew deployments, communications internally and with municipals, damage assessment, work package development, mutual assistance, and call center performance.

Weather Forecast

The weather forecasts received by the Company, prior to, and at the initiation of the storm, were inaccurate as discussed earlier. For example, the forecast received Saturday, March 13, 2010 stated:

"It will be breezy late Saturday morning through Monday night with a period of widespread alert level wind gusts of 35-45 mph likely from Saturday midday through Sunday morning with highest gusts along the coast and across the higher elevations. There could be a 6-hour period before daybreak on Sunday when gusts along the coast could approach 50-55 mph. The winds will diminish slightly during Sunday afternoon with alert level winds of 30-40 mph continuing across the southeastern corner of the state. Rain up to 3-4" is possible across Connecticut with greatest rainfall in the southwest."

By Saturday afternoon, a National Weather Service alert[9] stated:

[9] Source: http://thesouthportglobe.blogspot.com/2010/03/high-wind-warning-for-southern.html

SATURDAY, MARCH 13, 2010

High Wind Warning for Southern Fairfield, CT until 1am

Issued by The National Weather Service
New York City, NY 3:51 pm EST, Sat., Mar. 13, 2010
... HIGH WIND WARNING REMAINS IN EFFECT UNTIL 1 AM EST SUNDAY...
A HIGH WIND WARNING REMAINS IN EFFECT UNTIL 1 AM EST SUNDAY.
EASTERLY WINDS OF 30 TO 40 MPH WITH GUSTS UP TO 60 MPH CAN BE EXPECTED THROUGH THIS EVENING. ISOLATED GUSTS OF UP TO 70 MPH ARE POSSIBLE.
WINDS OF THIS MAGNITUDE WILL BE CAPABLE OF PRODUCING PROPERTY DAMAGE AND POWER OUTAGES DUE TO FALLEN TREES AND LIMBS.
THE WINDS WILL GRADUALLY DIMINISH LATE TONIGHT.
PRECAUTIONARY/PREPAREDNESS ACTIONS...
A HIGH WIND WARNING MEANS A HAZARDOUS HIGH WIND EVENT IS EXPECTED OR OCCURRING. SUSTAINED WIND SPEEDS OF AT LEAST 40 MPH OR GUSTS OF 58 MPH OR MORE CAN LEAD TO PROPERTY DAMAGE.

The resultant high winds, coupled with relatively saturated soil conditions caused extensive damage to the electric distribution system from toppling trees.

Storm Response Timeline Analysis

As early as Saturday morning, March 13th, CL&P realized the weather was more severe than forecasted, and the on-call supervisors and trouble crews were dispatched to the initial outages. CL&P also notified the tree trimming contractor that crews were needed and called out for more line crews using both the Automated Call Out System (ACOS) and manually initiated calls. A decision was made Saturday at 3:37 p.m. to open the Berlin EOC and later at 4 p.m. to decentralize the Norwalk district. As the storm began to intensify, CL&P decided to open storm rooms in Greenwich, Stamford, and New Milford. At 6 p.m., all restoration activities were suspended and available line and tree crew resources were shifted to performing only emergency response work. Also, a request for 50 mutual aid line crews was issued to the Northeast Mutual Aid group.

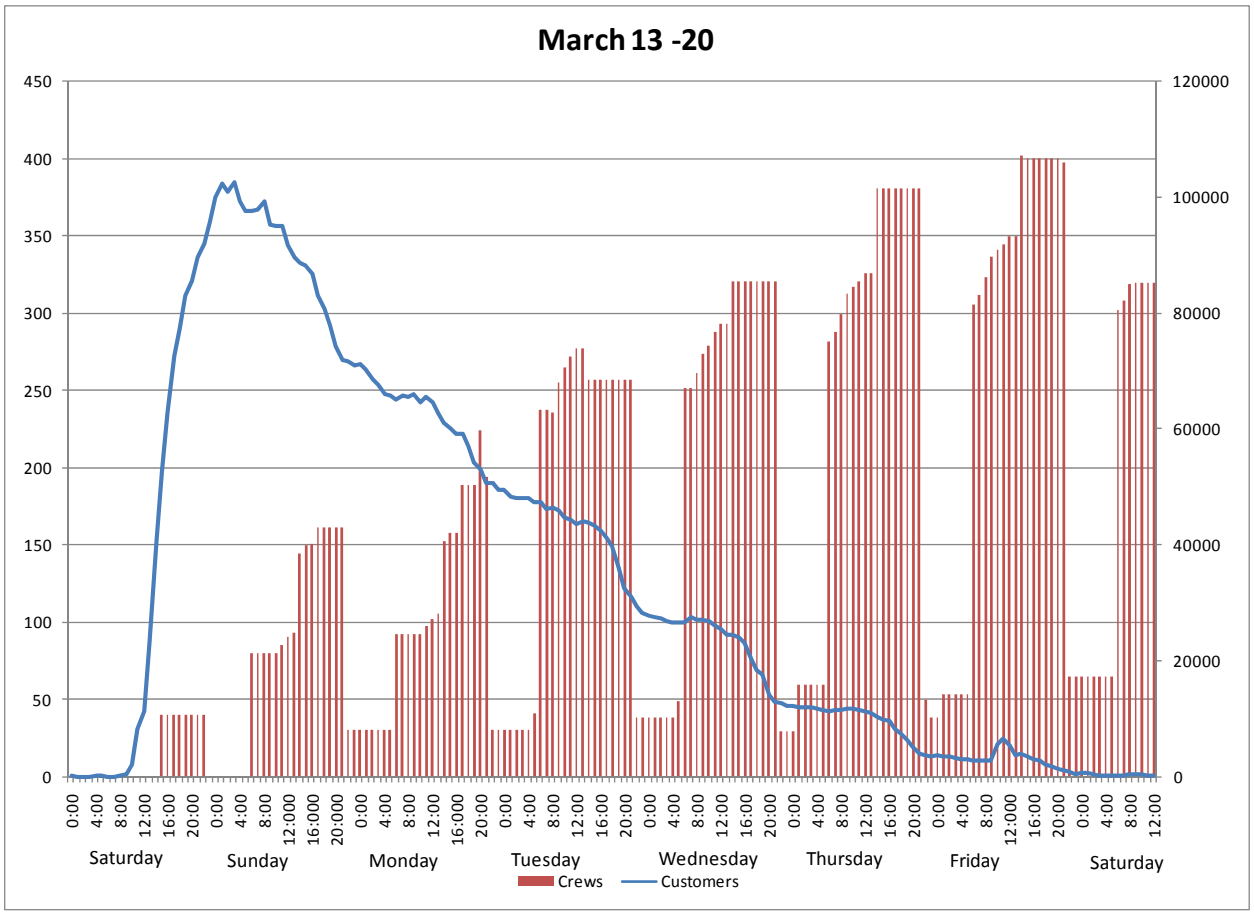
At this point in time, Northeast Mutual Aid group indicated no line crews were currently available for mutual aid assistance work due to the wide scope and path of the storm. The storm extended from the coast of Delaware to the coast of Maine. Therefore, CL&P reached further west and

secured 18 contract line crews from Ohio who would arrive on Sunday afternoon, March 14th. In addition, 14 local line contractor crews were secured earlier in the day"[10].

The entire CL&P system had sustained damage, with the Southern Division being the hardest hit. While restoration effort continued in the other divisions, all available crews in the Southern Division worked at making the hardest hit areas safe. On Sunday, CL&P did numerous call-out campaigns for Company's crews, but only received about a 20% return and asked union leaders to help in getting response from members. Around 12 p.m., local municipal crews arrived, and by 5 p.m. additional crews from contractor, municipals, Central Vermont, and Public Service New Hampshire arrived. By Sunday night, CL&P had restored power to all areas except the coastal districts and high elevation; crews were reassigned to these areas. The Account Executive, per the Company's ERP, started calling their normal municipal contacts to determine the cities needs. If they were unable to reach the contact they either left messages or called back later.

A timeline of overall customer outages and crew staffing is depicted in the figure below:

Figure 6 - Storm Response Timeline



[10] Staff DR EL 001

- The steep rise in customer outages on Saturday supports the fact the storm was more severe than expected and caused significant damage during a relatively short time period.
- The rapid decline in customer outages exemplifies application of restoration priorities as discussed in Section 8.2. In CL&P's report to the DPUC[11], the Company achieved restoration percentages as shown below.

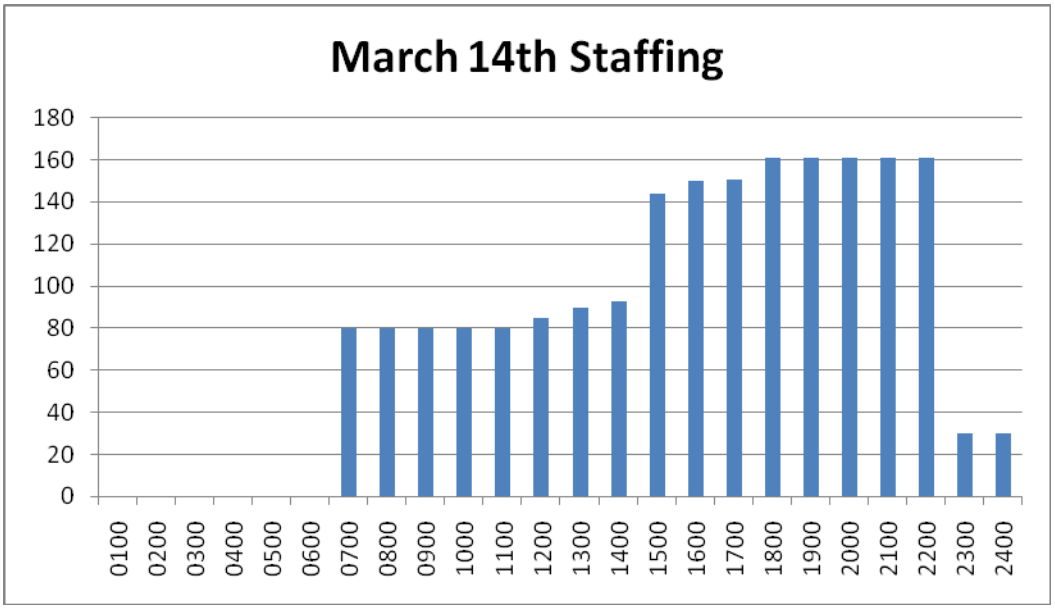
Hour Affected	Customers Impacted	% Restored
0-24	79,964	47%
24-48	34,877	21%
49-72	20,630	12%
>72	33,073	20%
Grand Total	168,544	100%

- CL&P's crew deployment depicted above, shows utilization of about 160 Company crews on Sunday, supplemented by other mutual crews on Monday through the following Saturday. On Saturday, March 13, during the initial and heaviest part of the storm, CL&P stood down crews during the high wind conditions for their own safety and was only able to attack the restoration effort in earnest on Sunday.
- Significant customer restorations were made during the first 24 hours of the storm, with a relatively small number of crews, indicating restoration of main line circuits as a first priority.
- CL&P managed to provide between 25 and 70 crews in the nighttime hours to continue restoration, while the balance of the crews took their required eight hour rest period. This is in accordance with utility best practices.
- Restoration later in an event usually requires a higher level of crews to attend to more numerous outages, each affecting fewer customers, ranging to restoration of individual service drops as the lowest priority during the restoration effort.

[11] "March 13, 2010 RAIN and WINDSTORM FILED IN ACCORDANCE WITH: DOCKET NO. 86-11-18"

During the daylight[12] hours, the number of crews working on Sunday, March 14th, ranged from 80-161 as shown below.

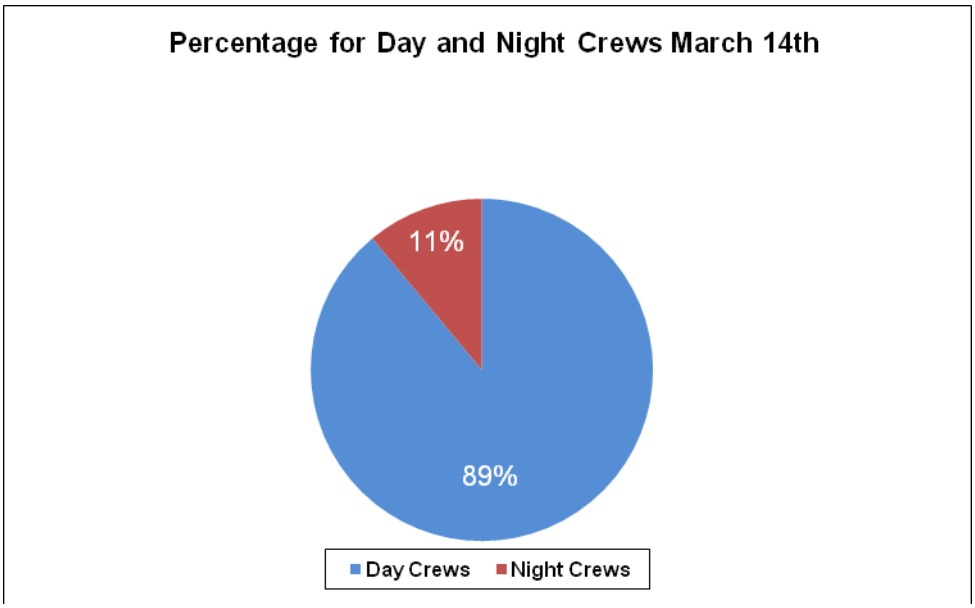
Figure 7 – Sunday March 14th Crew Staffing



CL&P worked 89% of their crews during the day and 11% at night on Sunday, March 14th, as shown below.

[12] Daylight shifts run from 7:00AM until 11:00PM and night shifts run from 3:00PM to 7:00 AM.

Figure 8 – Sunday March 14th Day vs. Night Crews

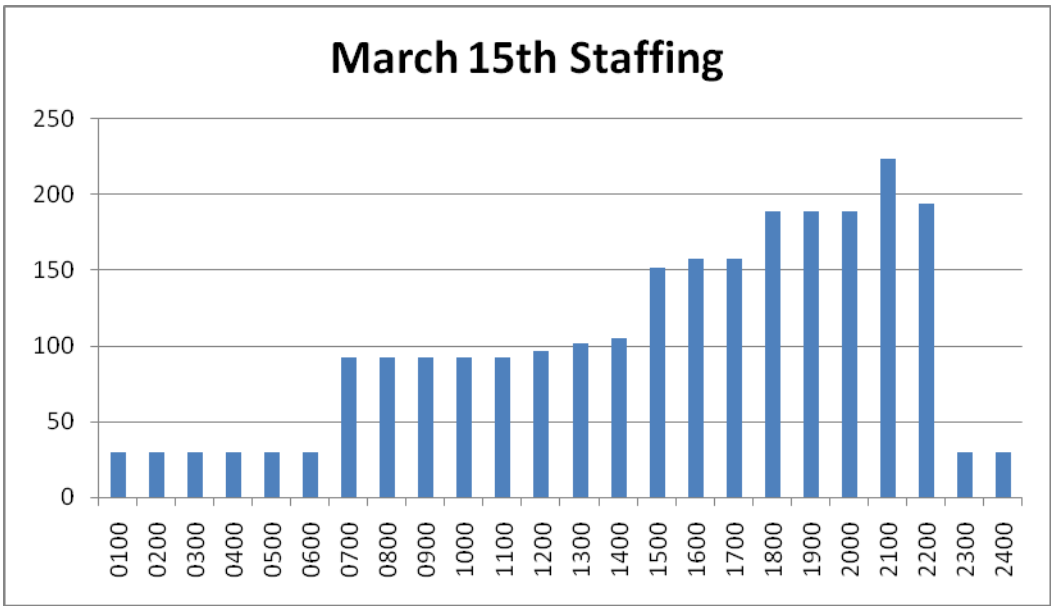


CL&P had 565 nonexempt employees working on Sunday, of which 31.4% worked more than 16 hours.

As damage assessment began, the Company further decentralized the command structure in the Southwest region and realized the restoration projections were inaccurate because of undetermined damages. On Monday, March 15th, CL&P participated in a conference call with the State of Connecticut Department of Emergency Management and Homeland Security. CL&P also realized that the efforts of the Account Executive to reach municipals were ineffective and additional resources were committed to communicate with local officials. CL&P started deploying electricians to reconnect service because of the high number of down services. The coastal district remained the only area with damage and CL&P resources from other areas were redeployed to enhance the restoration.

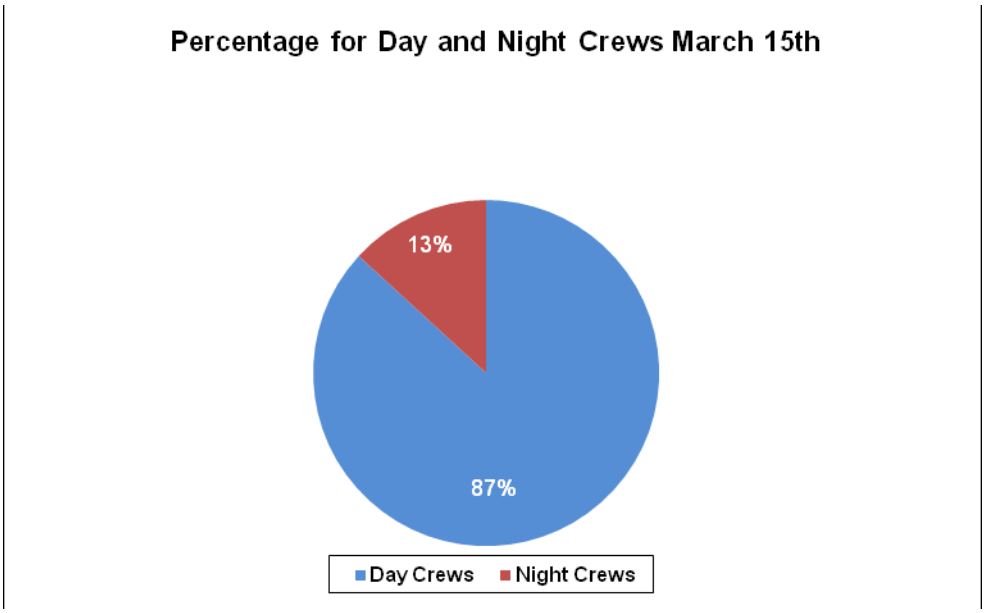
During the daylight hours of Monday, March 15th, the number of crews working ranged from 92-224 as shown below.

Figure 9 - Monday March 15th Crew Staffing



CL&P worked 87% of their crews during the day and 13% at night on Monday, March 15th, as shown below.

Figure 10 - Monday March 15th Day vs. Night Crews

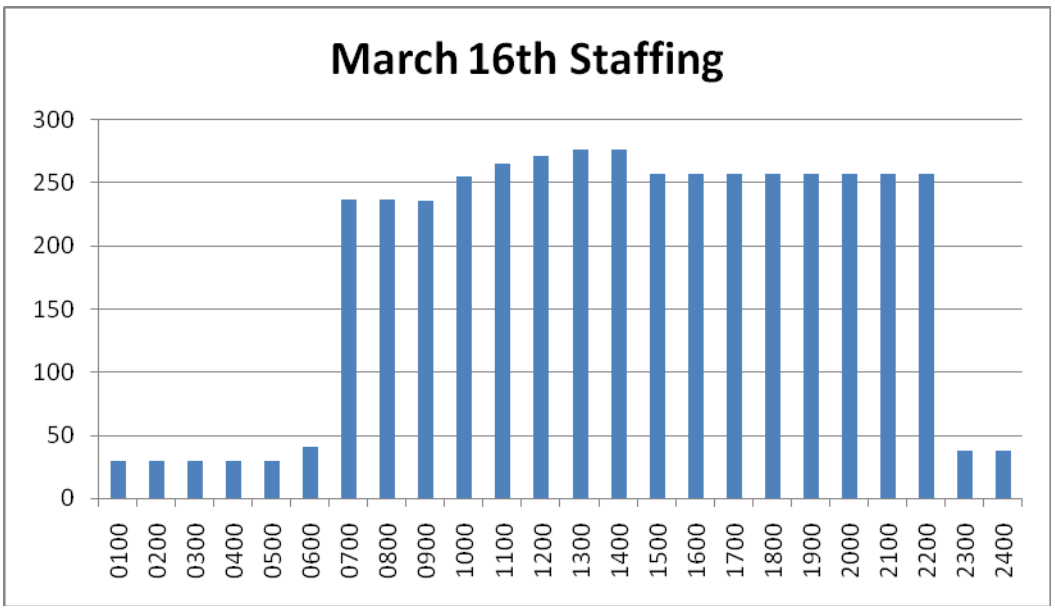


CL&P had 677 nonexempt Company employees working the storm, of which 13% worked longer than 16 hours.

On Tuesday, March 16th, as damage assessment reports were analyzed, CL&P realized that their original forecast of damage was in error as the storm caused wider scale damage. CL&P previously secured additional crews, but continued to ask for crews within a one-day radius. They also assigned additional damage assessment teams to determine the total damage to the area. CL&P placed resources in the municipal EOCs to aid in coordination and communication about restoration activities. They also contacted Consolidated Edison and the Long Island Power Authority / National Grid for mutual aid, but were declined due to restoration efforts that were taking place in their respective areas. "The municipalities were still working to clear all roads with the assistance of CL&P line resources and CL&P needed to understand, in real time, what and where those resources were deployed for safety considerations"[13]. A separate, but coordinated management team was assigned to the logistical needs of the additional 300 crews and support staff working in the southwest area.

During the daylight hours of Tuesday, March 16th, the number of crews working ranged from 237-277 as shown below.

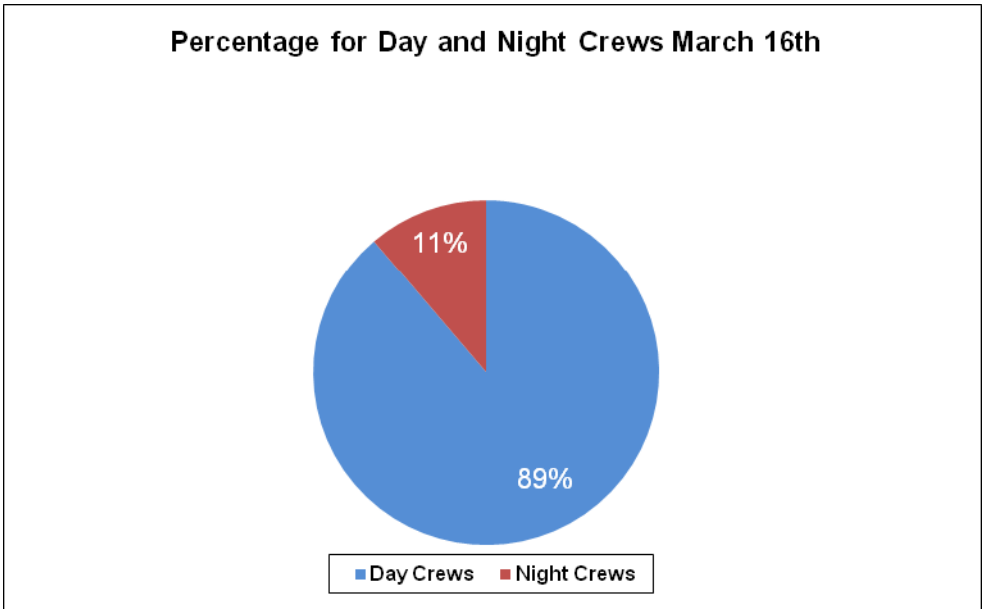
Figure 11 - Tuesday March 16th Crew Staffing



[13] Staff DR EL 001

CL&P worked 89% of their crews during the day and 11% at night on Tuesday, March 16th, as shown below.

Figure 12 - Tuesday March 16 Day vs. Night Crews

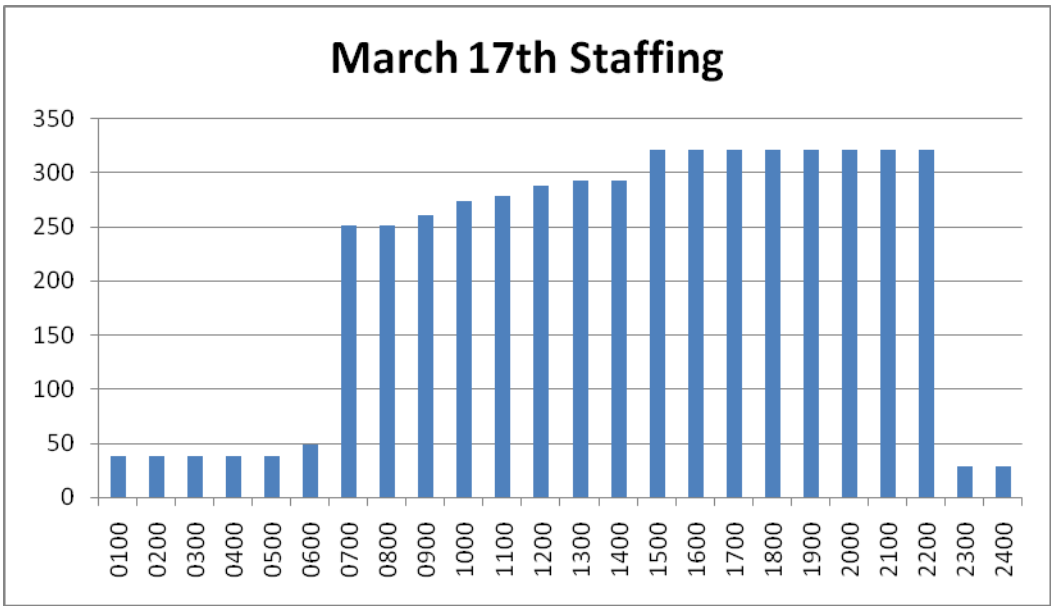


CL&P had 679 nonexempt company employees working the storm, of which 15.4% worked longer than 16 hours.

The Company continued its restoration effort and as areas were restored, crews were transferred to unrestored areas. The vast amount of damage, especially tree related damage, impaired the restoration effort.

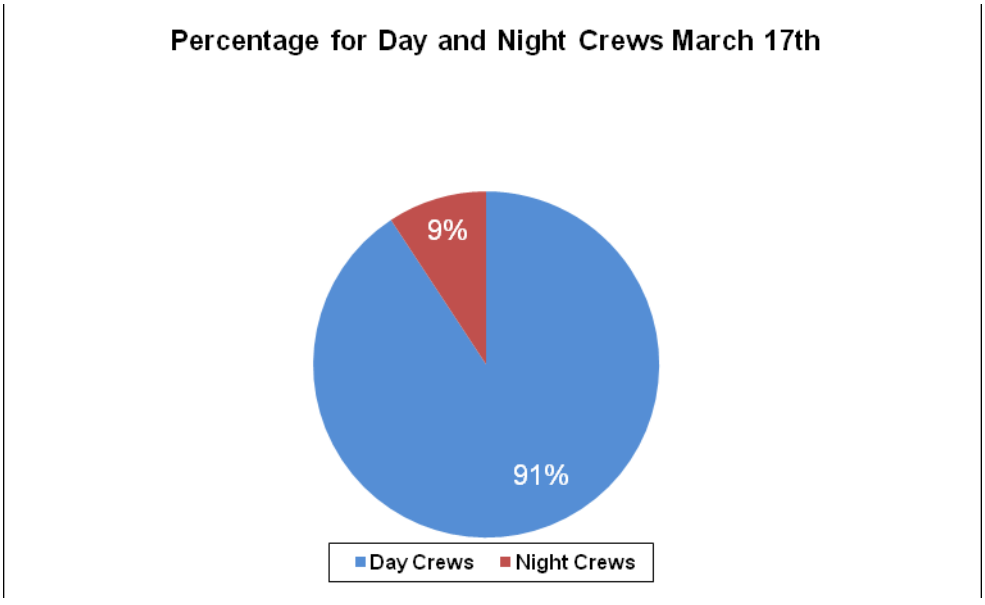
During the daylight hours on Wednesday, March 17th, the number of crews working ranged from 252-321 as shown below.

Figure 13 - Wednesday March 17th Crew Staffing



CL&P worked 91% of their crews during the day and 9% at night on Wednesday, March 17th, as shown below.

Figure 14 - Wednesday March 17th Day vs. Night Crews

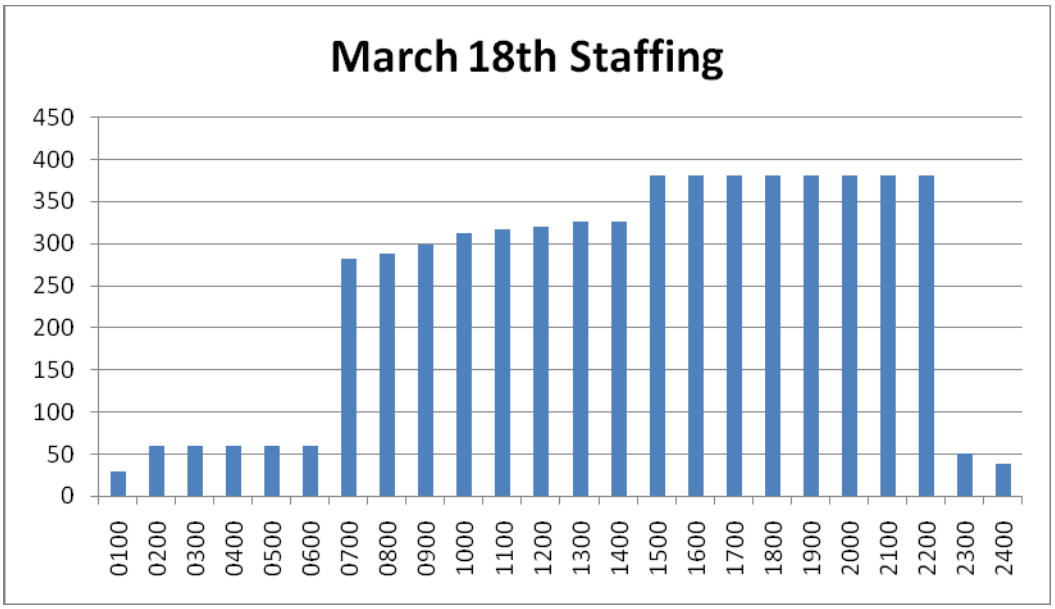


CL&P had 610 nonexempt company employees working the storm, of which 6 % worked longer than 16 hours.

Customers in the towns served by the Company's Norwalk district were fully restored by midday Thursday, March 18, 2010, and CL&P was able to secure an additional 20 line crews from Central Hudson Gas and Electric Company and eight out-of-state line contractor crews. In addition, 34 CL&P and contractor line crews that had been working in other Company districts were reassigned to the nonrestored area. CL&P opened an additional satellite office in the Greenwich area to accommodate these additional crews.

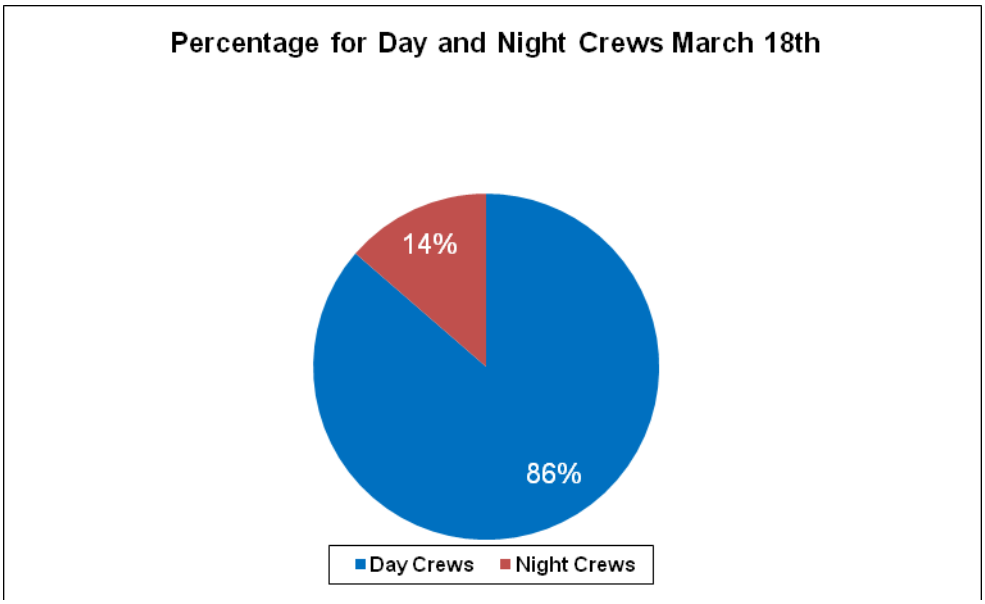
During the daylight hours of Thursday, March 18th, the number of crews working ranged from 282-381 as shown below.

Figure 15 - Thursday March 18th Crew Staffing



CL&P worked 86% of their crews during the day and 14% at night on Thursday, March 18th, as shown below.

Figure 16 - Thursday March 18th Day vs. Night Crews

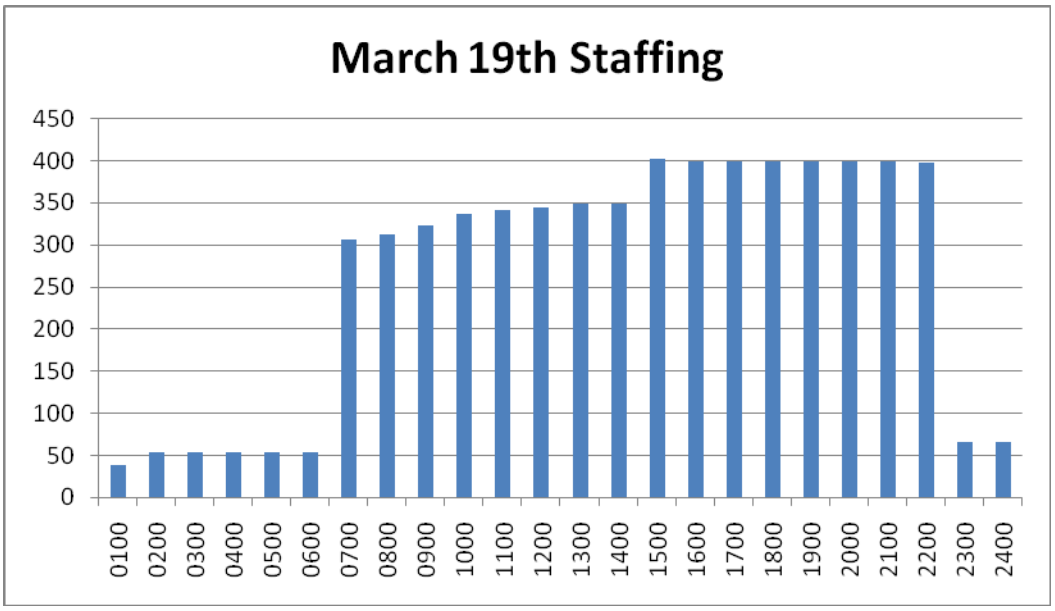


CL&P had 580 nonexempt company employees working the storm, of which 11% worked longer than 16 hours.

Customers in the towns served by the Stamford district were fully restored by midday Friday, March 19, 2010. CL&P started circuit patrol, which are intended to complete a detailed patrol of the circuit and its laterals, to assess the status of the system and identify any safety or reliability issues. As restoration was completed, Stamford crews were reassigned to Greenwich restoration effort.

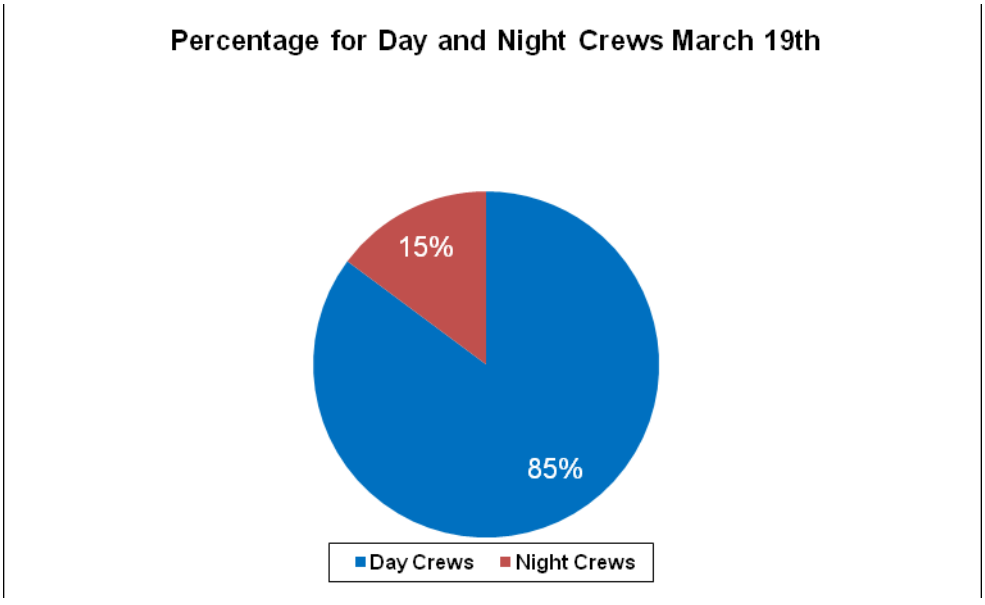
During the daylight hours of Friday, March 19th, the number of crews working ranged from 306-402 as shown below.

Figure 17 - Friday March 19th Crew Staffing



CL&P worked 85% of their crews during the day and 15% at night on Friday, March 19th, as shown below.

Figure 18 - Friday March 19th Day vs. Night Crews

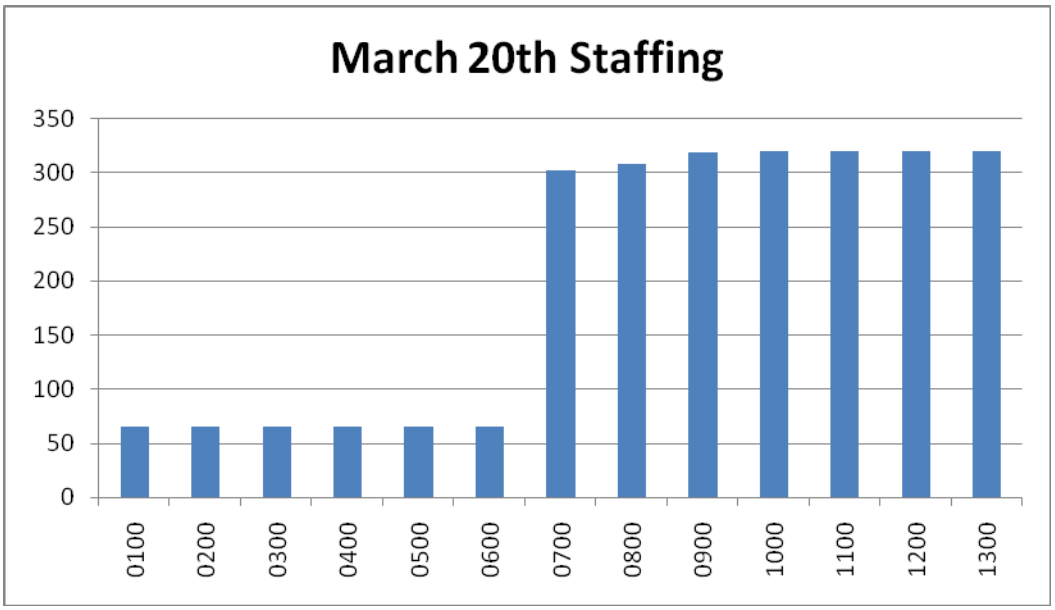


CL&P had 557 nonexempt company employees working the storm, of which 8.5% worked longer than 16 hours.

On Saturday, CL&P finished restoring service to the Greenwich area and released mutual aid and contractor crews as they completed their work assignment. The CL&P EOC was closed at 1 p.m., but continued circuit patrols on Saturday and Sunday to identify any issues with at-risk trees or equipment that could cause additional service interruptions.

On Saturday, March 20th, CL&P had between 302 - 320 crews working from 7 a.m. to 1 p.m. as shown below.

Figure 19 - Saturday March 20th Crew Staffing



CL&P had 464 nonexempt company employees working the storm and 3% worked longer than 16 hours.

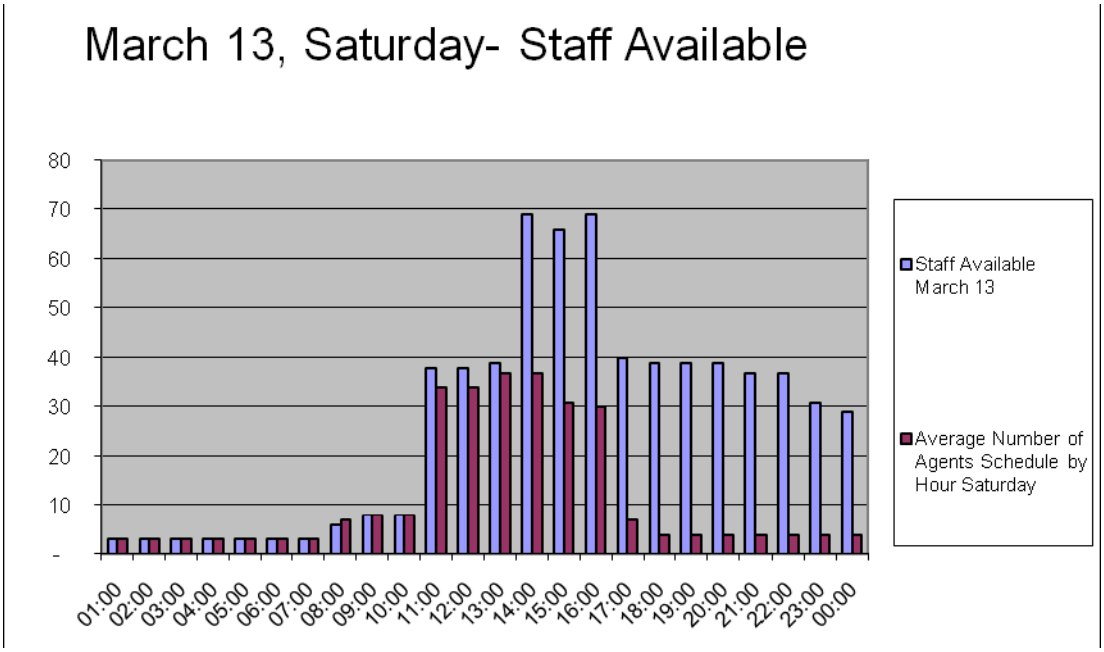
During the storm restoration, CL&P decentralized and opened four area work centers and four additional satellite locations to manage the work effort. CL&P also used tent locals to feed and disburse work packages and fuel the line trucks. This practice is more efficient than having crews attempt to eat and fuel vehicles individually.

Call Center Performance

CL&P call center management took steps on Thursday and Friday to prepare for the storm scheduled to hit on Saturday. They began to ask for volunteers for on-call duty for Saturday and Sunday and cancelled all meetings and training for the following week. Their effort established an on-call staff of 17 Customer Service Representatives (CSRs) on Saturday and 10 CSRs on Sunday. Since exempt employees are not usually on call, they were asked about their availability for weekend duty.

On Saturday, March 13th, CL&P recognized that the weather was more severe than forecasted and asked CSRs, in both the Windsor and Manchester locations, to voluntarily extend their shifts beyond their usual 2 p.m. and 4 p.m. departures. They also paged all their on-call CSRs to report to work and later sent a "Group 8" or universal call center page, and as a result, an additional four CSRs reported to work. The staff remaining at 5 p.m. was extended to 12-hour shifts, which gave them 37 CSRs taking storm calls. The staffing curve of available staff versus normal staffing levels for Saturday, March 13th, is shown below.

Figure 20 - Call Center Staffing Saturday March 13th



CL&P removed the automatic storm message from the phone system's call attendant and implemented the following generic message:

"The significant wind storm has caused power outages throughout the region. CL&P estimates more than xxxx of our customers are without power as of xx:xx a.m. / p.m. (day)[14]. We are not able at this time to estimate when your power will be restored, but will provide that information as soon as it is available."

CL&P made automated call-out campaigns to get additional assistance for storm duty. At this time, the automated phone attendant messaging was augmented with:

"The significant wind storm has caused power outages throughout Norwalk, Redding, Wilton, New Canaan, Weston and Westport. CL&P estimates more than 40,000 of our customers are without power as of 7 p.m. Saturday evening. We are aware of outages in your area of the state. It is clear at this point that it will take multiple days to restore power to all customers.

We are not able at this time to estimate when your power will be restored, but will provide that information as soon as it is available."

CL&P tried several avenues for soliciting employees for storm assistance, such as:

- On-call personnel from the Credit & Collections Department were contacted to assist with calls.
- Exempt supervisors made individual calls to employees to get additional assistance for Saturday and to solicit assistance for Sunday.
- A third Group 8 page was sent to solicit volunteers to work 12 hours on Sunday.
- Remaining exempt supervisors were contacted to report to work on Sunday and assigned hours.
- Nine New Hampshire based Public Service of New Hampshire call center personnel assisted with CL&P storm calls.

On Sunday, March 14th, in order to service the customers' needs, CL&P instituted several changes in their shift scheduling as follows:

- Operation Assistance and Technical Area personnel extended their normal 12-hour shift (7 a.m. - 7 p.m.) to 19 hours (5 a.m. - midnight) in order to provide continuous coordination efforts including scheduling and call pattern analysis. Operation Assistance and Technical Areas expanded support continued through Saturday, March 20th.
- Customer Billing Services supervisors contacted their group to report to work at 5 a.m. on Monday.
- CSRs who work the Monday 7 a.m., 7:30 a.m., and 8 a.m. shifts were contacted to report to work two hours before their scheduled shifts. All representatives who begin their work

[14] The message was continuously updated to reflect the number of customers affected at any specific point in time.

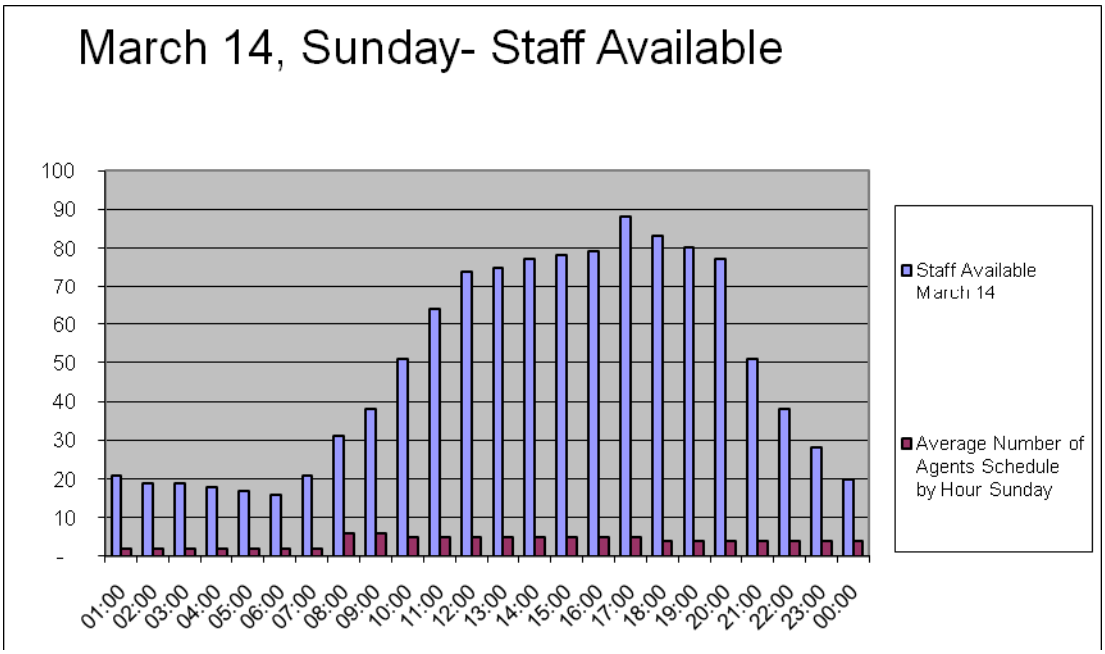
shift at 9 a.m. were contacted to report to work one hour earlier. This early schedule was performed in both Windsor and Manchester locations.

- Representatives who normally have Mondays off were contacted to report in at 5 a.m. on Monday. In addition, third shift CSRs were asked to stay beyond their normal work hours.

A Group 8 page was sent to request additional assistance to handle calls.

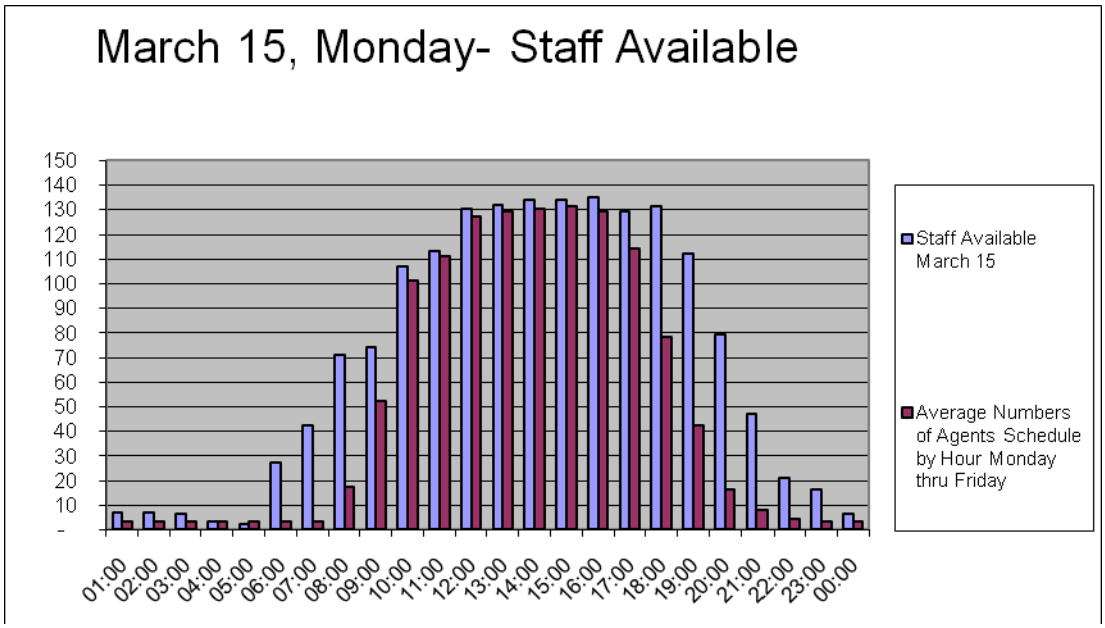
During the peak hours on Sunday, a total of 79 CSRs were taking storm calls and Manchester supported the Winsor Call Center with Public Service New Hampshire CSRs from second and third shifts as shown below.

Figure 21 - Call Center Staffing Sunday March 14th



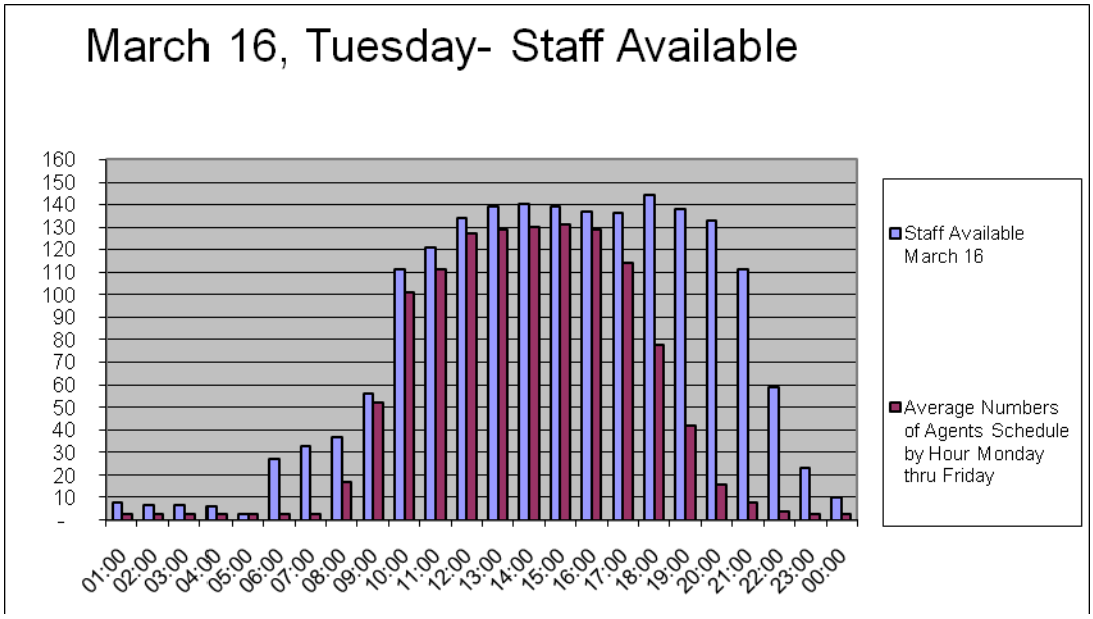
On Monday, March 15th, CL&P extended all shifts into 12 hours and dismissed representatives early, on a staggered basis, as the call volume diminished through the evening. The 7 a.m. shift reported at 5 a.m. and worked a 12-hour shift; they also assigned 21 Customer Billing Services agents to report to work at 5 a.m. to assist with outage calls from 5 a.m. to 7 a.m. and as needed throughout the day. The Customer Care Team covered the escalated call queue and handled all live escalated customer calls until 4:30 p.m. Call Center supervisors handled all escalated calls that required a call back and staffed the queue after 4:30 p.m. The staffing curve of available staff versus normal staffing levels is shown below.

Figure 22 - Call Center Staffing Monday March 15th



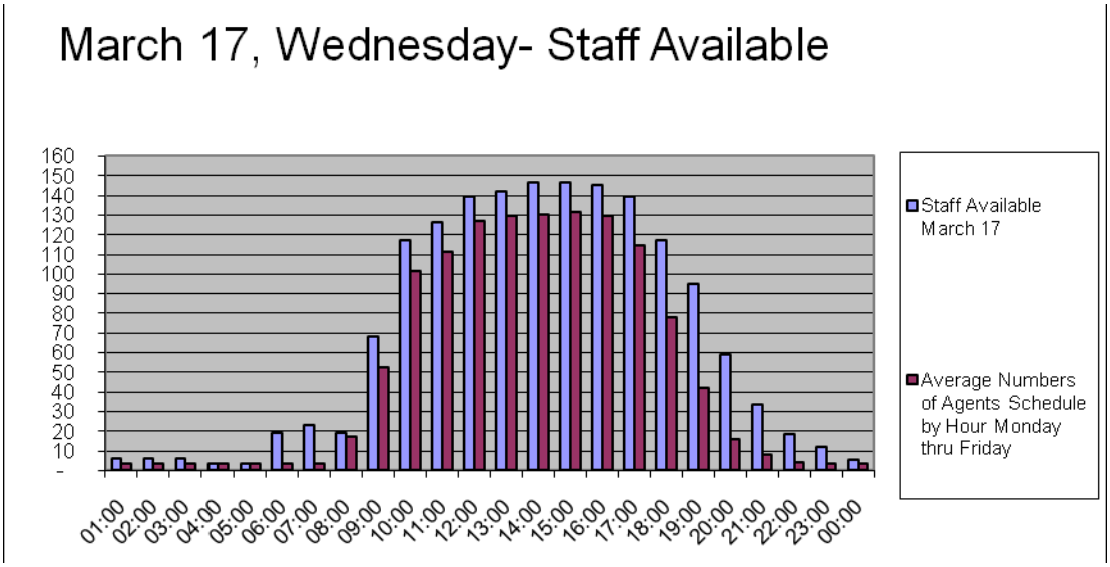
On Tuesday, March 16th, CL&P continued the schedule as describe above except the Customer Advocacy and the Training Departments covered the escalated call queue and handled all live escalated customer calls until 4:30 p.m. Also, the Credit and Collections Department solicited 10 volunteers to work 12-hour shifts. The staffing curve of available staff versus normal staffing levels is shown below.

Figure 23 - Call Center Staffing Tuesday March 16th



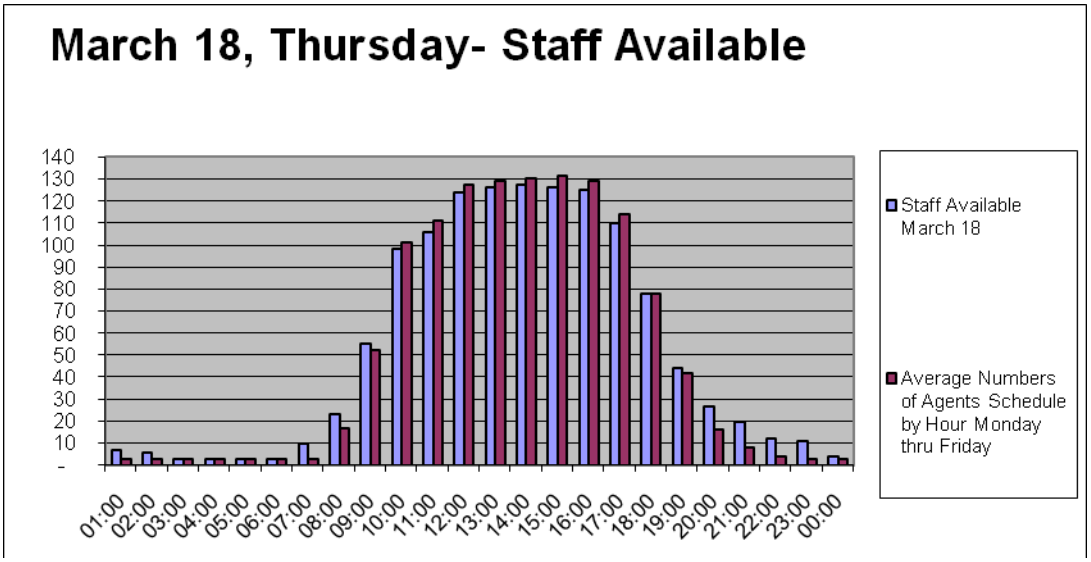
On Wednesday, March 17th, CL&P scheduled 15 Customer Billing Services agents to report in at 5 a.m. and an additional six agents reporting at 5:30 a.m. to handle storm calls, and had all 9 a.m. shift personnel reporting to work at 8 a.m. The staffing curve of available staff versus normal staffing levels is shown below.

Figure 24 - Call Center Staffing Wednesday March 17th



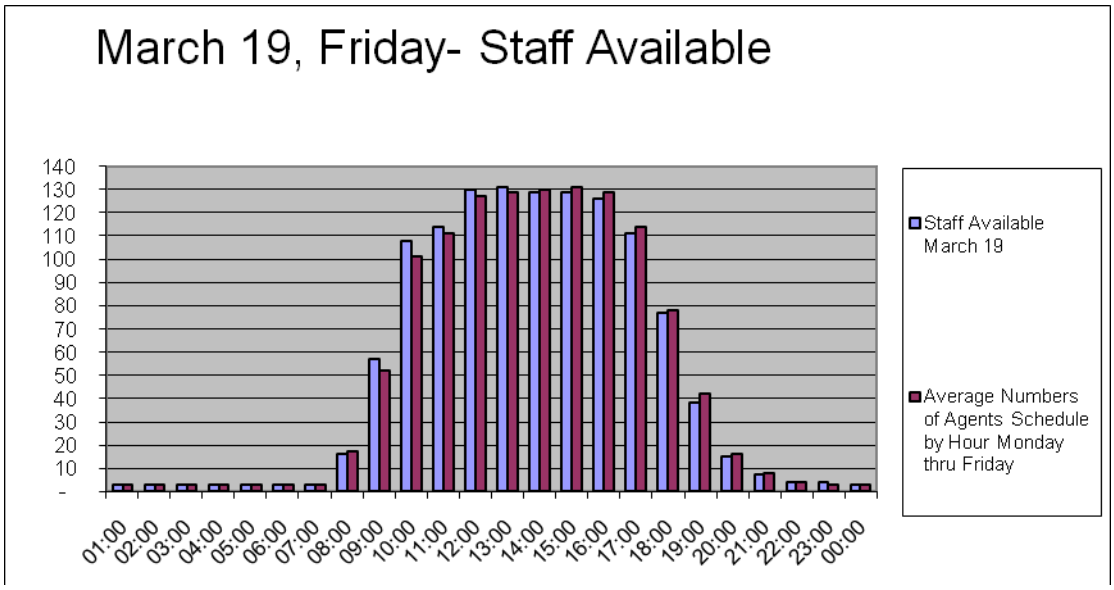
On Thursday, March 18th, CL&P scheduled five Customer Billing Services agents to report in at 5 a.m. with an additional 10 agents reporting in at 6 a.m. to handle storm calls in addition to their CSRs staff. The staffing curve of available staff versus normal staffing levels is shown below.

Figure 25 - Call Center Staffing Thursday March 18th



On Friday, March 19th, CL&P solicited CSRs to work additional hours; 20 volunteers worked and extended their shifts. The staffing curve of available staff versus normal staffing levels is shown below.

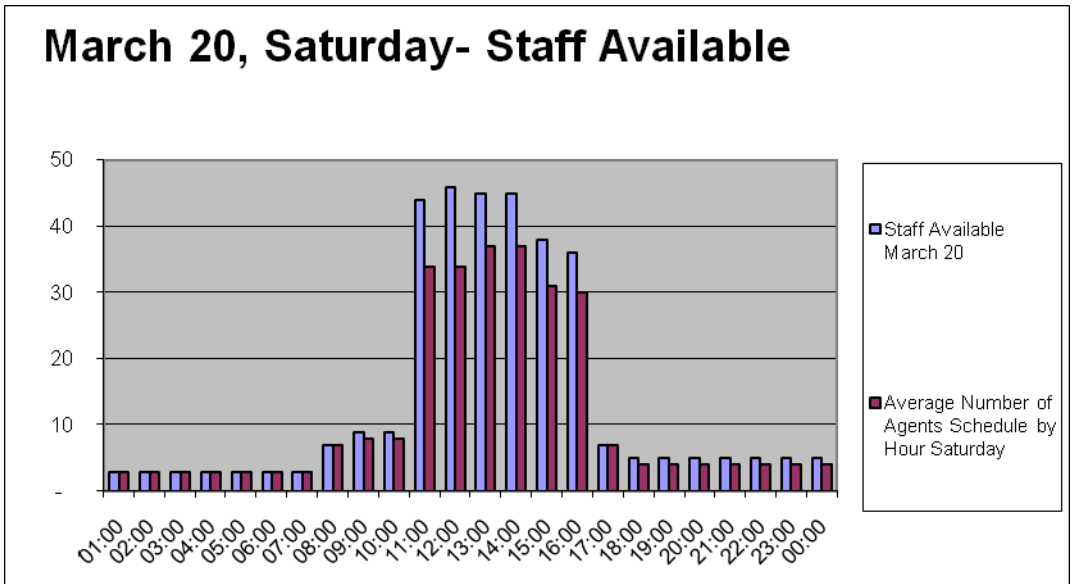
Figure 26 - Call Center Staffing Friday March 19th



On Saturday, March 20th, as the storm restoration was completed, CL&P added four additional CSRs whom were added to the midnight shift resulting in a total of 10 personnel; 10 additional CSRs were placed on call.

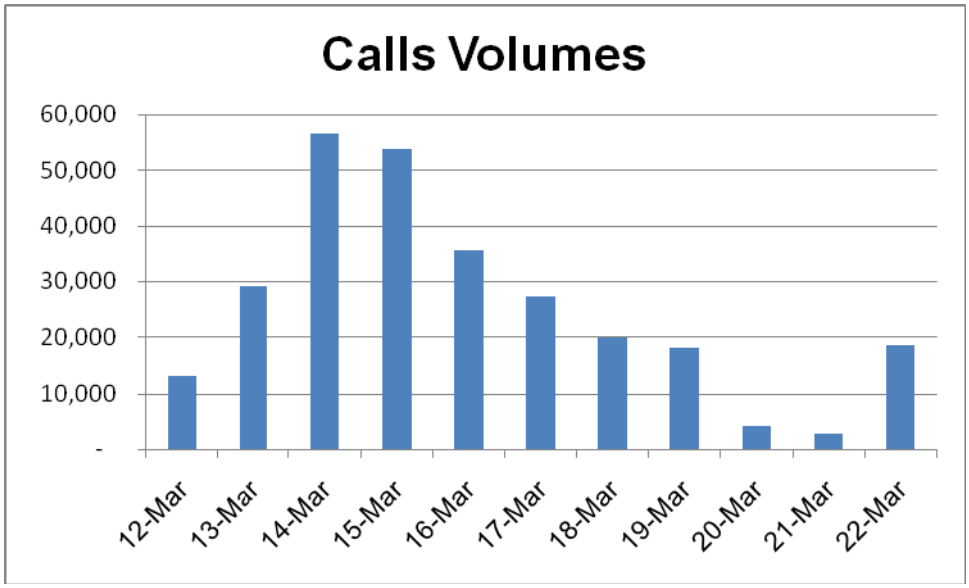
The staffing curve of available staff versus normal staffing levels is shown below.

Figure 27 - Call Center Staffing Saturday March 20th



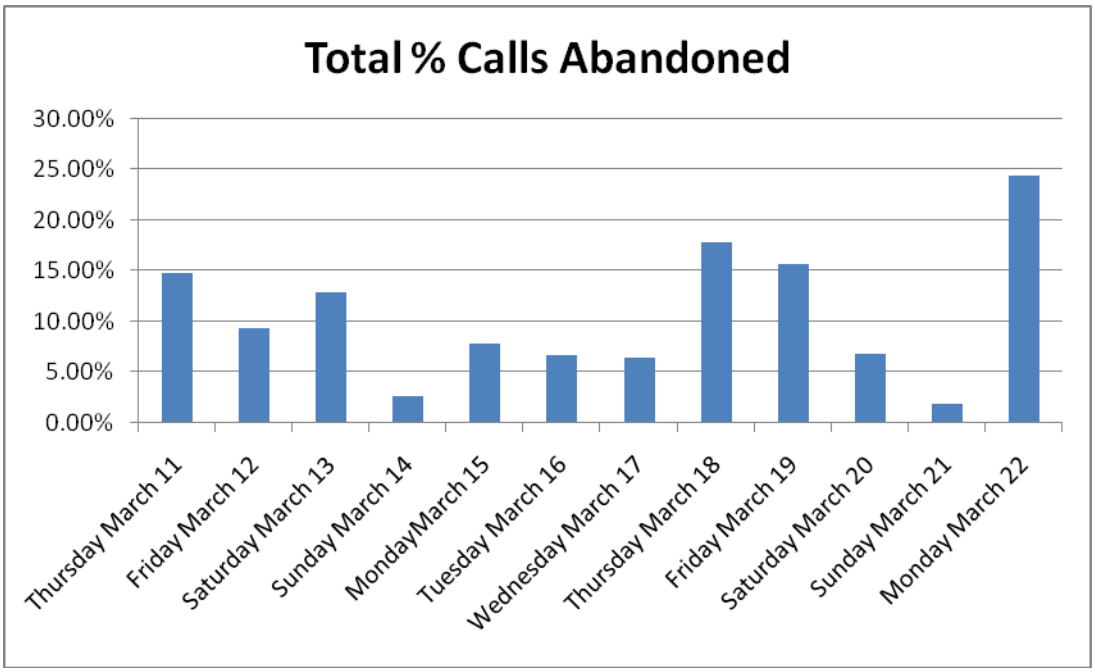
During the storm from March 13th through March 20th, the call volume exceeds the normal volume as shown below. The call volumes for March 12th, 21st, and 22nd have also been added to graphically represent normal nonstorm call volumes.

Figure 28 - Call Volumes for March 12th to 22nd



With the actions that CL&P took to augment the call center staff, they were able to keep their abandonment rate within the range of their normal operations as shown below.

Figure 29 - Call Abandonment Rate for March 11th – 22nd



8.3.1 Findings

- CL&P activated its EOC on Saturday, March 13, 2010, at approximately 5 p.m.
- CL&P's Call Center management rapidly responded as storm conditions worsened and had more staff available than their normal average staff level. During the storm restoration, CL&P maintained a higher level of call center staff to handle the call volume.
- CL&P's call abandonment rate, during the storm, was as good as or better than during operations preceding the storm.
- CL&P began utilizing decentralized control on March 14, 2010, at approximately 5 p.m. At the peak of the storm, there were eight decentralized control locations as follows:
    - Wilton Satellite – Geographic Areas: Wilton, Weston, Redding
    - Norwalk Area Work Center – Geographic Area: Norwalk
    - Westport Satellite – Geographic Area: Westport
    - Lakeview Substation – Geographic Area: New Canaan
    - Greenwich High School – Geographic Area: Greenwich
    - Darien Satellite – Geographic Area: Darien
    - Greenwich Area Work Center – Geographic Area: Greenwich
    - Stamford Area Work Center – Geographic Areas: Stamford, Darien (at night)

- CL&P suffered from continuing inaccuracies in official weather service forecasts as well as from other public weather services during this storm.
- CL&P recognizes that communications with cities and municipalities was inadequate and has instituted proactive programs.
- Communications with the State were reported to be adequate.
- The ability to respond to multiple and simultaneous large scale outages such as this one was negatively impacted by:
    - Inaccurate weather forecast
    - Occur on weekend
    - Saturated soil and associated large tree uprooting
- Initial and ongoing damage assessment was hampered by fallen trees and other road blockages.
- CL&P's field forces indicated that the level of experience and capability was lacking in some of the damage assessors, resulting in analysts and work planners not having a complete understanding of all the materials required for restoration.
- The extent of the damage, such as large trees down, made thorough damage assessment challenging. In some cases, there were other outage issues subsequently discovered; for example, after a main line was restored. This also led to further switching outages on the main lines to permit restoration of laterals, etc.
- Restoration efforts were hampered by delayed debris removal and delayed damage assessment.
- There were no significant issues with materials during the restoration. Crews were successful in utilizing runners to obtain needed materials.
- CL&P employed a 16/8-hour work schedule to maximize crew use during daylight hours for both safety and productivity reasons.
- There were four minor injuries[15] to CL&P workers and no injuries reported by any other crews working the storm on behalf of CL&P.
- Initially, communication of system status was every two hours during the Operations Conference Call; however, after misunderstandings regarding restoration time with municipalities and media CL&P introduced a Communications Conference Call on Monday, March 15th.
- CL&P has put an increased emphasis on the quality of the estimated restore times (ERTs) as well as the timing of the different types of ERTs - specifically global (manual

[15] DR EL-011

messaging), area work center, and event level ERTs. During the newly established communications calls, each division reports out on the ERTs for their area during all phases of an event; i.e., during the storm, during damage assessment, and during active restoration. The messages are available to the customers via the interactive voice response unit (IVR) as well as the call center.

- In addition to establishing communications calls, CL&P has initiated a project to improve the information flow between the outage management and customer service systems. This will provide additional and timelier restoration information to customers during an outage event.
- During major event restorations, crews do not necessarily "own" an entire circuit, or major isolatable portion of a circuit. This reportedly led to some confusion over switching and clearance orders as well as double assignment of crews to the same circuit.
- Switching and clearances are controlled by the system operations center, and coordinated with decentralized operating centers.

8.3.2 Conclusions

8.3.2.1 CL&P appears to have been well prepared for the restoration efforts by working two shifts with the vast majority of its workforce scheduled to work more effectively during daylight hours. In addition, a significant number of employees worked beyond 16 hours.

8.3.2.2 CL&P appears to have been well prepared for the restoration efforts as there were few, if any, complaints about material availability.

8.3.2.3 CL&P's safety policies appear to be effective given the small number of very minor injuries reported.

8.3.2.4 The call center was adequately staffed and responsive throughout the storm.

8.3.2.5 While CL&P did not adequately communicate with local officials early in the restoration process, communications improved significantly by Monday, March 15th.

8.3.2.6 CL&P did not adequately communicate with their nonmanaged accounts; this was due in part to the inability to broadcast accurate estimated restoration times via the IVR or by telephone during the first few days of the restoration; however, they have subsequently implemented enhanced processes to ensure more timely and accurate information for dissemination to its customers.

8.3.2.7 Enhanced training at all levels can produce an improvement in response success and could improve overall outage duration.

8.3.3 Recommendations

8.3.3.1 Provide additional training for staff assigned to Patrol or Damage Assessment duties during emergency responses to enhance their understanding of the configuration and operation of the system. This training should be conducted at least annually and preferably semiannually; and should include physical walk downs of the transmission and distribution systems led by experienced field workers. Refer to Conclusion 8.3.2.7.

8.3.3.2 Provide additional emergency response and corporate policy training for those involved in line crew management during emergencies. This should include Area Managers, Field Supervisor Lines (FSLs) and Supervisor of Distribution Lines (SDLs), especially those who are not involved in line activities on a daily basis. Refer to Conclusion 8.3.2.7.

8.4 Mutual Assistance

Our review of this area includes:

- Examine the Company's use of mutual assistance resources and their management of these resources during the restoration process.

On Saturday, March 13th, when CL&P realized that the extent of the damage to their system exceeded their ability to restore service in a timely fashion, a call was issued to the Northeast Mutual Assistance Group for an additional 50 crews. The request was denied at that time due to the wide-spread damage in the Northeast Mutual Assistance Groups service area.

On Sunday, CL&P was able to get 17 municipal, 12 mutual aids, and 12 other Northeast Utility crews to arrive and begin work on the restoration process, and on Monday, an additional 35 mutual aid crews arrived.

On Tuesday, "CL&P also initiated contact with the restoration leaders at Consolidated Edison and the Long Island Power Authority / National Grid in order determine if they had mutual aid resources they could make available to the Company. Both of these companies declined to offer mutual aid to the Company due to their own on-going service restoration requirements"[16].

On Tuesday, CL&P was able to obtain an additional 17 crews from Northeast Utilities. CL&P continued to add crews from their mutual aid group and Northeast Utility from Wednesday through Friday with a total of 110 mutual aid group and 48 Northeast Utilities crews taking part in the restoration effort.

[16] Staff Dr EL 001

We have included in the previous section a discussion on how the Company used and managed mutual assistance crews during the storm restoration effort.

8.4.1 Findings

- Due to the geographic area and intensity of the storm, mutual assistance was not available from Northeast Mutual Assistance Groups' members as they reserved their crews and contractor crews in anticipation of local needs.
- CL&P contacted and requested out-of-state mutual assistance crews by midday Saturday as the storm intensified. These crews were on site by Monday.
- CL&P utilized meter readers and others to birddog the foreign crews.
- CL&P used French interpreters to facilitate communication with Canadian crews.

8.4.2 Conclusions

8.4.2.1 CL&P initiated actions early to request assistance from mutual crews, and when they discovered that local mutual assistance was not available due to size and location of the storm, they immediately requested help from out-of-state crews. These crews were deployed and arrived within two days, which is the normal expectation.

8.4.3 Recommendations

None.

8.5 Post-Storm Actions

Our review of this area includes:

- Perform an evaluation of CL&P's post-event processes such as ramp down, clean-up, and post-event critiques.
- Address whether CL&P's post-event activities have been effective and are expected to be effective in improving future performance, determining the root causes of any undesired outcomes, and gaining a solid understanding of customer and other stakeholders' satisfaction and expectations.
- Determine if recommendations and lessons-learned from storm outage events have resulted in documented changes, such as modifications to the Emergency Response Plan.

The Company conducts a ***Post-Storm Critique*** as defined in its Emergency Response Plan[17]. Some of the preliminary lessons-learned include:

Communications:

- Enhance communications with the town EOCs by deploying Company employees into the town EOCs as soon as they are opened.
- Formally establish specific communications conference calls in parallel with, but separate from, the internal operations conference calls to heighten the focus of town or customer concerns. This process was successfully used during this storm beginning on Monday.
- Provide restoration projections only after full damage assessment has been performed, even if it is an aerial assessment, in order to help prevent multiple revisions to restoration projections.

Logistics:

- Where possible, secure hotel locations that can include feeding, lodging and fueling, and activate Base Logistics (i.e., tents and other temporary feeding and lodging facilities) in locations where these facilities are not available.
- Continue use of satellite trailers or satellite locations to allow storm teams to become fully operational before crews arrive to reduce bottlenecks at these locations.
- Collaborate earlier with municipal officials on work necessary to cut and clear roads and to make safe in cases where the nature of the damage was substantial and significant.

CL&P provided an update of its lessons-learned findings with progress indicated through July 10, 2010, in Appendix 9.2.

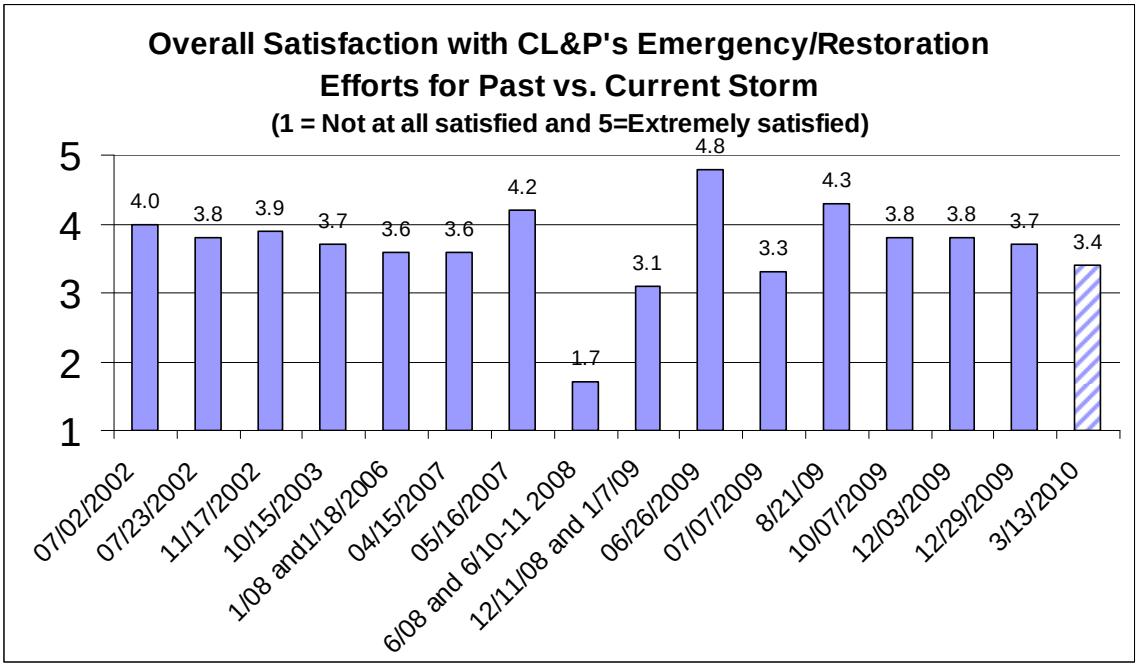
As part of ***Post-Storm Critiques***, CL&P conducted a Post-Storm[18] survey following the major storm on March 13, 2010, with local officials in towns where approximately 25% or more customers experienced an outage of duration more than several hours. The survey was triggered by the creation of a work order for the storm restoration efforts. The survey was designed to determine how well CL&P handled the restoration of service after a major storm. Phone interviews for this storm were conducted by a third-party vendor and contact information was provided for 19 local officials representing 13 towns. A total of seven phone interviews were completed, resulting in a response rate of 37%. The interviews took place from April 7th to April 14th. The results of this survey compared with similar surveys conducted since 2002 are shown graphically below:

---

[17] CL&P ERP, Section 1, pages 24-25

[18] EL-009-SP-01

Figure 30 - CL&P Satisfaction Survey - Storm Restoration



Note: sample sizes are small, ranging from 3 to 22.

As shown in the preceding, CL&P's performance at 3.4 out of 5 was in line with prior results, but below CL&P's historical average of 3.7. This decrease is a more likely result of the storm's intensity, extent of damage and issues with communications as discussed earlier.

8.5.1 Findings

- There was reportedly a significant amount of equipment, such as failed transformers left in the field following restoration. Based on interview notes, these were generally left in the field by foreign crews, who either did not know CL&P's policies or did not have the proper equipment to transport these items.
- It took CL&P approximately two weeks following completion of system restoration to clear up all the left equipment.
- CL&P has developed lessons-learned from the March storm experience.
- CL&P reported that they employed many of the lessons-learned in a more recent rain and wind storm in late June 2010, and the overall restoration process, including enhanced communications, worked very satisfactorily.
- CL&P has implemented strengthened external communications procedures.
- CL&P has changed its storm policy to provide for proactive out-going communications from its Account Managers/liaisons to city/municipal officials depending on event severity.

These changes will be incorporated in the revised Emergency Response Plan in its planned revision for filing with DPUC in 2011.

- CL&P does not have a formal process to include bargaining unit employees input into lessons-learned.
- CL&P increased the working hours and crew concentration the last days of the event to complete restoration for the remaining customers.
- The emergency plan provides the opportunity for inclusion of union in lessons-learned; however, this practice is not followed.

8.5.2 Conclusions

8.5.2.1 CL&P successfully implemented lessons-learned to enhance its emergency plan.

8.5.2.2 CL&P has implemented strengthened external communications procedures.

8.5.2.3 CL&P does not formally include union workers on lessons-learned. Without the input of all employees on the lessons-learned, the Company lacks a complete understanding of all issues for improvement.

8.5.3 Recommendations

8.5.3.1 Formally expand the after action/lessons-learned reviews to include direct input from field workers and first and second levels of field supervision, Field Supervisor Lines (FSL) and Supervisor of Distribution Lines (SDL). Refer to Conclusion 8.5.2.3.

8.6 Best Practices

Our review of this area includes:

- Identify applicable industry best practices for key elements of the major event emergency response process, and conduct comparative analysis to determine performance gaps in CL&P's practices and process.
- To the extent it is maintained by CL&P, collect benchmarking data from comparable utilities with similar operating environments. This comparison could include: planning, mobilization, damage assessment, system performance, management of restoration resources and management of information, and communications.
- Identify opportunities for improvement to mitigate and reduce the effects of outages by proposing areas suitable for adoption of suitable best practices, such as latest advances

with outage management systems, outage analysis programs, advanced metering, and other technical innovations.

- Despite assimilation of revised and improved practices from such activities as lessons-learned, it is often helpful for a utility to look beyond its immediate environment to see what other superior practices might exist. Identification of applicable **industry best practices** for key elements of the major event emergency response process can yield insightful discovery. These industry best practices can then be compared to CL&P's practices and procedures to help determine performance gaps and improvement opportunities. To identify industry best practices, Jacobs Consultancy reviewed a number of reports prepared for various state commissions, state utility association reports, industry best practices symposiums, and our knowledge and experience as utility consultants.

- Industry best practices are determined by collecting **benchmarking data from comparable utilities** with similar operating environments. By comparing metrics associated with various aspects of storm-related outage restoration, superior practices are identified. For the severe March storm which struck Connecticut, areas where comparisons could be made include: planning, mobilization, damage assessment, system performance, management of restoration resources and management of information, and communications. However, the benchmarking data that Jacobs Consultancy elected to survey from five comparable utilities was directly focused on a number of storm work practices that CL&P employed. The information gathered varied from union contract rules to outage-related communications and served to put in focus some of the CL&P work practice-related findings.

- Using best practices, we were able to identify a number of suitable **opportunities for improvement** to mitigate and reduce the effects of outages. By using benchmarking data from comparable utilities, we were able to assess the reasonableness of certain work practice-related issues that caught our attention during the study.

8.6.1 Findings

Best Practices

The list of best practices that follows is one that, in general, utilities consider appropriate for weather event related emergency planning and preparedness and post-storm related practices and processes. These best practices should be a part of every utility's effort to achieve excellence. For each best practice listed we first state the practice, provide an expanded description of the practice, and then indicate how or to what extent CL&P conforms to the practice.

Emergency Planning and Preparedness

Emergency operations should be based on the concept of the Incident Command System.

The Incident Command System has been adopted throughout the United States as a method for managing emergencies. The Incident Command System, now integrated under the National Incident Management System-NIMS, is universally used by federal, state, and local agencies[19]. Utilities across North America are adopting the proven Incident Command System method for the following two reasons:

1. It allows everyone to "speak the same language", thus greatly improving communications with police, fire, and government emergency management personnel.
2. It is suited to large-scale electric emergencies due to its scalability, flexibility, and ability to manage large influxes of resources.

- CL&P utilizes the incident command system both at the EOC and decentralized centers.

A dedicated emergency operations organization and facilities should exist.

Emergency operations are a function that requires special training. Just as other areas of a utility require specialized and dedicated staff and facilities, so does emergency operations. Dedicated emergency operations organization staff should be permanent and fulltime. The staff should be responsible for drills, preparation, and updates of the emergency plans and training. In addition, dedicated facilities called emergency operations centers or storm rooms are becoming standard in utilities following best practices.

- CL&P has dedicated emergency operations staff and facilities. The ERP specifies responsibilities by name in the current version and will specify responsibilities by position in the updated version being developed for filing with the DPUC in 2011. The EOC is identified and configured as part of the Berlin SOC and decentralized locations are identified geographically or by satellite trailer designation. Emergency staffing by position is maintained for the decentralized locations.

At the first indication of a storm, the restoration workforce should be geographically positioned. The restoration workforce should include damage assessors as well as crews, so initial damage assessment can begin as soon as possible after the storm has passed and restoration time estimates can be developed.

---

[19] National Interagency Fire Center. http://www.nifc.gov/. (Accessed August 26, 2009).

It is often difficult to move damage assessment personnel and crews into the areas where damage has occurred after a major storm. Conditions such as downed trees, snow, ice, and floods can greatly impede restoration efforts by delaying the ability to investigate damage and make repairs. By prepositioning damage assessors and crews prior to the storm, restoration time can be significantly shortened.

- CL&P did preposition the restoration workforce, but the unexpected severity of the storm caused CL&P to stand-down crews, except for make-safe activities, on Saturday, March 13, 2010, and subsequent access-related delays in completing damage assessments (some not completed until Monday, March 15, 2010) rendered some of the prepositioning moot. Further exacerbating the restoration process were some inadequate damage assessment reports produced by inexperienced damage assessors. We have recommended that CL&P enhance its training programs especially for damage assessors.

Never underestimate the potential damage of a forecasted storm.

Anticipate the worse-case scenario and get prepared accordingly. Underestimating the damaging effects of a storm will result in longer response times and longer outages.

- Utilizing its emergency response procedures CL&P did appropriately estimate the expected extent of damage based on the weather information provided by its sources, which continued to indicate only high winds right up until the storm actually hit the area. CL&P did mobilize 25% of its workforce and prepared for opening the EOC in advance of the storm, but were ultimately caught unaware of the actual damage until the storm was well upon them.

A communications plan should be in place to interact with public officials and emergency response agencies. Communications should be initiated early and should be consistently continued throughout the event.

Within the emergency response plan there should be a defined set of criteria including estimated storm damage and storm size, which would trigger initiating contact with public officials and emergency first responders. The criteria should be consistently followed and there should be dedicated utility staff whose sole function is to communicate with public officials and emergency responders. Public officials also include: local fire, police, other utilities, and public works departments and all those potentially impacted during outage restoration activities.

Communications should also be established and maintained with the news media and customers in the affected communities. This communication is necessary in order to provide warnings of an impending storm and instructions regarding safety and other information to the public during a power outage.

- CL&P maintains a robust internal communications plan in its ERP and followed the ERP closely during the storm. The communications with the State EOC were handled

appropriately as were the procedures for communications with municipal and town governments. The existing ERP specifies that the Company is to inform the towns and municipalities, then the Company opens its EOC, but since the storm occurred on a weekend it was difficult for the Company to make firm contact during the initial stages of the restoration. The Company has identified communications enhancements in the form of a more proactive regimen to reach out to the towns and municipals.

Extensive use of nontraditional employees.

Nontraditional employees are those individuals who work for the utility or a contractor and do not normally perform electric operations or provide field support. Nontraditional employees can be ideal for assignments to such storm-related items as: wire watchers, crew guides, communicators, or making simple deliveries. The best practice is that all employees within an organization along with contractors are used as support during the restoration effort.

Emergency response plan should address how these nontraditional employees will efficiently be used during a major storm.

- At CL&P most electric department employees have storm-related responsibilities and are fully engaged in such activities as wire watchers, material runners, birddogs, etc., thus freeing up internal CL&P staff to attend to more technically demanding activities.

Materials should be prestaged and could include items as storm trucks or storm boxes.

Getting material to crews in the field is a critical element in the restoration of power. The use of storm trucks or storm boxes may be particularly advantageous to the restoration effort when dealing with larger geographical areas. A storm truck consists of a trailer carrying an inventory of standard storm restoration material. While a storm box consists of dedicated, prepackaged storm restoration materials that can be quickly placed on a truck.

- CL&P made use of the nighttime hours to prepackage job ticket materials and utilized nontraditional staff to make material runs throughout the restoration effort. There were no reported issues with material shortages or inadequacies.

Post-Storm Actions and Processes

Determine the global estimated restoration times and publish that information within 24 to 48 hours.

Developing and publishing the estimated time to restore power as soon as possible in the storm response provides customers with necessary information. Communicating information on the magnitude of storm, the duration of the storm, and most importantly how long customers should expect to be without power. This best practice lets businesses know when employees should report to work, lets families know whether to stay home and wait or find shelters or other

temporary lodging, lets restaurants and homeowners make provisions for perishable food supplies, and lets critical care facilities take appropriate actions.

- CL&P was hampered during this storm restoration by the sheer amount of concentrated damage which affected their ability to complete accurate damage assessments quickly. Further, additional outages occurred after some circuits were restored due to subsequent trees toppling into the lines. However, the Company relied upon its OMS-based Estimated Restoration Time software algorithms, which produced excessively optimistic estimates, until they suppressed the system on Saturday, March 13th at 5 p.m. During more normal storm situations the Company's Estimated Restoration Time process (both system-based on manual) has resulted in more accurate estimates.

Employ a restoration strategy that targets the restoration of power to the greatest number of customers within the shortest amount of time.

The objective is to restore electric service to as many customers as possible in the shortest amount of time. This is considered a best practice because it focuses on restoration of efficiency as measured by the number of customers restored per hour or day. This practice might result in isolated groups of customers remaining without power long after other customers have been restored. In the long run, this minimizes the overall number of customers who will be inconvenienced.

- CL&P defined its restoration policy in its ERP and followed their policy during this storm restoration. Specifically, CL&P follows the following protocol:

  "Restoration operations proceed in conformance with the principal of first restoring service to critical customers. This is normally affected by placing initial emphasis on restoration of the transmission system lines and substations followed by distribution feeder backbones, side taps, and individual services"[20].

The need for supplemental crews should not be limited to local mutual aid groups and other local utilities.

When a major storm is predicted, the search for mutual aid groups and crews should not be limited to mutual aid groups and local utilities. In many cases, these groups are reluctant to commit to providing crews to another utility until they are certain that their crews will not be needed for their own restoration work. An emergency response plan should have provisions to expand the search for mutual aid crews well beyond its geographic area. Utilities should establish agreements and contacts outside their local area.

- As discussed earlier, CL&P's ERP provides for escalating contact of mutual aid groups both locally through NEMAG and municipal utilities as well as remote resources, such as

[20] DR-12, CL&P ERP, M3-EP-1001, Page 12

other NU electric operations and extending to widely disperse mutual aid entities contacted through Edison Electric Institute's RestorePower. During this event, CL&P made use of all of these resources at some point during the restoration.

Communications should be correct and consistent.

During storm restoration it essential that all communications to other entities both external to the company and internal to the company are correct and consistent. In order to accomplish this best practice for external communications, it is necessary to designate specific personnel as sources of information within the utility and that they are assigned to communicate with the various representatives of outside entities. Once communications links have been established the personnel assigned and sources of information should not be changed.

For internal communications it is essential that completed work be communicated to the EOC or decentralized dispatcher so that crews are not assigned to work already completed. During a major outage restoration effort there is sometimes a backlog of completed work assignments for entry into the work order/OMS system. This can cause inefficiencies in closing out outage records and having a clear view of what work is actually still outstanding. Some utilities have deployed mobile data terminals (MDTs) in their line trucks which allow completed work to be posted almost immediately and this is a best practice.

- CL&P does not yet utilize MDTs in their line trucks; however, some of the SDLs and FSLs had laptop computers with air card communication capabilities which were reported to greatly aid in closing completed restoration work orders. In areas that did not have such facilities there were reported issues with double assignments.

Following a major storm lessons-learned should be gathered and implemented in a timely manner. Implementation plans should include specific tasks and tracked completion dates.

Lessons-learned from storm restoration efforts are more effective when compiled as quickly as possible after the event. The lessons-learned objective is to identify policies and practices that were not effective and find ways to improve them. It is important to develop implementation plans and fixed deadlines for specific items that need attention.

- At CL&P, action reviews and the resulting lessons-learned were developed fairly quickly following the storm restoration; in fact some lessons-learned such as enhanced communications with municipals were implemented during the latter portions of the effort. Many of the lessons-learned were applied in operating policy for a similar storm in June 2010 with reportedly very good results.

Benchmarking Data

By using benchmarking data from comparable utilities we were able to assess the reasonableness of certain work practice related issues that caught our attention during the study. These issues are presented here in the form of findings.

Crew Work Scheduling During Outage Events

- CL&P utilizes an extended outage restoration crew schedule of 16 hours working and 8 hours of rest. The company focuses on the fatigue and safety aspects of restoration activities and enforces the 8-hour rest.
- CL&P will permit crews to work in excess of 16 hours for three reasons; however the company does enforce an 8-hour rest period in all cases:
    - At the beginning of the event if longer schedules will materially improve initial restoration efforts.
    - Toward the end of a long restoration event CL&P will allow crews to work in excess of 16 hours in order to "push" the final restoration efforts.
    - During a longer event where allowing a crew to work several hours past the 16-hour guideline to complete a restoration for more than a few customers or in the case of a priority circuit; this practice is limited to two to four hours. Approval is granted by the SDL/FSL or Area Manager, taking into account working conditions and fatigue.
    - While we found through interviews that approval for extended work schedules rests primarily with the SDL/FSL, we also found that there is a potential for differing opinions on interpretation of corporate policy at the SDL/FSL and Area Manager level. In some cases, we were told that supervision held firm to a flat 16-hour work shift while others provided the crews the requested flexibility.
- CL&P plans its crew schedules to maximize daylight working hours in order to promote productivity and safety. During the March storm, CL&P deployed about 10% of its crews for night work.
- CL&P does not typically "reserve" uncompleted work orders at the end of the 16-hour word period for the same crew to continue with following their rest period.
- In cases where there is a critical circuit and the crew reaches its 16-hour workday end, CL&P may assign another crew to continue and complete the work.

Decentralization and Staged Work Areas

- Depending on the severity of the event, CL&P will decentralize its field operations into satellite centers which are staffed by an Area Manager, analysts and line crew FSLs and

SDLs. The decentralization follows the Incident Command System format and structure and reporting up to the EOC is done on a regular basis.

- CL&P utilized tent-based feeding facilities for the first time during the March storm to cover breakfast, dinner and take-away lunches. During the initial days of the storm response, based on interviews, meals were judged to less than satisfactory. However, interviewees indicated that by the end of the restoration the meals service was adequate.

8.6.2 Conclusions

Crew Work Scheduling During Outage Events

8.6.2.1 CL&P's crew work scheduling of 16-hour work and 8-hour rest is in conformance with industry practice[21]. Some utilities utilize a slightly different work/rest time, but all require adequate rest times in the interest of safety.

8.6.2.2 CL&P's overall policy provides crews flexibility in completing restoration jobs that require only several hours beyond the 16-hour policy and this practice is in conformance with industry practice.

8.6.2.3 There is a potential for misunderstanding of company work schedule policy among Area Managers, FSLs and SDLs, particularly in situations where crews are decentralized and thus working for supervision that they are not accustomed to working with**.**

Decentralization and Staged Work Areas

8.6.2.4 Based on interviews, while it was recognized that the concept of using a "tent" facility for field staging and meal provision has been successfully employed by other utilities, CL&P's fist time to use this type of facility provided a number of lessons-learned.

8.6.3 Recommendations

8.6.3.1 CL&P should enhance its supervisory training program and communications to ensure corporate policy and exceptions relative to crew work scheduling are clearly understood and practiced. Refer to Conclusion 8.6.2.3.

---

[21] Please refer to Appendix-9.5 for Survey Results

8.6.3.2 CL&P should take steps to improve its centralized feeding concept, including use of tents. As part of this recommendation, CL&P should enlist the field workers to help identify opportunities to improve the implementation in future restorations. Refer to Conclusion 8.6.2.4.

8.7 Other

8.7.1 Findings

- CL&P's Locals 420 and 457, both union members and union management indicated a lack of trust and collaboration with the Company.
- However, during interviews we heard that the relationship between individual union members and their supervision was satisfactory, but that the relationship between union leadership and peer positions within the Company was not necessarily amicable.
- On Sunday, March 14, 2010, CL&P conducted numerous call-out campaigns for Company's crews, but only received about a 20% response rate and asked union leaders to help in getting response from members.
- In order to assure adequate staffing for unknown weather events, CL&P chose to preschedule staff for anticipated outages beyond its normal staffing requirements. This practice was initiated after the March 2010 storm and was to continue through Labor Day 2010. We learned during interviews that this precautionary measure was taken because the Company believed there would have been issues in securing enough worker responses through the traditional call out process.

8.7.2 Conclusions

8.7.2.1 CL&P's relationship with its union locals is strained from both parties' perspective and is starting to impact call out response.

8.7.3 Recommendations

8.7.3.1 CL&P and union leadership should identify any high-priority issues of disagreement and develop and implement a plan to work through those areas of disagreement with the goal of improving their relationship. Refer to Conclusion 8.7.1.1.

9 Appendix

9.1 List of Recommendations

Section	No.	Recommendation
Emergency Planning	8.1.3.1	Formally expand the after action/lessons-learned reviews to include direct input from field workers and first and second levels of field supervision, Field Supervisor Lines (FSL) and Supervisor of Distribution Lines (SDL). Refer to Conclusion 8.1.2.3.
Preparedness	8.2.3.1	Continue to develop enhanced communications capabilities with cities and municipalities. Refer to Conclusions 8.2.3.5, 8.2.3.6 and 8.2.3.7.
	8.2.3.2	Consider accelerating programs intended to provide mobile data terminals in distribution line trucks. Refer to Conclusion 8.3.2.8.
	8.2.3.3	Until mobile data terminals are in most line trucks, provide more Field Supervisor Lines (FSLs) and Supervisor of Distribution Lines (SDLs) with laptop or equivalent computers equipped with air cards to streamline the process of closing work order tickets and enhance the ability of the dispatcher and analysts to effectively and efficiently plan and direct the remaining work efforts. Refer to Conclusion 8.3.2.8.
Restoration Performance	8.3.3.1	Provide additional training for staff assigned to Patrol or Damage Assessment duties during emergency responses to enhance their understanding of the configuration and operation of the system. This training should be conducted at least annually; and preferably semiannually and should include physical walk downs of the transmission and distribution systems, led by experienced field workers. Refer to Conclusion 8.3.2.7.
	8.3.3.2	Provide additional emergency response and corporate policy training for those involved in line crew management during emergencies. This should include Area Managers, Field Supervisor Lines (FSLs) and Supervisor of Distribution Lines (SDLs), especially those who are not involved in line activities on a daily basis. Refer to Conclusion 8.3.2.7.
Post-Storm Activities	8.5.3.1	Formally expand the after action/lessons-learned reviews to include direct input from field workers and first and second levels of field supervision, Field Supervisor Lines (FSL) and Supervisor of Distribution Lines (SDL). Refer to Conclusion 8.5.2.3.

Best Practices	8.6.3.1	CL&P should enhance its supervisory training program and communications to ensure that corporate policy and exceptions relative to crew work scheduling are clearly understood and practiced. Refer to Conclusion 8.6.2.3.
	8.6.3.2	CL&P should take steps to improve its centralized feeding concept, including use of tents. As part of this recommendation, CL&P should enlist the field workers to help identify opportunities to improve the implementation in future restorations. Refer to Conclusion 8.6.2.4.
Other	8.7.3.1	CL&P and union leadership should identify any high-priority issues of disagreement and develop and implement a plan to work through those areas of disagreement with the goal of improving their relationship. Refer to Conclusion 8.7.1.1.

9.2 Update to Improvement Actions from Critiques of March 13, 2010 Windstorm[22]

Follow-up Actions	Owner(s)	Status	Next Action and Due Date
Improve Securing Additional On Call Resources	Mike Zappone	The CL&P Director Team now holds conference calls prior to anticipate weather events and discusses resource requirements. The resulting plan is then communicated to Senior Leadership for review and approval. This practice has been successfully implemented for the most recent preparation action plans.	• The "Emergency Level Description and Action Matrix", was reviewed by members of the Director Team on 6-14-10. • Recommended modifications will be incorporated into the next revision of CL&P's Emergency Plan (Red Book) in the 2nd quarter of 2011.
Expansion and Improvement of Municipal Communications during events	Katie Voght	Katie Voght and Jessica Cain were given a command structure. They will revisit Attachment 2 section 2021 from the ERP to update where necessary and develop the format and expectations for Communications Conference Calls. In addition, Katie has kicked-off a multi-discipline team to improve execution of all outage communications.	• Communications Conference Calls are already being used. There was also some input from the Conf Call format utilized by PSNH. This will be discussed at a meeting scheduled for the first week of September. If approved, the form and new format would be scheduled for 10-1-10 • Any update requirements to the Emergency Plan will be performed by the EOC staff.
Improvement to Operational Conference Call Information.	Mike Zappone	Linda Jackson-Biestek will complete the revision to the Emergency Plan Section 2 Appendix B Operational Conference Call Informational Form.	• Complete
Use of Aerial Patrols	Mike Zappone	The recommendation for consideration for aerial patrols during large scale events where damage assessment by over the road vehicle is hindered by impassable roads will be added to Section 10 of the Emergency Response Plan, utilizing the wording from TD509 section 2.	• The changes to the ERP have been drafted and will be incorporated into the 2011 edition. • CL&Ps Emergency Plan is scheduled for submittal 2nd quarter of 2011.
Additional Material	Hugh	The Stores Organization has already	• The target delivery is by end of 2010.

[22] DR-14, page 2, and update August, 31 2010

Follow-up Actions	Owner(s)	Status	Next Action and Due Date
Trailer Needed	Costello	placed the order for this new trailer.	
Improved Infrastructure of Satellite Trailers	Craig Weske	The list of improvements has been compiled by Craig Weske and approved by Mike Ahern on 6-28-10. The upgraded generators have been purchased. Newly installed technology has been tested successfully. Additional phones and phone lines have been installed.	• Request submitted to Transportation to modify trailers to accommodate installation of new generators. Estimated Completion date is 11-1-10.
Update Storm Restoration Guide and Debris Disposal	Mike Zappone	Existing guides are in use. Improvements are currently in progress. Environmental Guidance, as well as, CL&P's new Pole Banner incorporated. Manual rolled out. Printing complete. Books distributed.	• Complete
Improve Storm Room Layout	Tom McDermott	Make accommodations to better isolate job functions like DSO/Switching Director from the rest of the room.	• Ongoing.
Expansion to Attendance at "Post Event Critiques"	Mike Zappone	Future Critiques to more regularly include Representatives from Customer Solutions, Customer Experience and use the feedback from key stakeholders (Customers and Municipalities). This new practice is in use. revised Emergency Plan Sections 1 and 21 dealing with Post Event Requirements have been drafted.	• CL&P Emergency plan scheduled for submittal 2nd Quarter of 2011.

9.3 Document Request List

Electric Operations	
Item	**Description**
EL-1.	Provide a high-level summary of the Company's management of the storm that occurred during the period March 12 through March 14, 2010 (the Storm), beginning with the approach of the storm on March 10, 2010 and continuing through March 22, 2010. Include at least the following: • A timeline and describe the steps the Company took to prepare for the Storm, including when efforts were made to solicit assistance from contractors and mutual assistance from other utilities; • Identify any factors unique to the recent storm that hindered service restoration efforts; • Any factors which constrained resource deployment during restoration efforts; and • Descriptions how the Company tracked, prioritized and repaired outages during and after the Storm period.
EL-2.	State the name of the weather forecasting service that the Company relies upon for determining line worker staffing needs. Provide a copy of the forecast for each day March 8 through March 14, 2010.
EL-3.	Provide an hourly accounting of the number of line crews and other personnel assigned to storm restoration duties (including "make safe" assignments), beginning midnight March 11, 2010, through March 22, 2010. Provide this data differentiated by the smallest possible geographical level of detail. Include the Company's own personnel, contractors, and line crews obtained through mutual assistance from other utilities. Additionally, state the maximum current number of Company field staff available for service restoration, differentiated by job function.
EL-4.	For each hour beginning midnight, March 11, 2010 through March 22, 2010, identify the number of customers believed to be without service, total and by town.
EL-5.	Provide copies of all system status reports issued during the period from midnight of March 11, 2010 through March 22, 2010, including damage assessments.
EL-6.	Provide all company policies that pertain to line worker working hours and overtime during storm restoration activities. Have the policies changed over the last five years? Explain the reasons for any changes.
EL-7.	Did the Company limit overtime or other compensation to its field staff during or after the Storm period? If so, explain the factors that led to that decision, and when that decision was made.
EL-8.	Provide a copy of the Company's Emergency Preparedness Plan, and any other policies and plans in place to address widespread service outages, such as those caused by the recent storm. If those plans/policies were filed with the Department within the last 24 months, indicate the date of such filing along with the associated DPUC docket number, if applicable.
EL-9	Explain how the Company establishes and maintains communications with municipal officials during major storm periods. Has the Company received complaints from municipal officials regarding its communications during and after the period of the Storm? State the nature of the complaints, and identify the municipalities involved. Assess how well restoration efforts among affected utilities and municipalities were coordinated and how such coordination may be improved in the future.
EL-10.	Does the Company have a policy for performing a post-event review after a major system event such as the Storm? If so, explain and provide any such policies. When will the Company complete a post-event review on its performance during the Storm? To date, what have been the lessons learned from the Company's experience during the Storm?
EL-11.	Describe any incidents of employee injuries associated with service restoration efforts during the period March 11, 2010, through March 22, 2010.

EL-12.	Describe the current state of the Company electric system in the areas affected by the Storm, including any* temporary measures taken that must be corrected later. By what date does the Company expect* its facilities will be restored to pre-storm operating condition.
Customer Service Operation	
Item	**Description**
CSU-1.	Identify all measures enacted in the Company's call center(s) to respond to the numerous outages.
CSU-2.	Provide the following Company hourly call center metrics at your main call center, for the period March 11, 2010 through March 22, 2010: i. total number of staff available to take calls; ii. the total number of calls received; iii. total number of those calls handled via IVR; iv. total number of those calls handled by a live representative; v. number of abandoned calls; vi. number of customers who received a busy signal; and vii. average speed of answer statistics, and other tracked call metrics which you believe are relevant to the subject outage.
CSU-3.	Reference the Company's response to Interrogatory CSU-2. Provide this same information for any other call centers that were established by the Company exclusively to handle calls from state, municipal and/or public safety entities.
CSU-4.	Comment on the Company's success in meeting call center responsiveness goals.
CSU-5.	Identify the hours of operation of the customer call center (where live representatives are available) for each day between March 11, and March 22, 2010. Provide the same information for the seven calendar days leading up to March 11, 2010.
CSU-6.	Provide copies of any documents that were prepared to date by the Company related to any customer complaints and inquiries that were received by the Company by telephone, e-mail, fax or United States Postal Service.
CSU-7.	How many outage-related hits were received at the "Storm Center" section of your webpage? If available, provide a breakdown of those hits for each of these categories: • Outage Map; • Are You Ready?; • Storm FAQs; and • Before and After a Storm and Historic Storm Response. Separately explain if any enhancements were made to the Company's web page at any time between March 11, 2010 and the present related to storm response. If applicable, provide details behind the changes and the rationale for making those changes.
CSU-8.	How many storm response-related complaints has the Company received? How many storm-related inquiries has the Company received? For each category, provide a breakdown by town and by residential, business and government classes.
CSU-9.	Provide an exhibit identifying payroll expenses for the period March 11, 2010, through March 22, 2010. Compare these results with the similar period in 2009.
CSU-10.	Provide an exhibit depicting damage to Company plant in terms of associated loss and replacement costs, by town.
CSU-11	Provide copies of any materials or specific verbal instructions that were given to call center staff to assist them with answering questions and complaints about the subject outage, including when power would be restored.

9.4 Jacobs' Data Request Log

Item	Description	Date Requested	Priority	Date Received
Data Request #1				
1	Description of any emergency plan education and/or training programs for employees.	7/9/10	2	7/23/10
2	Identification and data on major system storms in past 10 years.	7/9/10	2	7/16/10
3	Description of mutual assistance agreements and a listing of mutual assistance resources.	7/9/10	1	7/16/10
4	Organization charts and position descriptions.	7/9/10	1	7/7/10
5	Last 5 years of outage data by cause code.	7/9/10	1	7/16/10
6	Specifics of reliability enhancement program initiatives, including storm hardening and related capital expenditures approved by the Commission and the level and timing of approved increases in vegetation management spending.	7/9/10	2	7/21/10
7	Descriptions and listing of any storm preparedness and/or table-top exercises.	7/9/10	1	7/16/10
8	Call Center normal operations (blue sky) staffing by hour.	7/9/10	1	7/19/10
9	Safety guidelines for aerial device operations (bucket trucks) during high wind conditions.	7/9/10	2	7/19/10
10	Referring to EL-3, please provide a breakdown of number of crews by crew size.	7/9/10	2	7/16/10
11	Referring to EL-6, please confirm that there have been no changes to these policies since 1985.	7/9/10	2	7/23/10
12	Referring to EL-8, please provide a copy of the Company's Emergency Preparedness Plan.	7/9/10	1	7/16/10
13	Referring to EL-9, please provide a copy of the 12-question satisfaction survey.	7/9/10	2	7/19/10
14	Referring to EL-10, have there been any further lessons-learned and if so, please describe.	7/9/10	1	7/16/10
15	Referring to EL-12, has there been any additional work identified as related to the storm and if so, please describe the work and its completion date.	7/9/10	1	7/16/10
Data Request #2				
16	Lessons-learned from the March Storm Document	7/23/10	1	7/30/10
17	Pictures from after the storm	7/23/10	2	7/30/10
18	Forced on-call list by operating center for the weekend of March 13th.	7/23/10	2	7/30/10
19	AWS Conference Call Form – updated version	7/23/10	2	7/30/10
20	Time worked by line crews by date – From 3/13 – 3/20 (Ken Bowes).	7/23/10	1	8/2/10
21	Call volume by hour from the week before and after the storm	7/23/10	1	7/30/10
22	Storm and non-storm overtime records for the last 5 years in hours for line crews.	7/23/10	1	8/2/10
23	When did you begin making the communication conference calls?	7/23/10	2	7/30/10
Data Request #3				
24	Referring to DR 022 please provide straight time hours	8/12/10	1	8/18/10

Item	Description	Date Requested	Priority	Date Received
	for the same groups and date.			
25	Roster of attendees for Tech and Communication conference calls during March 13th storm.	8/12/10	2	8/25/10
26	Methodology used in selecting Local 420 and 457 employees for interviews.	8/12/10	2	8/25/10
27	Referring to EL-003 please provide total number of crews both line and tree trimming in the same format as the initial response without including the company affiliation – so that we can analyze the numbers alone. For example, instead of listing 2 Hartford crews, just specify 2, and in cases where multiple crews are listed, just include the total for that hour.	8/12/10	1	8/18/10
28	Number of crews that worked longer than 16 hours by day and location.	8/12/10	1	8/17/10
29	From the Company's perspective what are the advantage and disadvantage of having tent locations and what are the Company's plans for using these going forward?	8/12/10	2	
30	What were the instructions given to FSL and SDL about working crews over 16 hours and reporting to tent locations? Was the dissemination of this information and implementation uniform throughout the Company?	8/12/10	1	8/18/10
31	Referring to CSU-006 please provide the ERMS for the March 13th storm.	8/12/10	2	8/17/10
32	Provide copies of the 2001 and 2009 letters to the union concerning working beyond 16 hours and double-time pay during storms.	8/12/10	2	8/25/10
33	When did the Company last conduct mock exercises with the municipalities, and when and why was this practice discontinued?	8/12/10	2	8/17/10
34	Locations of each main and decentralized command centers and the geographic areas (towns) they covered.	8/12/10	1	8/17/10
Data Request #4				
35	Does the Company keep statistical record for the police and fire numbers? (i.e. ASA, busy, abandonment numbers and abandonment rate.) If so, please provide these statistics for the period of the March 2010 storm.	8/18/10	2	8/3/10
36	In your reply to Jacobs 020 it was stated that the SCCC code was for individual, but is not unique to an individual please provide the same spreadsheet with a unique identifier for each employee and include if they are exempt or nonexempt.	8/18/10	1	8/25/10

Item	Description	Date Requested	Priority	Date Received
37	In reference to your reply to Jacobs 020, are the following time codes for actual work hours: 000, 005, 010, 145, 155, 210, 240, 260 If not please provide the codes that are only for actual work hours.	8/18/10	1	8/25/10
38	What are the start and stop times for day and night shift during a major storm?	8/18/10	1	8/25/10
39	Re CSU-006 Protected document (email files), when the NU web contact form is submitted, what is done with it for various outage reports: • Power out • Lines/wires-down • Medical • Other	8/18/10	2	8/31/10
40	Re CSU-006 Protected document (email files), what is the latency in passing outage info to dispatch (especially for wires-down)?	8/18/10	2	8/31/10
41	Re CSU-006 Protected document (email files), how are NU web contact forms answered: • Is there an auto response? • How are contact forms selected for agent response emails (some responses had specific info in them) – is it by presence of something in the contact field? • What group is responsible for answering emails?	8/18/10	2	8/31/10
42	Re CSU-006 protected documents (email files); some NU web contact forms were answered within 1 hour compared to 1-2 days for most of the others. How are contact forms and their responses prioritized?	8/18/10	2	8/31/10
Data Request #5				
43	What role(s) did cable splicers, electric maintenance, substation personnel, etc. play in the March storm? Would you envision using them in similar roles for future major storms?	8/26/10	1	8/31/10
44	Ref DR 043 above, how many of each of cable splicer's, electric maintenance, substation personnel and others, were used in the storm area. Please list by job duties and location.	8/26/10	1	8/31/10
45	What are the qualifications for damage assessors, what training is provided and how often is the training done?	8/26/10	2	9/8/10

Item	Description	Date Requested	Priority	Date Received
46	Are fire/police calls for wire-down entered into OMS and when?	8/26/10	2	9/3/10
47	When were city/municipal notified that the company EOC was opened?	8/26/10	2	9/3/10
48	Does the Company meet with public officials to review emergency plans? if so, please provide records for the last three years that document meetings and subjects discussed.	8/26/10	2	9/8/10

9.5 Interview Log

No.	Name	Title	Topics	Date/Time
1	Leon Olivier	EVP and COO (NU)	NU Overview, corporate philosophy, shared services, etc.	July 19 1:00
2	Jeffery Butler	President and COO CL&P	CL&P overview and corporate philosophy	July 19 3:30
3	Michael Ahern	VP Utility Services	ERP, Safety, Mutual Assistance Policy	July 21 1:00
4	Michael Zappone Thomas Layton	Manager System Restoration & Emergency Preparedness Team Leader	Emergency Plan and event coordination and mutual assistance	Aug 5 1:00
5	Kenneth Bowes Robert Hybsch Todd Blosser Robert Coates	VP Energy Delivery Services (was VP Customer Operations during storm) VP Customer Operations Director Division Operations (Southern) Director – Division Operations (was Area Commander during storm)	Customer Operations during Storm	July 23 1:00
6	Robert Dobson Susan Gaylord	Director Engineering Manager Central Engineering	Standards and system condition	July 22 1:00
7	Lauren Gaunt	Principal Engineer	Regulatory interface - technical	July 22 2:30
8	Johnny Magwood Daniel Comer	VP Customer Exp. And Chief Customer Officer Director Customer Exp. Operations	Call Center Operations	July 20 2:00
9	William Quinlan	VP Customer Solutions	Account Execs, Municipal Communications	July 21 9:30
10	Mark Fanelli	Manager – CL&P System Operations	Dispatch center operations	July 22 10:30 July 23 11:00
11	Bob Lizotte	Director Human Resources-Labor Relations	Labor relations	July 19 5:00
12	Local 420 Line Workers	Union Group Interview	Field force view	July 20 9:00
13	Local 457 Line Workers	Union Group Interview	Field force view	Aug 5 9:00
14	Local 420/457 Union Leadership	Union Group Interview	Field force view	July 23 8:30 Aug 6 9:00
15	Don Scacco, Paul Raia, Bob Warzhoa, Jim Prestiano, Dan Covney	SDL, FSL, Op Mgrs	Field force view	Aug 5 1:00 PM
16	James Pagliaro	FSL	Field force view	Sept 8 9:00 AM
17	David Florin	FSL	Field force view	Sept 8 10:20 AM

No.	Name	Title	Topics	Date/Time
18	Michael Aubin	SDL	Field force view	Sept 8 11:00 AM
19	Michael Begley	SDL	Field force view	Sept 8, 1:00 PM
20	Russell Brown	SDL	Field force view	Sept 8 2:00 PM
21	Chris Menard	FSL	Field force view	Sept 9 9:00 AM

9.6 Survey of Storm Work Practices – Crew Work Hours

1. What is the standard storm or event restoration work hours, i.e., 16 hours on duty and 8 hours rest?	
CL&P	The standard work schedule is 16 hours on duty and 8 hours rest. Crews may work up to 24 hours at the initiation of the event, but must then take the full 8 hours rest.
Middle States 1	During a 24-hour storm, they may work all the way through restoration. After 16 hours, crews have option and right to an 8-hour break. Company can also exercise its option to send them to rest at 16 hours. Longer events, running two to five plus days, they go straight to a 17/7 structure, with some variations due to different union contracts for 1.5 or DT pay. Toward the tail end of restoration, they will work crews beyond 17 hours to get the last restoration completed.
Northeast	In 2007, Company reviewed policies and established 17/7 standard. Found that paying 1.5 times around the clock was economically equivalent on average over paying DT for worked hours. During a declared System Emergency the first shift may work up to 24 hours, but thereafter the 17/7 schedule is strictly followed. The use of first shift to reach 24 hours allows more restorations to be done and greatly helps in getting crews aligned on daylight hours thereafter. Allowing over 17 hours impacts daylight rotation, job staging, scheduling and could delay overall restoration time. During non-declared events, 17/7 is strictly followed.
Southeast	Our standard work day is 12 hours but we do go to 16 hours with an 8-hour rest period depending on the extent of system damage or expected duration of the restoration. This is the same schedule for both crews and troubleshooters. In a major event in which they believe FEMA funding will be available, they will work crews 17 hours the first day and put crews on DT the rest of the event, even following 8 hours rest. (Rest time is not paid) They do not have this set up formally and are working on developing it**.**
Middle States 2	This depends on when the storm starts. If it is off hours, they go directly to a 16/8 schedule. If later in the evening, say 7 or 8 p.m., they may work crews through the night and after rest go back on 16/8. They will work up to 24 hours at initiation of storm.
Western	They can work up to a 24 hours burst initially. If event is prolonged, shift to a 16/8 schedule.

2. Are the first 8 hours at straight time, the next 8 on time and a half?	
CL&P	Yes, the first 8 hours are at straight time; the next 8 work hours are paid at 1.5 time; work time beyond 16 hours are paid at double time. Rest time is not paid and upon return to work after rest, they go back straight time for the first 8 hours.
Middle States 1	Yes, and can go to DT depending on contract.
Northeast	During a declared System Emergency all time is paid at 1.5 times, including rest time. During non-declared events, only time above 8 hours is paid 1.5 times, crews coming back after rest are on straight time.
Southeast	The first 12 hours is straight time (this is our standard shift) with the next 4 hours being time and a half. If the event is a hurricane, they will keep crews beyond 12 hours and 1.5 OT continues.
Middle States 2	This is based on union contracts. Typically field workers paid 24x7 (therefore including rest time) at 1.75 OT rate. Company usually does not provide meals.
Western	If the event starts during normal shift, continue straight pay through normal shift, then 1.5 OT next 4 hours, then DT next 4 hours (this is the top pay rate). In non-emergency, workers can call their rest after 16 hours, based on safety and fatigue. Rest of 8 hours or more breaks DT pay rate, goes back to straight with progression as above. In a declared emergency, Company regulates the timing of the rest period, but in this case there is no break in pay, they stay on DT, except rest is paid at straight time. The company can call a rest time of less than 8 hours in an emergency.

3. Following 8 hours rest, are the next 8 hours paid at straight time?	
CL&P	Yes.
Middle States 1	Yes.
Northeast	See answer 2 above.
Southeast	Yes, until the employee works past the 12 hour shift or more than 40 hours for the week.
Middle States 2	See question 2 above.
Western	See question 2 above. Rest time starts when crews leave the truck – so travel time is included in rest time. Meals are outside of rest time.

4. Are crews permitted to work an extra 2-3 hours (beyond 16 hours) to complete a restoration?	
CL&P	Yes, decision rests with SDL/FSL and/or Area Manager.
Middle States 1	Yes, followed by 7 hour break. Otherwise held over to next day, usually with same crew.
Northeast	No, except for the first shift during a declared System Emergency
Southeast	Yes, depending on the particular outage event. Have a safety review with focus on fatigue, will allow crews to work up to 18 hours (sometimes to 20). Try to keep to 12 or 16 hours is a lengthy storm. This practice does not materially affect rotation to daylight overall as the number of these type restorations is a small percentage.
Middle States 2	Yes, there is no formal corporate policy; crews can request additional time to complete.
Western	Yes, crew can request additional time up to 4.5 hours. So far, this practice has not significantly impacted policy to maximize daylight work time.

5. If a crew works beyond 16 hours, are the additional hours paid at double-time?	
CL&P	Yes.
Middle States 1	Yes, actual hours depend on contract.
Northeast	Yes.
Southeast	Yes.
Middle States 2	See question 2 above.
Western	See question 2 above.

6. After working beyond 16 hours, does the crew get a full 8 hours rest, and if so, on return to work after rest, do they continue on double-time or revert to straight time?	
CL&P	Yes, and revert to straight time.
Middle States 1	Yes, but here it is 7 hours, they come back in at straight time. They have 7 hours rest so crews are on double time if they get 8 hours rest then they are on straight time.
Northeast	See question 2 above.
Southeast	Yes. However, they revert to straight time when they return to work unless they are past the 40 hour threshold for the week. If so, they earn time and a half.
Middle States 2	Yes, return is at OT rate described above in question 2.
Western	See question 2 above.

7. If a crew must leave an in-progress restoration effort, for example if the completion time would extend significantly beyond 16 hours, is another crew assigned to finish up or is the work held until the next day?	
CL&P	Depends on the priority of the circuit.
Middle States 1	No.
Northeast	If it is a critical customer, the night crew will be assigned, otherwise the same (or other) crew picks back up in the morning.
Southeast	Yes, another crew would be assigned to finish it depending on the circuit priority.
Middle States 2	Not usually. If a crew must leave and it is a major storm, the OMS will produce a work packet for the next day. Preference is to use the same crew for work continuity. In a small storm, however, they could assign a completion crew to finish up. Use night hours to do preparation, planning and materials at night. At the tail end of a major event, will relax policy and send additional crews. Crews can work in excess of 16 hours to get restoration wrapped up.
Western	If calling in for fatigue, company will send another available crew. Outages are prioritized in OMS.

8. Is there a scheduling preference for daylight hours for crew work?	
CL&P	The Company's policy is to maximize daylight hours from productivity and safety reasons.
Middle States 1	Yes, believe daylight hours most productive and safe.
Northeast	Yes, from the standpoint of safety and productivity.
Southeast	Yes. We typically run the majority during the day and reduce staffing at night.
Middle States 2	Yes, particularly for foreign crews. Contractors (40 to 50 contractors) can work varied shifts through the night. There is no set percentage, but local crews would usually work overnight.
Western	Yes.

9. What percent of your field work force would be assigned night shift work during an outage?	
CL&P	Varies by event, but averaged about 10% during the March storm.
Middle States 1	Varies by event – each area produces a work plan usually they only work single man crews to isolate and prepare the area for day crews.
Northeast	Varies from event to event – could not specify.
Southeast	20% (6 of the 29 Troubleshooters). Crews about 30%.
Middle States 2	Varies.
Western	Usually skeleton, maybe 10%.

10. Is there a distinction between normal, blue-sky outages and major event type storms in crew working hours?	
CL&P	Yes, the 16/8 hour work pattern is implemented for extended response efforts.
Middle States 1	See question 1 above.
Northeast	See question 1 above.
Southeast	Yes. If we estimate that we can restore service in 24 hours or less we may work both shifts either 16 or 18 hours.
Middle States 2	See question 1 above.
Western	No, except in major event company has more control over work times and breaks.

11. What are the criteria for designating a storm a major event?	
CL&P	Based on the ERP a number of levels of escalation are provided. Level 1 with 30,000 customers out of service, with the expectation of restoration within 1 day, will trigger opening the EOC.
Middle States 1	This is tied to opening the EOC. EOC is generally not opened if one division is affected and can restore within 24 hours but if outside assistance is needed even if from another division then EOC is opened.
Northeast	It is up to the operations manager based on field reports and judgment. The EOC may or not already be opened and is not the criteria.
Southeast	A possible FEMA reimbursable event (Tropical storm, tornado or hurricane) or we estimate that more than 100,000 customers will be without service for more than 24 hours. Even if only 10,000 customers are affected, they will modify practice and schedules.
Middle States 2	Level Hours 1 < 24 with a primary storm center open and one or more secondary centers open 2 >24 with a primary storm center open and one or more secondary centers open 3 >24 with multiple primary storm centers open and/or secondary centers open
Western	Any event expected to take over 24 hours or if mutual crews are called in. See comments below under Declared Emergency.

12. Do you use staging areas and if so, do you use tent facilities for crew meals	
CL&P	Yes, the company will utilize freeway rest areas, shopping center parking lots, and retired company work center locations. During the march storm, CL&P utilized tent-based central mess facilities for the first time, based on best practices employed by other utilities. Breakfast and dinner serviced and lunch food provided for the crews to deploy with in the morning.
Middle States 1	Do use staging areas, but typically provide meals (catered) at hotel. They have periodically used a tent (Air-conditioned) for large meal service. Company provides breakfast, boxed lunch and dinner). Have provided tractor-trailers with sleeping and bath facilities (workers don't particularly like them).
Northeast	Yes, do use staging areas for materials and assignments. Do not use tents or field kitchens. During System Emergency the company provides breakfast and supper, crews are on their own for lunch, but company sometimes provides boxed lunches.
Southeast	Yes, their response plan is scalable, as per NIMS requirements, and have vendors contracted to set up tent cities at malls, providing security, showers, and hot meals.
Middle States 2	Yes, but are few staging areas, have one very large area, but not used frequently. Do not use tents for meals.

Western	Most events are localized. In a major city, have a large staging yard at main work center and have used this in some storms. In cases of major events in rural areas or smaller towns, like a tornado, they will stage at outage site. They have not used shopping centers or other public spaces for staging. Have not used meal tents or catering, but this is provided for in the ERP. Company has delivered meals to crews.

13. Do foreign crews work the same schedule?	
CL&P	Yes, unless contracts dictate differently.
Middle States 1	Yes in most cases (almost always), but are paid according to their union contracts.
Northeast	Yes, unless they are on a more restrictive plan, then it is negotiated. Rarely results in foreign crews working a different schedule.
Southeast	Yes, but sometimes a little shorter schedule. They usually do not call foreign crews in until the 3rd day (assume this means to start) in order to allow damage assessors to complete and work packages to be developed.
Middle States 2	Yes, unless dictated by foreign crew contract.
Western	Yes, they are paid per their contracts but work company schedules.

14. Other comments?	
CL&P	CL&P and all survey respondents utilize Incident Command System (ICS) for event management. Will decentralize command centers depending on severity of damage and geographic coverage.
Middle States 1	Company engineers often work all night to prepare work packages for the crews to deploy immediately the next morning on arrival. Will use gas, meter, and construction engineers to birddog mutual crews. Major problem is that it is hard at the beginning of a storm to determine the extent of damage and if it will be a single or multiple day event.
Northeast	None.
Southeast	Teams of engineers from company have Damage Assessment duty. They are trained and have assigned circuits. Pre-storm they ride the circuit and have a mobile device. Meals during events – company provides two hot meals – breakfast and dinner and gives each crew member two MREs for lunch

Middle States 2	Utilize Incident Command System. Will use satellite/decentralized dispatching/switching, but control is always from main center will decentralize jurisdictionally on laterals, etc. Damage assessment – Sometimes us contractors, but are struggling with this concept. Are able to dispatch crews so fast and have good customer outage information via OMS – crews are often on site before damage assessment is completed. Public Safety- For the last 2 years has been focusing on wire downs- Has a desk to handle calls will send meter tech or substation personnel to assess if they can't de-energize then will send wire watcher.
Western	Use Incident Command System. Central dispatch controls all switching Subordinate Command Centers – i.e. Call Center plus 1 or more in regions. Formal operations calls; every 2 hours. Have stakeholder calls. Have executive update calls that include cities and major accounts. In a major event will break up crews to provide additional troubleshooters for damage assessment and the ability to handle single handed restorations. Crew work is assigned regionally based on TS damage assessment info. ERP has provisions to engage others in damage assessment including helicopters, meter readers, etc. , and have had mixed results due to lack of skills; this option is helpful but not as efficient as qualified troubleshooters. They will bring in additional dispatchers, aim for a ratio of 1 dispatcher to 10 troubleshooters. The State EOC has Incident Control System. Company has a desk there that is staffed by Risk and Emergency Managers. Cities and County EOC, company does not have a person there, they rely on internal Community and Account managers to serve as liaisons to counties and cities. Their OMS is very helpful in an emergency. Connectivity is at a high level. They have implemented a customer call back feature that calls staged restoration customers. The system performs an "all close" and calls customers still in the system as unresolved to clear out bad records and refresh actual work remaining. This practice has saved 1-2 days on restoration. About 75% of non-gold ticket items are removed through this process.

	Declared Emergency Rules During 2003 Negotiations, the parties agreed to create new parameters for working, compensation and employee rest during extended, major restorations efforts. Timely response and employee safety are the foundations for this initiative. The Managing Director Field Operations or higher level management will be responsible for announcing a Declared Emergency. A Declared Emergency occurs when the Company anticipates having the work force on duty more than twenty-four (24) continuous hours. Once announced, local management will inform each employee directly, if they are assigned to work under the terms of the Declared Emergency. The Rules of pay for employees working a Declared Emergency are as found in Article 4 of the Agreement with the following exceptions: 1. Employees shall not be required to work any longer than 24 continuous hours unless the restoration will be completed within 4-6 hours after the Declared Emergency has been announced. For every 24 hour period or major fraction thereof, the employee shall be provided up to eight hours of paid rest at their regular straight-time rate, provides that either: a) the employee returns to work directly after the end of their rest period or b) the employee returns at their regularly scheduled shift time due to the emergency being declared over. In the Case of situation a, the employee will return to work with no change in their pay status from their pre-rest period pay status. In the case of situation b, the employee will be paid at his/her straight-time rate for the rest period, even if the emergency is complete mid-way through the rest period. 2. Once restoration is completed and the employees have completed a rest period, they shall return to the appropriate rate of pay per the agreement. 3. The parties agree to convene a Labor/Management meeting promptly after the completion of the first restoration completed under the terms of this Declared Emergency agreement. The purpose of this meeting will be to review schedules, restoration time frames, safe work practices and any other potential problems or operating practices that may be improved during Declared Emergencies.

9.7 Glossary

A glossary of terms is set out below to familiarize the reader with the acronyms and industry terms used throughout this report.

Abbreviations

ACOS	Automated Call Out System
CL&P	Connecticut Light and Power Company
CSR	Customer Service Representative
CT-based	Connecticut-based
DPUC	Department of Public Utility Control
EEI	Edison Electric Institute
EOC	Emergency Operations Center
ERP	Emergency Response Plan
ERT	Estimated Restore Time
FERC	Federal Energy Regulatory Commission
FSL	Field Supervisor Lines
ICS	Incident Command System
IVR	Interactive Voice Response
MDT	Mobile Data Terminal
NEMAG	New England Mutual Assistance Group
NIMS	National Incident Management System
NU	Northeast Utilities
NUERP	Northeast Utilities Emergency Response Plan
OMS	Outage Management System
SCADA	System Control and Data Acquisition

SDL	Supervisor of Distribution Lines
SOC	System Operations Center
TBD	To Be Determined
UI	The United Illuminating Company
WSI	Weather Service International