Michigan Public Service Commission Staff

Review of July 1995 Storm Related

Distribution Outages

Case U-10908

Operations Section
Electric Division
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Executive Summary

This report is filed in response to the July 31, 1995 Order of the Michigan Public Service Commission in Case U-10908 that directed its Staff to examine the severity of three storms that occurred in July 1995 and the ability of Consumers Power Company and Detroit Edison ability to respond to them. The Commission was specifically interested in learning whether customers were able to notify the utilities of service problems in a timely manner, how Consumers Power and Detroit Edison responded to reports of electrical outages and downed power lines, the safety procedures that were utilized by the utilities to protect the public, and whether additional changes are needed to deal with future storm damage. Finally, the Commission directed Staff to analyze the extent to which measures taken subsequent to a July 1991 storm enhanced the reliability of the utilities transmission and distribution systems and whether further improvements are necessary.

The storms during the July 13-16, 1995 period interrupted service to 282,000 customers of Consumers Power Company and 451,000 customers of Detroit Edison. Restoration for all customers required 7 days. The most significant of the storms, that affected northern Michigan, the eastern areas of Consumers Power's service territory and the entire service territory of Detroit Edison, occurred on Thursday July 13, 1993. Staff estimates that approximately 600,000 of the 733,000 total customers of the two utilities that lost electrical service during the period, lost

service during the initial storm. The subsequent two storms and weather conditions during the period further complicated restoration efforts and the publics ability to endure sustained loss of service. Near record temperatures and high humidity, not only made restoration efforts difficult for the crews restoring service, but added frustration to customers that were out of service for long periods of time.

In response to the Commission Order, Staff reviewed the customer communication and downed wire programs that were used by the utilities during the storm management process. Staff has concluded that with minor exception, the commitments implemented as part of the U-9916 agreements have greatly improved both utilities capabilities relative to those that existed during the July 1991 storm. While some members of the general public appearing at the public hearings expressed frustration with computerized phone systems, the substantially expanded volumes of processed calls provided by the systems greatly increased the amount of storm damage intelligence available to the storm management teams during the early hours of the restoration process. The multiple storms also complicated the utilities ability to provide accurate restoration estimates to certain customers who lost service during the initial storm, in part, because the subsequent storms forced a restatement of customer restoration priority. To address this issue, Staff requests that both companies provide information in their response to this report as to what actions, if any, are required to resolve this issue.

Concerning wire down coverage, approximately 4,000 wire down cases were confirmed during the storm period, an amount that was less than the number that occurred during the July 1991 storm. The Staff review in this case has concluded that the system strengthening efforts that were part of the U-9916 commitments were beneficial in reducing the possibility of downed conductors during severe weather. In addition, the wire down coverage efforts of both utilities was much more effective in the most current storms given the large increase in trained wire down response teams.

Staff believes that the system strengthening efforts initiated by both companies has reversed the declining trend of total system reliability that was identified in the U-9916 record and has improved service to most customers over the course of the U-9916 commitment implementation period. However, Staff is concerned that the trend of improved system reliability demonstrated by Consumers through 1993 may have reached a plateau in 1994. Additional attention by the Company may be required if the trend of system improvement is to continue.

A review of expense and capital expenditures suggests that both Consumers Power Company and Detroit Edison have satisfied or are satisfying the financial commitments made in U-9916. However no formal reconciliation of these commitments has been performed to date. A Staff analysis that benchmarked the

annual distribution system expenditures of Consumers Power and Detroit Edison during the 1992-1994 implementation period against those of 29 other comparable electric utilities shows Detroit Edison spent slightly more than the comparison average on distribution system capital improvements and operation and maintenance expenditures. Annual total expenditures for Consumers, although up significantly over the period that preceded the commitments period,were approximately $16 per customer per year below the benchmark average and nearly $20 per customer per year below those of Detroit Edison for the 1992-1994 period. In addition, Consumers recently froze total system operation and maintenance expenditures at actual 1994 levels for a three year period. Staff believes that a combination of the above factors may jeopardize the system improvement gains realized by Consumers during the U-9916 commitment implementation period.

Although total system reliability of service provided by both companies has improved, a significant number of customers are still receiving inadequate reliability of service. Additional attention needs to be directed towards customers who are experiencing an unacceptably high frequency of outages over a multiple number of years. Within this report, Staff has asked both utilities to provide an estimate of the number of customers on their system that are currently experiencing more than two outages per year and an average total outage duration of more than 200 minutes per year. Secondly, Staff has observed that customers in different locations of the state

appear to tolerate different levels of service reliability. Staff believes that additional information is needed from the companies so that the Commission can make a determination as to what constitutes adequate reliability of service to different types of customers. This report also contains a discussion of possible rate mechanisms for customers who consistently experience frequent and sustained services outages.

In view of the many issues identified in this report, Staff recommends that the Commission consider initiating a consolidated U-9916 and U-10908 proceeding in early 1996. Such a proceeding could be used to formally reconcile and close out Case U-9916 commitments and to explore resolution of a number of new issues raised in this report and the company responses to this report. Given the improvement in system performance and storm response capabilities that have transpired as a result of the implementation of the U-9916 commitments, Staff does not believe that an expedited proceeding is currently necessary. Secondly, most of the information necessary to reconcile the U-9916 commitments will be available in early 1996.

Introduction

On July 13, 1995 a storm of major significance affected parts of Michigan's lower peninsula. The storm, that was characterized by high winds and intense lightning, initially hit the northern third of the lower peninsula shortly after 2:00 pm as it moved in a westerly to easterly direction along a line from Traverse City to Gaylord. As the storm moved east, it veered south and continued through the eastern half of the lower peninsula until it exited the state at about 8:00 pm through western Ontario and northwest Ohio. In its wake, the storm left nearly 600,000 customers of Consumers Power Company (Consumers) and Detroit Edison (Edison) out of service. The most significant damage to the Consumers Power Company system was located in and around Flint, the Tri Cities, and Prudenville. Damage to the Detroit Edison system was more widespread as the storm affected essentially the entire service territory of the company.

On July 15, a second, but somewhat less severe storm hit portions of the central and southeastern portion of the state in the late afternoon as it moved in a southeasterly direction. On July 16, a third storm moved out of northwest Indiana and affected portions of the extreme southern portion of the lower peninsula and southeast Michigan as it moved to northeast. All told, a total of 733,000 customers of Consumers Power Company and Detroit Edison lost electric service during the four day period as a result of the three storms. A total of 282,000 of Consumers

customers were without electrical service for periods of up to 4 days and a total of 451,000 of Edison's customers were without electrical service for periods up to 7 days.

The significance of the weather the week of July 9th, was not limited solely to the occurrence of the three major storms. Temperatures and humidity for the week were consistently at near record levels. Consequently, electrical demands placed on both electrical systems were approaching all time peaks as well. Customers that were without electrical service and utility personnel that worked long periods of time to restore those interrupted customers had to endure nearly unbearable conditions.

On July 31, 1995 the Michigan Public Service Commission, on its own motion, instituted an investigation to study the condition of the utilities transmission and distribution systems before the storms and the ability of the utilities to restore service and to protect the public in the aftermath of catastrophic storms. In the Order for Case U-10908, the Commission scheduled three public hearings to gather input from the public and directed Staff to review and report on the severity of the storms and the companies' ability to respond to them. Following the submission of the Staff report, the companies are to file a written response within 14 days. After reviewing the respective reports, the Commission will determine whether any

additional remedial actions are appropriate This report contains the results of the Staff review as ordered by the Commission.

In the July 31st Order, the Commission expressed interest in learning whether customers were able to notify the utilities of service problems in a timely manner, how Detroit Edison and Consumers responded to reports of electrical outages and downed power lines, the safety procedures that were utilized by the utilities to protect the public, and whether additional changes are needed to limit potential damage future severe weather occurrences.

This report is the second Staff investigation since 1991, that addresses the storm response capability of Michigan's two largest electric utilities. Subsequent to the first report, that was issued in September 1991 in connection with Case U-9916, the Commission approved settlement agreements between the Staff and the utilities that addressed a number of remedial actions for system deficiencies that were exposed during a July 1991 storm. Staff used the most recent July 1995 storms to evaluate a series of commitments that were implemented pursuant to the U-9916 agreements. In addition to addressing the Commission's stated interests, the Staff review also focused on evaluating whether the distributions systems of both utilities are currently providing adequate service to all customers. At the public hearings that were held in conjunction with this Case, a number of members of the general

public expressed strong frustration with the reliability of service that they receive during non storm periods.

Historical Background

The Commission's action in Case U-10908 is the latest in a series of regulatory reviews, studies or formal actions relating to the issue of reliability of service for jurisdictional electric utilities within Michigan. The Commission order in Case U-10908 directed the Staff to examine several questions which relate to commitments for major system improvements by Consumers Power Company and Detroit Edison in a previous storm related case, Case U-9916. A brief review of the recent history of the issue is warranted to place the current issues in context with previous Company, Staff, and Commission actions.

In September of 1989, the Electric Division Staff issued a report entitled, "Quality of Electric Service: An Assessment of the Current Situation and an Evaluation of Possible State Regulatory Actions" (1989 Staff Report) that analyzed the historical distribution system performance of most of the jurisdictional electric utilities in this state. The report was prompted by a growing Staff concern as to the adequacy of the reliability of service provided through the distribution infrastructure of certain Michigan electric utilities. The report was written contemporaneous to a period when both Consumers Power Company and Detroit Edison were emerging from a

long and financially consuming generating station construction program. Consumers was struggling with the financial ramifications presented by the construction, cancellation and subsequent conversion of the Midland Nuclear Project to the Midland Cogeneration Venture. Similarly, Detroit had just completed placing two major generating projects in service, the Belle River Power Plant and the Fermi 2 Nuclear Plant. The basic concern in the 1989 Report Staff was premised on the belief that the demand for financial and human resources during this era of power plant construction severely limited the availability of capital and maintenance expenditures for the transmission and distribution systems. The concern was exacerbated by the fact that the absolute number of customers served by and resultant loads imposed on certain elements of the distribution systems was increasing contemporaneously during the mid and latter parts of the 1980's. Because of these concerns and an observed increase in the number of customer complaints relating to reliability issues, the Staff also initiated a series of quality of service reviews of electric utilities subject to Commission jurisdiction.

The 1989 Staff report identified a significant decline in the reliability of electric service provided by Consumers Power Company through their transmission and distribution system, and concluded that the decline could be attributed in part to rigid cost controls imposed both on and by Consumers during the historical period analyzed. The report findings concerning Detroit Edison, however, did not identify

any statistically significant trends relating to a decline in reliability of service provided on their system.

On March 27, 1991, a severe spring storm hit Michigan that interrupted service to approximately 377,000 customers of Consumers Power Company and 241,000 customers of Detroit Edison. At the time it was the second worst storm to hit the Consumer's system and fourth worst to hit Edison's system, in terms of customers interrupted. On July 7th of that year, a far more severe storm struck the southern third of Michigan's lower peninsula. The fast moving storm, characterized by intense lightning and reported local wind speeds in excess of 80 miles per hour, interrupted service to at least 504,000 customers of Consumers Power Company for periods lasting up to 5 days; and approximately 684,000 customers of Detroit Edison for periods lasting up to eight days. In terms of the impact on reliability of electric service, the July 7, 1991 storm was the worst ever to hit this state.

In response to the storms, the Commission initiated a proceeding in Case U-9916 on July 17, 1991 to review the readiness and capability to respond of Consumers Power Company and the Detroit Edison Company to severe weather occurrences. The Commission directed the Staff to investigate the companies' actions, focusing specifically on: (1) the policies and procedures used to protect the general public from downed and potentially energized wires, (2) the ability of the utilities to

communicate with their customers during emergency periods, and (3) the effect that the utilities' construction and maintenance programs have on customer outages. The Staff was directed to file its investigative report with the Commission within 45 days, and the companies were directed to file a written response 14 days later. As part of the investigative process, the Commission also held five public hearings in areas affected by the July 1991 storm. On November 20, 1991, the Commission issued a second order in Case U-9916 which adopted settlement agreements negotiated between the Staff and each utility relating to necessary corrective actions identified during the course of investigation. A copy of the U-9916 Order and individual settlement agreements is contained in Appendix A of this report.

The settlement agreements embodied specific commitments from each utility that were directed at: (1) improving the response capability during and following severe storms, (2) improving each Company's ability to communicate with customers and public safety agencies during both storm and non-storm periods, and (3) improving the ability of the distribution delivery system to withstand the effects of severe weather and to provide more reliable service during non-storm periods.

Consumer's commitments toward storm response included significant increases in the number of trained corporate public safety personnel for guarding wire down hazards, enhancing the Company's computerized Trouble Analysis System (TAS),

installation of an uninterruptible power supply (UPS) for it's central computer site, improving priority communication capability with local fire and police agencies, and improving the internal communication capability of corporate response personnel.

In the communication area, Consumers committed to increasing it's telephone call capability to 10,000 calls per hour by April 1992 and to 30,000 calls per hour by October 1994. Commitments were also made to provide priority communication channels for public safety agencies, most notably in the form of exclusive telephone lines and a private facsimile network. Various types of public information announcements and education programs were also committed to.

For system strengthening, Consumers committed to doubling tree trimming and removal activities, tripling lightning protection activities, and tripling system rehabilitation activities, all relative to 1991 budget levels. In addition, the Company committed to meeting a reliability performance target of 1.0 for total system frequency of outages and 150 minutes or less per year for total system duration of outages for calendar year 1995; and 0.9 for total system frequency of outages and 125 minutes or less per year for total system duration of outages for calendar year 1996. Concerning capital improvements, Consumers committed to investing $250 - $400 million over a five year period on substation improvements,

system sectionalizing, system communications and information, and generating plant improvements. The reliability performance targets are of particular significance in this case since Consumers' system must perform at a level in 1995 that does not exceed an outage frequency of 1.0, and a total system customer minutes per customer served rate of 150 minutes.

Detroit Edison's commitments addressing storm response included significant increases in the number of trained corporate public safety personnel for guarding wire down hazards, enhancing the Company's computerized Outage Analysis System (OAS), developing a mobilization plan to address all wire-down locations within 24 hours of their reported occurrence, improving priority communication capability with local fire and police agencies, and improving internal communication capability of corporate response personnel.

In the communication area, Detroit Edison committed to the purchase and installation of an automated voice response unit (VRU), centralizing customer communication operations, extending the hours of operation of the Customer Communication Center, increasing customer communication staffing levels, increasing the number of telephone lines available for public contact, and strengthening public information announcements and education programs concerning storm response and wire down.

For system strengthening, Detroit Edison committed to greatly accelerating tree trimming and removal activities, accelerating line and pole top maintenance, adding circuits to relieve heavily loaded areas, installing sectionalizing to limit the number of customers affected when an outage on a circuit occurs, installing both manual and auto-remotely operated switches to speed and assist in restoration during outages, and establishing a 1994 reliability performance target of 0.5-0.6 for total system frequency of outages and 80-100 minutes per year for total system duration of outages. In total, Detroit Edison committed to increase cumulative capital and O&M expense levels for system strengthening by $206 over a three year period through 1994.

The U-9916 commitments were developed to address system deficiencies that related to customer communication, storm response, and system reliability and reinforcement that were observed during the 1991 storm and the following restoration period. In view of the overall magnitude of the problems that were exposed by the 1991 storm, the commitments were designed using a macro approach to enhance the system's ability to withstand severe weather events and the utilities ability to respond effectively when a severe weather event occurred. By focusing on the overall system, implementation of the commitments would affect the greatest number of customers of the combined companies' 3.4 million customers in the shortest time practicable. Consequently, essentially all of the commitments

agreed to between Staff and the Companies focused on system improvements. As an example, improvements relating to customer communication significantly expanded each utility's call handling and computer analysis capability during storm events. Public information and education programs were also broadened during both storm and non-storm periods to alert the public about the dangers of downed wires. With respect to storm response, additional wire down investigators and guards were added and new communication systems developed to enhance communication and coordination of utility response teams and local public safety officials. Finally, improvements in the system reliability area were implemented not only to strengthen the transmission and distribution systems' infrastructure to withstand future storm events, but to drive down the overall system frequency of outages that any average customer may experience; and the average system outage duration, to minimize the length of time that an average customer will be out of service when outages do occur. Staff, in retrospect, believes that such a total system focus was valid and necessary given the scope of infrastructure deficiencies that existed in 1991. The infrastructure in question involved some 4,600 distribution circuits and 80,000 miles of lines.

The commitments addressing system reliability of service improvement established annual system performance targets based on frequency of customer interruption as and average outage duration. In addition, the commitments required the companies

to meet with Staff at least annually to review commitment implementation progress and planned project activities for the current budget year. The commitments established reporting requirements for "poor performing" and "high outage circuits" so that emphasis was not solely placed on total system improvement, but at the circuit level as well for the companies' worst performing circuits. Staff became acutely aware of this problem in the 1991 public hearings held in connection with the U-9916 storm investigation. A large number of speakers at these hearings voiced frustration with repeated service outages during non-storm periods and not the actual response of the company to the storm itself as initially anticipated by Staff. This criticism came in spite of the fact that total system performance indices relating to frequency and duration of outages in some cases appeared acceptable to Staff.

The total system performance indices reported by Detroit Edison in 1990, inclusive of the contribution from major storms, was 0.70 for outage frequency and an average outage duration of 192 minutes. This meant that in 1990, an average Detroit Edison customer experienced 0.70 outages and was out of service for 192 minutes. Because of the comments provided by the general public, Staff determined that the 767 circuit 13.2 kv segment of Detroit Edison's distribution system operated with an average outage frequency of 1.22 and corresponding outage duration of 345 minutes in 1990. Although the Staff recognized that a large

performance variation could exist among the individual 13.2 kv circuits, time did not permit a circuit by circuit ranking to identify the very worst performers. Staff was able, however, to segregate the 1990 13.2 kv system performance data for each of Detroit Edison's six operating divisions and found that, in one area where two of the public hearings were held, outage frequency for the local 13.2 kv system was 1.35 with a corresponding outage duration of 452 minutes. Even within this area a large variation in the level of service provided to individual customers would exist if one considered performance differences of each circuit and differences of services received by customers on any single circuit. What Staff and the Commission had observed at those public hearings was not the criticisms voiced by average customers, but frustrations of individual customers whose reliability of service was far worse than depicted by either total system or 13.2 kv system indices.

The need to monitor and focus on high outage and poor performing circuits was also driven by a second, but related, consideration. Prior to the 1991 storm, Detroit Edison began an internal program to improve service reliability within its service territory. An internal report entitled "Preliminary EMD Best In Class Reliability Plan" had analyzed the Company's 2,417 distribution circuits and found that 1,800 of the 4,000 plus larger sustained outages that occurred in 1991 occurred on either 141 poor performing circuits or 215 high outage circuits. In excess of 40 percent

of the outages on the Detroit Edison system occurred on less than 5 percent of the system's total distribution circuits. By flagging these circuits, Staff believed that public satisfaction towards service reliability would improve along with total system performance. In general, a review of the progress made since 1990 would support such a belief. However, this approach and the commitments within the U-9916 agreement excluded any mechanism to monitor or effect service improvements to the remaining individual customers or customer clusters who continued to regularly receive service at unacceptable levels of reliability. The public hearings associated with this Case U-10908 review clearly pointed out the need to establish remedies for individual customers who are consistently receiving unacceptable levels of service. A large majority of the customers who spoke at the U-10908 public hearings spoke not about utility storm response, but about consistently poor electric service during non-storm periods. This aspect will be discussed in greater detail later in this report.

Overview of Staff Review in Case U-10908

The Commission order initiating this review set forth certain areas for the Staff and utilities to address.

> Specifically, the Commission is interested in learning whether customers were able to notify the utilities of service problems in a timely manner, how Detroit Edison and Consumers responded to

reports of electrical outages and downed power lines, the safety procedures that were utilized by the utilities to protect the public, and whether additional changes are needed to deal with future storm damage.

The Commission will also direct the Commission Staff (Staff) to examine the severity of the storms and the companies' ability to respond to them. Due in large part to the thorough examination conducted in the aftermath of the 1991 storms, the Staff's investigation will not have to proceed from scratch. Rather, the Staff should be able to focus upon the crucial issue of whether the remedial efforts taken subsequent to the 1991 storm actually improved the ability of the utilities to communicate with their customers and to respond to outages and downed power lines. Further, the Staff should analyze the extent to which the measures taken subsequent to the 1991 storms enhance the reliability of the utilities transmission and distribution systems and whether further improvements are necessary.

To comply with this directive, Staff reviewed the general effectiveness of the communication systems and wire down processes that were put in place following the 1991 storm. The most recent storms were the first storms of major significance to affect the companies' systems since the improvements were effected and could serve as a test of the improvements' effectiveness. These areas will be discussed individually in the immediately following sections. Staff also believes that as part of this review process both Consumers Power Company and Detroit Edison should

include information in their responses to this report that discuss the effectiveness of these functional areas and identify any problems that were observed during the 1995 storm management period.

At the public hearings held in conjunction with this proceeding it was apparent to Staff that the majority of public comments related to the reliability of electric service provided during non storm periods and not the response of each utility following the July 13-15 storms. The exception to this observation involved utility restoration priorities, the inability of certain customers to get an accurate estimate of when service must be restored, and a desire from some customers for some form of financial compensation when their electric service is interrupted frequently or for sustained periods of time. These issues will also be addressed by Staff. However, Staff believes the most significant questions in this review relate to the adequacy of system strengthening efforts, whether the respective distribution systems are better able to withstand the effects of severe weather occurrences, and whether day to day service provided during non storm periods is now acceptable for all customers. These two issues receive special emphasis in this report.

Customer Communication

The storm restoration processes of Consumers Power and Detroit Edison are similar in that after a storm occurs, both rely on the customer and local public safety

officials to provide a majority of the initial information necessary to effectively manage storm restoration. The customer is the utility's primary intelligence resource in terms of outage identification, downed wire reporting, and initial system damage assessment. A second source of critical information during the initial hours of storm restoration is fire, police, and other local pubic safety officials. Public safety personnel from local agencies are often the first to arrive on the scene of potentially dangerous situations involving downed wire, damaged utility equipment, or traffic problems created by the loss of power.

Both Consumers Power and Detroit Edison use centralized computer systems as a storm management tool that rely on customer and pubic safety official supplied information as a basic input. Consumer's system, known as the Trouble Analysis System (TAS) and Detroit Edison's system, known as the Outage Analysis System (OAS) are capable of performing a multitude of tasks including tallying the number of customers out of service, tracking wire down reports and locations, identifying the suspected location of circuit fault, identifying the number and location of interrupted medical or public safety sensitive circuits, generating information necessary to update public safety authorities, and predicting restoration times. In the initial hours following a major storm, company management uses information generated by the analysis systems to assess of the potential number of customers out of service, the locations hardest hit, and the size and character of work force

needed to accomplish restoration.

The July 1991 storm exposed several weaknesses in these aspect of the communication processes. The 1991 U-9916 Staff Investigative Report found that:

> The Staff review of the communication systems and procedures used during the storm indicate that the communication systems were inadequate to handle the tremendous customer demands placed on them in the days following the July 7th storm. The utilities inability to handle large volumes of customer contacts not only angered customers, but limited the utilities' ability to accurately assess on a timely basis the actual number of customers out of service and the number of downed wire situations that were present. The system used to communicate with local public safety personnel was also severely overloaded, hindering the flow of communication to and from local fire and law enforcement agencies who were actively engaged in guarding downed utility wires for extended periods of time. Given the clear limitations of the current systems in relation to the number of customers interrupted by the July 7th storm, significant improvements in the ability of the utilities to process large number of customer contacts during emergency periods are needed. Dramatic improvements in the timely flow of information to and from local fire and law enforcement agencies are also necessary, recognizing their critical role in the protection of public health and safety.

In the resulting U-9916 settlements both companies agreed to significantly upgrade their communication processes. Consumers committed to increasing its telephone

call capability to 10,000 calls per hour by April 1992 and to 30,000 calls per hour by October 1994. Commitments were also made to provide priority communication channels for public safety agencies, most notably in the form of exclusive telephone lines and a private facsimile network. Various types of public information announcements and education programs were also committed to. Detroit Edison committed to the purchase and installation of an automated voice response unit (VRU), centralizing customer communication operations, extending the hours of operation of the Customer Communication Center, increasing customer communication staffing levels, increasing the number of telephone lines available for public contact, and strengthening public information announcements and education programs concerning storm response and wire down.

Consumer's system incurred 282,000 outages over July 13-16, 1995 storm period. Approximately 56 percent of the customers interrupted were restored by July 14th and 93 percent were restored by the July 16th. Consumers had a minor problem with its Voice Response Unit (VRU) that began at about 17:00 hrs on July 13. For a 3 hour period, Consumers processed 6,800 calls per hour of an estimated 8,500 calls per hour attempted. Consumers system currently does not have the capacity to handle 30,000 per hour as was prescribed in the U-9916 commitment. The current capacity is 10,000 - 15,000 calls per hour. Another $2,000,000 in capital investment and $1,500,000 in annual operations and maintenance expense would

be needed to upgrade to the system to a 30,000 call per hour capacity. Consumers does not believe the additional expenses would be cost justified given their geographic diversity of their service territory and the resulting unlikely probability that a capacity of this magnitude would be needed. Consumers processed a total 109,370 storm related calls for the 282,000 customers affected in the July 13-16, 1995 storm as contrasted to 94,704 outage related calls for the 505,100 customers affected in the July 7, 1991 storm. Consumers also experienced some difficulty in providing timely and accurate restoration estimates to their customers.

During the restoration period that followed the July 13-16 storms, Consumers issued 13 media restoration progress updates to 1,398 outlets and 226 media interviews. Wire down warning notifications were broadcast at the rate 3 per hour on 29 radio stations (1,007 paid announcements).

In summary, the communications area for Consumers in this storm worked well as contrasted to the problems that existed during the 1991 storm restoration effort. However, the overall number of customers and resultant demands placed on the communication system were less than the demands placed on the Edison communication system given that the severest part of the storms missed the more populated areas of Consumers service territory.

Detroit Edison's communication system with minor exception, worked effectively during the restoration period that followed the July 13-16, 1995 storms. During the initial three hour period of the July 13th storm, the VRU was limited by a "trunk busy" signal. Following a modification by Edison personnel, the VRU operated at capacity and call volumes exceeded 40, 000 calls per hour for the 20:00 to 22:00 hr period. In the initial 7 hours of the storm period, the VRU processed approximately 140,000 calls. Daily call volumes for the first four days of the storm period, were 136,200 on July 13th, 103,200 on July 14th, 52,200 on July 15th, and 33,000 on July 16. In contrast to the above values, Edison's communication that was in place for the July 7, 1991 storm had a peak capacity of about 2,600 calls per hour.

Edison's ability to process large volume of calls and enhanced Outage Analysis System (OAS) allowed Edison to develop early estimates of the storm's impact on their system. The initial July 13 storm appeared to require a 3 day storm restoration effort through July 15th, before the second storms hit. Some customers who were still out of service on July 15th were initially informed they would be restored in 72 hours. The second storm forced Edison to reshuffle their restoration process and priorities. Restoration of the remaining outages that occurred on July 13th was estimated to have been set back an additional 24 hours for each of the July 15th and July 16th storms. Following each storm Edison was forced to go

back to the OAS to reset restoration priorities by critical customer segment and largest number of customers affected. The resulting customer bumping could have caused some customers to receive different and lengthening estimates of restoration time. A number of comments on this issue were voiced customers at the public hearings in this proceeding. The effect of multiple major storms is an issue that was unique to this storm period and created problems during the restoration effort. The July 7, 1991 for instance was a single very severe storm. Weather following the July 7, 1991 storm was ideal throughout the entire 8 day restoration period. In view of the problems created by the potential of multiple major storms, Staff would request that the Companies identify what modifications if any they are contemplating within their storm management processes to accommodate such an occurrence. Two areas that the Staff is most desirous in receiving comment on relates to messages to the general public that predict initial restoration time estimates. A second issue involves whether adjustments are needed to the presently used prioritization process that would afford customers of this type a higher restoration priority following succeeding storms.

Downed Wire Procedures and Response

Following a major storm, the immediate concern of most customers, at least those not directly affected by a downed wire, is when their service is restored. Yet the more immediate concern to electric utilities is the identification and resolution of

potentially dangerous downed wires. The utilities in situations such as these, have procedures in place to address the resolution of downed wires. These procedures vary somewhat between companies depending on factors such as size of service territory and number of employees. Consumers 1,475,000 electric customers reside in a 27,000 square mile service territory that is served through 49,000 miles of distribution circuits. Detroit Edison's 1,927,000 customers reside in a 7,600 square mile service territory that is served by 27,000 miles of distribution circuits. Consumers has about twice the circuit length, but only twenty percent of the customer density as compared to Detroit Edison.

Although their system characteristics and policies differ somewhat, they also share common objectives and practices. Each utility assigns a downed wire top priority over the resolution of other issues in a storm situation. Each utility believes that safety to the general public and their own employees is the primary consideration during emergency periods. All reports of wire down are treated as energized and dangerous until confirmed information is received to the contrary. In addition the utilities assume that a public report of a wire down involves one of their wires even though it may in reality involve telephone or cable television wires or wire belonging to another electric utility. All the utilities rely very significantly on local public safety officials such as fire and law enforcement agencies to assist them in identifying and covering downed wire occurrences.

Since the July 1991 storm, a number of improvements have been made in the policies and procedures of the utilities. Extensive tree trimming has reduced the instances of wire downs due to tree limbs. Increasing the number of utility personnel trained as wire down guards has improved the response time in relieving local public safety personnel from guarding fallen wires. And there was a substantial increase in public safety announcements aired on the radio warning the public of the hazards associated with fallen wires.

As a result of the July 13-16, 1995 storms, Detroit Edison experienced 2,249 actual wire down cases. During the same storm, Consumers experienced 2,611 reported cases of downed wire, with about 2/3 being confirmed as actual Consumers conductors. For both Consumers and Detroit Edison, most of the wire downs were caused by trees with over half the cases involving material that came from outside the normal trimming clearances. Detroit Edison's internal engineering audit of the July 13-16 storms revealed that between 60 to 80 percent of the wire down in the most recent storms was caused by tree contact. Lightning is was the second most significant cause of wire down. Less than a third of the tree related cases may have been preventable if full 10 foot clearance was available at the time of the occurrence.

Both Detroit Edison and Consumers rely extensively on fire and law enforcement

personnel for assistance in covering down wires. While they have a policy of trying to relieve non-company personnel within four hours, they will continue to respond to new cases if the number of unresolved wire down is greater than company personnel available to respond. In the severest of storm situations then, relief for fire and law enforcement coverage may not be available for an extended period of time. At the onset of the 1991 storm, Edison had 595 employees company wide that were trained in wire down procedures. One of the significant improvements since 1991 is that, during the 1995 storm, Edison had 2400 people trained to guard wire downs, and Consumers had over 1000. This greatly improved the response time in relieving local public safety personnel, and reduced the instances of marking wire downs with warning tape and leaving them unguarded. For Detroit Edison, this meant that 82% of the public safety personnel were relieved within the 4 hour goal, and that 91% of all downed wire was covered by utility wire guard personnel within 30 hours. The remainder would have involved remote location. Consumers response in a more urban situation (Flint) was 78% coverage within 4 hours. It should also be noted that wire guard relief times have improved for non-storm situations as well, with Consumers reporting 91% coverage within 90 minutes for 1995 prior to the July storm.

Another noted improvement was the increased use of paid radio announcements warning the public of the dangers associated with downed wires. Consumers aired

3 wire down advertisements per hour on 29 radio stations throughout the 1995 storm, for a total of 1007 paid advertisements. Detroit Edison also increased their use of public safety announcement over the radio. Regrettably, there was still one fatality from a public contact with a downed Detroit Edison wire. Public education programs and announcements are a critical tool in alerting the public of the potential dangers from downed wire. Given the sheer magnitude of the logistics involved in removing wire down occurrences following major storms, no utility can guarantee that a public contact with a downed line will not occur.

System Strengthening - Consumers Power

To assess whether the distribution infrastructures of both companies have materially improved as a result of the U-9916 commitments, Staff reviewed a number of performance indices that measure total system performance and implicit system condition. Staff's conclusions in this area are also influenced to some degree by observations gathered during periodic field visits. In addressing this issue Staff compiled annual system performance indices relating to the outage frequency, average outage duration, number of outage occurrences, increases or decreases in the number of poor performing circuits, and the number of catastrophic and major storms that have occurred within each utility system since the implementation of the system strengthening commitments began. Comparing changes in these indices in any two consecutive years, however, is not necessarily a gauge for change in

long term system strength and performance, since these indices used are significantly affected by weather variations in any given year. In any particular year performance of a given system can appear relatively good or relatively poor depending on the severity of weather that occurred in that year. Only by comparing the longer term trends of these indices can a subjective determination of system improvement or deterioration be made.

The Case U-9916 agreements establish performance targets for both companies that utilized outage frequency and outage duration normalized for severe weather occurrences. Measurable increases in the trend of system outage frequency and duration were used by Staff in both the 1989 Electric Division Report and the U-9916 investigation to establish that performance and material condition of the distribution systems had significantly deteriorated prior to 1991. Consumers Power Company's U-9916 commitment requires the Company to achieve an average frequency of 1.0 outages per customer per year and average outage duration of 150 minutes in 1995, and 0.9 outages per customer per year and average outage duration of 125 minutes in 1996. Consumer's frequency and duration indices are calculated using a "customer" method that tracks the number of customer interruption occurrences, cumulative minutes of customer interruption, and the total customer served in any particular year. System outage frequency for Consumers is calculated by dividing the number of total customer interruptions by total

customers served. System outage duration is similarly calculated by dividing the cumulative customer minutes of interruption by total customers served. By agreement, the calculation of these indices in 1995 and 1996 was to exclude the impacts of catastrophic storms.

Figure 1 depicts the historical performance indices inclusive of the effects of major and catastrophic storms for Consumers Power Company since 1989. This is an important qualification since Staff believes that outage data, for analytical purposes, should not be normalized for contributions of abnormally severe weather. From a customer's perspective, they care very little if they are frequently out of service due to a severe storm or some non-storm related cause. Secondly, a utility with a substandard distribution infrastructure is indirectly able to mask the system condition by normalizing severe weather contributions when calculating these indices. Major or catastrophic storms are usually defined by the number of customers they affect or the length of time the restoration process takes. For a given set of weather conditions, a well maintained distribution system is better able to withstand the effects of severe weather with less overall service disruption. Correspondingly, a poorly maintained system will experience a greater level of disruption for the same magnitude of storm. By removing the contributions from major storms, poorly maintained systems appear statistically better than they are given the relative likelihood that they are more susceptible to incur a major

disruption due to the material condition of the system.

The 1989 Staff Report identified a significant increase in the trend of system frequency of interruption and outage minutes per customer served that began in 1982 for Consumers Power Company. Historical performance data for both companies for this time frame is contained in Appendix B of this report. Prior to 1982, annual system frequency of interruptions were below 1.0 and average outage minutes per customer served below 150 minutes, except in years when a major storm occurred. After 1982, the trend of system performance continued to deteriorate until 1989 when system frequency of interruption climbed to 1.59. Average outage minutes of interruption per customer served, inclusive of major storms, in 1989 was also the third highest for the 16 year historical period reviewed. However, 1989 was a non-storm year which highlighted the fact that non-storm average outage minutes of interruption per customer served had increased to the point that it was only exceeded in three previous years when major weather disruptions had occurred.

For Consumers Power Company, implementation of the system strengthening commitments from Case U-9916 did not begin in earnest until 1992. Figure 1 shows that system performance for Consumers bottomed out in 1991. Staff believes this was due in part to the magnitude of the July 7, 1991 storm and the

fact that implementation of the U-9916 commitments had not yet begun. Thereafter, system performance has gradually improved to a point where average system outage frequency, inclusive of major storms, improved to the 1.36 to 1.40 range exhibited for 1993 and 1994. Similarly, average outage minutes per customer served improved to the 216 to 219 minute range.

Figure 1. Consumers Power Historical Performance Indices

Year	Total Customer Interruptions	Outage Frequency	Outage Minutes per Customer	Millions of Customer Minutes Interrupted
YTD 6/95	773,287	0.50	60	93.4
1994	2,184,000	1.41	219	380.7
1993	1,995,000	1.36	216	327.2
1992	2,334,000	1.56	580	868.9
1991	3,208,000	2.16	890	1,319.2
1990	2,291,000	1.57	277	405.8
1989	2,286,000	1.59	358	518.5

One factor to consider in evaluating the effectiveness of the U-9916 commitments in improving reliability of service that is not aptly demonstrated by these indices is the degree of effort that was necessary to arrest the historical trend of declining

system performance that was gaining momentum in the 1989-1991 time period. In the U-9916 discussions, Consumers Power Company, Detroit Edison, and the Staff realized that substantial effort would be needed to stabilize the trend of deteriorating system performance, let alone effect improvement. Given the size of the systems in question and scope of necessary work activities that had accumulated in prior years it was imperative that any program designed to reverse this trend and measurably improve system performance would require an accelerated program that would be sustained over the long term.

Staff believes that Consumers Power has reversed the trend of deterioration that began in the early 1980's and realized improved system performance since the initiation of the U-9916 commitments. However, the rate of system improvement is not as fast as Staff believes necessary and appears to have reached a plateau in the two most recent years. This concern has been regularly voiced to Consumers in recent U-9916 meetings and Staff rate case presentations. It appears that the general trend of improvement in system performance necessary to achieve the 1995 performance target leveled off in 1994. While system performance, as measured by frequency of interruption and customer minutes of interruption per customer served, improved gradually from year to year through 1993, the frequency of interruption increased from 1.28 in 1993 to 1.32 in 1994; while the total minutes of customer outage per customer served increased from 209 in 1993 to 222 in 1994. This

apparent reversal is of particular concern when recognizing Consumers' commitment to meet a performance target of 1.0 or less for system outage frequency and 150 minutes of customer outages per customer served in 1995. While some of the observed increase may be attributable to abnormal weather conditions or refinements in data compilation and analysis techniques, it is clear to the Staff that Consumers will need substantially improved performance in 1995 if their target commitments are to be achieved.

Staff believes one factor affecting slow rate of system improvement is the level of operating and maintenance expense dollars and overall level of capital dollars directed at the distribution system. Staff's benchmark comparison of Consumer's distribution operation and maintenance expense levels and total cash expenditures which include capital expenditures as well, to those of 30 other comparable utilities demonstrates that Consumers has traditionally spent less than other comparable utilities even during the U-9916 commitment implementation period. Appendix C of this report contains the Staff's annual benchmark analysis for the 31 comparable utilities for the 1990-1994 time frame and a three year average comparison of the same utilities that would correspond to the initial three years of U-9916 commitment implementation period. The three year average comparisons show that, during 1992-1994 commitment implementation period, Consumers spent an average of $58.57 per customer per year for distribution system O&M expense and

an average of $158.78 per customer per year on distribution system O & M and distribution system capital plant additions. The annual average of the 31 utility sample group for the same period was $68.36 per customer per year for distribution system O&M and $174.86 per customer per year for distribution system O & M and distribution system plant additions. Even though Consumers spending levels are up significantly from pre-U-9916 commitment levels, the Company was still spending at a rate of a $16 less per customer per year on distribution improvements than the average of other comparable utilities.

The benchmark analysis does not reflect the fact that Consumers recently froze future total company operations and maintenance expenses at 1994 actual levels for a three year period. Aside from the fact that future distribution expenditures will not be adjusted to reflect inflationary pressures, such a total company freeze means that operation and maintenance expense demands within other functional areas of the Company, such as nuclear or fossil production, could result in a decrease of actual expenditures directed at distribution system improvement.

Another consideration that supports the Staff conclusion that service improvement for Consumer's customers has leveled off is an increase in the number of poor performing circuits in 1994 as reported by the Company in their U-9916 and U-9346 quarterly increased significantly. While this index excludes the effect of

major storms and scheduled interruptions, the number of circuits defined as poor performing increased from a range of 58 to 79 for the 1990 to 1993 time frame to 146 in 1994. Over ten percent of Consumer's customers were served off these circuits in 1994.

A final consideration that has long troubled Staff, is that Consumer's line clearance program utilizes a 7 to 8 year cycle as compared to a 4 year cycle used by Detroit Edison. Staff experience shows in areas where a ten foot clearance standard is used, most trees will grow back into conductor locations in a period much shorter than 8 years. As a result, Staff continues belief that Consumers has never eliminated the tree trimming backlog that accumulated in the years prior to Case U-9916. Consumers, in its response to this report, should comment on the above concerns.

System Strengthening - Detroit Edison

Detroit Edison's reliability performance targets are also based on outage frequency and outage duration during an average storm year in recognition that catastrophic storms can distort long term system performance. However the Edison targets are calculated using an "MVA" method that tracks the cumulative annual MVA of load interrupted, cumulative annual MVA - minutes of load interrupted, and the total MVA of load served annually. The MVA method weights interruptions by the size

of load interrupted. Edison believes that the MVA method is more appropriate for its system given the large percentage of commercial and industrial customers in its service territory. Edison committed to achieving a system outage frequency of 0.5 to 0.6 in 1994. System outage frequency using the MVA method is calculated by dividing the total MVA load interrupted in a year by the total MVA served. Edison also committed to achieve a system outage duration of 80 to 100 minutes per year in 1994. Outage duration using the MVA method is calculated by dividing cumulative MVA - minutes of load interrupted by total MVA of load served. Since 1993 Detroit Edison has also calculated system outage frequency and outage duration on a customer basis. The two methodologies yield distinctly different results, therefore a direct comparison of performance between the companies using the different indices is not directly practicable.

In the Staff U-9916 storm report, more focus was placed on reviewing Detroit Edison's historical performance because of the vocal nature of public comments concerning quality of service at the public hearings in that docket, and the fact that Staff was unable to verify any significant trend of decline in performance in the 1989 Staff Report. As was previously discussed, Staff determined that much of the public frustration expressed at the 1991 public hearings was driven by unacceptable outage frequency and durations on Edison's 13.2 kv system in certain regional locations. The Staff 1991 Investigative Report concluded that;

> The Staff review of the level of reliability of distribution service currently provided by Consumers Power indicates that the trend in reliability deterioration first addressed by Staff in 1989 appears to have stabilized although it still remains unacceptably high. The Staff review of similar performance data for Detroit Edison demonstrates that the reliability of service provided by Edison's 13.2 kv primary voltage system, has declined significantly in recent years. Customers served at this voltage level in 1990 were interrupted on average 1.22 times for a total duration of 345 minutes. By Division, for the 13.2 kv system, Oakland Division exhibited the poorest reliability with customers experiencing, on average, 1.35 outages in 1990 for a total duration of 452 minutes. Ann Arbor Division demonstrated the second poorest performance with customers experiencing on average 1.32 outages in 1990 with a total duration of 407 minutes.

By comparison, total system frequency of outage and outage duration in 1990 for Detroit Edison was .70 and 192 minutes inclusive of the effects of three major storms that had occurred that year.

Figure 2 depicts recent total system data inclusive of major storms for Detroit Edison for the period from 1989 through year-to-date August 1995. The August 1995 year to date data includes the contributions of the July 13-15 storms. System frequency and outage duration data using the customer method is also shown for the 1992 through 1994 period. The data demonstrates a measurable decline in total

system outage frequency and outage duration following the July 1991 storm and subsequent implementation of the U-9916 system strengthening commitments. In 1994, Detroit Edison demonstrated a system outage frequency of 0.47 and average outage duration of 68 minutes which is below its 1994 performance target of 0.5-0.6 for outage frequency and 80 - 100 minutes for outage duration.

Figure 2. Detroit Edison Total System Performance Indices

Year	Sustained Interruptions	Frequency	Duration	Restoration
YTD 8/95	NA	.45	210	470
1994	2,958	.47 *.65*	68 *106*	146
1993	2,403	.36 *.53*	58 *88*	161
1992	2,825	.43 *.64*	83 *137*	195
1991	4,083	.84	520	622
1990	4,018	.70	192	272
1989	3,600	.61	113	185

Staff also reviewed recent performance data for Detroit Edison's 13.2 kv system to determine if the observed improvement in total system performance was also occurring on the 13.2 kv distribution system that generated many customer complaints in the 1991 hearings. Figure 3 summarizes the performance data for the 13.2 kv system. For the 13.2 kv distribution system, the number of sustained

interruptions, frequency of interruption, and outage duration have fallen consistently and significantly from the levels first observed by Staff for 1990 in the U-9916 Staff Investigative Report. Staff attributes this improvement to a number of actions including an aggressive capital effort by Edison to reduce the MVA per instance of interruption. This was accomplished by reducing maximum circuit loadings to below 8 MVA and by the installation of remote circuit sectionalizing and restoration equipment that both limits the amount of MVA interrupted during an outage occurrence and speeds restoration after an outage occurs.

Figure 3. Detroit Edison 13.2 kv System Performance Indices

Year	Sustained Interruptions	Frequency	Duration	Restoration
1994	2,303	.29	41	139
1993	1,925	.52	90	175
1992	2,177	.77	150	194
1991	2,941	1.36	931	683
1990	2,825	1.13	320	282
1989	2,539	1.04	208	200
1988	2,512	1.03	193	187

A number of other measures besides system frequency of outages and outage

duration also point to positive progress in Detroit Edison's system strengthening efforts. System losses have been reduced from 6.6 percent in 1990 to 5.8 percent in 1994. The number of poor performing circuits have also been reduced from 157 and 185 in 1990 and 1991, to 47 in 1994. Further, the number of customers interrupted more than two times a year has been reduced from 14.1 percent of the customer base in 1991 to 7 percent in 1994.

As part of the system strengthening effort, Detroit Edison has also implemented a relatively aggressive line clearance strategy that utilizes, on average, a four year trimming cycle. As part of its system strengthening program, Edison has already completed a first line clearing cycle and is currently engaged in a second cycle. To maintain a four year cycle, the Company must on average trim approximately 800,000 trees per year on its system.

From the above observations, Staff believes that the system strengthening measures implemented by Edison both prior to and subsequent to Case U-9916 have measurably improved total system performance and the systems ability to withstand the effects of severe future weather occurrences.

While Detroit Edison has driven its total system towards measurable improvement, Staff identified certain issues that could affect the momentum generated in recent

years. First, total dollars of operation and maintenance expense and total cash directed at the distribution system appear to be drifting down in 1994 and 1995 in terms of dollars per customer expended. This comes at a time when expenditures related to new customer connections are increasing given recent near term growth in Edison's service territory. The addition of new customers, when coupled with the increased loads imposed by existing customers during the summer of 1995, must be adequately addressed if overall system strengthening momentum is to be maintained.

Appendix C of this report contains the Staff's annual benchmark analysis for the 31 comparable utilities for the 1990-1994 time frame and a three year average comparison of the same utilities that would correspond to the three years of Edison's U-9916 commitment implementation period. The three year average comparisons show that, during 1992-1994 commitment implementation period, Edison spent an average of $69.75 per customer per year for distribution system O&M expense and an average of $178.22 per customer per year on distribution system O & M and plant capital additions. The annual average of the 31 utility sample group for the same period was $68.36 per customer per year for distribution system O&M and $174.86 per customer per year for distribution system O & M and plant capital additions. In comparison to expenditure levels for Consumers Power Company, Edison spent nearly $11 more per customer per year for

distribution system O&M and nearly $20 more per customer per year on total distribution improvements during the three year U-9916 implementation period.

Concerning line clearance expenditures it appears that line clearing expenditures have fallen from a high of $38.3 and $34.6 million in 1992 and 1993 to $27.1 million in 1994. Some of this reduction can be attributed to the fact that higher values were expended during the early years of the U-9916 commitment period. However, through this period Edison was also predicting an increase in productivity in line clearance that would raise the rate of trees touched to approximately 1.2 trees per man-hour at the start of the Company's second trimming cycle. Actual 1994 productivity fell short of this goal when reported productivity was 0.90 trees per hour. The combined effect of lower dollars expended and productivity realized means that Detroit Edison fell short of their 800,000 tree per year trimming target.

The majority of complaints voiced by customers in the two public hearings held in Detroit Edison's service territory in this case related to dissatisfaction with day to day service reliability. As previously pointed out, the number of customers interrupted more than twice a year on Edison's system has been cut in half since 1991. Yet, approximately 7 percent of Detroit Edison's two million customers had their service interrupted more than twice in 1994. In addition, nearly 45 percent of the 2,958 sustained cases of interruption in 1994 involving more than 100 kVA

of load occurred on 8.7 percent of Edison's 2,528 distribution circuits. Similarly, Detroit Edison's 47 identified poor performing circuits in 1994, as defined in the U-9916 agreement, were responsible for nearly 20 percent of the total MVA-minutes interrupted on the entire Edison system. Many of the customers who expressed dissatisfaction at the public hearings in this docket may have been served from these circuits. Staff believes that the criticisms of customers experiencing multiple interruptions in multiple years are valid. While it may be impossible to eliminate multiple interruptions in any given year, a concerted effort should be put forth by Edison to reduce the number of customers experiencing multiple outages in consecutive years. Staff believes that such an effort should be made by Consumers Power Company as well. The efforts undertaken should be incremental in nature and should not be effected by reducing other established total system improvement efforts.

An emerging issue that applies to both companies, involves an increase in public dig-ins. Some people who spoke at the public hearings suggested that one solution to outages from overhead distribution was to replace overhead conductors with underground circuits. Aside from the rate implications involved in removing and replacing overhead circuits with underground equipment, such an undertaking would be very disruptive to local property owners and communities in general. Michigan currently has a mandatory underground requirement for new distribution

systems in new platted subdivisions in the lower peninsula that has been in effect since 1970. Such a policy is beneficial, since it allows a gradual phase in of underground facilities. However, as the number of underground facilities increase, so do the instances of contractor dig-ins. Nearly half of all failures associated with underground facilities appear to be caused by unnecessary dig-ins despite the existence of the Miss Dig Program underground facilities location program. In some instances, contractors are more willing to take the risk of incurring Miss Dig penalties than to hand dig in staked locations as is required by statute. Such a contractor strategy, when utilized, ignores the financial hardship and general inconvenience imposed on other customers when a non-compliance dig-in occurs. Staff would request that the Companies provide information relative to this issue in their responses to this report.

Individual Customer Service Reliability

Much of the previous discussion relative to system strengthening and reliability of service viewed the customer as a composite average of the respective total customer bases of both companies. Few, if any, of the frustrated customers that appeared at either proceeding's public hearings were probably service in terms of the reliability of service they received. This raises the question of whether electric service within Consumer's and Edison's service territory is adequate for all customers. From the previous discussions, Staff believes that electric service could be categorized as

improved from that which existed in 1991. Yet it is clear that an unacceptably large percentage of customers within both utilities' service territories are currently receiving inadequate reliability of service. One issue that the Staff, companies, and Commission need to address is how service can be improved to individual customers or customer clusters who are receiving inadequate service, while at the same time maintaining or accelerating total system improvement measures.

In the U-9916 proceeding, Staff believed that individual customer issues, for the most part, could best be handled by addressing system problems, given the large number of customers who appeared dissatisfied with their service. Although service reliability has improved since the U-9916 commitments were initiated, a far too large number of customers are still receiving poor service. The U-9916 commitments included a requirement that the companies periodically report and discuss progress on poor performing circuit issues with Staff, developed on the belief that improving individually identified poor performing circuits would assist the parties in reducing individual customer problems. As previously discussed, Detroit Edison has made significant progress in reducing its overall level of poor performing circuits. Consumers Power was able to stabilize system decline and generate measurable improvement until 1994 when the number of poor performing circuits on their system increased significantly. Another twist to this issue arose in the U-10908 public hearings that involves small groups of customers receiving

locally inadequate service on circuits that are statistically considered to be performing adequately. Staff believes that many of the customers who spoke at the Waterford Township public hearing in this proceeding were customers of this type.

From information filed pursuant to the Case U-9916 agreements, Staff was able to roughly estimate the number of customers on both companies' systems who are currently receiving poor service. The Case U-9916 commitments relating to the identification and reporting of poor performing circuits for both Companies use significantly different criteria to define what a poor performing circuit is. Consumers defines poor performing circuits as "circuits that have an average outage duration greater than 500 minutes per year or an average frequency of interruption greater than 4" using the customer method of calculation. Detroit Edison's U-9916 agreement defines poor performing circuits as "those with a frequency of interruption equal to or greater than 1.5, an average outage duration equal to or greater than 180 minutes, and four or more outages (including partial and total circuit outages)" using an MVA method of computation. The different definitions and different methods of calculation make it difficult for Staff to perform any quantitative determination of the relative number of customers receiving service at different levels of reliability on each system. For instance, Consumer's annual reported totals for poor performing circuits ranged from a low of 58 circuits in 1993 to a high of 146 circuits in 1994, out of a total of some 1,664 distribution

circuits. Customers served from these circuits ranged from 59,800 in 1993 to 163,700 in 1994, out of a total of about 1.55 million customers. Lowering the definition to something more representative of inadequate service raises the total significantly. A Staff analysis of Consumer's circuits that have an outage frequency of 2.0 or greater and 200 minutes or greater of minutes of outage per customer served in 1993 raises the circuit total to 248. This new circuit grouping served approximately 290,000 customers in 1993.

Another problem involves identifying the number of customers who receive inadequate service from circuits that are considered statistically adequate. In response to the customer concerns raised at the Waterford Township public hearing in this proceeding, Detroit Edison performed an analysis to identify customers who have experienced two or more outages on their system for each of the last three years. The analysis identified between 32,000 and 40,000 specific customers who met such criteria. Many of these customers were served from circuits that perform acceptably by traditional statistical definitions. In addition, Edison was unable to identify precisely which customers met this criteria because some customers are fed off of three phase circuits and their current utility information system does not identify what specific phase of the circuit each individual customer is served from. The number of actual customers affected is usually lower than the number calculated. Discussions with Consumers Power leads Staff to believe that

modifications to their analytical systems would also be necessary to address the above problem.

Most of the early Staff reliability analyses in the 1989 Report and U-9916 proceedings focused on outage duration as the main driver for customer satisfaction. Over time, Staff now believes that frequency of outage occurrence is the more important satisfaction driver for most customers. But the issue remains: What frequency of occurrence and what outage duration should be considered acceptable, and is a uniform definition acceptable to all customers? Staff believes that the "500 minutes per year duration or frequency of outage equal or greater than 4" used by Consumers as a definition for a poor performing circuit is clearly too high to be used as a definition for acceptable service. A more proper definition for minimum service adequacy may be a frequency of two and an outage duration of 200 minutes or less for each customer. However, this belief is based on general impressions that Staff developed as a result of public comment at the hearings in both storm proceedings and not any statistically valid customer survey. Secondly, Staff does not believe that all customers desire or require the same level of service, particularly if the customer's rate reflects the cost of the level of service provided. It appears that many rural customers, including those in Consumer's service territory, tolerate higher outage frequency and outage durations than customers in heavily populated areas such as the Grand Rapids area of Consumers service

territory or Oakland county within Detroit Edison's service territory. Customer survey data and focus group results from both utilities seem to support this observation. Staff would like to address the issue of the ranges of service reliability that would be considered acceptable by customers when their rates accurately reflect the cost of providing this service. Staff would also like to develop a more accurate estimate of the number of customers who currently receive less than adequate reliability of service. Staff believes that each company, in response to this report, should provide an estimate of the number of customers on its system who experienced more than two outages and a total outage duration greater than 200 minutes in 1994. The companies should comment on the methods used to identify this customer total, including whether the methods used can accurately identify specific customers within this group. The companies should also provide comment on what their customer surveys suggest are an appropriate definition for adequate service reliability.

Rate Mechanisms for Addressing Service Interruption Problems

A residential utility customer, upon suffering an electric service interruption, is subject to conditions and circumstances which may produce undesired economic consequences. If the service interruption is of short duration, the customer may suffer some level of personal inconvenience. When interruptions occur frequently or repetitively from year to year personal inconvenience and frustration increases

further. If the service interruption persists, at some point the customer may suffer more than personal inconvenience. The customer may be forced to vacate his premises, replace perishable food supplies, repair flooded basement damage, or otherwise incur undesired economic hardships.

In reality, it is impossible for the utility service provider to guarantee uninterrupted service for all customers within reasonable cost limits. Likewise, it is impractical for the customer to expect such a guarantee at reasonable prices. The customer does have some alternatives that may reduce the harmful economic effects. For certain customers, their economic loss might be reduced by their foresight in purchasing homeowner's insurance policies. Other customers may have decided to install emergency power generators or other power supply alternatives. In these instances, the customer is insuring against the loss of the utility service—in lieu of the utility insuring or guaranteeing its service to all customers.

While a utility cannot guarantee perfect uninterrupted service to all customers, it can strive to minimize sustained periods of multiple interruptions and outages of long duration that occur during normal weather conditions, even while minimizing costs. The utility should expect to be held to certain levels or standards of service reliability. In the past, utilities have argued that they are providing a service in "standing ready to provide service at any moment." When they cannot provide

service as requested, the customer suffers to the extent he has paid in anticipation of the "readiness to serve" and receives no service. This failure may lead to the consequences previously discussed.

The question of the standard of reliability that should be provided by the utility given the authorized prices for its service is discussed in greater detail elsewhere in this report. For the purpose of this discussion it will be assumed that "quality-reliability standards" have been established. The question to be addressed is what penalty the utility should receive when service is below these standards.

Penalty Invoked by Substandard Service

A penalty for substandard service may be structured such that the customer is reimbursed for harm, inconvenience or both. Direct economic harm is probably more easily established in value than is inconvenience. Inconvenience is, to some degree, psychologically defined. It may rest on a less physically quantifiable factual foundation and be less susceptible to valuation on an empirical basis. For simplicity, the general term—economic deprivation—will be used to incorporate both the harm and inconvenience concepts.

A penalty for substandard service might be set equal to economic deprivation suffered by a customer. However, as previously discussed, the customer does not

pay for (nor should not expect) perfectly reliable service. If nothing else, some inconvenience should be anticipated by customers from acts of nature. Therefore the penalty for substandard service might be adjusted as follows:

Penalty Invoked by Substandard Service = Economic Deprivation - Outage Fairness Factor

The *Outage Fairness Factor* is an economic adjustment to reflect the fact that perfect—uninterrupted service—for all customers is unattainable at existing reasonable costs. And since prices are based on these reasonable costs of service, it is not appropriate to expect perfect service. This factor represents a value of service offset whose quantification is imprecise and subject to judgments relative to any service standards established.

The need for the outage fairness factor is based a fundamental premise of the penalty structure. That premise is: The magnitude of a penalty should be sufficient to redress the deed not done but small enough so as not to unjustly enrich the victim to a level of perfect service.

As defined, this form of penalty for substandard service suffers from a major handicap—implementation. The administrative overhead required to determine individual customers' level of economic deprivation could outweigh the deprivation suffered. Such a process would not serve the customer well and would add to the

cost of a penalty for the utility. Thus, a more practical, less administratively burdensome, approach would seem appropriate. One such approach is the involuntary interruptible service approach.

Involuntary Interruptible Service

If the customer pays for a given type of service he is entitled to that service or appropriate consideration in lieu of receiving that service. In a competitive market, a dissatisfied customer would have the opportunity to seek damages or other consideration and could choose to receive service elsewhere. In a monopoly situation, if the customer receives service below the level of service commensurate with payment extended should not he be entitled to a reduced payment level consistent with service received?

If the utility is providing service of lesser value than that desired by a customer but at a higher price than the normal compensation for the received service, then fairness would imply that the customer be charged only for services actually received. If the customer receives interruptible service, then he should only pay for interruptible service.

Thus, one practical way to implement a substandard provision is to allow the utility to recover only the price of an interruptible service. Clearly, this is a situation

where the customer is not volunteering to receive such service but receives such service involuntarily due to the failure of the utility to meet the standards expected of it. Thus, the customer would not be subject to normal interruptions required under such tariffs but would pay a reduced price based on actual substandard service.

If the utility has a specific interruptible tariff for the customer's class of service then that tariff may be an appropriate proxy to use in billing involuntary interruptible service.Without an existing interruptible tariff, it may be necessary to develop involuntary interruptible service tariff provisions. This approach could have the advantage of flexibility in the development of alternative prices for variations in service reliability. For example, there might be graduated pricing discounts (i.e. 10%, 20%, 30%, etc.) for increasingly poorer levels of service.

A question arises as to how long the customer would receive involuntary interruptible service pricing. The short answer is: until his service achieves an appropriate standard of reliability. However, as a practical matter, it may be necessary to group customers—by circuits or other means—to implement this provision. Since individual customer records are not readily available given the current monitoring process, it may be that specification of the period (e.g. 3-months, 6-months, etc.) during which service will be priced as involuntary

interruptible will be appropriate.

Other Approaches

Other approaches to substandard service may be appropriate as well. For example, Detroit Edison agreed in the Special Manufacturing Contracts to fixed schedules of payments for service interruptions beyond agreed base standards. Such fixed level rebates for substandard service could be developed and administered with relative ease.

Consideration for a Consolidated Case U-9916 and U-10908 Proceeding

To address the issues in raised in the report and the utilities' response to this report, Staff believes the Commission should consider a consolidated proceeding in Cases U-9916 and U-10908 in the first quarter of 1996, to allow Staff, Companies, and other interested parties to provide additional information concerning storm response and adequacy of service. The parties may address different reliability of service levels, system strengthening strategies needed to provide such service, and changes in customer rates necessary to support such service.

Staff has not audited nor has either company formally reconciled the U-9916 financial commitments implemented to date. In early 1996, both Consumers Power Company and Detroit Edison should be in a position to reconcile most if not all of

their U-9916 commitments. A consolidated proceeding would give the Commission an opportunity verify that commitments from U-9916 were implemented and to evaluate their overall effectiveness.

LIST OF APPENDICES

Appendix A: **July 17, 1991 Michigan Public Service Commission Order from Case U-9916**

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

* * * * *

In the matter, on the Commission's own motion, of the investigation into the response of CONSUMERS POWER COMPANY and THE DETROIT EDISON COMPANY to storm damage.	)))))	Case No. U-9916

At the November 20, 1991 meeting of the Michigan Public Service Commission in Lansing, Michigan.

PRESENT: Hon. Steven M. Fetter, Chairman
Hon. Ronald E. Russell, Commissioner
Hon. John L. O'Donnell, Commissioner

ORDER APPROVING SETTLEMENT AGREEMENTS

On July 17, 1991, the Commission issued an order initiating this proceeding to investigate the responses of Consumers Power Company (Consumers) and The Detroit Edison Company (Detroit Edison) to the severe storms that swept across Michigan on July 7, 1991. As a result of those storms, more than a million customers of Consumers and Detroit Edison lost electric power to their homes and businesses. A week later, power had still not been restored to all customers.

An investigation was ordered to learn what happened to the utilities' systems and why, how they responded, and whether any changes should be implemented to reduce the potential for public injury and massive power outages before we are faced with severe storms in the future.

Public hearings were held throughout the service areas of both utilities. On August 30, 1991, the Commission Staff (Staff) filed its report concerning the utilities' responses to the storm. On September 13, 1991, the utility companies filed their responses to the concerns raised in the Staff's report. A follow-up hearing was held before the full Commission on September 24, 1991.

After discussions between the Staff and each company, agreements were reached concerning the implementation of a number of proposals to address the companies' responses to major storms and improve the reliability of their electric distribution systems.

On November 12, 1991, the Staff and the companies submitted individual stipulations and agreements, attached as Exhibit A and Exhibit B, to the Commission for its review and approval. It is both the Staff's and the companies' intention that the settlement agreements resolve all of the issues raised in this proceeding, thereby concluding the investigation ordered by the Commission.

The Commission has reviewed the settlement agreements and the programs that Consumers and Detroit Edison have agreed to implement and finds them to be both reasonable and responsive to those problems. Although the two companies have not agreed to achieve the same goals nor to implement the same programs, the Commission finds that those variations reasonably reflect differences between the two companies.

The Commission commends Consumers and Detroit Edison for committing personnel and financial resources to the goals and programs outlined in the agreements. This is a major step in enhancing the reliability of their electric systems and improving their ability to respond to their customers' needs. The Commission expects both utilities to build on those commitments

by continuing to monitor the quality of the service they provide and making additional improvements as are necessary and appropriate.

The Commission FINDS that:

a. Jurisdiction is pursuant to 1909 PA 106, as amended, MCL 460.551 et seq.; 1919 PA 419, as amended, MCL 460.51 et seq.; 1939 PA 3, as amended, MCL 460.1 et seq.; 1969 PA 306, as amended, MCL 24.201 et seq.; and the Commission's Rules of Practice and Procedure, 1979 Administrative Code, R 460.11 et seq.

b. The stipulation and agreement entered into by the Staff and Consumers is reasonable and in the public interest.

c. The stipulation and agreement entered into by the Staff and Detroit Edison is reasonable and in the public interest.

d. The investigation ordered by the Commission has fulfilled its purpose and may be concluded.

THEREFORE, IT IS ORDERED that:

A. The stipulation and agreement between Consumers Power Company and the Commission Staff, attached as Exhibit A, is approved.

B. The stipulation and agreement between The Detroit Edison Company and the Commission Staff, attached as Exhibit B, is approved.

C. The investigation of the companies' responses to the July 7, 1991 storms initiated by the Commission's July 17, 1991 order is concluded.

D. Consumers Power Company and The Detroit Edison Company shall immediately implement the terms of their respective settlement agreement, including the various reporting requirements specified in the agreements.

The Commission reserves jurisdiction and may issue further orders as necessary.

MICHIGAN PUBLIC SERVICE COMMISSION

/s/ Steven M. Fetter
Chairman

(S E A L)

/s/ Ronald E. Russell
Commissioner

/s/ John L. O'Donnell
Commissioner

By its action of November 20, 1991.

/s/ Dorothy Wideman
Its Executive Secretary

Appendix B:Historical Performance Indices

Table 1

CONSUMERS POWER COMPANY
Interruption Data for the Period 1974-1990

YEAR	Number of Interruptions		Frequency of Interruption		Restoration Avg. Min.		Duration (min/cust)*	
	With Storms (000)	W/O	With Storms	W/O	With Storms	W/O	With Storms	W/O
1974	1003	985	0.84	0.74	109	96	92	71
1975	1344	1010	1.10	0.83	126	94	140	78
1976	1247	790	1.02	0.65	680	108	692	70
1977	1081	1018	0.87	0.82	99	98	86	80
1978	1117	952	0.87	0.74	137	108	121	81
1979	1178	840	0.91	0.65	105	163	148	68
1980	1540	1021	1.17	0.77	102	235	247	79
1981	1133	837	0.85	0.63	122	208	177	77
1982	1286	1169	0.96	0.87	127	140	135	111
1983	1234	1079	0.91	0.80	141	163	148	146
1984	1679	1190	1.23	0.86	318	148	393	129
1985	2178	1713	1.58	1.24	441	192	699	240
1986	1438	1361	1.04	0.99	147	148	152	147
1987	1868	1769	1.33	1.26	195	199	259	250
1988	2170	2014	1.54	1.43	191	198	292	281
1989	2288	2211	1.59	1.53	225	230	358	353
1990	2291	2195	1.57	1.50	177	181	277	271

* Computed from reported data
(Total minutes of customer interruption /avg. no. customers)

Source: Consumers Power Company - Annual Report
Customer Interruptions (1990 and prior years)

AJD 9916 CP7490

Table 2

DETROIT EDISON COMPANY

Interruption Data for the Period 1974-1990

YEAR	Number of Interruptions		Frequency of Interruption		Restoration Avg. Min.		Duration (min/cust)*	
	With Storms (cases > 5 min.)	W/O	With Storms	W/O	With Storms	W/O	With Storms	W/O
1974	3172		0.29	0.00	144		43	
1975	3316		0.41	0.00	158		64	
1976	3084		0.43	0.00	440		192	
1977	4513		0.41	0.00	128		53	
1978	4031		0.50	0.00	247		122	
1979	3192		0.55	0.36	408	118	225	
1980	5580		0.59	0.41	812	169	476	
1981	3728		0.34	0.34	138	136	48	
1982	3655	3655	0.48	0.48	146	146	70	
1983	3434	3137	0.58	0.52	170	161	96	
1984	5149	4329	0.39	0.33	217	176	84	58
1985	4562	2672	0.54	0.36	336	148	181	52
1986	2682	2682	0.37	0.37	146	146	55	55
1987	3742	3549	0.55	0.52	170	163	94	87
1988	3703	3087	0.62	0.51	172	129	107	66
1989	3782	3239	0.61	0.53	185	143	113	76
1990	4178	3423	0.70	0.58	272	188	192	105

Source: Detroit Edison Company - Energy Delivery
Annual Performance and Outage Report (1990 and prior years)

Appendix C:Staff Benchmark Analysis of Distribution System Expenditures

Staff Benchmark of Distribution O & M Expenses

Three Year Annual Average 1992 - 1994

Dollars per Customer

COMPANY	Distribution Expense ($'s /Customer)
1 . SOUTHERN CALIFORNIA EDISON	$49.17
2 . TEXAS UTILITIES ELECTRIC	$54.03
3 . ARIZONA PUBLIC SERVICE	$54.04
4 . **CONSUMERS POWER**	**$58.87**
5 . VIRGINIA ELECTRIC POWER	$59.72
6 . WISCONSIN POWER AND LIGHT	$60.07
7 . COMMON WEALTH EDISON-ILLINOIS	$61.54
8 . GEORGIA POWER	$61.72
9 . FLORIDA POWER & LIGHT	$62.57
10 . HOUSTON LIGHTING & POWER	$63.21
11 . CLEVELAND ELECTRIC ILLUMINATING	$63.62
12 . INDIANAPOLIS POWER & LIGHT	$65.08
13 . OHIO EDISON	$68.00
14 . **DETROIT EDISON**	**$69.75**
15 . COLUMBUS SOUTHERN	$70.08
16 . OHIO POWER	$70.64
17 . NORTHERN STATES POWER-MINNESOTA	$71.09
18 . DUQUESNE LIGHT	$72.21
19 . LOUISVILLE GAS & ELECTRIC	$74.10
20 . UNION ELECTRIC-MISSOURI	$74.72
21 . WISCONSIN PUBLIC SERVICE	$75.07
22 . INDIANA MICHIGAN	$75.79
23 . TOLEDO EDISON	$75.86
24 . WISCONSIN ELECTRIC POWER	$76.15
25 . BALTIMORE GAS & ELECTRIC	$79.73
26 . POTOMAC ELECTRIC POWER	$82.63
27 . CINCINNATI GAS & ELECTRIC	$83.63
28 . ALABAMA POWER	$83.92
29 . PHILADELPHIA ELECTRIC	$89.43
30 . CONSOLIDATED EDISON-NEW YORK	$95.55
31 . BOSTON EDISON	$99.61
AVERAGE	**$68.36**

Staff Benchmark of Total Distribution Expenditures

Three Year Annual Average 1992 - 1994

Dollars per Customer

COMPANY	Total Distribution Cash ($'s /Customer)
1 . SOUTHERN CALIFORNIA EDISON	$140.56
2 . WISCONSIN PUBLIC SERVICE	$141.47
3 . CLEVELAND ELECTRIC ILLUMINATING	$141.61
4 . COLUMBUS SOUTHERN	$144.50
5 . OHIO EDISON	$150.84
6 . FLORIDA POWER & LIGHT	$151.08
7 . NORTHERN STATES POWER-MINNESOTA	$152.33
8 . DUQUESNE LIGHT	$154.12
9 . INDIANA MICHIGAN	$154.90
10 . COMMON WEALTH EDISON-ILLINOIS	$155.14
11 . **CONSUMERS POWER**	**$158.78**
12 . TEXAS UTILITIES ELECTRIC	$160.16
13 . TOLEDO EDISON	$160.92
14 . HOUSTON LIGHTING & POWER	$163.07
15 . WISCONSIN POWER AND LIGHT	$164.35
16 . INDIANAPOLIS POWER & LIGHT	$167.07
17 . LOUISVILLE GAS & ELECTRIC	$169.36
18 . PHILADELPHIA ELECTRIC	$171.19
19 . **DETROIT EDISON**	**$178.22**
20 . UNION ELECTRIC-MISSOURI	$186.07
21 . CINCINNATI GAS & ELECTRIC	$189.68
22 . VIRGINIA ELECTRIC POWER	$189.95
23 . BALTIMORE GAS & ELECTRIC	$190.32
24 . GEORGIA POWER	$191.78
25 . WISCONSIN ELECTRIC POWER	$193.12
26 . BOSTON EDISON	$200.49
27 . CONSOLIDATED EDISON-NEW YORK	$206.45
28 . ARIZONA PUBLIC SERVICE	$216.96
29 . ALABAMA POWER	$225.36
30 . POTOMAC ELECTRIC POWER	$234.42
31 . OHIO POWER	$385.74
AVERAGE	**$174.86**

1994 TOTAL DISTRIBUTION EXPENSE

(Dollars per Customer)

	COMPANY	Distribution Expense ($'s /Customer)
1 .	ARIZONA PUBLIC SERVICE	$51.36
2 .	TEXAS UTILITIES ELECTRIC	$51.53
3 .	WISCONSIN POWER AND LIGHT	$53.45
4 .	CLEVELAND ELECTRIC ILLUMINATING	$56.93
5 .	COMMON WEALTH EDISON-ILLINOIS	$57.98
6 .	OHIO POWER	$58.78
7 .	HOUSTON LIGHTING & POWER	$59.01
8 .	CONSUMERS POWER	$59.46
9 .	FLORIDA POWER & LIGHT	$59.69
10 .	VIRGINIA ELECTRIC POWER	$60.36
11 .	OHIO EDISON	$62.43
12 .	TOLEDO EDISON	$64.93
13 .	SOUTHERN CALIFORNIA EDISON	$65.65
14 .	INDIANAPOLIS POWER & LIGHT	$66.28
15 .	DUQUESNE LIGHT	$69.12
16 .	NORTHERN STATES POWER-MINNESOTA	$69.72
17 .	GEORGIA POWER	$70.59
18 .	DETROIT EDISON	$70.85
19 .	WISCONSIN PUBLIC SERVICE	$72.98
20 .	COLUMBUS SOUTHERN	$74.33
21 .	WISCONSIN ELECTRIC POWER	$76.13
22 .	INDIANA MICHIGAN	$77.72
23 .	UNION ELECTRIC-MISSOURI	$77.78
24 .	LOUISVILLE GAS & ELECTRIC	$82.81
25 .	POTOMAC ELECTRIC POWER	$83.50
26 .	BALTIMORE GAS & ELECTRIC	$85.03
27 .	PHILADELPHIA ELECTRIC	$85.33
28 .	CINCINNATI GAS & ELECTRIC	$93.31
29 .	CONSOLIDATED EDISON-NEW YORK	$96.85
30 .	ALABAMA POWER	$103.51
31 .	BOSTON EDISON	$111.80

1994 TOTAL DISTRIBUTION CASH

(Dollars per Customer)

	COMPANY	Total Distribution Cash ($'s /Customer)
1 .	OHIO POWER	$115.28
2 .	WISCONSIN PUBLIC SERVICE	$125.08
3 .	CLEVELAND ELECTRIC ILLUMINATING	$131.49
4 .	TOLEDO EDISON	$132.49
5 .	COMMON WEALTH EDISON-ILLINOIS	$137.35
6 .	FLORIDA POWER & LIGHT	$138.52
7 .	NORTHERN STATES POWER-MINNESOTA	$149.10
8 .	DUQUESNE LIGHT	$150.43
9 .	OHIO EDISON	$154.63
10 .	PHILADELPHIA ELECTRIC	$154.72
11 .	COLUMBUS SOUTHERN	$156.55
12 .	WISCONSIN POWER AND LIGHT	$160.76
13 .	HOUSTON LIGHTING & POWER	$163.50
14 .	TEXAS UTILITIES ELECTRIC	$165.66
15 .	INDIANA MICHIGAN	$167.60
16 .	SOUTHERN CALIFORNIA EDISON	$167.60
17 .	CONSUMERS POWER	$168.82
18 .	WISCONSIN ELECTRIC POWER	$175.08
19 .	DETROIT EDISON	$187.57
20 .	BALTIMORE GAS & ELECTRIC	$188.86
21 .	UNION ELECTRIC-MISSOURI	$193.38
22 .	LOUISVILLE GAS & ELECTRIC	$196.09
23 .	CONSOLIDATED EDISON-NEW YORK	$201.54
24 .	CINCINNATI GAS & ELECTRIC	$207.51
25 .	VIRGINIA ELECTRIC POWER	$210.03
26 .	GEORGIA POWER	$211.23
27 .	BOSTON EDISON	$211.89
28 .	INDIANAPOLIS POWER & LIGHT	$216.42
29 .	ARIZONA PUBLIC SERVICE	$217.71
30 .	POTOMAC ELECTRIC POWER	$255.01
31 .	ALABAMA POWER	$265.95

1993 TOTAL DISTRIBUTION EXPENSE

(Dollars per Customer)

	COMPANY	Distribution Expense ($'s /Customer)
1	SOUTHERN CALIFORNIA EDISON	$43.45
2	ARIZONA PUBLIC SERVICE	$49.52
3	CONSUMERS POWER	$56.77
4	TEXAS UTILITIES ELECTRIC	$57.69
5	GEORGIA POWER	$58.28
6	VIRGINIA ELECTRIC POWER	$59.61
7	INDIANAPOLIS POWER & LIGHT	$59.92
8	COMMON WEALTH EDISON-ILLINOIS	$63.64
9	FLORIDA POWER & LIGHT	$63.83
10	WISCONSIN POWER AND LIGHT	$64.28
11	HOUSTON LIGHTING & POWER	$65.50
12	LOUISVILLE GAS & ELECTRIC	$67.25
13	OHIO EDISON	$67.53
14	NORTHERN STATES POWER-MINNESOTA	$68.70
15	DETROIT EDISON	$69.47
16	COLUMBUS SOUTHERN	$70.54
17	DUQUESNE LIGHT	$72.51
18	INDIANA MICHIGAN	$73.37
19	CLEVELAND ELECTRIC ILLUMINATING	$74.62
20	WISCONSIN PUBLIC SERVICE	$76.47
21	UNION ELECTRIC-MISSOURI	$76.62
22	OHIO POWER	$76.65
23	ALABAMA POWER	$77.01
24	BALTIMORE GAS & ELECTRIC	$78.62
25	CINCINNATI GAS & ELECTRIC	$80.88
26	POTOMAC ELECTRIC POWER	$84.71
27	BOSTON EDISON	$84.83
28	TOLEDO EDISON	$84.93
29	WISCONSIN ELECTRIC POWER	$86.42
30	PHILADELPHIA ELECTRIC	$92.79
31	CONSOLIDATED EDISON-NEW YORK	$94.52

1993 TOTAL DISTRIBUTION CASH

(Dollars per Customer)

	COMPANY	Total Distribution Cash ($'s /Customer)
1 .	SOUTHERN CALIFORNIA EDISON	$126.54
2 .	OHIO EDISON	$130.64
3 .	INDIANAPOLIS POWER & LIGHT	$132.54
4 .	WISCONSIN PUBLIC SERVICE	$139.17
5 .	COLUMBUS SOUTHERN	$143.33
6 .	LOUISVILLE GAS & ELECTRIC	$143.35
7 .	CLEVELAND ELECTRIC ILLUMINATING	$144.73
8 .	NORTHERN STATES POWER-MINNESOTA	$145.31
9 .	DUQUESNE LIGHT	$145.72
10 .	COMMON WEALTH EDISON-ILLINOIS	$147.39
11 .	OHIO POWER	$150.03
12 .	FLORIDA POWER & LIGHT	$152.14
13 .	INDIANA MICHIGAN	$153.49
14 .	TOLEDO EDISON	$157.88
15 .	CONSUMERS POWER	$160.23
16 .	TEXAS UTILITIES ELECTRIC	$162.87
17 .	HOUSTON LIGHTING & POWER	$172.16
18 .	BALTIMORE GAS & ELECTRIC	$173.54
19 .	WISCONSIN POWER AND LIGHT	$176.54
20 .	PHILADELPHIA ELECTRIC	$178.00
21 .	DETROIT EDISON	$179.08
22 .	VIRGINIA ELECTRIC POWER	$179.90
23 .	BOSTON EDISON	$183.32
24 .	UNION ELECTRIC-MISSOURI	$187.35
25 .	GEORGIA POWER	$187.81
26 .	CINCINNATI GAS & ELECTRIC	$194.21
27 .	ARIZONA PUBLIC SERVICE	$206.35
28 .	ALABAMA POWER	$210.77
29 .	CONSOLIDATED EDISON-NEW YORK	$211.13
30 .	POTOMAC ELECTRIC POWER	$227.17
31 .	WISCONSIN ELECTRIC POWER	$240.83

1992 TOTAL DISTRIBUTION EXPENSE

(Dollars per Customer)

	COMPANY	Distribution Expense ($'s /Customer)
1 .	SOUTHERN CALIFORNIA EDISON	$42.64
2 .	TEXAS UTILITIES ELECTRIC	$52.90
3 .	GEORGIA POWER	$57.15
4 .	VIRGINIA ELECTRIC POWER	$59.18
5 .	CLEVELAND ELECTRIC ILLUMINATING	$59.30
6 .	CONSUMERS POWER	$60.39
7 .	WISCONSIN POWER AND LIGHT	$63.15
8 .	COMMON WEALTH EDISON-ILLINOIS	$63.23
9 .	ARIZONA PUBLIC SERVICE	$63.85
10 .	FLORIDA POWER & LIGHT	$64.26
11 .	HOUSTON LIGHTING & POWER	$65.39
12 .	COLUMBUS SOUTHERN	$65.41
13 .	WISCONSIN ELECTRIC POWER	$65.75
14 .	DETROIT EDISON	$68.91
15 .	INDIANAPOLIS POWER & LIGHT	$69.07
16 .	LOUISVILLE GAS & ELECTRIC	$69.10
17 .	UNION ELECTRIC-MISSOURI	$69.77
18 .	ALABAMA POWER	$70.72
19 .	NORTHERN STATES POWER-MINNESOTA	$74.85
20 .	DUQUESNE LIGHT	$74.98
21 .	OHIO EDISON	$75.06
22 .	BALTIMORE GAS & ELECTRIC	$75.46
23 .	WISCONSIN PUBLIC SERVICE	$75.82
24 .	INDIANA MICHIGAN	$76.26
25 .	CINCINNATI GAS & ELECTRIC	$77.56
26 .	TOLEDO EDISON	$77.92
27 .	POTOMAC ELECTRIC POWER	$79.60
28 .	OHIO POWER	$80.29
29 .	PHILADELPHIA ELECTRIC	$90.48
30 .	CONSOLIDATED EDISON-NEW YORK	$95.27
31 .	BOSTON EDISON	$106.23

1992 TOTAL DISTRIBUTION CASH

(Dollars per Customer)

	COMPANY	Total Distribution Cash ($'s /Customer)
1 .	COLUMBUS SOUTHERN	$133.70
2 .	SOUTHERN CALIFORNIA EDISON	$134.50
3 .	INDIANA MICHIGAN	$143.42
4 .	CONSUMERS POWER	$147.03
5 .	CLEVELAND ELECTRIC ILLUMINATING	$148.64
6 .	INDIANAPOLIS POWER & LIGHT	$151.52
7 .	TEXAS UTILITIES ELECTRIC	$151.69
8 .	HOUSTON LIGHTING & POWER	$153.39
9 .	WISCONSIN POWER AND LIGHT	$155.94
10 .	LOUISVILLE GAS & ELECTRIC	$159.09
11 .	WISCONSIN PUBLIC SERVICE	$160.72
12 .	NORTHERN STATES POWER-MINNESOTA	$162.59
13 .	FLORIDA POWER & LIGHT	$163.03
14 .	WISCONSIN ELECTRIC POWER	$163.26
15 .	DUQUESNE LIGHT	$166.19
16 .	DETROIT EDISON	$167.89
17 .	CINCINNATI GAS & ELECTRIC	$168.90
18 .	OHIO EDISON	$169.38
19 .	UNION ELECTRIC-MISSOURI	$177.49
20 .	GEORGIA POWER	$178.11
21 .	VIRGINIA ELECTRIC POWER	$179.47
22 .	COMMON WEALTH EDISON-ILLINOIS	$182.02
23 .	PHILADELPHIA ELECTRIC	$182.18
24 .	TOLEDO EDISON	$192.98
25 .	ALABAMA POWER	$198.26
26 .	CONSOLIDATED EDISON-NEW YORK	$206.67
27 .	BALTIMORE GAS & ELECTRIC	$209.15
28 .	BOSTON EDISON	$211.09
29 .	POTOMAC ELECTRIC POWER	$220.39
30 .	ARIZONA PUBLIC SERVICE	$230.23
31 .	OHIO POWER	$981.66

1991 TOTAL DISTRIBUTION CASH

(Dollars per Customer)

	COMPANY	Total Distribution Cash ($'s /Customer)
1 .	CLEVELAND ELECTRIC ILLUMINATING	$99.03
2 .	OHIO POWER	$102.45
3 .	TOLEDO EDISON	$109.65
4 .	CONSUMERS POWER	$116.05
5 .	INDIANAPOLIS POWER & LIGHT	$130.74
6 .	WISCONSIN PUBLIC SERVICE	$131.14
7 .	OHIO EDISON	$135.42
8 .	NORTHERN STATES POWER-MINNESOTA	$140.27
9 .	COLUMBUS SOUTHERN	$141.08
10 .	SOUTHERN CALIFORNIA EDISON	$151.08
11 .	LOUISVILLE GAS & ELECTRIC	$153.25
12 .	WISCONSIN POWER AND LIGHT	$156.49
13 .	TEXAS UTILITIES ELECTRIC	$156.96
14 .	PHILADELPHIA ELECTRIC	$157.04
15 .	DETROIT EDISON	$157.37
16 .	INDIANA MICHIGAN	$158.73
17 .	UNION ELECTRIC-MISSOURI	$161.97
18 .	ARIZONA PUBLIC SERVICE	$162.02
19 .	DUQUESNE LIGHT	$162.47
20 .	BALTIMORE GAS & ELECTRIC	$171.29
21 .	COMMON WEALTH EDISON-ILLINOIS	$173.60
22 .	CINCINNATI GAS & ELECTRIC	$180.96
23 .	HOUSTON LIGHTING & POWER	$183.04
24 .	FLORIDA POWER & LIGHT	$183.93
25 .	BOSTON EDISON	$188.93
26 .	WISCONSIN ELECTRIC POWER	$191.30
27 .	CONSOLIDATED EDISON-NEW YORK	$199.18
28 .	VIRGINIA ELECTRIC POWER	$205.61
29 .	POTOMAC ELECTRIC POWER	$222.04
30 .	GEORGIA POWER	$230.04
31 .	ALABAMA POWER	$231.81

1991 TOTAL DISTRIBUTION EXPENSE

(Dollars per Customer)

	COMPANY	Distribution Expense ($'s /Customer)
1	. ARIZONA PUBLIC SERVICE	$52.06
2	. CONSUMERS POWER	$52.35
3	. SOUTHERN CALIFORNIA EDISON	$54.17
4	. TEXAS UTILITIES ELECTRIC	$56.09
5	. INDIANAPOLIS POWER & LIGHT	$57.70
6	. WISCONSIN POWER AND LIGHT	$60.10
7	. CLEVELAND ELECTRIC ILLUMINATING	$61.63
8	. BALTIMORE GAS & ELECTRIC	$62.20
9	. OHIO POWER	$62.65
10	. VIRGINIA ELECTRIC POWER	$62.77
11	. OHIO EDISON	$63.40
12	. COMMON WEALTH EDISON-ILLINOIS	$63.43
13	. GEORGIA POWER	$67.22
14	. HOUSTON LIGHTING & POWER	$67.59
15	. LOUISVILLE GAS & ELECTRIC	$69.60
16	. COLUMBUS SOUTHERN	$70.95
17	. DUQUESNE LIGHT	$71.74
18	. NORTHERN STATES POWER-MINNESOTA	$72.61
19	. ALABAMA POWER	$72.85
20	. UNION ELECTRIC-MISSOURI	$73.92
21	. WISCONSIN PUBLIC SERVICE	$74.57
22	. TOLEDO EDISON	$75.04
23	. FLORIDA POWER & LIGHT	$75.08
24	. INDIANA MICHIGAN	$78.42
25	. DETROIT EDISON	$83.29
26	. BOSTON EDISON	$83.60
27	. CINCINNATI GAS & ELECTRIC	$83.64
28	. PHILADELPHIA ELECTRIC	$84.56
29	. POTOMAC ELECTRIC POWER	$85.73
30	. CONSOLIDATED EDISON-NEW YORK	$89.71
31	. WISCONSIN ELECTRIC POWER	$90.96

1990 TOTAL DISTRIBUTION EXPENSE

(Dollars per Customer)

	COMPANY	Distribution Expense ($'s /Customer)
1 .	WISCONSIN POWER AND LIGHT	$22.95
2 .	CONSUMERS POWER	$38.62
3 .	SOUTHERN CALIFORNIA EDISON	$42.87
4 .	COMMON WEALTH EDISON-ILLINOIS	$54.43
5 .	TEXAS UTILITIES ELECTRIC	$57.32
6 .	OHIO EDISON	$59.36
7 .	CLEVELAND ELECTRIC ILLUMINATING	$59.58
8 .	GEORGIA POWER	$59.80
9 .	ARIZONA PUBLIC SERVICE	$60.00
10 .	VIRGINIA ELECTRIC POWER	$64.25
11 .	NORTHERN STATES POWER-MINNESOTA	$64.55
12 .	HOUSTON LIGHTING & POWER	$64.99
13 .	INDIANAPOLIS POWER & LIGHT	$65.21
14 .	TOLEDO EDISON	$67.66
15 .	ALABAMA POWER	$69.86
16 .	UNION ELECTRIC-MISSOURI	$70.20
17 .	COLUMBUS SOUTHERN	$72.03
18 .	DETROIT EDISON	$72.07
19 .	WISCONSIN PUBLIC SERVICE	$72.68
20 .	POTOMAC ELECTRIC POWER	$74.41
21 .	FLORIDA POWER & LIGHT	$75.30
22 .	INDIANA MICHIGAN	$76.68
23 .	DUQUESNE LIGHT	$77.01
24 .	BALTIMORE GAS & ELECTRIC	$77.37
25 .	CINCINNATI GAS & ELECTRIC	$78.75
26 .	PHILADELPHIA ELECTRIC	$81.18
27 .	LOUISVILLE GAS & ELECTRIC	$81.19
28 .	OHIO POWER	$81.70
29 .	WISCONSIN ELECTRIC POWER	$90.60
30 .	CONSOLIDATED EDISON-NEW YORK	$97.57
31 .	BOSTON EDISON	$113.56

1990 TOTAL DISTRIBUTION CASH

(Dollars per Customer)

	COMPANY	Total Distribution Cash ($'s /Customer)
1 .	WISCONSIN POWER AND LIGHT	$53.89
2 .	CONSUMERS POWER	$97.50
3 .	SOUTHERN CALIFORNIA EDISON	$138.61
4 .	COMMON WEALTH EDISON-ILLINOIS	$154.14
5 .	TEXAS UTILITIES ELECTRIC	$144.38
6 .	OHIO EDISON	$141.57
7 .	CLEVELAND ELECTRIC ILLUMINATING	$121.82
8 .	GEORGIA POWER	$222.50
9 .	ARIZONA PUBLIC SERVICE	$265.10
10 .	VIRGINIA ELECTRIC POWER	$217.91
11 .	NORTHERN STATES POWER-MINNESOTA	$127.14
12 .	HOUSTON LIGHTING & POWER	$170.88
13 .	INDIANAPOLIS POWER & LIGHT	$146.90
14 .	TOLEDO EDISON	$124.53
15 .	ALABAMA POWER	$199.61
16 .	UNION ELECTRIC-MISSOURI	$164.01
17 .	COLUMBUS SOUTHERN	$164.21
18 .	DETROIT EDISON	$157.40
19 .	WISCONSIN PUBLIC SERVICE	$142.74
20 .	POTOMAC ELECTRIC POWER	$224.95
21 .	FLORIDA POWER & LIGHT	$203.80
22 .	INDIANA MICHIGAN	$156.00
23 .	DUQUESNE LIGHT	$159.78
24 .	BALTIMORE GAS & ELECTRIC	$200.01
25 .	CINCINNATI GAS & ELECTRIC	$153.03
26 .	PHILADELPHIA ELECTRIC	$207.23
27 .	LOUISVILLE GAS & ELECTRIC	$150.25
28 .	OHIO POWER	$153.77
29 .	WISCONSIN ELECTRIC POWER	$184.59
30 .	CONSOLIDATED EDISON-NEW YORK	$209.14
31 .	BOSTON EDISON	$262.98

Appendix D: Ten Year Compilation of Distribution Plant in Service and Operation and Maintenance Expenditures

CONSUMERS POWER COMPANY

Ten Year Historical Compilation of Distribution Plant and O&M (1995-1986)

ACCT.	DESCRIPTION	Budget 1995	1994	1993	1992	1991	1990	1989	1988	1987	1986
	DISTRIBUTION PLANT										
360	Land and Land Rights		18,292,019	16,877,301	16,475,739	15,751,585	15,435,153	15,079,760	14,844,714	14,555,685	14,368,310
361	Structures and Improvements		12,433,249	10,291,202	8,253,628	8,415,946	8,223,576	8,054,355	7,810,077	7,663,400	7,751,896
362	Station Equipment		198,994,337	173,572,987	156,826,871	141,584,616	136,694,975	132,357,814	125,428,186	121,284,464	123,802,674
363	Storage Battery Equipment		0	0	0	0	0	0	0	0	0
364	Poles, Towers, and Fixtures		380,490,267	350,674,940	318,584,142	294,391,595	249,221,760	264,985,542	249,956,638	239,817,133	230,924,005
365	Overhead Conductors and Devices		338,566,333	311,439,804	282,691,467	260,336,712	246,115,067	230,776,393	217,450,506	208,711,508	201,107,463
366	Underground Conduit		28,373,400	27,151,224	26,117,414	24,921,612	24,357,140	23,429,092	22,643,156	20,822,074	20,081,159
367	Underground Conductors and Devices		194,849,215	181,977,345	173,712,484	164,788,870	158,948,684	153,949,312	149,100,306	131,251,982	123,767,947
368	Line Transformers		372,184,072	348,162,350	324,318,325	302,265,211	288,948,329	270,923,124	255,621,236	244,305,430	231,623,192
369	Services		266,140,205	246,607,653	225,001,492	203,632,813	191,918,549	178,744,474	164,229,702	150,182,047	139,097,256
370	Meters		102,006,820	99,610,591	96,618,072	92,583,952	90,631,966	84,215,546	80,488,868	76,970,293	73,189,014
371	Installations on Customer Premises		4,574,789	4,267,010	4,013,737	3,674,488	2,158,312	2,214,599	902,654	351,556	242,861
372	Leased Property on Customer Premises		0	0	0	0	0	0	0	0	0
373	Street Lighting and Signal Systems		54,353,313	52,242,941	49,865,845	56,097,093	47,403,025	45,359,978	43,326,415	41,637,014	40,715,320
	Total Distribution Plant	0	1,971,258,019	1,822,875,348	1,682,479,216	1,568,444,493	1,460,056,536	1,410,089,989	1,331,802,458	1,257,552,586	1,206,671,097
	DISTRIBUTION EXPENSE										
	OPERATION EXPENSE										
580	Operation Supervision and Engineering	11,296,766	10,082,393	9,337,714	8,830,394	14,187,553	3,171,700	4,045,384	3,561,456	3,530,336	3,996,883
581	Load Dispatching	0	0	0	0	0	0	0	0	0	0
582	Station Expenses	2,587,679	2,439,400	2,380,248	2,354,063	2,182,518	1,940,878	2,051,753	2,088,554	1,969,699	1,931,212
583	Overhead Line Expenses	5,791,168	8,283,689	5,201,322	5,576,899	5,406,216	4,523,553	4,114,838	4,239,481	3,799,337	3,680,890
584	Underground Line Expenses	2,612,323	3,116,953	2,827,124	2,836,395	2,756,936	2,545,074	2,503,747	2,253,200	2,068,224	2,304,405
585	Street Lighting and Signal Systems Expen	(177,888)	258,347	440,149	471,481	(2,057,520)	393,188	572,427	498,359	522,656	725,090
586	Meter Expenses	3,149,386	3,600,340	3,673,072	3,492,194	3,551,229	3,201,293	3,160,706	3,530,199	3,792,543	3,681,859
587	Customer Installations Expenses	2,214,729	3,420,480	3,158,093	2,387,849	2,225,941	1,996,152	1,659,622	1,594,139	1,346,442	1,314,765
588	Miscellaneous Expenses	9,882,195	10,596,293	10,007,004	11,358,899	10,246,225	8,159,059	7,303,450	6,184,107	6,362,888	6,011,212
589	Rents	2,185,123	2,411,395	2,429,561	2,245,232	2,107,755	2,195,102	2,085,437	2,222,194	1,951,208	2,377,470
	Total Operation Expense	39,541,481	44,209,290	39,454,287	39,553,406	40,606,853	28,125,999	27,497,364	26,171,689	25,343,333	26,023,786
	MAINTENANCE EXPENSE										
590	Maintenance of Supervision and Engineeri	2,772,262	2,240,039	3,399,036	2,783,255	2,500,274	1,954,022	2,123,757	1,997,811	2,278,685	2,186,373
591	Maintenance of Structures	326,528	271,722	243,225	191,021	176,437	(91,199)	195,483	147,803	295,893	243,871
592	Maintenance of Station Equipment	2,719,432	2,423,595	2,484,460	2,360,930	2,707,260	2,412,822	2,663,352	2,856,283	2,747,734	2,542,288
593	Maintenance of Overhead Lines	34,319,647	35,941,501	34,188,411	40,340,303	26,523,002	20,317,754	18,555,352	17,481,410	16,836,108	16,663,531
594	Maintenance of Underground Lines	1,910,692	2,322,070	2,397,878	2,080,641	1,937,152	1,658,198	1,481,222	1,799,053	1,598,486	1,389,099
595	Maintenance of Line Transformers	1,125,198	1,585,806	1,698,824	1,404,823	1,507,181	1,371,127	1,369,841	1,292,878	1,270,231	1,446,479
596	Maintenance of Street Lighting & Sig. Sy	974,157	1,028,550	1,028,261	864,576	824,300	757,871	657,117	595,071	583,816	454,509
597	Maintenance of Meters	980,371	959,609	977,688	822,875	850,374	743,637	813,264	846,145	832,993	759,261
598	Maintenance of Misc. Distribution Plant	78,543	188,022	110,613	903	(11,806)	37,039	(23,755)	(25,394)	(36,015)	(35,846)
	Total Maintenance Expense	45,206,830	46,960,914	46,528,396	50,849,327	37,014,174	29,161,271	27,835,633	26,991,060	26,407,931	25,649,565
	Total Distribution O & M Expense	84,748,311	91,170,204	85,982,683	90,402,733	77,621,027	57,287,270	55,332,997	53,162,749	51,751,264	51,673,351
	Distribution O & M per Customer	$54.50	$59.39	$56.77	$60.39	$52.35	$39.14	$38.40	$37.45	$36.75	$37.17
	Distribution O & M per MWH of Sales	$2.34	$2.65	$2.62	$2.86	$2.53	$1.93	$1.87	$1.81	$1.82	$1.85

CONSUMERS POWER COMPANY

Ten Year Historical Compilation of Transmission Plant and O&M (1995-1986)

ACCT	DESCRIPTION	Budget 1995	1994	1993	1992	1991	1990	1989	1988	1987	1986
	TRANSMISSION PLANT										
350	Land and Land Rights		78,885,248	72,869,488	73,202,147	72,286,671	72,152,457	72,901,426	72,883,046	73,016,142	72,923,591
352	Structures and Improvements		17,279,615	15,334,938	14,219,018	14,007,733	13,679,922	13,623,362	13,517,079	13,457,680	13,079,132
353	Station Equipment		292,386,101	275,571,245	269,064,635	249,465,695	244,049,175	236,922,318	229,081,964	225,133,093	218,278,064
354	Towers and Fixtures		99,041,081	97,717,400	97,127,690	97,903,847	100,307,589	99,394,282	99,090,650	97,680,929	97,680,140
355	Poles and Fixtures		105,447,527	92,720,630	88,363,083	84,910,304	83,491,632	82,870,441	82,261,066	81,688,680	81,077,348
356	Overhead Conductors and Devices		148,845,247	137,530,995	134,087,770	132,750,888	134,309,986	133,562,004	132,277,774	129,484,982	129,186,894
357	Underground Conduit		493,727	446,769	446,769	446,769	3,966,823	425,840	425,840	435,751	372,528
358	Underground Conductors and Devices		7,874,303	7,781,046	7,786,384	7,686,189	3,561,073	3,471,527	3,474,195	3,400,301	2,741,601
359	Roads and Trails		1,044,921	1,041,584	1,041,584	1,041,584	1,041,584	1,041,584	1,041,584	1,041,584	1,041,584
	Total Transmission Plant	0	751,297,770	701,014,095	685,339,080	660,499,680	656,560,241	644,212,784	634,053,198	625,339,142	616,380,882
	TRANSMISSION EXPENSE										
	OPERATION EXPENSE										
560	Operation Supervision and Engineering	2,652,100	1,709,124	829,012	945,173	945,348	424,665	853,567	1,074,616	1,004,105	1,099,392
561	Load Dispatching	0	0	0	0	0	0	0	0	0	0
562	Station Expenses	1,854,145	1,846,847	2,218,197	2,483,282	2,400,270	2,094,230	2,170,404	2,025,272	1,977,178	1,960,320
563	Overhead Line Expenses	3,073,837	2,339,924	2,444,712	1,993,111	704,722	692,161	934,913	955,157	851,235	671,237
564	Underground Line Expenses	15,000	0	19,398	495	(14,629)	1,009	1,028	1,300	2,166	7,454
565	Transmission of Electricity by Others	0	0	0	0	0	0	0	0	0	0
566	Misc. Transmission Expenses	541,828	257,668	551,084	405,658	574,458	172,061	455,449	314,299	271,632	516,919
567	Rents	979,000	922,479	966,475	1,091,900	76,041	34,607	113,457	146,391	162,593	105,481
	Total Operation Expense	9,115,910	7,076,042	7,028,878	6,919,619	4,686,210	3,418,733	4,528,818	4,517,035	4,268,909	4,360,803
	MAINTENANCE EXPENSE										
568	Maintenance of Supervision and Engineeri	548,526	140,836	70,481	48,149	62,653	43,583	66,783	72,945	108,419	187,150
569	Maintenance of Structures	218,320	266,273	200,129	209,045	273,811	188,140	157,536	104,135	159,387	140,416
570	Maintenance of Station Equipment	5,516,811	4,573,659	5,280,428	4,463,145	4,252,889	4,115,802	4,031,932	3,630,706	2,886,454	2,554,428
571	Maintenance of Overhead Lines	4,146,221	5,811,119	6,695,273	6,064,035	3,573,585	3,391,122	4,339,807	2,685,682	1,841,088	1,513,697
572	Maintenance of Underground Lines	50,000	0	0	51	2,991	3,944	481	(3,623)	27,171	21,956
573	Maintenance of Misc. Transmission Plant	177,600	71,624	1,324	7,241	274	530	(2,466)	1,758	(15,258)	0
	Total Maintenance Expense	10,657,478	10,863,511	12,247,635	10,791,666	8,166,203	7,743,121	8,594,073	6,491,603	5,007,261	4,417,647
	Total Transmission O & M Expense	19,773,388	17,939,553	19,276,513	17,711,285	12,852,413	11,161,854	13,122,891	11,008,638	9,276,170	8,778,450
	Average Number of Customers	1,555,000	1,535,062	1,514,588	1,497,050	1,482,778	1,463,473	1,440,883	1,419,655	1,408,114	1,390,133
	Total Sales (MWH)	36,184,836	34,461,749	32,764,347	31,601,094	30,692,171	29,672,734	29,667,035	29,293,914	28,489,858	27,977,409

THE DETROIT EDISON COMPANY

Ten Year Historical Compilation of Distribution Plant and O&M (1995-1986)

ACCT	DESCRIPTION	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986
	DISTRIBUTION PLANT										
360	Land and Land Rights		7,861,661	7,805,538	7,797,597	7,719,554	7,703,345	7,710,266	7,710,553	7,374,203	7,374,203
361	Structures and Improvements		51,747,238	49,202,006	47,901,988	47,155,289	44,471,373	43,231,122	42,186,612	39,127,838	39,127,838
362	Station Equipment		406,199,504	377,219,924	349,060,003	327,010,115	309,852,848	281,830,994	258,793,493	235,672,248	235,672,248
363	Storage Battery Equipment		0	0	0	0	0	0	0	0	0
364	Poles, Towers, and Fixtures		374,392,394	348,130,581	326,712,335	304,416,005	285,590,727	268,659,239	253,478,953	237,415,406	237,415,406
365	Overhead Conductors and Devices		799,129,947	707,624,778	624,569,744	549,881,686	516,788,600	480,888,391	446,300,046	412,446,467	412,446,467
366	Underground Conduit		91,645,935	91,361,245	86,197,668	80,648,413	79,599,733	74,918,688	70,813,512	67,294,258	67,294,258
367	Underground Conductors and Devices		351,173,304	333,051,856	316,477,432	299,098,234	282,396,975	257,748,091	233,593,794	205,930,756	205,930,756
368	Line Transformers		279,231,450	270,184,300	258,416,466	246,730,076	238,767,809	225,698,476	210,975,573	193,650,631	193,650,631
369	Services		171,976,945	161,670,327	152,858,868	144,824,333	136,383,613	128,323,800	118,187,890	108,774,070	108,774,070
370	Meters		122,627,221	116,777,201	111,919,355	107,449,592	102,157,293	97,173,619	91,611,071	86,260,427	86,260,427
371	Installations on Customer Premises		17,365,870	16,966,482	16,531,833	15,941,284	15,652,496	15,057,863	14,662,698	14,070,262	14,070,262
372	Leased Property on Customer Premises			0	0	0	0	0	0	0	0
373	Street Lighting and Signal Systems		112,034,549	109,740,177	106,623,971	103,125,586	99,824,847	97,493,095	94,373,100	91,135,648	91,135,648
	Total Distribution Plant	0	2,785,386,018	2,589,734,415	2,405,067,260	2,234,000,167	2,119,189,659	1,978,733,644	1,842,687,295	1,699,152,214	1,699,152,214
	DISTRIBUTION EXPENSE										
	OPERATION EXPENSE										
580	Operation Supervision and Engineering		21,650,762	21,553,988	15,589,379	16,931,175	14,249,291	14,555,987	13,312,967	13,126,245	12,491,262
581	Load Dispatching		3,578,352	2,682,089	809,511	952,153	721,169	700,998	648,649	635,591	412,736
582	Station Expenses		5,681,983	5,024,159	5,400,696	6,370,810	6,761,519	7,225,438	9,157,536	8,465,376	8,116,465
583	Overhead Line Expenses		17,699,049	14,915,288	12,523,310	20,009,475	10,550,304	14,162,118	8,761,426	8,953,852	7,131,065
584	Underground Line Expenses		2,956,441	2,781,561	3,347,199	2,767,076	2,582,816	2,743,467	3,160,936	3,688,289	3,333,242
585	Street Lighting and Signal Systems Expense		739,209	910,597	881,866	708,232	823,369	906,947	773,517	724,205	806,520
586	Meter Expenses		6,605,696	6,148,791	6,343,997	9,446,562	9,805,164	9,670,742	9,396,538	7,879,866	7,824,922
587	Customer Installations Expenses		4,186,211	5,013,308	5,680,766	8,919,157	9,326,284	9,701,609	9,648,697	10,712,911	10,838,092
588	Miscellaneous Expenses		10,886,651	14,411,082	9,082,693	7,700,340	9,084,696	8,722,872	9,150,091	8,978,989	8,573,356
589	Rents		2,126,632	2,580,932	2,225,839	2,501,235	2,507,667	2,242,361	1,824,778	2,613,916	2,535,215
	Total Operation Expense	64,999,600	76,110,986	76,021,795	61,885,256	76,306,215	66,412,279	70,632,539	65,835,135	65,779,240	62,062,875
	MAINTENANCE EXPENSE										
590	Maintenance of Supervision and Engineering		1,206,962	1,283,482	1,159,180	1,204,837	1,164,791	1,109,166	1,065,757	1,010,183	903,156
591	Maintenance of Structures		1,894,931	1,801,894	531,736	788,259	1,266,154	1,405,915	2,083,838	2,370,530	2,269,437
592	Maintenance of Station Equipment		5,212,357	5,141,796	6,830,388	7,212,823	6,141,913	6,073,242	5,855,841	4,672,390	3,657,799
593	Maintenance of Overhead Lines		42,321,614	40,856,726	51,628,024	60,955,373	47,888,251	45,873,851	43,942,670	43,423,784	41,862,420
594	Maintenance of Underground Lines		4,730,675	3,618,191	3,296,337	4,771,727	5,057,266	5,510,110	5,725,568	6,575,799	6,083,833
595	Maintenance of Line Transformers		996,164	686,097	896,435	944,986	655,240	667,120	849,093	1,092,496	736,773
596	Maintenance of Street Lighting & Sig. Sys.		5,475,145	4,469,795	4,825,385	6,594,378	6,167,492	5,532,521	5,748,861	5,934,133	6,241,695
597	Maintenance of Meters		670,149	801,631	1,041,729	710,742	880,577	897,644	904,638	1,215,597	976,553
598	Maintenance of Misc. Distribution Plant		946,445	1,202,681	1,990,360	1,609,610	2,594,916	260,093	1,117,674	1,366,004	524,195
	Total Maintenance Expense	40,249,000	63,454,442	59,862,293	72,199,574	84,792,735	71,816,600	67,329,662	67,293,940	67,660,916	63,255,861
	Total Distribution O & M Expense	105,248,600	139,565,428	135,884,088	134,084,830	161,098,950	138,228,879	137,962,201	133,129,075	133,440,156	125,318,736
	Distribution O & M per Customer	$53.16	$70.81	$69.47	$68.92	$83.29	$72.08	$72.85	$71.23	$72.74	$69.49
	Distribution O & M per MWH of Sales	$2.18	$3.03	$2.92	$3.05	$3.46	$3.41	$3.40	$3.25	$3.38	$3.29

THE DETROIT EDISON COMPANY

Ten Year Historical Compilation of Transmission Plant and O&M (1995-1986)

ACCT	DESCRIPTION	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986
	TRANSMISSION PLANT										
350	Land and Land Rights		51,226,508	45,215,604	45,196,582	45,779,857	46,275,293	45,785,790	45,807,441	45,731,399	46,199,037
352	Structures and Improvements		44,243,505	43,910,398	43,677,107	43,638,481	43,284,523	43,103,512	42,934,894	34,441,175	33,661,632
353	Station Equipment		429,499,320	420,367,213	415,459,449	412,711,575	395,792,866	386,995,462	362,306,670	327,838,177	321,678,713
354	Towers and Fixtures		153,797,402	152,959,791	150,911,312	149,702,338	149,320,713	148,212,627	135,581,241	135,323,648	135,361,087
355	Poles and Fixtures		54,053,253	51,026,849	48,736,981	45,749,973	43,444,735	41,317,186	39,399,429	37,092,309	35,567,017
356	Overhead Conductors and Devices		164,187,308	158,441,985	152,198,338	148,048,743	145,134,156	141,254,787	131,567,679	127,458,701	125,600,317
357	Underground Conduit		84,630,271	81,436,191	78,947,544	78,847,919	76,944,808	73,985,465	71,721,620	69,584,979	68,486,078
358	Underground Conductors and Devices		130,294,102	125,417,947	125,324,620	126,694,825	124,050,329	120,089,325	116,292,480	112,998,531	111,311,921
359	Roads and Trails			0			-			0	0
	Total Transmission Plant	0	1,111,931,669	1,078,775,978	1,060,451,933	1,051,173,711	1,024,247,423	1,000,744,154	945,611,454	890,468,919	877,865,802
	TRANSMISSION EXPENSE										
	OPERATION EXPENSE										
560	Operation Supervision and Engineering		5,831,448	6,035,426	6,035,499	5,374,639	6,605,515	6,349,791	6,413,771	6,217,745	6,964,564
561	Load Dispatching		1,430,949	1,020,460	1,066,659	1,123,572	966,809	890,648	814,921	814,384	845,142
562	Station Expenses		3,906,278	3,550,140	3,474,431	4,406,848	4,083,204	4,097,841	4,177,868	3,739,405	3,612,676
563	Overhead Line Expenses		475,348	494,281	708,201	1,193,386	789,508	845,243	639,104	523,351	563,597
564	Underground Line Expenses		525,001	531,014	444,339	870,995	611,187	570,998	522,097	447,083	500,677
565	Transmission of Electricity by Others		320,295	533,374	2,874,917	3,226,762	3,117,377	3,694,268	4,206,808	3,951,842	3,744,561
566	Misc. Transmission Expenses		3,377,500	2,731,580	2,003,373	2,150,113	2,012,028	1,833,053	1,675,361	2,212,125	2,033,261
567	Rents		269,828	504,155	570,786	590,460					
	Total Operation Expense	17,393,000	16,136,647	15,400,430	17,178,205	18,936,775	18,185,628	18,281,842	18,449,930	17,905,935	18,264,478
	MAINTENANCE EXPENSE										
568	Maintenance of Supervision and Engineering		704,935	662,835	661,083	1,136,577	1,143,764	1,251,626	978,453	972,138	890,081
569	Maintenance of Structures		732,055	529,554	468,211	383,710	548,144	715,394	1,171,391	996,220	1,171,298
570	Maintenance of Station Equipment		6,139,953	6,682,588	7,710,515	9,621,186	8,677,135	8,520,676	7,486,724	6,632,497	6,771,557
571	Maintenance of Overhead Lines		5,619,208	4,697,778	4,118,835	5,801,783	6,521,411	6,444,852	5,802,971	6,677,477	5,024,532
572	Maintenance of Underground Lines		2,367,925	3,397,798	1,984,033	1,967,694	2,967,277	1,631,381	2,452,076	2,356,928	2,193,503
573	Maintenance of Misc. Transmission Plant		183,445	229,198	614,100	284,411	321,706	116,318	356,126	739,028	342,303
	Total Maintenance Expense	17,590,000	15,747,521	16,199,751	15,556,777	19,195,361	20,179,437	18,680,247	18,247,741	18,374,288	16,393,274
	Total Transmission O & M Expense	34,983,000	31,884,168	31,600,181	32,734,982	38,132,136	38,365,065	36,962,089	36,697,671	36,280,223	34,657,752
	Average Number of Customers	1,980,000	1,971,122	1,955,991	1,945,638	1,934,134	1,917,653	1,893,690	1,869,066	1,834,413	1,803,389
	Total Sales (MWH)	48,207,429	46,131,511	46,575,915	43,901,121	46,609,992	40,595,715	40,585,276	40,958,448	39,492,167	38,039,854

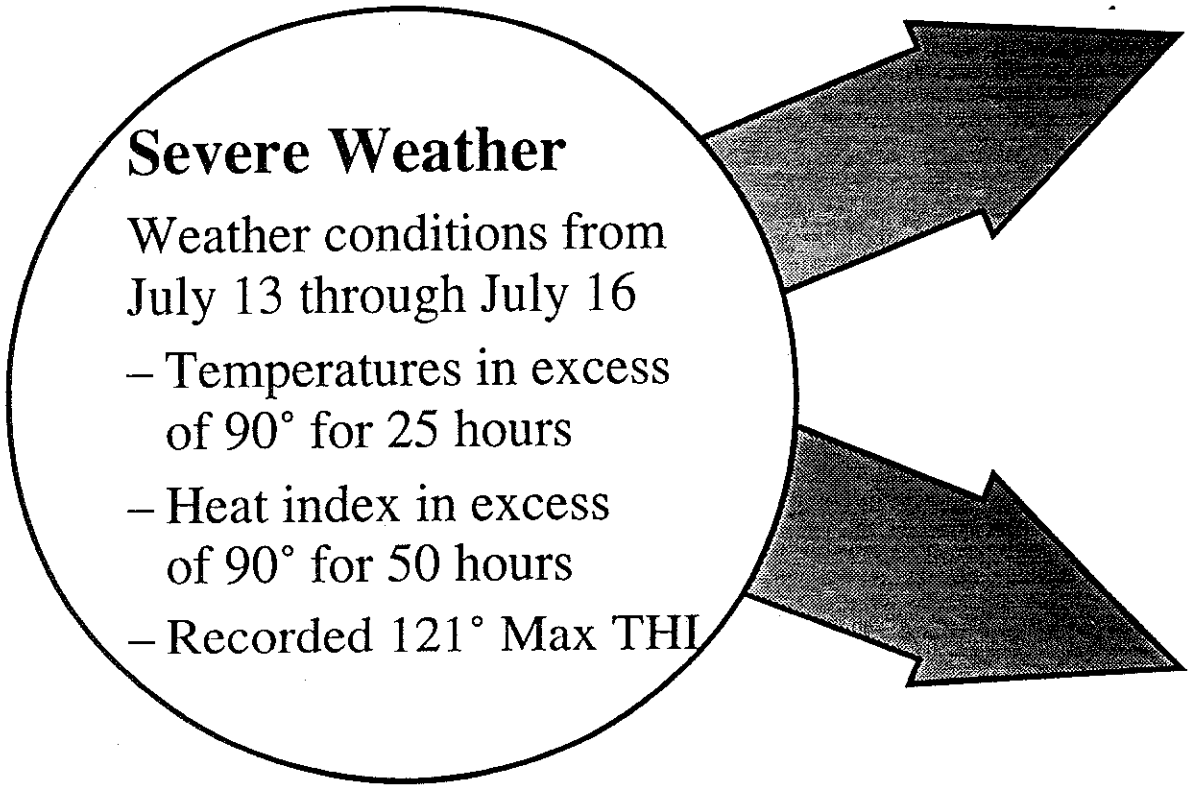
Appendix E: Storm Data and Radar Summary

JULY 13 - JULY 16: STORM ACTIVITY AND RESPONSE

- Continuous, severe weather conditions (heat, humidity, severe thunder storm activity) from July 13 through July 16 challenged Detroit Edison's system capabilities

- Detroit Edison has responded quickly and effectively to these challenges

WEATHER CONDITIONS CREATED CHALLENGES FOR THE SYSTEM



System peaks

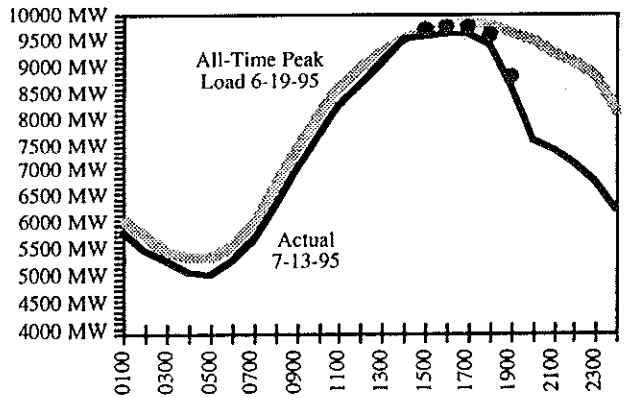
- Record or near record customer peaks on each of the 4 days

Thunderstorm activity and customer outages

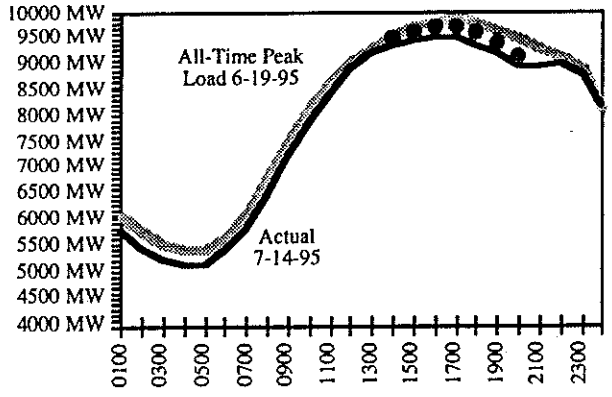
- Severe thunderstorm activity on 3 of the 4 days
- Approximately 480,000 customers lost power

WEATHER CONDITIONS CREATED RECORD/ NEAR RECORD DEMANDS

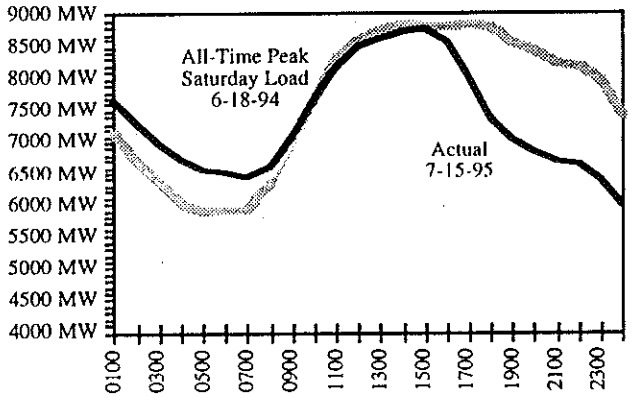
July 13 – 100MW below all-time peak



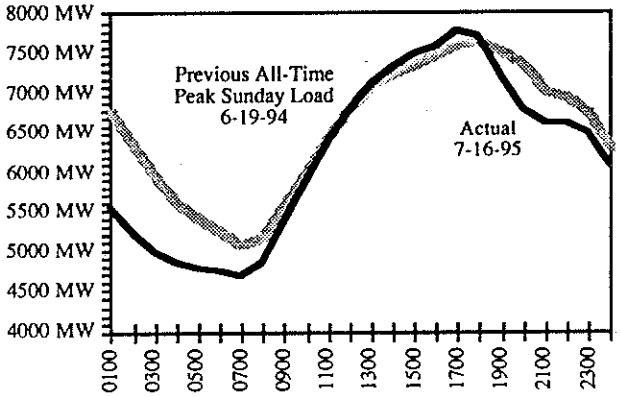
July 14 – 350MW below all-time peak

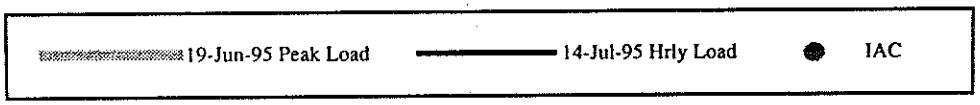


July 15 – 60MW below all-time peak



July 16 – Set new peak





Detroit Edison successfully met system requirements

- **Improved plant availability**
- **Used IAC**
- **Utilized power purchases**
- **Few low voltage calls**

High system load affected restoration speed and flexibility

'95 STORM MORE SEVERE THAN '91, BUT LESS CUSTOMER/SYSTEM IMPACT

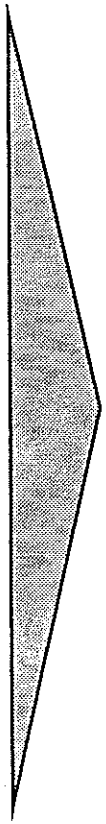
	Storm Severity				Customer Outages
	Wind Speed	Lightning Strikes	Storm Duration	% Territory Affected	
July 13, 15, 16 1995	60-80mph	10,725	720min	95%	~ 480,000*
July 7, 1991	60-80mph	1,650**	90min	50%	685,000*

* 1991 as audited; 1995 expected audited numbers.
**Estimate based on 824 strikes when lightning system failed with storm half way through service territory.

RELIABILITY PROGRAM: KEY DRIVER OF REDUCED CUSTOMER/SYSTEM IMPACT OF '95 STORM

Key Elements of Reliability Program

- Increased Line Clearance
- Pole-Top Maintenance – 20 to 25% of the circuits annually
- Lightning Protection
- Poor Performing and High Outage Circuits – Redesign and Reconfiguration
- New Circuits, Looped Circuit Design and Distribution Automation
- Maintenance Plan – 17 key areas
- Animal Protection



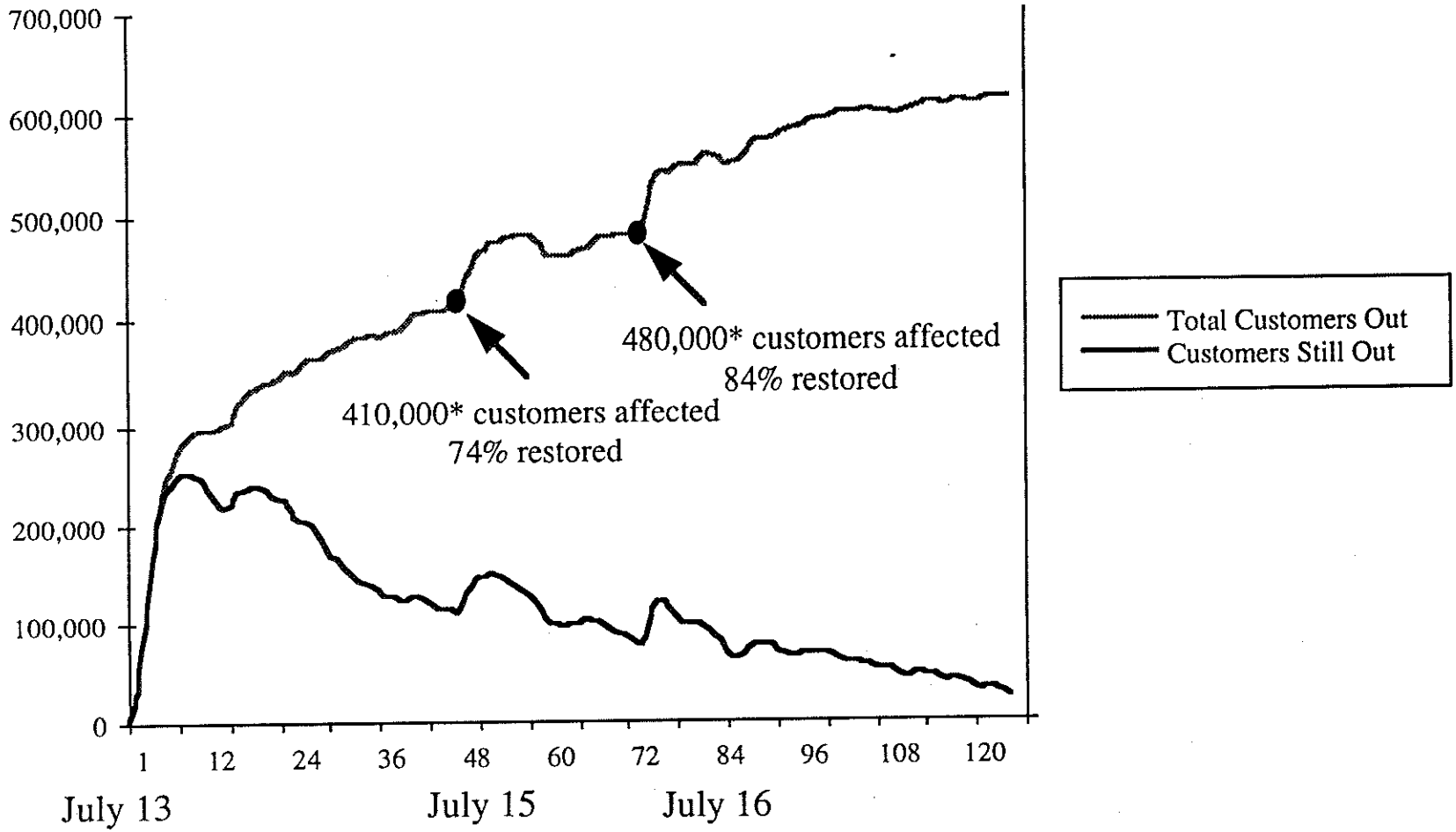
	Customer Outages	Wire Downs	Primary Cases
Actual '95	~480,000*	3,146	7,891
Potential '95** (Approx.)	720,000	7,000	12,000

* 1991 as audited; 1995 expected audited numbers

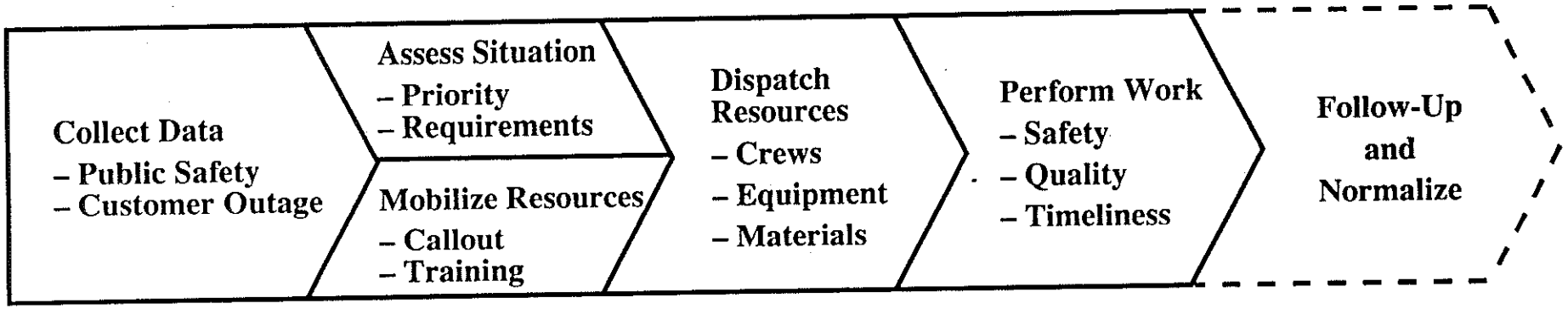
**Assuming '91 impact x '95 storm severity

DETROIT EDISON RESPONDED QUICKLY AND EFFECTIVELY TO THE CHALLENGES

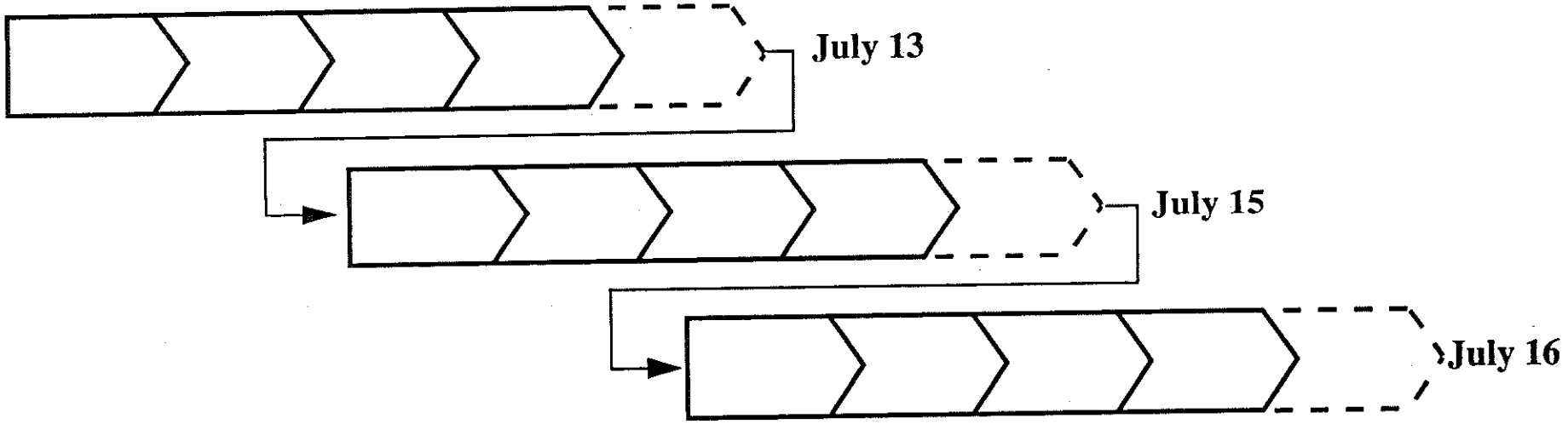
***Unaudited Outage Figures**



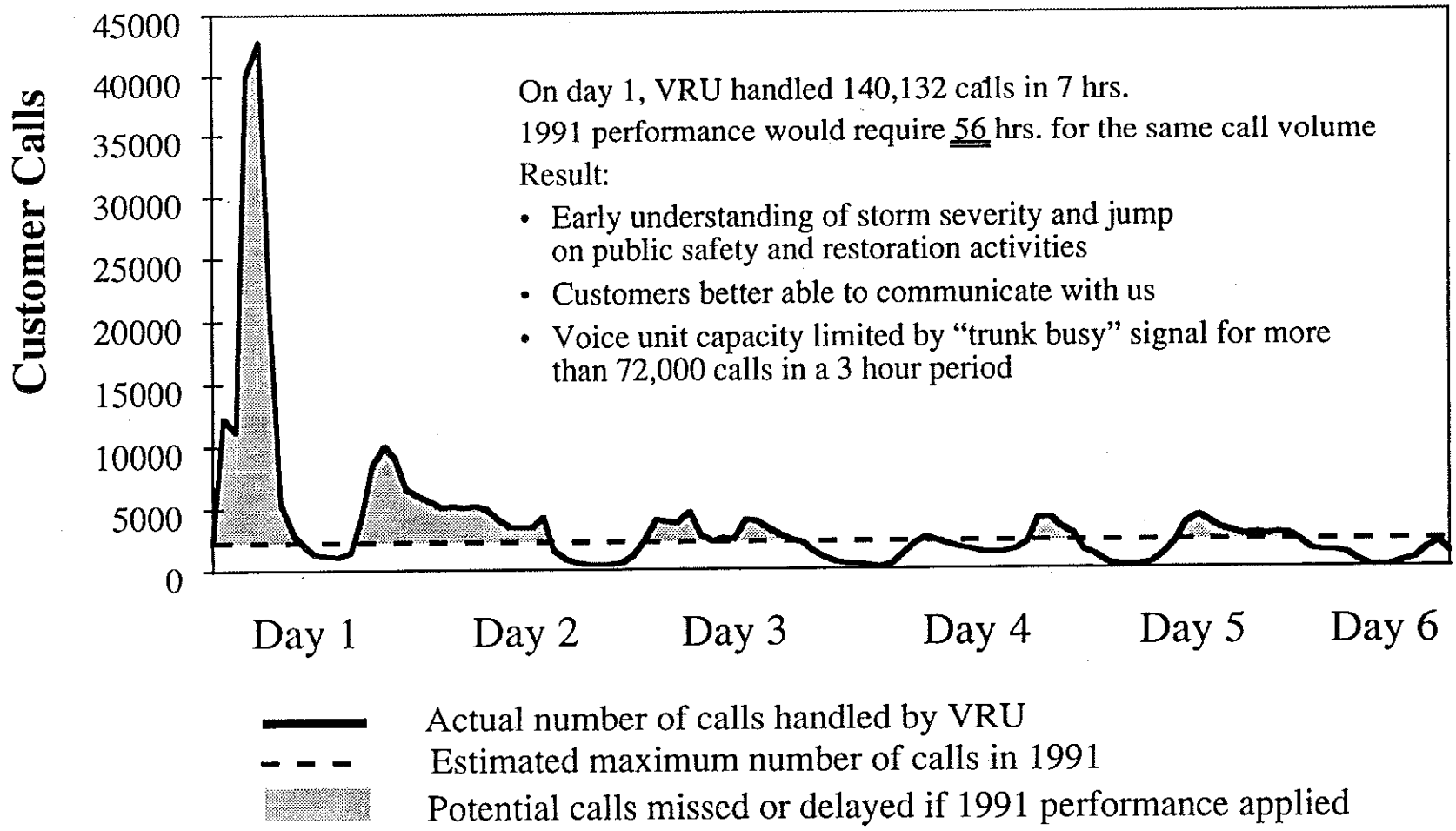
EFFECTIVE STORM MANAGEMENT



Our Situation:



VOICE RESPONSE UNIT (VRU) TECHNOLOGY ENABLED EARLY DATA COLLECTION AND ANALYSIS



QUICKLY MOBILIZED PUBLIC SAFETY TEAMS

- Utilized more than 2,400 people to guard downed wires
- 91% of all downed wires covered within 30 hours of event; 82% of police and fire calls covered within 4 hours
- Utilized quick response teams and roving supervisors to improve response time

MOBILIZED PERSONNEL FROM THROUGHOUT COMPANY

- Work force approached 7,400 people

	Estimated number of personnel*
Linemen	1,350
Line Clearance	350
Service Restoration	400
Wire Down	2,500
Support**	2,800
Total	7,400

- More than 5,000 Detroit Edison employees were involved (virtually every available person had an assignment)
- Drew from every area of the company to fill critical safety and restoration roles as well as key customer and community contact requirements

* Includes contract resources

** Includes communications, engineers, field technicians, field supervisors, operations and support

UTILIZED GREATER FIELD CREW RESOURCES TO ENSURE MORE TIMELY RESTORATION OF CUSTOMERS

- Linemen force:

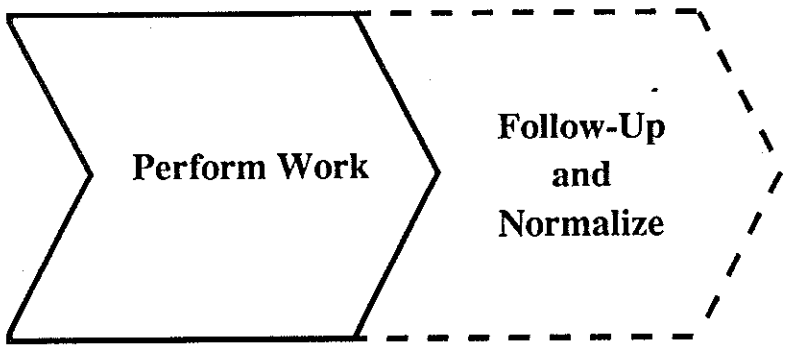
Detroit Edison	450
Contractors	300
Out-of-state contractors/other utilities*	600
	1,350

Resulted in restoration rate of about 3,200 customers per hour** (vs. 3,262 in '91)

* Includes Ohio, Indiana, Illinois, Kentucky, Pennsylvania, Maryland, New York, Consumers Power, Dayton Power & Light, NIPSCO)

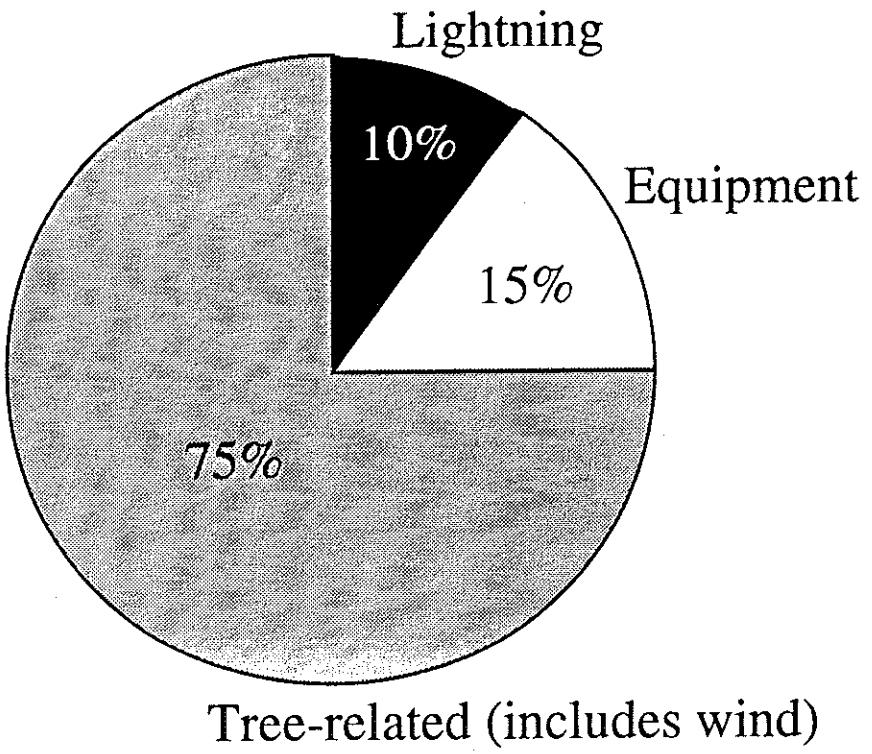
** Estimate based on 1995 expected audited outage numbers

ACCOMPLISHED SIGNIFICANT WORK, BUT FOLLOW-UP REMAINS



- **Expect additional work to restore final customers and effect permanent repairs**
  - **Temporary repairs**
  - **Low voltage problems may occur**
  - **New business connections schedules delayed**

AUDIT OF JULY '95 STORM CONFIRMS "RELIABILITY PROGRAM WORKS"



- Over 60% of tree-related cases were outside of trim area (e.g., hazard trees and overhang)
- Outages due to lightning strikes low relative to number of lightning strikes
- Pole-top structural damage low given high wind speeds and high wind variability

OPERATING AND CUSTOMER DATA CONFIRM RELIABILITY IMPROVEMENTS IN DAY-TO-DAY OPERATIONS

Detroit Edison has improved reliability considerably

- Frequency data place Detroit Edison second or third in major utilities benchmarking group
- Since the reliability program was implemented:
  - Frequency – reduced 43%, from an average of .72 to .41 outages per customer per year
  - Duration – reduced 79%, from an average of 273 to 57 minutes per customer per year
  - Customers interrupted more than 2 times per year – reduced 57%, from 14% to 6% of customers per year

And customer satisfaction data show improvement as well*

- Satisfaction with reliability – increased 14%, from 78% to 92%
- Satisfaction with restoration – increased 20%, from 70% to 90%

* Based on random customer survey conducted by market research firm.

INITIAL REFLECTIONS

Need to assess why so many customers were affected

Restoration efforts

- Technology – Assess current state of our technology and identify critical areas for improvement
- Communications
  - Customer in – Relatively good
  - Out to customer – Need to meet customer desire for estimated return of service
- Prevention
  - Line clearance
  - Lightning protection
  - System configuration and design

Managing record demand for electricity and severe weather was a significant challenge for streamlined organization, even as an integrated utility

July 1995 Catastrophic Storm

1995 Storm Facts -

Severe Wind and Lightning Storm starting about noon on July 13, 1995 with smaller storms on July 15th. and 16th.

Service Interrupted to 282,000 Consumers Power Customers

The following is a list of headquarters that experienced the most damage.

Headquarters	Customers Interrupted
Flint	68,000
Prudenville	25,000
Tri Cities	24,000
Tawas/Harrisville	20,000
Rose City	14,000
Standish	12,000
Jackson	12,000
Owosso	12,000
Adrian	12,000
Gladwin	9,000

Storm Response -

Restoration Summary Facts:

56% Restored by July 14th. (Flint 56%)
93% Restored by July 16 th. (Flint 96%)

Crewing Statistics:

410 Crews

Included in the hardest hit locations:
128 Line and Tree Contract Crews
22 Crews from Other Utilities
150 CPCo Crews

Wireguard Program:

2,611 Wiredowns
36% on site in 90 minutes, Flint 78% in four hours
June 1995 year-to-date - 91 % onsite in 90 minutes

July 1995 Catastrophic Storm

Distribution Storm Outages By Cause:

	Number of Occurences	Number of Customers
Trees	944	122,105
Lightning	2,002	136,236
Other	562	23,189

Transmission Storm Outages:

	Number of Occurences	Number of Customers
Outages	9	43,774

Ongoing Improvement Measures:

1) Maintain System Capacity

2) Maintain Vegetation Management

3) Continue Lightning Protection Improvement

4) Continue Sectionalizing Improvement

5) Expand Secruity Inspection (25% of Distribution System Annually)

a. Verify PDM (Primary Distribution Maps) accuracy
b. Verify DCM (Distribution Circuit Model) accuracy
c. Identify & correct safety violations
d. Identify & correct system defects causing imminent failure

Consumers Power Company
July 1995 Catastrophic Storm

1995 Weather Facts -

Severe Wind and Lightning Storm starting about noon on July 13, 1995 with smaller storms on July 15th. and 16th.

National Weather Service reported:

- Wind gusts to 70 MPH, Roofs blown off homes.
- Lightning Damage, Funnel clouds sighted, golf-ball sized hail.
- "Scores of trees and powerlines down"

Specifics on the Prudenville Area:

- waterspout near north shore of Houghton Lake
- Southeast Roscommon County
  - "Over 1000 trees down....."
- West Branch
  - Tornado reported by skywarn spotter at Greenwood Rd. & M-30
  - several boats capsized and docks damaged or destroyed
  - man injured at fairgrounds as thunderstorm winds tore down large tree
  - golf ball sized hail at intersection of M-33 & M-55

Specifics on the Flint Area:

- Widespread wind damage, trees and powerlines down
- "Uprooted trees.....3 mile stretch of Road"
- "Tornado on the ground for 10 minutes"
- Roof blown off home.

July 1995 Catastrophic Storm

Communication -

Outage and Safety Messages:

13 Media Storm Updates Issued to 1,398 Outlets
226 Media Interviews

Wiredown Adds:

3 Ads per hour on 29 Radio Stations (1,007 Paid Ads)

Total Calls Handled:

109,370 Calls vs 282,000 Customers Effected
1991 Storm 94,704 Calls vs 505,100 Customers Effected
61% TSF for July 13th 5:00 p.m. thru July 16th