

Michigan Public Service Commission

Staff Investigation

**Detroit Edison
Distribution System Reliability**

**November 1999
Engineering Section
Electric Division**

1. Executive Summary

On July 23-24, 1999 intense lightning and wind storms struck the Detroit Edison (DE) service territory. The storms, characterized by winds exceeding 65 miles per hour and 4172 lightning strikes to ground, interrupted power to over 264,000 DE customers. Hardest hit was the DE Northwest Region with nearly one half the total number of outages. On July 31, 1999 another intense wind and lightning storm struck the DE service territory. This storm had local top winds of 83 miles per hour, 1100 lightning strikes to ground and interrupted over 225,000 customers. Again the Northwest Region had nearly one half the total number of outages.

Reacting to the large number of outages caused by these storms, the Michigan Public Service Commission (MPSC) directed its Staff to investigate the reliability of the DE distribution system. This report contains the results of the Staff investigation.

This is the third Staff investigation since 1991 that addresses the reliability of the DE distribution system and the company's storm response capability. The two previous investigations included the Consumers Energy Company (CE), but the 1999 storms did not strike very severely in the CE service territory. In 1991 the MPSC initiated Case No. U-9916 which requested public hearings, a Staff investigation and report. Case No. U-9916 resulted in an agreement between DE and Staff that established certain reliability performance targets and reporting requirements. After a period of several years of improved performance and only one major storm, the DE service territory was hit by a storm in 1995 that interrupted service to 450,277 customers. The MPSC initiated another series of public hearings and a Staff investigation in

Case No. U-10908. This case resulted in additional reliability performance targets and reporting requirements.

In carrying out the current investigation Staff reviewed the investigation reports and Commission orders from Case Nos. U-9916 and U-10908. Staff also reviewed DE annual reliability reports and presentations to Staff, DE individual storm reports, annual DE financial reports, and DE and Staff complaint data. In addition, Staff met with company personnel, made site visits and reviewed DE responses to specific information requests. Staff has the following conclusions and recommendations.

1.1 Conclusions

1. The period from 1997-1999 included 3 of the 4 worst storm years since 1991. In 3 of these years, wind speeds exceeded 80 mph and approximately one million DE customers experienced power interruptions. These storms have had a substantial impact on DE customers' actual and perceived reliability.

2. Frequent outage complaints to DE and the MPSC have increased significantly over the past 3 years. The number of frequent outage complaints to the MPSC has doubled. DE has seen a 66% increase. Customers complain to the MPSC about long waiting times when they try to call the DE toll free number. The DE complaint process has difficulty handling the high volumes of complaints which accompany customer-disturbing events such as a severe storm. This difficulty has resulted in increased numbers of complaints received by the MPSC. DE plans to increase staffing levels of Customer

Representatives from 288 to 350 people operating over three shifts late in 1999.

3. Since 1991 the DE distribution system performance, excluding the impact of severe storms, has met the outage frequency and duration performance targets established by the 1991 Case No. U-9916 agreement. When storms are included, reliability has declined substantially over the past three years.

4. Since the 1995 Case No. U-10908 agreement, DE has been implementing what it calls a “pocket program”. The pocket program is designed to identify and improve reliability problems for customers in poor performing areas or pockets. A pocket is defined as a group of more than 10 customers in a specific area or locale who have had more than 2 outages per year in successive years. The program has resulted in a 76-85% reduction in the number of these pockets of customers. There remain 3,014 customers who have been in poor performing pockets for two successive years. There also are 597 customers who have been in poor performing pockets for three successive years. The DE pocket program does not currently include the impact of severe storms.
5. Approximately 60% of all outages occur on 13.2 kv overhead lines. Twenty five percent of outages occur on 4.8 kv overhead lines. A relatively small number of outages involve substations or underground lines. The average frequency of outages on the 13.2 kv system has improved substantially since 1991. Even with increases in recent years due to the storms, the 1998 frequency of 0.38 outages per year was 72% better than experienced in 1991.
6. The most significant cause of outages on the DE system has been wind and tree contact. In severe storm years, wind and tree contact have caused 30-52% of all outages. From 1994-1998 the number of outages caused by wind and trees increased 8-fold. This represents a deterioration of performance back to 1991 levels. Equipment failures contributed to 20-40% of all outages.
7. The 4.3 year average tree trimming cycle DE committed to in the Case No. U-10908 agreement has never been met. Since 1991 the tree trimming cycle has averaged 5.8 years. While inadequate tree trimming appears to be a major contributor to DE outages, it should be noted that a significant number of outages are caused by trees located outside the normal trimming corridor.
8. Alternative construction types exist which can be used in areas where trimming trees is not practical or aesthetically undesirable from a customer perspective. These options result in higher costs. Hendrix overhead

spacer cable appears to be one option that is more economical and less disruptive to trees, property and roads when compared to underground installations.

9. Operation and maintenance (O&M) expenses, adjusted for storm restoration, have remained essentially level since 1991. The \$133 million of non-storm O&M spent in 1997 was the same as DE spent in 1992, a mild storm year. The \$163 and \$168 million spent in 1997 and 1998 respectively included extensive storm related expenses. These amounts were about the same as was spent in 1991, which was also a severe storm year. Tree trimming expenses have remained flat from 1991 to 1998, averaging about \$32 million per year. The 1999 DE budget for tree trimming has been increased to \$42.7 million.
10. The level of capital spending for distribution system improvement excluding storm restoration has been relatively flat since 1994. With the exception of increases to \$94 and \$115 million per year immediately following previous Staff investigations, capital spending for system strengthening has averaged about \$76 million per year. Meanwhile, DE distribution capital expenditures for new business has grown steadily by about 7.9% per year since 1991, to \$73 million in 1998.
11. The commitments implemented as part of the Case Nos. U-9916 and U-10908 agreements have substantially improved DE communication capabilities and responses to downed wires since 1991. The automated voice response unit (VRU) has increased the DE call handling capability from 2600 to over 40,000 calls per hour. The number of DE personnel trained for wire down duty has increased from 595 to 2400 people, which shortened times to relieve local fire and police personnel. DE plans additional upgrades to its communications systems in the 2000-2002 period. Implementation of an Internet communication system to interface with local fire and police personnel is one improvement. Another is a review of the seven year old VRU system to assess the need for possible upgrade or replacement. A third is a new Predictive Outbound Dialer which would expand their power outage status notification capability from 3500 to 17,000 calls per hour.

12. The number of DE substations has increased by an average of 1.1% per year since 1991. This growth rate is less than half the rate of growth in system sales or peak load. The result is that the DE distribution system is carrying higher loads on the circuits and impacting higher numbers of customers when the circuits have an outage. Staff also notes that some of the company's efforts to construct additional substations have been met by resistance of some citizens and communities.

1.2 Recommendations

Consistent with the Commission's statutory authority in MCL 460.6, MCL 460.551 and MCL 460.555 and rules promulgated by the Commission pursuant thereto, the Staff has the following recommendations:

1. Staff recommends that DE tree trimming be increased to meet the 4.3 year average trimming cycle target. This would require trimming 23% of the distribution and subtransmission lines each year, which currently equates to 6955 miles of line. Poor performing circuits may require more frequent trimming. The \$42.7 million budgeted for line clearance in 1999 should be spent with future increases depending on system performance.
2. Staff recommends DE work with Staff to develop reliability performance targets for Commission approval. These targets should include, but not be limited to, frequency of outages and duration of outages and performance criteria for poor performing pockets.
3. Staff recommends DE expand its poor performing pocket program to include the impact of all storms.
4. Staff recommends that DE review its programs for distribution system strengthening, pole top and line maintenance, downed wire reduction, secondary rewiring and others to demonstrate that activities are adequately funded and implemented in a manner which reduces outages due to equipment failures.
5. Staff recommends that DE strengthen its system with new substations, which can reduce loads vulnerable to circuit outages.

6. Staff recommends that DE expand its utilization of storm-resistant overhead wiring configurations such as Hendrix spacer cable. Such alternatives would improve reliability in areas where optimal tree trimming is not practical or permitted due to land owner objections.
7. Staff recommends DE work with Staff to identify levels of distribution capital and O&M spending which optimize system performance and reliability. A mechanism should be established to link reliability performance and distribution spending levels to the company's allowed rate of return. This could be similar to the concept proposed by Staff in Case No. U-11495.
8. Staff recommends DE work with Staff to improve the responsiveness of its toll free number and complaint processes.

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