

Illinois Commerce Commission
Assessment of
MidAmerican Energy Company's
Annual Reliability Report and
Electric Service Reliability
For Calendar Year 2005

Pursuant to 83 Ill. Adm. Code 411.140

December 2006

1. Executive Summary

Pursuant to Section 16-125 of the Illinois Public Utilities Act and the Commission's electric reliability rules found in 83 Illinois Administrative Code, Part 411 ("Part 411"), MidAmerican Energy Company ("MEC" or "MidAmerican") filed its annual electric reliability report for the 2005 calendar year. The report MEC filed was organized in such a manner that information could be located easily, and it fully complied with Part 411 reporting requirements.

During 2005, MEC's system average interruption frequency index ("SAIFI") and customer average interruption frequency index ("CAIFI") were the highest (worst) reported by Illinois utilities, while MEC's customer average interruption duration index ("CAIDI") was one of the lowest (best) reported. These indices indicate that, on average, MEC's Illinois customers experienced more but shorter interruptions than customers of other reporting utilities.

During the summer of 2006, Staff inspected three of MEC's Illinois distribution circuits that had relatively high SAIFI values during the 2005 calendar year. Two of the circuits Staff inspected appeared to be in good shape, but when inspecting the third circuit Staff observed several locations where MEC's distribution facilities appeared to be in a deteriorated condition. Staff also found several National Electrical Safety Code violations on that circuit, which MEC agreed to promptly correct.

After reviewing MEC's reliability report and inspecting its circuits, Staff recommends that MEC:

- Conduct more frequent inspections of its overhead distribution lines,
- Respond more promptly with corrective actions once it identifies threats to reliable service,
- Continue to install animal protection on distribution facilities in problem areas,
- Re-emphasize with its tree trimming personnel that all trees adjacent to its distribution circuits must be cleared so that they do not contact the power lines prior to being trimmed again, and
- Ensure that its personnel are instructed to identify distribution facilities that do not meet the specifications set forth in the National Electrical Safety Code.

Table of Contents

1.	Executive Summary.....	i
2.	Introduction.....	1
3.	Description of Customers and Service Territory.....	1
4.	Description of Electric Distribution System.....	1
5.	Assessment of Company's Reliability Report.....	2
6.	Historical Performance Relative to Established Reliability Targets.....	2
7.	Analysis of Reliability Performance.	3
8.	Trends in Reliability Performance.....	13
9.	Plan to Maintain or Improve Reliability.....	20
10.	Potential Reliability Problems and Risks.....	21
11.	Implementation of the Plan Listed in the previous Reliability Report.....	23
12.	Summary of Recommendations.....	23
	Summary of Staff's Circuit Inspection Findings	Attachment A

2. Introduction

This document assesses the reliability report that MidAmerican Energy Company ("MEC" or "MidAmerican") filed covering the 2005 calendar year, and evaluates MEC's reliability performance for that year.

83 Illinois Administrative Code Part 411.140 requires the Commission to assess the annual reliability report of each jurisdictional entity and evaluate the entity's reliability performance. Code Part 411.140 requires the Commission evaluation to:

- A) Assess the reliability report of each entity.
- B) Assess the jurisdictional entity's historical performance relative to established reliability targets.
- C) Identify trends in the jurisdictional entity's reliability performance.
- D) Evaluate the jurisdictional entity's plan to maintain or improve reliability.
- E) Identify, assess, and make recommendations pertaining to any potential reliability problems and risks that the Commission has identified as a result of its evaluation.
- F) Include a review of the jurisdictional entity's implementation of its plan for the previous reporting period.

3. Customers and Service Territory

MEC provided electric service to approximately 84,000 Illinois customers during 2005. MEC's Illinois service territory includes urban areas near the Quad Cities as well as surrounding rural areas and smaller communities within the counties of Rock Island, Henry, and Mercer.

4. Description of Distribution System

MEC states its distribution system in Illinois, which is made up of 13.2 and 4kV circuits, utilizes 8,119 miles of overhead conductor, and 663 miles of underground conductor. MEC's distribution circuits originate at substations that are supplied by MEC's 161kV and 69kV transmission lines that loop through the Quad Cities area.

Subsection 411.120(b)(3)(G) requires MEC to report on the age and condition of its distribution and transmission facilities. MEC indicated the average age of its substation equipment is 25 years; the average age of its poles and fixtures is 33 years; the average age of its distribution transformers is 23 years; and the average age of its underground conductors and devices is 21 years.

MEC stated that it schedules a complete patrol and inspection of each distribution circuit on a 10-year cycle, and that follow-up maintenance and construction is performed as required. MEC also stated that it notes and addresses problems on its distribution circuits that are found by tree trimmers or during periodic inspection of line equipment, such as capacitors, reclosers, and voltage regulators. Based on the results of its various inspections and follow-up

maintenance and construction activity, MEC concluded its facilities are adequately constructed, inspected, and maintained to provide safe and reliable service to its Illinois customers.

5. Assessment of Company's Reliability Report

83 Illinois Administrative Code Part 411.120(b) requires each non-exempt jurisdictional entity to file an annual reliability report for the previous calendar year by June 1 of the current year. MEC's 2005 reliability report was filed on schedule and contained all the information necessary to comply with Subsection 411.120(b)(3) requirements. Staff found that MEC's reliability report was organized in a logical manner so that finding information within the report and the attachments was not difficult. As was the case with MEC's report for 2004, Staff was pleased with MEC's descriptions of progress on specific projects it listed in its previous year's reliability report.

6. Historical Performance Relative to Established Reliability Targets

Code Part 411.140(b)(4)(A-C) establishes electric service reliability targets that jurisdictional entities (utilities) must strive to meet. These targets specify limitations on customer interruptions as well as hours of interruption that a utility must strive not to exceed on a per customer basis. Code Part 411.120(b)(3)(L) requires each utility to provide a list of every customer, identified by a unique number, who experienced interruptions in excess of the service reliability targets, the number of interruptions and interruption duration experienced in each of the three preceding years, and the number of consecutive years in which the customer has experienced interruptions in excess of the service reliability targets.

In April 2004, all regulated Illinois electric utilities agreed to report on all interruptions (controllable and uncontrollable) in relation to the service reliability targets for the reporting periods of 2003 through 2007, and to include the specific actions, if any, that the utility plans or has taken to address the customer reliability concerns. The customer service reliability targets are listed in Table 1:

Table 1: Service Reliability Targets

Immediate primary source of service operation voltage	Maximum number of interruptions in each of the last three years	Maximum hours of total interruption duration in each of the last three years
69kV or above	3	9
Between 15kV & 69kV	4	12
15kV or below	6	18

In Supplement Attachment A to its reliability report MEC indicated that in 2005, 20 of its Illinois customers experienced interruptions in excess of the targets, down from 175 Illinois customers listed in MEC's 2004 Reliability Report. The 20 customers were supplied by 2 different circuits and all experienced interruptions that exceeded the quantity reliability target (more than 6 interruptions for at least 3 consecutive years). None of MEC's Illinois customers experienced

interruptions that exceeded 18 hours for 3 consecutive years. MEC indicated that two of its Illinois customers experienced more than 6 interruptions each year for four consecutive years.

Subsection 411.140(b)(4)(D) requires the Commission's assessment to determine if MEC has a process in place to identify, analyze, and correct service reliability for customers who experience a number or duration of interruptions that exceeds the reliability targets. Staff is satisfied that MEC can identify and analyze service reliability for customers who experience interruptions that exceed the targets. Staff was very pleased that the number of customers that experienced interruptions in excess of the targets decreased significantly from 175 customers in 2004 to 20 customers in 2005. However, Staff was disappointed that MEC did not indicate it had yet taken any steps, other than responding to each interruption as it occurred and performing regularly scheduled maintenance, to improve reliability for these 20 customers, two of whom have experienced more than six interruptions for at least four consecutive years.

Staff believes that when one or more customers experience interruptions that approach or exceed reliability targets, minimally MEC should promptly inspect its distribution facilities supplying the affected area, and aggressively remove any additional threats to reliable service that it finds, even if the threats do not relate to the interruptions that have already occurred. In December of 2005, MEC reported that it had begun monthly reviews of customers experiencing 3 or more interruptions during a 3-month rolling window, and quarterly reviews of customers experiencing 7 or more interruptions in a 12-month rolling window. MEC further indicated that reliability improvements for these customers would be implemented if warranted. Staff was encouraged to learn of MEC's reviews of customers experiencing multiple interruptions because, unless MEC responds to interruptions to its customers in a prompt and proactive manner, some customers will continue to experience interruptions in excess of reliability targets.

7. Analysis of Reliability Performance

Reliability indices can be used to compare the reliability performance of several utilities, and provide an indication of whether an individual utility's performance is improving or degrading over time. Since each reporting utility uses its own reporting and recording methods, direct reliability index comparisons between utilities are not exact, but can still be informative. When comparing the indices reported by all the utilities that filed reliability reports for 2005, Staff observed:

- MEC's SAIFI of 1.77 was the highest reported for 2005: about 59% higher than the average of the values reported by the other seven utilities.
- MEC's CAIDI of 72 was the second lowest reported for 2005: about 46% lower than the average of the values reported by the other seven utilities.
- MEC's CAIFI of 2.38 was the highest reported for 2005: about 38% higher than the average of the values reported by the other seven utilities.

Table 2 (a-c) shows the SAIFI, CAIDI, and CAIFI indices for 2005 as submitted by each reporting utility. Each index table is sorted from best to worst performance:

Table 2: Year 2005 Reliability Indices for Reporting Utilities

a) SAIFI		b) CAIDI		c) CAIFI	
UTILITY	SAIFI	UTILITY	CAIDI	UTILITY	CAIFI
IPL	0.54	Mt. Carmel	66	IPL	1.30
South Beloit	0.69	MidAmerican	72	South Beloit	1.42
ComEd	1.18	ComEd	104	Mt. Carmel	1.43
AmerenCILCO	1.23	AmerenCIPS	112	AmerenIP	1.81
AmerenIP	1.38	South Beloit	135	ComEd	1.95
AmerenCIPS	1.38	IPL	162	AmerenCILCO	2.02
Mt. Carmel	1.39	AmerenCILCO	165	AmerenCIPS	2.12
MidAmerican	1.77	AmerenIP	196	MidAmerican	2.38

$$\text{SAIFI} = \frac{\text{Total \# Customer Interruptions}}{\text{Total \# Customer Served}}$$

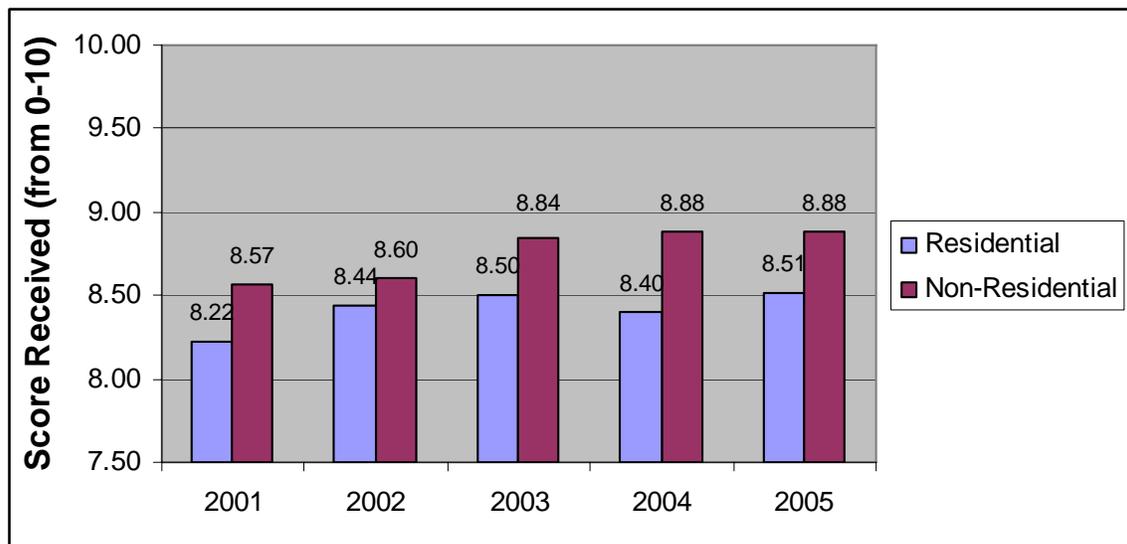
$$\text{CAIDI} = \frac{\text{Sum of all Interruption Durations}}{\text{Total \# Customer Interruptions}}$$

$$\text{CAIFI} = \frac{\text{Total \# Customer Interruptions}}{\text{Total \# Customers Affected}}$$

MEC stated it had no Illinois customers receiving power from another utility or ARES during 2005. Therefore a comparison of interruption frequency and duration for MEC's customers buying from MEC versus buying from another utility or ARES is not feasible.

Independent survey results indicate that for 2005, MEC's residential customers gave MEC a reliability score of 8.51 out of 10, and its non-residential customers gave MEC a reliability score of 8.88 out of 10. These scores are fairly consistent with MEC's scores from recent years, as illustrated by Figure 1:

Figure 1: MEC's Survey Score for Providing Reliable Electric Service (2001-2005)



MEC stated that it had no unresolved complaints from customers during 2005. The number of MEC's complaints from Illinois customers that related to excessive outage frequency, which had increased by more than 300% from 2002 to 2004, decreased in 2005 from 2004 levels by nearly 40%.

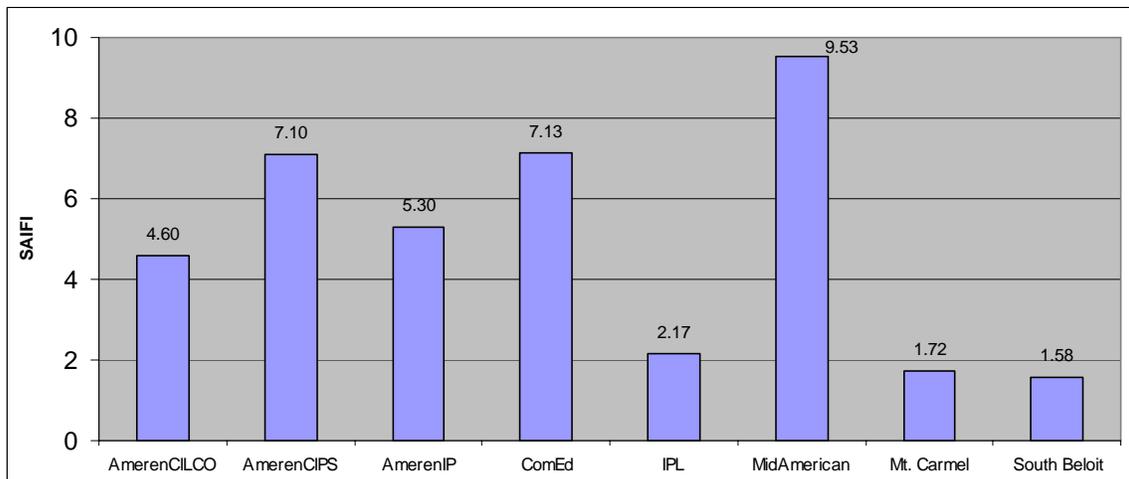
Worst Performing Circuits

Section 411.120 requires utilities to report worst performing circuits and state corrective actions taken or planned to improve the performance of those circuits. Worst performing circuits for each reporting utility are its 1% of circuits that had the highest SAIFI, CAIDI, and CAIFI during the report year. MEC reported only 2 circuits as worst performing circuits during 2005 because the same circuit (Circuit 13-28-2) was MEC's worst performing circuit for both SAIFI and CAIFI.

A utility must report worst performing circuits even if all its circuits performed well during the year: the Part 411 requirement is simply that the utility report its circuits that performed the worst based on each reliability index. Since designating a circuit as a worst performing circuit does not necessarily indicate that the circuit performed poorly, comparing the index values for worst-case circuits from utility to utility can be useful when assessing the relative performance of circuits among several utilities.

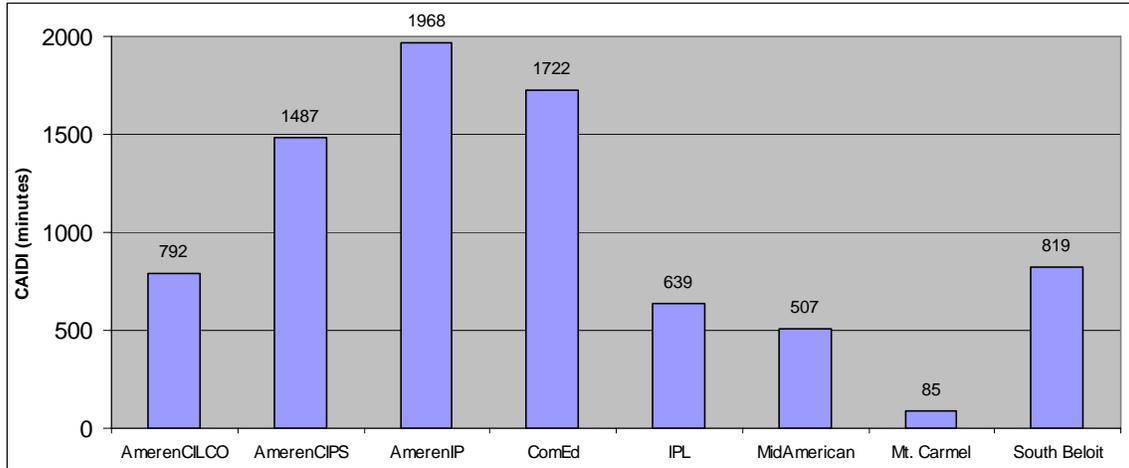
- As illustrated by Figure 2, the highest values of SAIFI for individual distribution circuits (worst performing) reported by each utility during 2005 ranged from 1.58 for South Beloit Water, Gas, and Electric Company to 9.53 for MEC. The SAIFI associated with MEC's Circuit 13-28-2 (9.53) was the highest single-circuit SAIFI reported by any Illinois electric utility for the 2005 calendar year.

Figure 2: Highest Reported SAIFI for 2005 Worst Performing Circuits



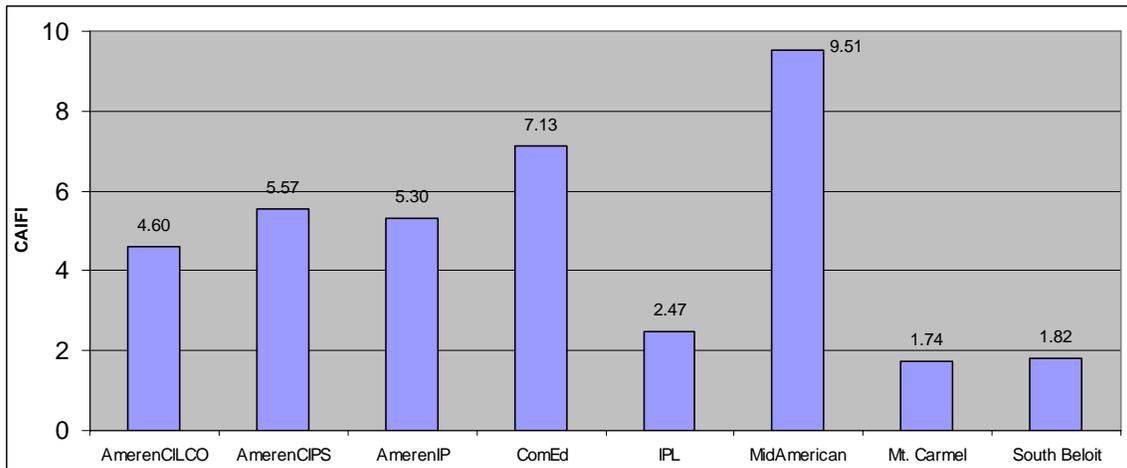
- As illustrated by Figure 3 the highest value of CAIDI reported for an individual distribution circuit during 2005 ranged from 85 (Mt. Carmel Public Utility Company) to 1968 (AmerenIP). MEC's highest CAIDI for an individual circuit in 2005 (507) was the 2nd lowest (best) value reported.

Figure 3: Highest CAIDI for 2005 Worst Performing Circuits



- As illustrated by Figure 4, the highest value of CAIFI reported for an individual distribution circuit during 2005 ranged from 1.74 (Mt. Carmel Public Utility Company) to 9.51 (MEC). As with SAIFI, the CAIFI associated with MEC's Circuit 13-28-2 was the highest single-circuit CAIFI reported by any Illinois utility for the 2005 calendar year.

Figure 4: Highest CAIFI for 2005 Worst Performing Circuits



MEC included statements in its reliability report regarding the operating and maintenance history of the 2 circuits it designated as worst performing circuits, Circuits 13-28-2 and 13-102-2, and listed corrective actions, taken or planned:

MEC stated there were nine whole-circuit outages of Circuit 13-28-2 during 2005, causing it to be a worst performing circuit due to both SAIFI and CAIFI. MEC

stated it patrolled Circuit 13-28-2 during the first quarter of 2006 and then initiated projects to install lightning arresters, additional cutouts, animal guards, and guy guards, with work scheduled to be completed by the end of 2006. MEC also stated that tree trimming was completed during the first quarter of 2006. Staff believes the actions MEC described should improve the performance of this circuit, but would encourage MEC to undertake additional maintenance, and do so more promptly. Circuit 13-28-2 will be discussed in more detail later in this report.

Circuit 13-102-2 was MEC's worst performing circuit during 2005 due to CAIDI. MEC explained that a single storm-caused outage involving the failure of a pole that supported both 69kV transmission and Circuit 13-102-2 caused the high CAIDI for this circuit. Corrective action was performed at the time, and MEC did not disclose plans for any additional corrective action. If it has not done so, Staff recommends MEC test the remaining poles that jointly support the 69kV and Circuit 13-102-2 to confirm they are in good shape, and repair or replace any poles that are found to be deteriorated.

Staff's Circuit Inspections

On July 19 and 20, 2006, Staff inspected three of MEC's distribution circuits that had higher than average SAIFI indices during 2005: Circuit Q48202, Circuit 13-18-1, and Circuit 13-28-2. An MEC representative accompanied Staff during these inspections.

While MEC's distribution facilities appeared to be maintained fairly well on Circuits Q48202 and 13-18-1, Staff noted deteriorated and/or damaged facilities, blown lightning arresters, tree contacts, and National Electrical Safety Code ("NESC") clearance violations on Circuit 13-28-2, which was a worst performing circuit with the highest single-circuit SAIFI reported by any Illinois electric utility during 2005. The items Staff noted during the inspections were discussed with the MEC representative that accompanied Staff and were also summarized and sent to MEC in a follow-up communication (see Attachment A). Additional information regarding each of the circuits that Staff inspected follows:

- *Circuit Q48202 (13.2 kV): (SAIFI=8.69; CAIDI=66; CAIFI=8.72)*

Circuit Q48202, which supplies electricity to the northeastern part of the community of Silvis, was not reported as a worst performing circuit during 2005, but MEC reported values for SAIFI and CAIFI that were the 2nd worst for any single circuit in Illinois during 2005 (MEC's Circuit 13-28-2 had the highest reported values). MEC stated its findings from its most recently scheduled inspection of this circuit, in 1998, were unavailable, and Staff had no way to verify that the 1998 inspection actually took place.

Of the 24 interruptions that occurred on Circuit Q48202 during 2005, MEC reported that 11 were weather-related, 6 were caused by the failure of overhead equipment, and 4 were animal-related. MEC reported no tree-caused interruptions. Tree trimming was last completed in October 2005, and is scheduled again for October 2008.

Staff's 2006 inspection identified only four locations where threats to reliable service were visible, and MEC appeared to already be aware of two of those locations, as two deteriorated poles had already been marked for replacement. Staff noted one additional deteriorated pole and one location along 4th Avenue, in Silvis, where several trees were contacting or very close to the conductor (Photo 1). These trees were apparently not trimmed at the time MEC trimmed trees along the rest of the circuit, in October of 2005.

Photo 1: Oak tree growing into and burning on primary wires (Q48202)



- *Circuit 13-18-1 (13.2 kV): (SAIFI=3.53; CAIDI=37; CAIFI=3.53)*

Circuit 13-18-1 supplies customers in a commercial/industrial area of southern Rock Island. Though Circuit 13-18-1 had SAIFI and CAIFI values that were higher than MEC's system values in 2005, it was not a worst performing circuit. MEC reported 15 sustained interruptions on this circuit during 2005. Six of these interruptions were due to failed cable, 5 were caused by the public, and 2 were due to overhead equipment failure. In response to the underground interruptions, MEC stated it is replacing nearly 1600 feet of underground cable during 2006. Three of the interruptions caused by the public were vehicle accidents that caused an interruption to all customers on the circuit, and MEC indicated that during 2006 it will review the accident locations to determine whether its facilities should be relocated. MEC provided a copy of the results of its most recent inspection of Circuit 13-18-1, which occurred in 2003. As a result of that 2003 inspection MEC replaced insulators, installed guy guards, tightened hardware, and replaced ground molding. MEC's last completed tree trimming on Circuit 13-18-1 in January of 2005.

When inspecting Circuit 13-18-1, Staff observed that MEC's facilities appeared to be in good condition. Some line sections extend across private property, including parking lots and driveways, to supply commercial/industrial structures, and some of these facilities could be inadvertently hit by truck traffic, though Staff did not note any MEC facilities obviously placed in the path of vehicles. Even though MEC noted 3 total circuit interruptions due to vehicle accidents, Staff noted MEC appeared to do a good job installing tap fuses to minimize the number of customers affected should such vehicle-caused interruptions occur. Staff noted only one reliability concern on Circuit 13-18-1: pine trees growing into the primary near the end of a single-phase fused tap. Staff expects that the corrective actions described above that MEC has taken or plans to take during 2006 will result in improved service for customers supplied by this circuit.

- *Circuit 13-28-2 (13.2 kV): (SAIFI=9.53; CAIDI=56; CAIFI=9.51)*

Circuit 13-28-2 supplies electricity to the mostly rural areas between the communities of Hillside and Port Byron. Circuit 13-28-2 had the highest single-circuit SAIFI and CAIFI reported by any Illinois utility for calendar year 2005. Of the 50 interruptions on this circuit during 2005, MEC reported 21 were weather related, 13 were animal related, 9 were tree related, and 6 were due to overhead equipment failure. MEC stated its findings from its most recently scheduled inspection of this circuit, in 1997, were unavailable, and Staff had no way to verify that the 1997 inspection actually took place. MEC indicated it had begun its general trimming for the circuit in January 2006.

During its inspection of Circuit 13-28-2 Staff noted trees contacting the primary conductor at three locations (examples are shown in Photos 2 & 3), and noted four locations where vines had grown to the primary level (an example is shown in Photo 4). Staff was concerned by the high number of detached or failing cross arm braces on the circuit (see Photos 4-7). Staff was pleased with MEC's placement of lightning arresters, but observed at least seven that were blown. Staff observed several locations with deteriorated or damaged cross arms and pole tops, or loose or damaged hardware (see Photos 7-9). Based on the numerous locations with deteriorated facilities, Staff would not be surprised if Circuit 13-28-2 exhibited poor performance again in 2006.

Photo 2: Oak tree growing through primary (13-28-2)



Photo 3: Oak tree grown through/around primary and burning (13-28-2)



Photo 4: Vine grown up pole to primary level –also a broken cross arm brace (13-28-2)



Photo 5: Failing brace (13-28-2)



Photo 6: Failed brace (13-28-2)



Photo 7: Splitting arm with brace detached & hanging (13-28-2)



Photo 8: Deteriorated arm (13-28-2)



Photo 9: Damaged pole top pin (13-28-2)



In addition to the observations described above, Staff noted at least 10 locations on Circuit 13-28-2 where MEC's facilities did not meet with requirements set forth in the National Electrical Safety Code ("NESC"). After Staff notified MEC of its findings, MEC informed Staff that MEC would modify its facilities so that they comply with NESC requirements by the end of October, 2006. Based on the number of locations MEC needed to modify, Staff was satisfied with MEC's response regarding the NESC violations.

MEC stated it has taken or will take additional steps to improve the reliability of Circuit 13-28-2. MEC indicated that during 2006 it would patrol and repair conductor on the mainline portion of Circuit 13-28-2, as required. In 2006, MEC completed tree trimming on Circuit 13-28-2, and initiated projects to install animal guards, lightning protection, guy guards, cutouts and ground moldings, and planned to replace 2 poles. Staff believes that all the actions MEC mentioned are appropriate, and should help the circuit perform more reliably. However, Staff believes MEC should again perform preventative maintenance on this entire circuit, including tightening hardware, replacing arms and braces, and replacing blown lightning arresters. Staff was disappointed that MEC had not already acted to eliminate more of the many threats to reliable service on this 2005 worst performing circuit by the time of Staff's inspection: Staff's inspection occurred in July of 2006.

Tree Trimming:

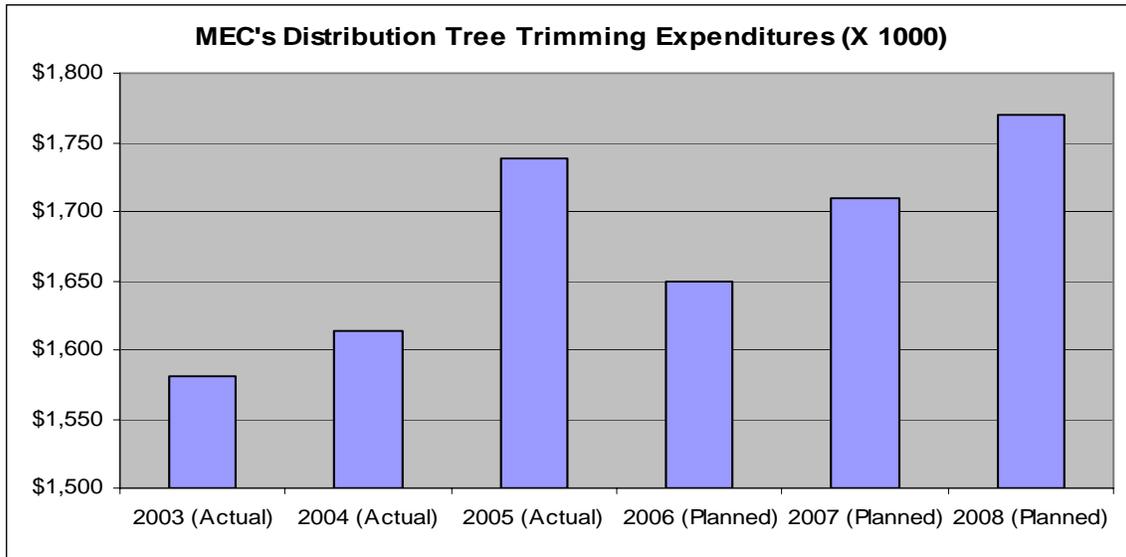
MEC indicated it maintains a tree-trimming cycle of between 3 and 4 years for its distribution circuits in Illinois. During Staff's circuit inspections that took place during the summer of 2006, Staff observed several locations where trees were contacting MEC's primary conductor, but these locations appeared to be isolated, and not indicative of the general tree conditions on the circuits. MEC appears to be doing an adequate job of keeping trees clear from its lines for most line sections Staff inspected. On all three circuits Staff inspected, Staff observed that MEC's tree trimmers simply did not trim individual trees: most often oak trees. In response to Staff's observation, MEC indicated that its tree trimmers do not trim oak trees from March 15 to September 1 to minimize spread of oak wilt disease, but instead return to trim oak trees after September 1. Staff suggests that if MEC maintains this policy for trimming oak trees, it should work ahead to clear oaks away from conductors before March 15 rather than allowing oak trees to contact its primary conductors through the summer storm season, and returning to trim the oak trees in the fall.

MEC indicated its customers experienced 209 tree related interruptions during 2005, which is a 14% decrease from the 244 MEC reported for 2004, and the lowest number of tree related interruptions that MEC reported during any calendar year since 2002. Staff believes that interruptions categorized as "weather related" and/or "unknown" sometimes also involve trees. Staff is encouraged that MEC's interruptions attributed to the combined categories of trees, weather, and unknown decreased by 33% from 2004 to 2005. This reduction includes a 52% decrease in the number of MEC's interruptions

categorized as weather related (from 629 in 2004, to 304 in 2005) and a 33% increase in interruptions with a cause identified as "unknown" (from 104 in 2004, to 138 in 2005).

Figure 4 illustrates MEC's actual annual expenditures for tree trimming for the years 2003 through 2005, and its budgeted/planned annual tree trimming expenditure for 2006-2008. All expenditures are shown in actual year dollars.

Figure 5: MEC's Distribution Tree Trimming Expenditures for Illinois in Actual Dollars



MEC explained that 2005 expenditures were higher than had been budgeted because significant storm related tree trimming work that year was not budgeted. Staff remains hopeful that MEC's level of tree trimming expenditures in 2006 and beyond will result in a continually improving tree trimming program that promotes a continued reduction in the number of tree-related interruptions.

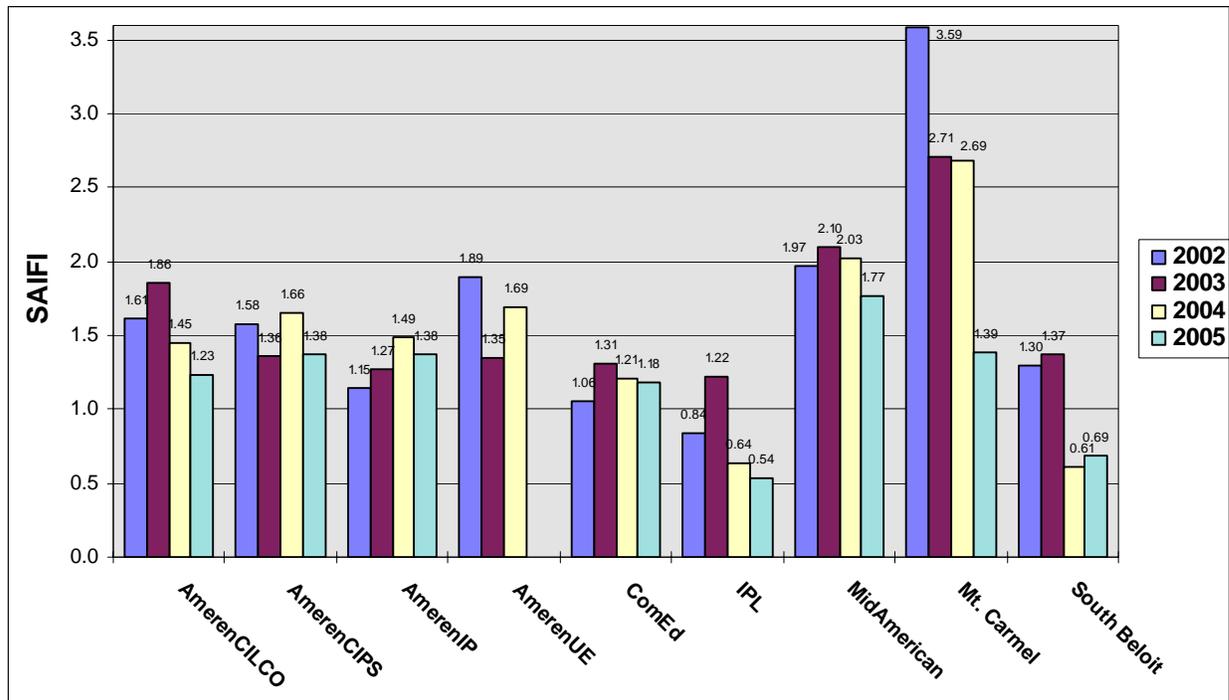
8. Trends in Reliability Performance

It is Staff's view that MEC's reliability performance as indicated by its reliability indices has not changed appreciably during the period 2002 to 2005. Though its system CAIDI increased slightly for 2005, it is still very low, which would indicate, at least generally, that MEC does a good job responding to interruptions that occur on its system. However, MEC's SAIFI and CAIFI values continue to be relatively high: the highest reported for the 2005 calendar year. These two indices, though somewhat lower for MEC in 2005 than in the previous two years, indicate that MEC should take additional steps to reduce the number of service interruptions its customers experience.

A comparison of MEC's reliability performance based on the reliability indices of all reporting utilities follows:

- **SAIFI:** Figure 6 shows system SAIFI values for years 2002-2005 for reporting electric utilities:

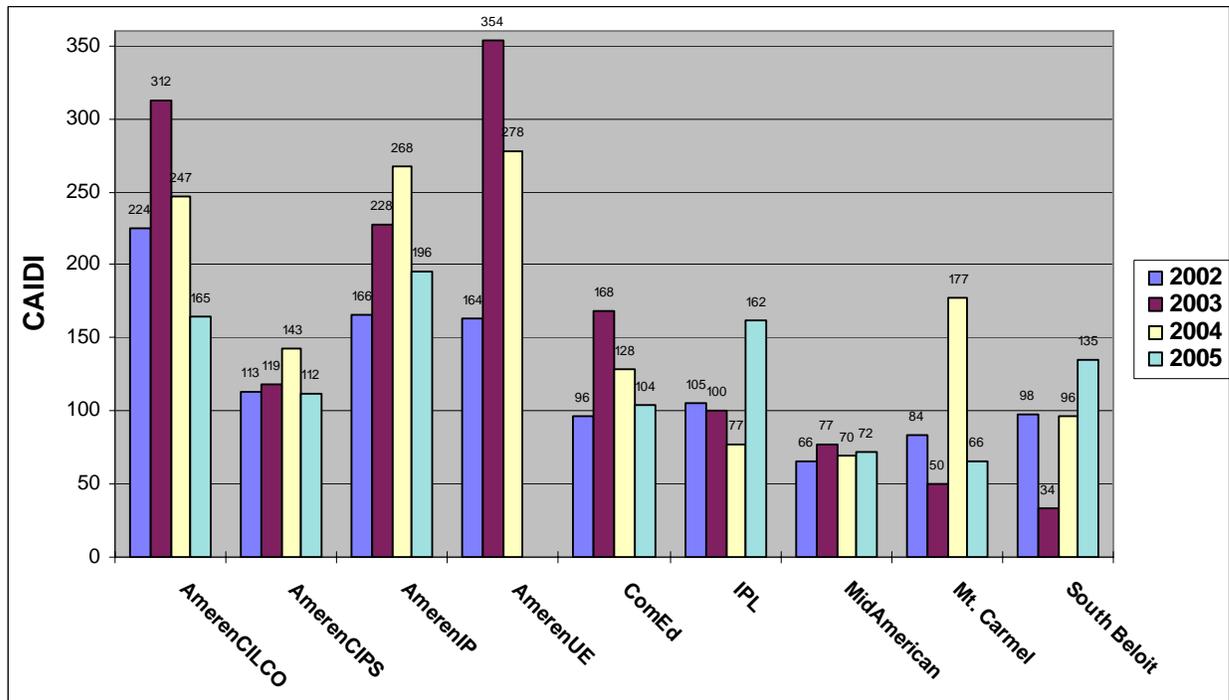
Figure 6: SAIFI by Utility



- In 2002, MEC's SAIFI was the second highest (worst) reported: about 21% higher than the average of SAIFI values reported by the other eight utilities (MEC's 2002 SAIFI=1.97).
- In 2003, MEC's SAIFI increased (worsened) by approximately 6%, and was again the second highest reported: about 35% higher than the average of the SAIFI values reported by the other eight utilities (MEC's 2003 SAIFI=2.10).
- In 2004, MEC's SAIFI decreased (improved) by about 3% from its 2003 value, and was yet again the second highest reported: about 42% higher than the average of the SAIFI values reported by the other eight utilities (MEC's 2004 SAIFI=2.03).
- In 2005, though MEC's SAIFI decreased (improved) by about 13%, MEC's SAIFI was the highest reported (MEC's 2005 SAIFI=1.77).

➤ *CAIDI*: Figure 7 shows system CAIDI values for years 2002-2005 for reporting electric utilities:

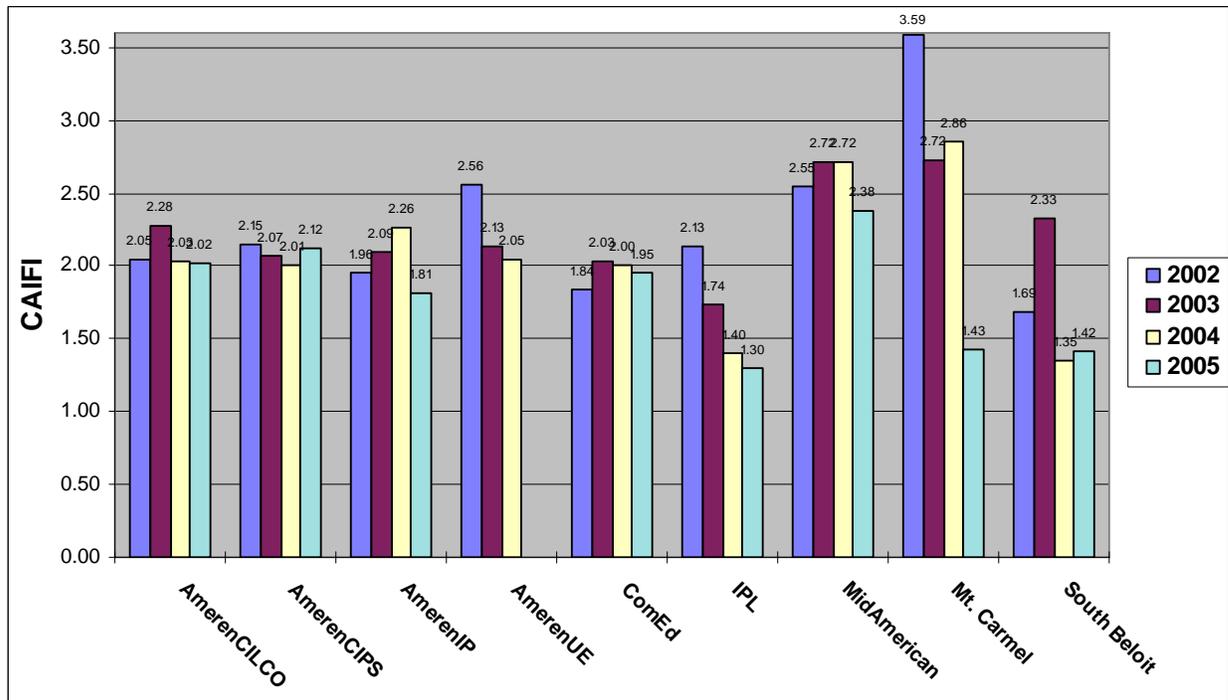
Figure 7: CAIDI by Utility



- In 2002, MEC had the lowest (best) CAIDI reported: approximately 50% lower than the average of the CAIDI values reported by the eight other reporting utilities (MEC's 2002 CAIDI=66).
- In 2003, MEC's CAIDI increased (worsened) by approximately 16%, but was still about 55% lower than the average of the CAIDI values reported by the eight other utilities (MEC's 2003 CAIDI=77).
- In 2004, MEC's CAIDI decreased (improved) by approximately 9%, and was again the lowest reported: about 60% lower than the average of the CAIDI values reported by the eight other reporting utilities (MEC's 2004 CAIDI=70).
- In 2005, MEC's CAIDI increased (worsened) by approximately 3%, and MEC reported the second lowest CAIDI value: 46% lower than the average of the CAIDI values reported by the other utilities (MEC's 2005 CAIDI=72).

- **CAIFI:** Figure 8 shows system CAIFI values for years 2002-2005 for reporting electric utilities:

Figure 8: CAIFI by Utility



- In 2002, MEC's CAIFI was about 14% higher (worse) than the average of the CAIFI values reported by the eight other utilities (MEC's 2002 CAIFI=2.55).
- In 2003, MEC's CAIFI increased (worsened) approximately 6% and was the highest (worst) value reported: about 25% higher than the average of the CAIFI values reported by the eight other utilities (MEC's 2003 CAIFI=2.72).
- In 2004, MEC's CAIFI stayed about the same as its 2003 value and was about 36% higher (worse) than the average of the CAIFI values reported by the eight other reporting utilities (MEC's 2004 CAIFI=2.72).
- In 2005, though MEC's reported CAIFI decreased (improved) by nearly 13%, MEC again reported the highest (worst) CAIFI value: 38% higher than the average of the CAIFI values reported by the other utilities (MEC's 2005 CAIFI=2.38).

A comparison between the changes in MEC's reliability indices from 2004 to 2005 to changes in the average of the indices from all the other reporting utilities for the same period reveals:

- MEC's SAIFI decreased (improved) by about 13%; the average of the SAIFI values of the other reporting utilities decreased by about 22%.
- MEC's CAIDI increased (worsened) by about 3%; the average of the CAIDI values of the other reporting utilities decreased by about 24%.
- MEC's CAIFI decreased (improved) nearly 13%; the average of the CAIFI values of the other reporting utilities decreased by about 14%.

Interruptions to Individual Customers

MEC's reliability report lists the number of customers that experienced various quantities of interruptions during the year. This information can indicate the level of reliable service MEC provided to individual customers.

- *Zero interruptions:* During 2005, 25% of MEC's customers experienced zero interruptions. This value was 31% during 2004, and 21% during 2003.
- *3 or Fewer Interruptions:* During 2005, more than 86% of MEC's customers experienced 3 or fewer interruptions. This value was 80% during 2004, and 79% during 2003.
- *7 or More Interruptions:* During 2005, 2.6% of MEC's customer experienced 7 or more interruptions. This value was 6.4% during 2004, and 3.7% during 2003.

Figure 9 illustrates that during 2005 the percentage of MEC's customers experiencing 3 or fewer interruptions was more similar to the percentage MEC achieved in 2000 and 2001. This improving statistic could be the result of MEC's maintenance efforts on poorly performing circuits, and fewer weather related customer-interruptions.

Figure 9: Percent of MEC Customers with 3 or Fewer Interruptions Annually (2000-2005)

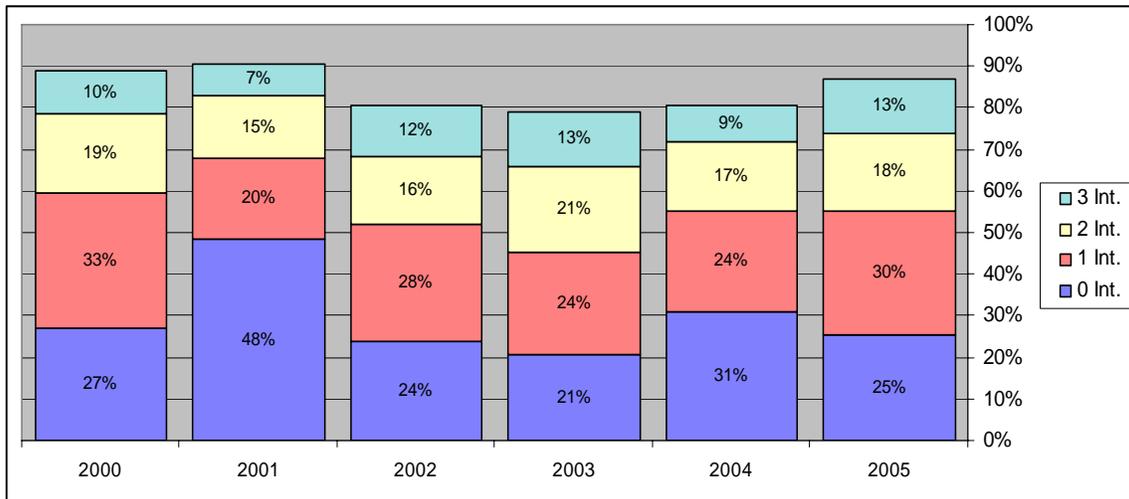
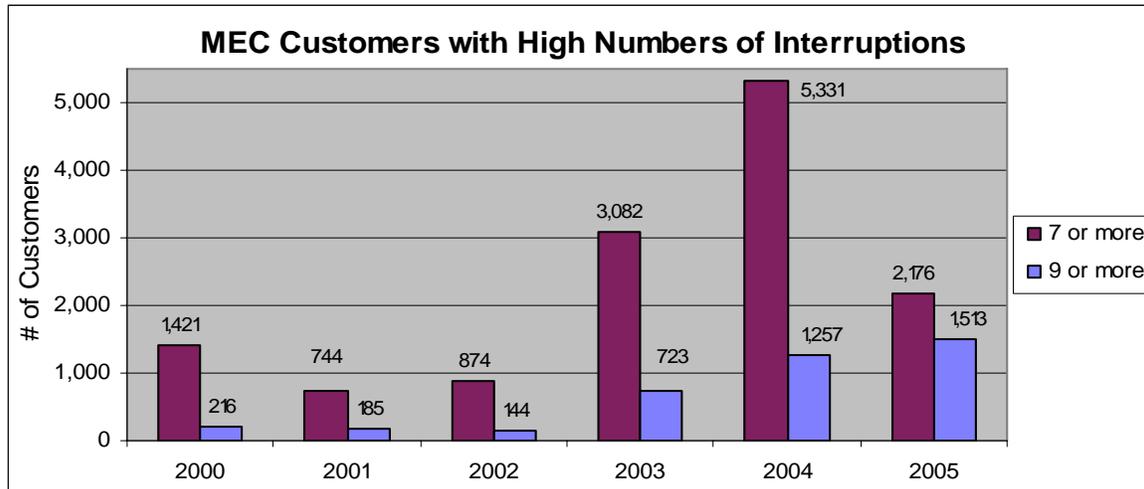


Figure 10 shows the number of MEC's customers that experienced 7 or more, and 9 or more, interruptions annually during the years 2000-2005. As Figure 10 illustrates, less than 1000 of MEC Illinois customers experienced 7 or more interruptions in 2001 and 2002, compared to more than 3000 in 2003, and 5331 in 2004. With significantly fewer MEC customers experiencing 7 or more interruptions during 2005 compared to 2003 and 2004, MEC appears to have reversed an undesirable trend in 2005.

Figure 10: Number of MEC Customers Experiencing 7 or More Interruptions Annually



However, Staff is very concerned that the number of MEC's customers experiencing 9 or more interruptions continued to increase in 2005 (Figure 10). Nearly 70% of MEC's customers that experienced 7 or more interruptions during 2005, in fact, also experienced 9 or more. MEC should prevent so many interruptions from occurring for these customers by monitoring their interruptions throughout the year, performing timely inspections of the line sections affected when interruptions occur, and following up its inspections with prompt remedial actions to address all reliability threats found during the inspections. MEC would then be taking steps to minimize the number of additional interruptions that occur for those customers who already have experienced so many interruptions.

Customer Interruption Cause Categories

Table 3 shows MEC's interruptions for 2003-2005 attributed to the various interruption categories listed in Table-A of Part 411. Table 3 illustrates that there were approximately 17% fewer interruption events on MEC's Illinois distribution system during 2005 than during either 2004 or 2003.

Table 3: MEC's Interruptions by Cause for Calendar Years 2003 to 2005

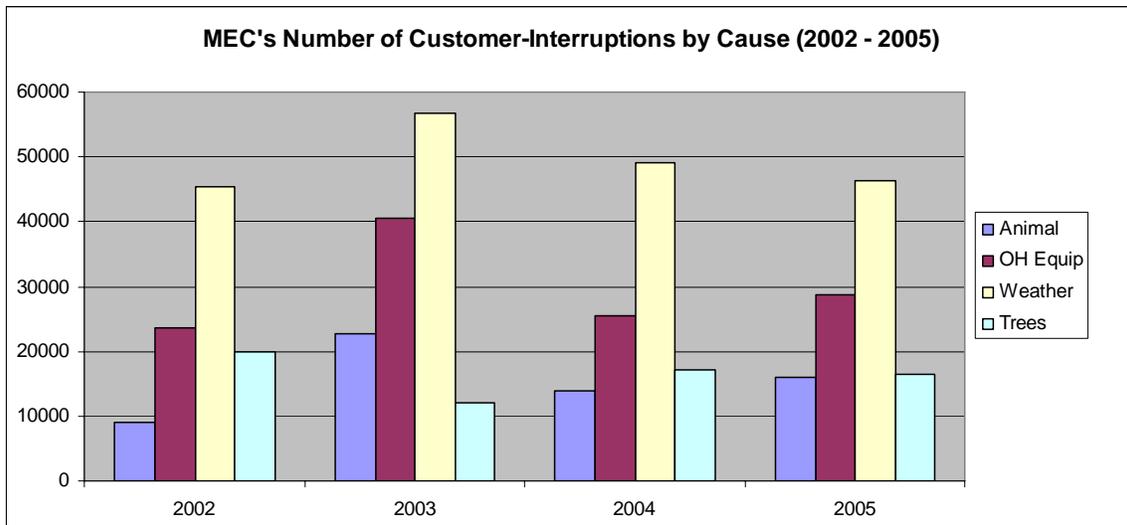
Interruption Cause	Number of Interruptions			Percentage of Interruptions		
	2005	2004	2003	2005	2004	2003
Animal Related	629	673	697	31.0%	27.4%	28.7%
Overhead Equipment Related	497	546	560	24.5%	22.3%	23.1%
Weather Related	308	628	579	15.2%	25.6%	23.8%
Tree related	209	244	220	10.3%	10.0%	9.1%
Unknown	138	104	134	6.8%	4.2%	5.5%
Underground Equipment Related	86	87	79	4.2%	3.5%	3.3%
Public	82	85	83	4.0%	3.5%	3.4%
Intentional	44	43	33	2.2%	1.8%	1.4%
Other	14	19	23	0.7%	0.8%	0.9%
Transmission and Substation Equipment	14	18	8	0.7%	0.7%	0.3%
Jurisdictional Entity/Contractor Personnel-Errors	6	5	12	0.3%	0.2%	0.5%
Customer	0	0	0	0.0%	0.0%	0.0%
Other Alternative Supplier/Utility	0	0	0	0.0%	0.0%	0.0%
TOTAL (all causes)	2027	2452	2428	100.0%	100.0%	100.0%

Four interruption causes accounted for more than 80% of the interruptions on MEC's Illinois system during each of the past three years. Table 3 illustrates that animals consistently caused the most interruptions: for 2005 MEC reported animals caused nearly one-third of all interruptions on its Illinois system. MEC listed overhead equipment as its second most frequent interruption cause for calendar year 2005, accounting for nearly one-quarter of the interruptions. Weather was listed as MEC's 3rd most numerous interruption cause during 2005, accounting for 15% of the interruptions. MEC reported slightly fewer tree related interruptions in 2005 than in either 2003 or 2004: approximately 10% of interruptions in Illinois were tree-related during 2005.

While Staff recognizes and is pleased by this significant reduction in the number of electric service interruptions on MEC's Illinois system, Staff also recognizes that fewer interruptions does not necessarily mean that fewer MEC customers were affected by interruptions, or that interruptions were of shorter duration. The number of interruptions from various causes, shown in Table 3, is not by itself, indicative of how these interruptions affected MEC's customers. For example, an

animal-caused interruption isolated by a tap fuse might affect 10 customers for an hour, while an overhead equipment failure on the mainline might affect 1000 customers for five hours. In both cases, one interruption event occurred, however the animal caused interruption would result in 10 customer-interruptions (10 customers X 1 interruption) and 600 customer-minutes (10 customers X 60 minutes of interruption), while the overhead equipment failure would result in 1000 customer-interruptions (1000 customers X 1 interruption) and 300,000 customer-minutes (1000 customers X 300 minutes of interruption). Figures 11 shows that, even though weather-related interruptions were only the 3rd most frequently occurring interruption cause in MEC's Illinois jurisdiction during 2005, weather-related interruptions have consistently affected more of MEC's customers than interruption from other causes.

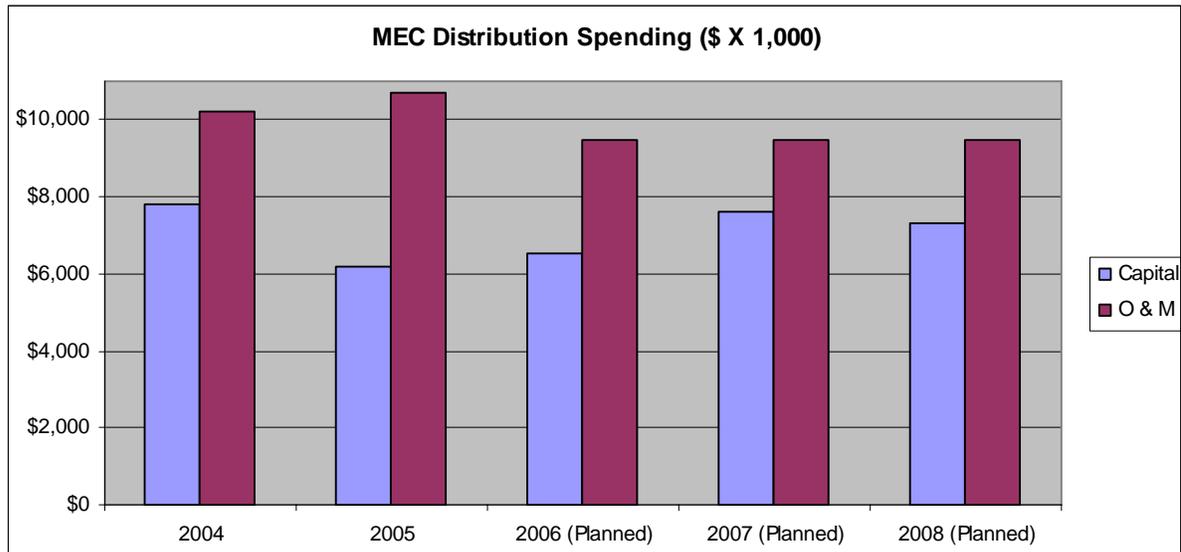
Figure 11: MEC's Customer-Interruptions by Cause



9. Plan to Maintain or Improve Reliability

As illustrated by Figure 12, MEC anticipates an increase in distribution capital spending and a decrease in distribution O&M spending during the years 2006 through 2008, when compared to 2005 expenditures. MEC indicates that its O&M spending is budgeted for only one year (2006), and that amount is simply projected to 2007 and 2008: actual budget amounts for 2007 and 2008 will be determined during 2006 and 2007, respectively. Staff remains concerned that MEC's SAIFI and CAIFI reliability indices have been some of the highest reported for several consecutive years. MEC's decreasing O&M budget does not imply that MEC plans to make any significant changes in its maintenance practices for the purpose of improving service reliability.

Figure 12: MEC's Distribution Spending (2004-2008)



MEC anticipates more than a \$6 million increase in transmission capital spending during 2006 due to construction of a new 345-161 substation and associated transmission lines. During 2006, MEC projects its transmission O&M spending to be similar to 2004 and 2005 levels.

In Attachment A to its 2005 reliability report, MEC listed 6 specific projects it included in its budgeting process for the years 2006-2009 that are intended to improve the quality of service to customers. MEC provided its estimated annual expenditures for these projects for each year. In Attachment B to its 2005 reliability report MEC listed several on-going inspection and maintenance programs for its transmission and distribution systems in Illinois. MEC included the following programs in its list for its distribution system: tree trimming, circuit inspection, and inspection of various equipment types such as switches, capacitors, reclosers and regulators. Staff agrees that MEC's specific projects and maintenance programs are likely to maintain or improve the reliability of its distribution system.

10. Potential Reliability Problems and Risks

Staff has the following concerns about MEC's distribution system and distribution operations:

- Staff is concerned that MEC does not appear to consistently adequately maintain its distribution facilities. Staff had very few concerns regarding MEC's maintenance after inspecting distribution circuits Q48202 and 13-18-1; however, Staff's inspection of Circuit 13-28-2 led Staff to question MEC's maintenance practices for that distribution circuit. In addition to observing numerous locations with deteriorated or damaged facilities, Staff identified several NESC violations on Circuit 13-28-2. The condition of some of MEC's distribution facilities on Circuit 13-28-2 could negatively impact service to customers, and MEC appeared to be unaware of the poor condition of some

of its facilities. MEC is required to inspect its lines and equipment at such intervals as experience has shown is necessary.¹ Staff does not believe that MEC's practice of conducting a thorough inspection of each of its distribution circuits on a ten year cycle allows MEC to stay aware of the condition of facilities on each of its distribution circuits. More frequent inspections on circuits like Circuit 13-28-2 would give MEC the opportunity to identify and correct problems before those problems cause interruptions to customers. MEC reported it had recently begun a new process of ranking its distribution circuits by reliability performance to determine if an intermediate inspection was warranted. If MEC did not conduct an intermediate inspection on Circuit 13-28-2, the circuit with the highest SAIFI and CAIFI in Illinois, then its evaluation process needs work. If MEC did conduct an intermediate inspection on Circuit 13-28-2, then its implementation of improvements based on inspection findings needs to happen faster.

- As was the case last year, Staff is concerned that MEC's existing process to initiate relatively simple maintenance tasks can take a long time. Staff encourages MEC to respond to field findings more promptly, particularly if the associated expense is small. Staff has the impression that MEC's practice is to delay even relatively simple maintenance tasks, such as replacing cross arms or cross arm braces, until several such tasks can be grouped together to form a large project that may or may not get funded the following year. MEC's customers that experience multiple interruptions would experience fewer interruptions if MEC simply repaired its facilities more quickly.
- Staff continues to be concerned by the high occurrence of animal related interruptions in MEC's Illinois service territory. When inspecting three of MEC's distribution circuits during the summer of 2006, Staff observed animal guards on most distribution transformers in geographic areas that appeared would likely support significant animal populations, especially squirrels. Though Staff did not observe any obvious shortcomings in this area during its inspections, MEC's reliability report indicated that over 30% of the interruptions in its Illinois jurisdiction during 2005 were animal-related. Thus, it would be difficult for Staff to over-emphasize the priority MEC should place on retrofitting its equipment with animal protection.
- Staff is concerned at finding trees close to or contacting MEC's distribution lines. MEC claims to be trimming trees on less than a four year cycle. Yet Staff found that MEC has not consistently been trimming trees so that they stay clear of the lines the entire time between tree trimming cycles and/or MEC's tree trimming crews are not trimming some trees. MEC should make sure its tree trimming crews trim all trees (including oak trees) that contact its distribution circuits, and trim them in such a manner that they will not contact the power lines between cycles.

¹ National Electrical Safety Code 214(A)

11. Implementation of the Plan Listed in the Previous Reliability Report

In 2005, MEC spent very close to its budgeted amounts for both distribution capital and distribution O&M. In Attachment C to its reliability report MEC provided updates on several specific projects that it had previously described in its 2004 reliability report, and included a description of work performed on worst performing circuits for calendar year 2004. MEC adequately explained deviations from its 2004 plan associated with individual projects. Staff was especially pleased that MEC installed 12 overhead electronic fault indicators on Circuit 13-46-1, which was a 2004 worst performing circuit. These devices should help MEC locate the cause(s) of interruptions on that circuit.

MEC indicated that an accelerated in-service date associated with a new 345-161 kV substation caused its capital transmission expenditures to significantly exceed the amount budgeted for 2005. MEC spent approximately 9% more on transmission O&M projects in 2005 than expected, based on its 2004 plan.

12. Summary of Recommendations

Most of Staff's recommendations to MEC for improving the reliability of service to its distribution customers remain similar to the recommendations Staff listed in its assessment for calendar year 2004:

- MEC should perform more frequent inspections of its distribution facilities, which would provide MEC with an opportunity to identify and correct reliability threats prior to interruption occurrence. MEC should perform inspections on its circuits or beyond specific protective devices whenever customers experience multiple interruptions.
- MEC should develop procedures to take prompt remedial actions when threats to reliable service are identified, especially beyond protective devices where customers have already experienced multiple interruptions. Simple maintenance tasks should be performed right away.
- MEC should continue with its efforts to install animal protection on distribution equipment. Staff did not observe any obvious deficiencies in this area during its most recent inspections, but MEC's interruption statistics make it clear that MEC needs to continue to install animal protection on its distribution facilities.
- MEC's tree trimming personnel should consistently clear trees away from all line sections of distribution circuits so that the trees will not grow or blow into the lines prior to being trimmed again.
- MEC should ensure its inspectors are trained to identify NESC violations. Staff identified several locations during its 2005 and 2006 inspections where MEC's facilities did not meet the specifications provided in the NESC. MEC should identify and correct these violations as part of its own inspection process.

From: Rockrohr, Greg
Sent: Friday, August 04, 2006 11:56 AM
To: @ Jared, Robert
Cc: 'sfmcgovern@midamerican.com'; Stoller, Harry; Buxton, Roy
Subject: Staff inspection of MidAmerican distribution circuits

Attachments: 2006_MEC Summary of Field Inspection.xls

On July 19 & 20, I inspected 3 of MidAmerican's distribution circuits that operate in Illinois. MidAmerican's Sean McGivern accompanied me during the inspections, and I appreciated his assistance very much.

The attached worksheets summarize the notes I took during the circuit inspections. These worksheets are not represented as capturing all of the potential reliability problems that may exist on the circuits that I inspected. In many cases, there were portions of the circuits that I did not see. My inspections are not intended to take the place of the thorough, detailed inspections that your company should periodically perform.

Please note that for Circuit 13-28-2 I listed several apparent National Electric Safety Code ("NESC") violations in bold font. Of particular concern was a tap line along 301 St., extending north from Hwy 2 where the conductor appeared to be quite low within many of the spans. During the inspection we did not take time to measure conductor height at every one of the suspect locations along this tap, however, those locations that Mr. McGivern measured had neutral heights between 10' and 15' and primary heights between 14' and 18'. NESC Table 232-1(4) specifies a neutral vertical clearance of 15.5 feet, and a primary conductor clearance of 18.5 feet. MidAmerican should carefully inspect this entire tap to determine which spans do not presently meet NESC vertical clearance requirements, and then correct every instance.

Also on Circuit 13-28-2, where 300 St. crosses the Burlington Northern railroad tracks, it appeared MidAmerican used a single crossarm with pin insulators on poles at both sides of the railroad crossing. NESC Rule 261D4c requires the equivalent of double crossarms at such locations.

Please provide MidAmerican's schedule for modifying its distribution facilities on Circuit 13-28-2 so that they comply with NESC requirements. If MidAmerican believes its facilities at any of the locations I have listed in bolded font in the attached worksheet require no modification, please explain MidAmerican's position in detail. Please respond no later than September 8, 2006.

If you have any questions about the information contained in the attached summaries, or the information requested above, please contact me.

Greg Rockrohr
Illinois Commerce Commission
Energy Division: Engineering
217-524-0695

Summary of Distribution Circuit Field Inspection by ICC Staff			
Utility:	MidAmerican	Date:	7/19/06
Circuit:	Q48202	Inspector:	Rockrohr (ICC)/McGivern (MEC)
Gen. Notes:	Silvis. Tree trimming last completed October 2005. Trees observed contacting primary at one location. Some areas residential and some commercial/industrial. Not all visible. In 2006, MEC replaced 18 LA's, installed 23 AG's and 13 fuses. 2005 "Next 10" circuit: Weather and OH equipment listed as most frequent outage causes. MEC marked several poles for changeout.		
Map No.	Item Description	Photo(s)	Location
8	Deteriorated pole top: MEC already marked it		In easement W/ tap to John Deere & Switch #4751
5	Deteriorated pole top		2nd Av. at 16th St.
4	Deteriorated pole top: MEC already marked it		15th St. between 4th Av. & 5th Av.
4	Trees contacting primary	1 to 3	North side of 4th Av. between 15th St. & 16th St.

Summary of Distribution Circuit Field Inspection by ICC Staff			
Utility:	MidAmerican	Date:	7/19/06
Circuit:	13-18-1	Inspector:	Rockrohr (ICC)/McGivern (MEC)
Gen. Notes:	Rock Island & Milan: mostly commercial/industrial area. Tree trimming last completed January 2005. No tree contacts observed. MEC's last inspection was in 2003. In 2006, MEC plans to replace UG cable in industrial park. 1-phase along Turkey Hollow Creek not visible. 2005 "Next 10" circuit: UG equipment & public listed as most frequent outage causes		
Map No.	Item Description	Photo(s)	Location
1	Fir trees into primary		At 9329 51st St. W. (near end of line)

Summary of Distribution Circuit Field Inspection by ICC Staff			
Utility:	MidAmerican	Date:	7/20/06
Circuit:	13-28-2	Inspector:	Rockrohr (ICC)/McGivern (MEC)
Gen. Notes:	Rock Island County: rural area between Hillsdale & Port Byron. MEC's last inspection was in 1997. Noted good LA coverage -some blown. Tree trimming last completed February 2002, and is due to be completed again in 2006. Tree trimming looked recent in many locations. 2005 worst performing circuit: weather, animal and trees listed as most frequent outage causes.		
Map No.	Item Description	Photo(s)	Location
47	Location of Switch # 4669 is mapped incorrectly		80 Av. N _E/256 St.
48	Detached cross arm brace	1	80 Av. between 256 St. & 270 St.
49	Two adjacent transf. poles leaning rather severely		80 Av W/270 St.
38	NESC: Neutral & pri low (N:9'-3", P:16'-10")	2	270 St. N/73 Av.
38	Vines to primary level of pole		270 St. -1-span S/ 73 Av.
39	Pole top pin bent over and pole top partially rotted	3	73 Av. -E/270 St. (just W/curve at end of 1-ph tap)
50	Failing cross arm brace	4	80 Av E/270 St: on 1-phase tap to north
51	Rotted cross arm brace	5	80 Av E/270 St: near end of the 1st 1-phase tap to south
53	Deteriorated cross-arm with pin & insul. laying over	6 & 7	Hwy 2 S/80 Av.
52	NESC: Neutral & pri low (N:11'-10", P:15'-7")	8	Hwy 2 S/80 Av. NW. -along 1st 1-phase tap to NW
25	Broken cross-arm brace		300 St. -2nd pole W/Hwy 88
10	Apparent NESC violation: Single arm at RR tracks		300 St. at railroad tracks
10	Broken down guy		300 St. at 52 Av.
20	Oak tree contacting primary	9 & 10	320 St. N/52 Av.
94	NESC: Neutral low (N:15'-1", P:N/A)	12	Tap N/Main St. along RR tracks: W/High St.
94	Massive growth of vines weighing neutral down		Rear lot-line S/Hwy 2, W/ High St.
93	Deteriorated cross-arm	13 & 14	Hillsdale: Main St. at fire station
92	Blown lightning arrester		Hwy 2 N/Main St. where 3-phase ends
92	Tree contacting single-phase primary		Hwy 2 N/Main St.
67	Vines to primary level & broken cross arm brace	15	Hwy 2 W/Hwy 88
60	Vines to primary level		Hwy 2 E/301 St.
60, 66, 67	NESC: Neutral & primary -at least 6 separate spans		Along 301 St. N/Hwy 2
80	Blown lightning arresters -two within a few spans		94 Av. btw 303 St. & Switch 4834
78	Blown lightning arrester	16	94 Av. btw 303 St. & Candle Creek
75	Blown lightning arrester at riser		256 St. N/94 Av.
89	Damaged cross arm brace		256 St. N/94 Av. (betw. high school & middle school)
106	Damaged cross arm brace		256 St. N/108 Av.
109	Damaged cross arm with loose nut on insulator pin	18	256 St. S/115 Av.
98	Pole splitting		235 St N/101 Av: 4th pole from end of tap
72	Pole holding 3-phase trf. bank is leaning fairly severely		94 Av. W/ 234 St.
71	2 blown lightning arresters		94 Av. E/ 228 St.
71	Oak tree contacting primary	19	94 Av. opposite 217 St.
71	Vines grown to primary level		93 Av. Ct.