# Electric Service Reliability in Pennsylvania

2008

Pennsylvania Public Utility Commission

# ELECTRIC SERVICE RELIABILITY IN PENNSYLVANIA 2008

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# Executive Summary

The Electricity Generation Customer Choice and Competition Act mandates that the Pennsylvania Public Utility Commission (Commission) ensure that levels of reliability that existed prior to the restructuring of the electric utility industry continue in the new competitive markets.[1] In response to this mandate, the Commission adopted reporting requirements designed to ensure the continuing safety, adequacy and reliability of the generation, transmission and distribution of electricity in the Commonwealth.[2] The Commission also established reliability benchmarks and standards to measure the performance of each electric distribution company (EDC).[3]

Given the uncertainty of weather and other events that can affect reliability performance, the Commission has stated that EDCs should set goals to achieve benchmark performance in order to prepare for those times when unforeseen circumstances push the indices above the benchmark.[4] In recognition of these unforeseen circumstances, the Commission set the performance standard as the minimum level of EDC reliability performance. The standard is the level of performance beyond which the company must either justify its poor performance or provide information on the corrective measures it will take to improve performance. Performance that does not meet the standard for any reliability measure may be the threshold for triggering additional scrutiny and potential compliance enforcement actions.

In 2008, nine of the 11 EDCs achieved compliance with the 12-month Customer Average Interruption Duration Index (CAIDI) performance standard for duration of service outages, and six of those nine EDCs performed better than the 12-month CAIDI performance benchmark. When measured on a company-wide basis, these six EDCs provided restoration of service in a manner that was statistically more timely than was experienced over the five years prior to the restructuring of the electric utility industry.

Ten of the 11 EDCs achieved compliance with the 12-month System Average Interruption Frequency Index (SAIFI) performance standards for the average frequency of service outages per customer. Five EDCs performed better than the 12-month SAIFI performance benchmark. The majority of the EDCs have maintained the number of customer outages at a statistically acceptable level, with five EDCs reducing average customer outage levels below those experienced over the five years prior to the restructuring of the electric utility industry.

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[1] Act of December 3, 1996, P.L. 802, No. 138, 66 Pa.C.S. Sec. 2801 et. seq.
[2] Docket No. L-00970120; 52 Pa. Code §§ 57.191-57.197.
[3] Docket No. M-00991220.
[4] Docket No. M-00991220, Page 25.

As mandated, enforcement of the three-year rolling average standard began with the utilities' filing of their 2006 annual reports. The three-year performance standard only allows a deviation of 10 percent from the reliability index benchmark, as compared with the 20 percent or 35 percent deviations allowed by the 12-month performance standard.[5] This year, we have assessed the average reliability performance of EDCs over a three-year period, utilizing data from 2006, 2007 and 2008.

Ten of the 11 EDCs performed better than the three-year standard for average duration of service outages. For the average frequency of service outages per customer, only six of the 11 EDCs performed better than the three-year performance standard. Some of the EDCs that failed to perform better than the three-year standards were EDCs that had performance issues in prior years. However, these EDCs have shown a trend toward improving performance that if continued, should bring those EDCs into compliance with the three-year standards.

A variety of non-compliance enforcement actions were taken with EDCs that failed to meet any of the Commission's electric reliability performance standards. These enforcement actions ranged from meetings with the companies to discuss reliability improvement plans to formal reliability investigations.

In addition to monitoring the reliability performance of the EDCs, the Commission adopted a Final Rulemaking Order on May 22, 2008, which describes the inspection and maintenance standards that are appropriate for electric transmission and distribution systems.[6] Biennial plans for the periodic inspection, maintenance, repair and replacement of facilities, designed to meet performance benchmarks and standards, are to be filed with the Commission beginning in October 2009.[7]

[5] For an explanation of performance standards, see Section 2, page 5.
[6] Docket No. L-00040167.
[7] 52 Pa. Code § 57.198(a).

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# Section 1 – Introduction

## Purpose

This report discusses the reliability performance of EDCs operating under the Commission's jurisdiction within the Commonwealth. Although the reliability of the bulk transmission system[8] is integral to the overall reliability of electric service, this report focuses on the reliability of the electric distribution system.

The data contained in this report was obtained from the quarterly and annual reliability reports submitted by the EDCs pursuant to the Commission's regulations.[9] These annual reports provide an assessment of electric service reliability for each EDC's service territory.

## Background

The Electricity Generation Customer Choice and Competition Act[10] (Act) became effective January 1, 1997. The Act amended Title 66 of the Pennsylvania Consolidated Statutes (Code) by adding Chapter 28 to establish standards and procedures to create direct access by retail customers to the competitive market for the generation of electricity, while maintaining the safety and reliability of the electric distribution system. Specifically, the Commission was given a legislative mandate to ensure that levels of reliability that existed prior to the restructuring of the electric utility industry would continue in the new competitive markets.[11]

In response to this legislative mandate, the Commission adopted a Final Rulemaking Order on April 23, 1998, setting forth various reporting requirements designed to ensure the continued safety, adequacy and reliability of the generation, transmission and distribution of electricity in the Commonwealth.[12] The Final Rulemaking Order also suggested that the Commission could re-evaluate its monitoring efforts at a later time as deemed appropriate.

On December 16, 1999, the Commission entered a Final Order establishing reliability benchmarks and standards for the EDCs.[13] The purpose of these reliability indices is to measure the performance of EDCs' transmission and distribution systems in terms of the frequency and duration of unplanned

[8] The high-voltage transmission system, nominally >100 kV, is regulated by the Federal Energy Regulatory Commission. The electric distribution system is under the purview of the Pennsylvania Public Utility Commission.
[9] 52 Pa. Code § 57.195.
[10] Dec. 3, P.L. 802, No. 138 § 4.
[11] 66 Pa.C.S. §§ 2802(12), 2804(1) and 2807(d).
[12] Docket No. L-00970120; 52 Pa. Code §§ 57.191-57.197.
[13] Docket No. M-00991220.

electric service outages to ensure that the levels of reliability existing prior to retail competition do not deteriorate.

On May 7, 2004, the Commission adopted amendments to its existing regulations regarding electric reliability standards, which became effective on September 18, 2004.[14] In conjunction with the adoption of the amended regulations, the Commission adopted an Order amending its benchmarks and standards.

Subsequently, five EDCs filed petitions requesting an adjustment to their amended benchmarks and standards. The Commission adopted Orders granting adjustments to the benchmarks and standards of the five EDCs as follows:

- Met-Ed, Penelec and Penn Power on February 17, 2006, at Docket No. P-00042115;
- Allegheny Power on July 20, 2006, at Docket No.M-00991220F0003; and
- Pike County Light & Power Company on August 17, 2006, at Docket No. M-00991220F0003.

On January 31, 2007, the LB&FC[15] released a performance audit of the Commission. The report observed that the Commission has enhanced the monitoring of electric reliability and generally has the processes and procedures in place to adequately monitor electric reliability. The performance audit was directed by House Resolution 695 of 2006 and is available on the LB&FC's website at http://lbfc.legis.state.pa.us.

In order to further enhance reliability performance monitoring of the EDCs, the Commission initiated a rulemaking proceeding to determine the type and scope of inspection and maintenance (I&M) standards that would be appropriate for electric transmission and distribution systems.[16] A Final Rulemaking Order was adopted by the Commission on May 22, 2008. Biennial plans for the periodic inspection, maintenance, repair and replacement of facilities, designed to meet performance benchmarks and standards, are to be filed with the Commission beginning in October 2009. The new regulation also sets forth inspection and maintenance intervals.[17]

Also, on July 17, 2008, the Commission adopted an Advance Notice of Proposed Rulemaking pertaining to adding Neutral Connection I&M standards for EDCs.[18] Comments and reply comments have been received.

[14] Docket No. L-00030161; 34 Pa.B. 5135.
[15] Legislative Budget and Finance Committee.
[16] Docket No. L-00040167.
[17] 52 Pa. Code § 57.198(a) and (n).
[18] Docket No. L-2008-2044821.

# Section 2 – Reliability Performance Measures

## Reliability Performance Indices

The benchmarks and standards established by the Commission are based on four reliability performance indices which have been adopted by the Institute of Electrical and Electronic Engineers Inc. (IEEE). These indices include: (1) Customer Average Interruption Duration Index (CAIDI); (2) System Average Interruption Frequency Index (SAIFI); (3) System Average Interruption Duration Index (SAIDI); and (4) Momentary Average Interruption Frequency index (MAIFI).

- CAIDI is the average duration of sustained interruptions[19] for those customers who experience interruptions during the analysis period. CAIDI represents the average time required to restore service to the average customer per sustained interruption. It is determined by dividing the sum of all sustained customer interruption durations, in minutes, by the total number of interrupted customers;

- SAIFI measures the average frequency of sustained interruptions per customer occurring during the analysis period. It is calculated by dividing the total number of sustained customer interruptions by the total number of customers served;

- SAIDI is the average duration of sustained customer interruptions per customer occurring during the analysis period. It is the average time customers were without power. It is determined by dividing the sum of all sustained customer interruption durations, in minutes, by the total number of customers served. SAIDI is also the product of CAIDI and SAIFI; and

- MAIFI measures the average frequency of momentary interruptions[20] per customer occurring during the analysis period. It is calculated by dividing the total number of momentary customer interruptions by the total number of customers served.

The actual values of these four reliability indices are submitted by the EDCs on both a quarterly (rolling 12-month average) and annual basis. Also included is the data used in calculating the indices, namely the average number

[19] The loss of electric service by one or more customers for the period defined as a sustained customer interruption by the IEEE as it may change from time to time – currently five minutes or greater. The term does not include "major events" or the authorized termination of service to an individual customer.

[20] The loss of electric service by one or more customers for the period defined as a momentary customer interruption by the IEEE as it may change from time to time – currently less than five minutes. The term does not include "major events" or the authorized termination of service to an individual customer.

of customers served, the number of sustained customer interruption minutes and the number of customers affected by service interruptions.

It is noted that some EDCs do not currently have the necessary equipment to collect meaningful data relating to momentary service interruptions (MAIFI). However, the Commission desires to assess, where possible, the affect of frequent momentary interruptions on EDCs' customers. Thus, the provision of this data is required, if available.

In addition to the outage data mentioned above, the Commission's regulations require EDCs to report a breakdown and analysis of outage causes, such as equipment failure, animal contact and contact with trees. This analysis is helpful in identifying the primary causes of service interruptions and determining which causes, if any, can be prevented in the future through proposed solutions.

The regulations require EDCs to report reliability performance on a system-wide basis, rather than on an operating area basis, and provide an analysis of the worst performing five percent of circuits and major remedial efforts to improve those circuits.

## Major Events

In order to analyze and set measurable goals for electric service reliability performance, outage data is separated into normal and abnormal periods so that only normal event periods are used for calculating reliability indices. The term "major event" is used to identify an abnormal event, such as a major storm, and is defined as either of the following:

- An interruption of electric service resulting from conditions beyond the control of the EDC which affects at least 10 percent of the customers in the EDC's service territory during the course of the event for a duration of five minutes or greater; or

- An unscheduled interruption of electric service resulting from an action taken by an EDC to maintain the adequacy and security of the electrical system.

Outage data relating to major events are to be excluded from the calculation of reliability indices. In order to avoid the inappropriate exclusion of outage data, the Commission has implemented a process whereby an EDC must submit a formal request for exclusion of service interruptions for reporting purposes, accompanied by data which demonstrates that a service interruption qualifies as a major event.

During 2008, 17 requests for exclusion of major events were filed by the EDCs. One of these requests was denied. A major event exclusion request may be denied for a variety of reasons, including such things as the event not meeting the 10 percent threshold of customers interrupted or the failure of equipment without supporting maintenance records.

## Reliability Performance Benchmarks and Standards

The performance **benchmark** represents the statistical average of the EDC's annual, system-wide, reliability performance index values for the five-year time period from 1994-98. The benchmark serves as an objective level of performance that each EDC should strive to achieve and maintain, and is a reference point for comparison of future reliability performance.

The performance **standard** is a numerical value that represents the minimal performance allowed for each reliability index for a given EDC. Performance standards are based on each EDC's historical performance benchmarks. Both long-term (rolling three-year) and short-term (rolling 12-month) performance standards have been established for each EDC. The performance standard is the minimum level of EDC reliability performance permitted by the Commission and is a level of performance beyond which the company must either justify its poor performance or provide information on corrective measures it will take to improve performance. Performance that does not meet the standard for any reliability measure is the threshold for triggering additional scrutiny and potential compliance enforcement actions.

The rolling **12-month standard** is 120 percent of the benchmark for the major EDCs and 135 percent for the small EDCs.[21] A greater degree of short-term latitude recognizes that small EDCs have fewer customers and fewer circuits than large EDCs, potentially allowing a single event to have a more significant impact on the reliability performance of the small EDCs' distribution systems. The 12-month standard became effective on November 1, 2004.

The rolling **three-year standard** is 110 percent of the benchmark for all EDCs. This new performance standard was set at 10 percent above the historical benchmark to ensure that the standard is no higher than the worst annual performance experienced during the years prior to restructuring. The three-year average performance is measured against the standard at the end of each calendar year. Enforcement of the rolling three-year standard began with the submission of the annual reports due on or before April 30, 2007. The third

[21] Large EDCs currently include: Allegheny Power, Duquesne Light, Met-Ed, Penelec, Penn Power, PECO and PPL. Small EDCs include: UGI, Citizens', Pike County and Wellsboro.

rolling three-year standard analysis, contained in this report, utilizes 2006, 2007 and 2008 calendar year data.

If any electric distribution company's reliability performance does not meet Commission standards, the Commission may require a report discussing the reasons for not meeting the standard and the corrective measures the company is taking to improve performance.[22] In addition, Commission staff may initiate an investigation to determine whether an electric distribution company is providing reliable service.[23]

Benchmarks and standards for EDC reliability performance are listed in Appendix A.

Note: A lower number for any index indicates better reliability performance; i.e., a lower frequency of outages or shorter outage duration. A higher number indicates worse performance. For example, if an EDC has a CAIDI benchmark of 180 minutes, a rolling 12-month CAIDI standard of 216 minutes and an actual CAIDI for a particular year of 200 minutes, its performance is considered to be adequate. If CAIDI is 160 minutes, the performance is better than the historical average performance. A CAIDI of 240 minutes, on the other hand, indicates a failure to meet the performance standard.

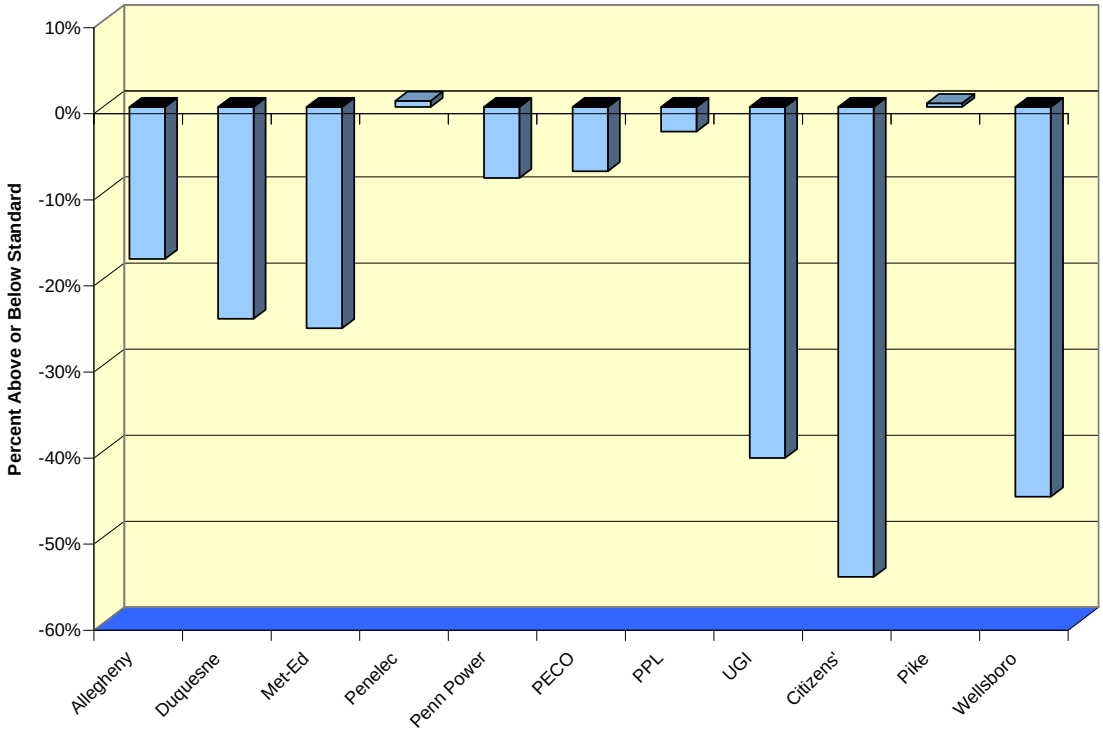
[22] 52 Pa. Code § 57.195(g).
[23] 52 Pa. Code § 57.197(a).

# Section 3 – Statistical Utility Performance Data

## Statewide Summary

The 2008 reliability data submitted by the EDCs indicates nine of the 11 EDCs achieved compliance with the 12-month CAIDI performance standards for duration of service outages (Allegheny Power, Duquesne, Met-Ed, Penn Power, PECO, PPL, UGI, Citizens' and Wellsboro). Also, six of those nine EDCs performed better than their CAIDI benchmarks. Two EDCs (Penelec and Pike) failed to meet their standards by only one minute each. Figure 1 compares the 2008 CAIDI performance for all EDCs.

**Figure 1. CAIDI 2008 Comparison**




The only EDC that failed to meet its rolling 12-month SAIFI performance standard for the average frequency of service outages per customer was Penelec. Five EDCs (Duquesne, PECO, UGI, Pike and Wellsboro) performed better than the 12-month SAIFI performance benchmark. Figure 2 compares the 2008 SAIFI performance of all EDCs.

**Figure 2. SAIFI 2008 Comparison**

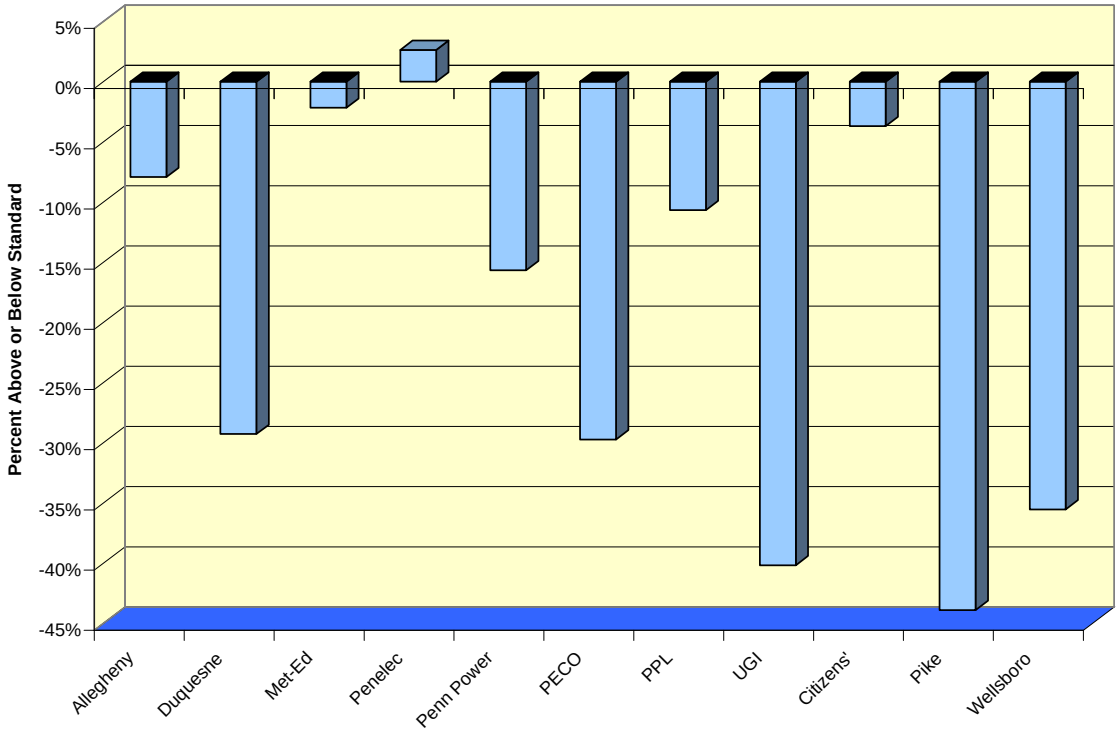



Table 1, that follows on the next page, provides the actual 2008 reliability performance for each EDC, and the benchmarks and standards for each reliability index.

We have assessed the average reliability performance of EDCs for a three-year period, utilizing data from 2006, 2007 and 2008. One EDC (Penn Power) failed to meet its rolling three-year CAIDI performance standard. Five EDCs (Met-Ed, Penelec, PPL, Pike and Wellsboro) failed to meet their rolling three-year SAIFI performance standards.

The actual 2006, 2007 and 2008 performance for each EDC and the results of the three-year performance analysis are displayed in Table 2 on page 10.

The remedial actions taken for EDCs not meeting performance standards are discussed in detail in the appropriate utility-specific performance data sections within this report.

## Table 1. 12-Month Average Electric Reliability Indices for 2008

| Customer Average Interruption Duration Index (CAIDI) | | | | % Above (+) or | % Above (+) or |
|---|---|---|---|---|---|
| EDC | 2008 | Benchmark | Standard | Below (-) Standard | Below (-) Benchmark |
| Allegheny Power | **168** | 170 | 204 | -17.6% | **-1.2%** |
| Duquesne Light | **98** | 108 | 130 | -24.6% | **-9.3%** |
| Met-Ed (FE) | **104** | 117 | 140 | -25.7% | **-11.1%** |
| Penelec (FE) | **142** | 117 | 141 | **0.7%** | 21.4% |
| Penn Power (FE) | 111 | 101 | 121 | -8.3% | 9.9% |
| PECO | 124 | 112 | 134 | -7.5% | 10.7% |
| PPL | 169 | 145 | 174 | -2.9% | 16.6% |
| UGI | **135** | 169 | 228 | -40.8% | **-20.1%** |
| Citizens | **64** | 105 | 141 | -54.6% | **-39.0%** |
| Pike County | **236** | 174 | 235 | **0.4%** | 35.6% |
| Wellsboro | **91** | 124 | 167 | -45.3% | **-26.3%** |
| **System Average Interruption Frequency Index (SAIFI)** | | | | % Above (+) or | % Above (+) or |
| EDC | 2008 | Benchmark | Standard | Below (-) Standard | Below (-) Benchmark |
| Allegheny Power | 1.16 | 1.05 | 1.26 | -7.9% | 10.5% |
| Duquesne Light | **0.99** | 1.17 | 1.40 | -29.3% | **-15.4%** |
| Met-Ed (FE) | 1.35 | 1.15 | 1.38 | -2.2% | 17.4% |
| Penelec (FE) | **1.56** | 1.26 | 1.52 | **2.6%** | 23.8% |
| Penn Power (FE) | 1.13 | 1.12 | 1.34 | -15.7% | 0.9% |
| PECO | **1.04** | 1.23 | 1.48 | -29.7% | **-15.4%** |
| PPL | 1.05 | 0.98 | 1.18 | -10.7% | 7.6% |
| UGI | **0.67** | 0.83 | 1.12 | -40.2% | **-19.3%** |
| Citizens | 0.26 | 0.20 | 0.27 | -3.7% | 30.0% |
| Pike County | **0.46** | 0.61 | 0.82 | -43.9% | **-24.6%** |
| Wellsboro | **1.07** | 1.23 | 1.66 | -35.5% | **-13.0%** |
| **System Average Interruption Duration Index (SAIDI)** | | | | % Above (+) or | % Above (+) or |
| EDC | 2008 | Benchmark | Standard | Below (-) Standard | Below (-) Benchmark |
| Allegheny Power | 195 | 179 | 257 | -24.1% | 8.9% |
| Duquesne Light | **97** | 126 | 182 | -46.7% | **-23.0%** |
| Met-Ed (FE) | 139 | 135 | 194 | -28.4% | 3.0% |
| Penelec (FE) | **220** | 148 | 213 | **3.3%** | 48.6% |
| Penn Power (FE) | 125 | 113 | 162 | -22.8% | 10.6% |
| PECO | **129** | 138 | 198 | -34.8% | **-6.5%** |
| PPL | 178 | 142 | 205 | -13.2% | 25.2% |
| UGI | **90** | 140 | 256 | -64.8% | **-35.7%** |
| Citizens | **17** | 21 | 38 | -55.3% | **-19.0%** |
| Pike County | 109 | 106 | 194 | -43.8% | 2.8% |
| Wellsboro | **98** | 153 | 278 | -64.8% | **-36.1%** |

Note: GREEN = better than benchmark; RED = worse than standard; BLACK = between benchmark and standard.

## Table 2. Three-Year Average Electric Reliability Indices for 2006-08

| Customer Average Interruption Duration Index (CAIDI) | | | | 3-Year | 3-Year | % Above (+) or |
|---|---|---|---|---|---|---|
| EDC | 2006 | 2007 | 2008 | Average | Standard | Below (-) Standard |
| Allegheny Power | 185 | 208 | 168 | **187** | 187 | **0.0%** |
| Duquesne Light | 102 | 107 | 98 | **102** | 119 | **-14.0%** |
| Met-Ed (FE) | 121 | 112 | 104 | **112** | 129 | **-12.9%** |
| Penelec (FE) | 108 | 110 | 142 | **120** | 129 | **-7.0%** |
| Penn Power (FE) | 112 | 126 | 111 | **116** | 111 | **4.8%** |
| PECO | 133 | 105 | 124 | **121** | 123 | **-1.9%** |
| PPL | 165 | 140 | 169 | **158** | 160 | **-1.3%** |
| UGI | 112 | 167 | 135 | **138** | 186 | **-25.8%** |
| Citizens | 68 | 62 | 64 | **65** | 115 | **-43.8%** |
| Pike County | 142 | 125 | 236 | **168** | 192 | **-12.7%** |
| Wellsboro | 91 | 107 | 91 | **96** | 136 | **-29.1%** |
| **System Average Interruption Frequency Index (SAIFI)** | | | | 3-Year | 3-Year | % Above (+) or |
| EDC | 2006 | 2007 | 2008 | Average | Standard | Below (-) Standard |
| Allegheny Power | 1.16 | 1.29 | 1.16 | **1.15** | 1.16 | **-0.9%** |
| Duquesne Light | 0.79 | 0.79 | 0.99 | **0.86** | 1.29 | **-33.6%** |
| Met-Ed (FE) | 1.73 | 1.63 | 1.35 | **1.57** | 1.27 | **23.6%** |
| Penelec (FE) | 1.47 | 1.71 | 1.56 | **1.58** | 1.39 | **13.7%** |
| Penn Power (FE) | 1.22 | 1.19 | 1.13 | **1.18** | 1.23 | **-4.1%** |
| PECO | 1.35 | 0.99 | 1.04 | **1.13** | 1.35 | **-16.5%** |
| PPL | 1.27 | 1.11 | 1.05 | **1.14** | 1.08 | **6.0%** |
| UGI | 0.79 | 0.68 | 0.67 | **0.71** | 0.91 | **-21.6%** |
| Citizens | 0.14 | 0.25 | 0.26 | **0.22** | 0.22 | **-1.5%** |
| Pike County | 1.16 | 0.45 | 0.46 | **0.69** | 0.67 | **3.0%** |
| Wellsboro | 1.50 | 1.63 | 1.07 | **1.40** | 1.35 | **3.7%** |
| **System Average Interruption Duration Index (SAIDI)** | | | | 3-Year | 3-Year | % Above (+) or |
| EDC | 2006 | 2007 | 2008 | Average | Standard | Below (-) Standard |
| Allegheny Power | 215 | 268 | 195 | **226** | 217 | **4.1%** |
| Duquesne Light | 81 | 84 | 97 | **87** | 153 | **-42.9%** |
| Met-Ed (FE) | 210 | 182 | 139 | **177** | 163 | **8.6%** |
| Penelec (FE) | 158 | 188 | 220 | **189** | 179 | **5.4%** |
| Penn Power (FE) | 137 | 150 | 125 | **137** | 136 | **1.0%** |
| PECO | 179 | 104 | 129 | **137** | 167 | **-17.8%** |
| PPL | 209 | 156 | 178 | **181** | 172 | **5.2%** |
| UGI | 88 | 114 | 90 | **97** | 170 | **-42.7%** |
| Citizens | 10 | 16 | 17 | **14** | 25 | **-42.7%** |
| Pike County | 165 | 57 | 109 | **110** | 129 | **-14.5%** |
| Wellsboro | 139 | 169 | 98 | **135** | 185 | **-26.9%** |

Note: GREEN = better than standard; RED = worse than standard.

# Utility-Specific Performance Data

## Allegheny Power

On May 26, 2004, Allegheny filed a petition to amend its benchmarks, asserting that the recomputed benchmarks were unrealistic and artificially low.[24] On July 20, 2006, the Commission adopted an Order modifying the benchmarks and standards for Allegheny. Allegheny's CAIDI benchmark was decreased from 178 minutes to 170 minutes; the SAIFI benchmark was increased from 0.67 interruptions to 1.05 interruptions; and the SAIDI benchmark was increased from 119 minutes to 179 minutes.

Commission staff convened meetings with Allegheny in December 2007 and April 2008 to address concerns with the increases in all of Allegheny's reliability indices. On August 22, 2008, Law Bureau and the Bureau of Conservation, Economics and Energy Planning (CEEP) sent a joint letter requiring Allegheny to propose a written formal improvement plan with enforceable commitments. The written formal improvement plan was required as a result of Allegheny's continuing difficulties in achieving the Commission approved reliability benchmarks and standards on a consistent basis. Commission staff selected this option after careful consideration of the additional monitoring and enforcement actions outlined in 52 Pa. Code § 57.194(h)(1)(ii).

On September 22, 2008, Allegheny filed its proposed Pennsylvania Major Reliability Improvement Plan (PMRIP) with CEEP as directed in the August 22, 2008, letter. On October 23, 2008, CEEP sent a letter to Allegheny stating that staff had reviewed Allegheny's proposed PMRIP and provided comments and modifications to Allegheny. Allegheny submitted its final plan on November 21, 2008.

On December 22, 2008, CEEP provided notice to Allegheny that the specific improvement strategies and action plans in the PMRIP filing seem to be focused on achieving the Commission established reliability standards and that CEEP would continue to monitor the implementation of Allegheny Power's reliability improvement plan. Since the issuance of the original August 22, 2008, letter, CEEP has observed a steady improvement in Allegheny's reliability performance.

Allegheny's overall reliability performance in 2008 was substantially better than its performance during 2007. In 2007, Allegheny's SAIFI, CAIDI and SAIDI values were all higher than the adjusted performance standards. In comparison, Allegheny's 2008 SAIFI, CAIDI and SAIDI values were better than the standards

[24] Docket No. M-00991220 F0003.

by 7.9 percent, 17.6 percent and 24.1 percent, respectively. The CAIDI value was 1.2 percent below the benchmark. The CAIDI three-year average was equal to the standard of 187 minutes, and SAIFI remained at 0.9 percent below the three-year standard of 1.16.

One major event occurred in Allegheny's service territory during 2008. The calculation of the reliability indices exclude outage data relating to this event, which was approved by the Commission.

- September 14-19, 2008 – Hurricane Ike caused significant damage due to off right-of-way trees impacting poles and conductors; 126,127 customers were affected; 177.5 million customer interruption minutes were excluded.

In 2008, Allegheny experienced 818,562 customer interruptions with a total duration of 137.4 million minutes, which was about 26.8 percent lower than last year. Allegheny reported that during 2008 its service territory, which is spread across four weather zones, experienced several large storms, which were not excludable and contributed about 68 minutes to SAIDI.

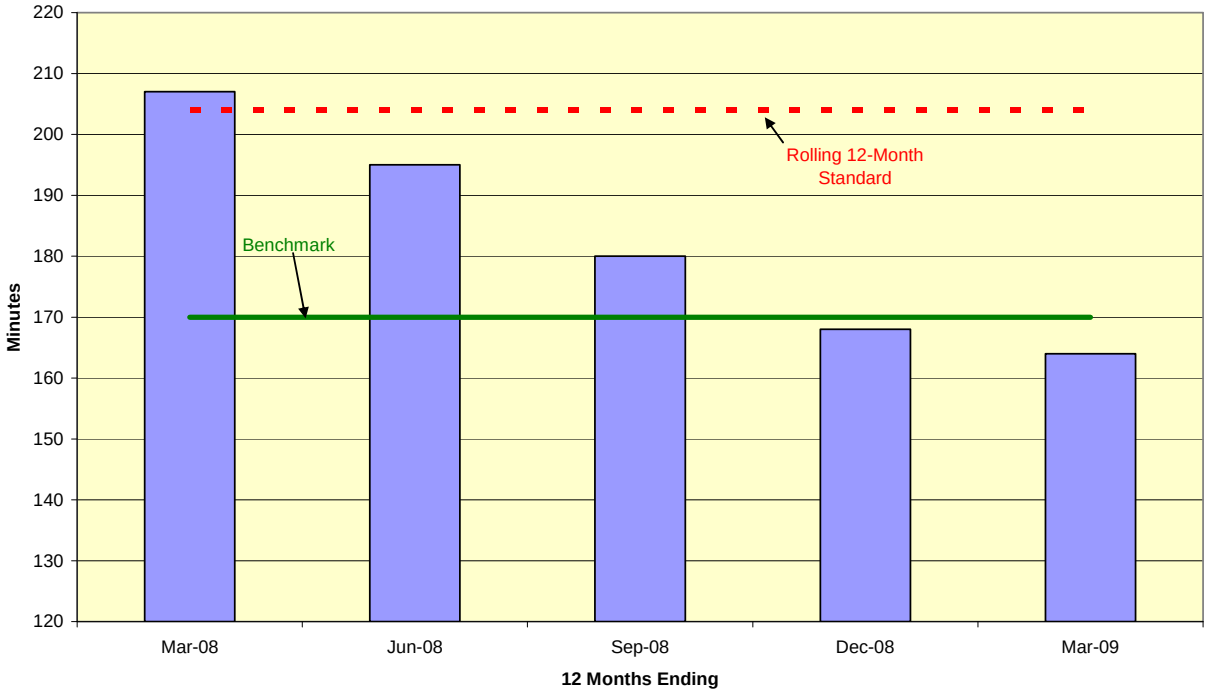
Figures 3 and 4 depict trends in the duration of customer interruptions for the Allegheny system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

Average CAIDI values decreased from 208 minutes in 2007 to 168 minutes in 2008, which was a 19.2 percent decrease in CAIDI minutes.

Throughout 2008 and into the first quarter of 2009, CAIDI has consistently trended toward the benchmark. For the 12-month average ending March 31, 2009, CAIDI was 164 minutes, or 3.5 percent below the benchmark.

**Figure 3. Allegheny Power System**
**Customer Average Interruption Duration Index (CAIDI)**


**Figure 4. Allegheny Power System**
**Customer Average Interruption Duration Index (CAIDI)**



Figures 5 and 6 depict trends in the frequency of service interruptions for the Allegheny system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards for SAIFI.

Average SAIFI values decreased from 1.29 in 2007 to 1.16 in 2008, which was a 10.1 percent decrease in outage frequency. For the 12-month average ending March 31, 2009, SAIFI was 1.04, or one percent below the benchmark.

**Figure 5. Allegheny Power System**
**System Average Interruption Frequency Index (SAIFI)**

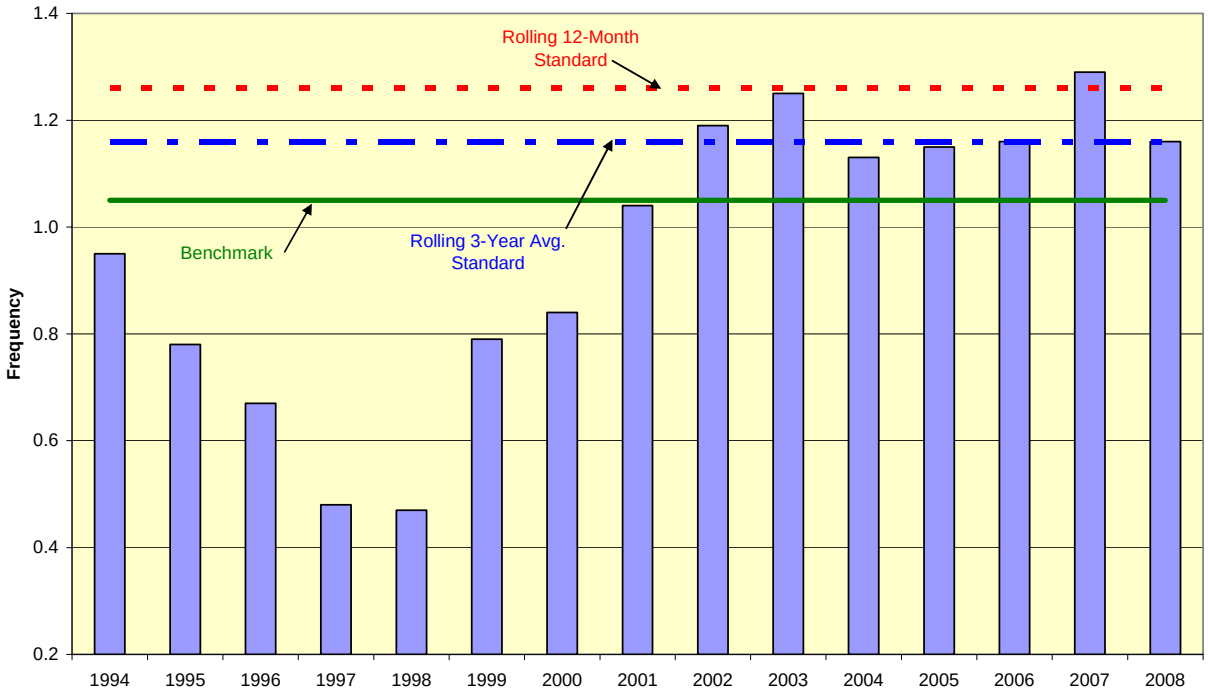


**Figure 6. Allegheny Power System**
**System Average Interruption Frequency Index (SAIFI)**

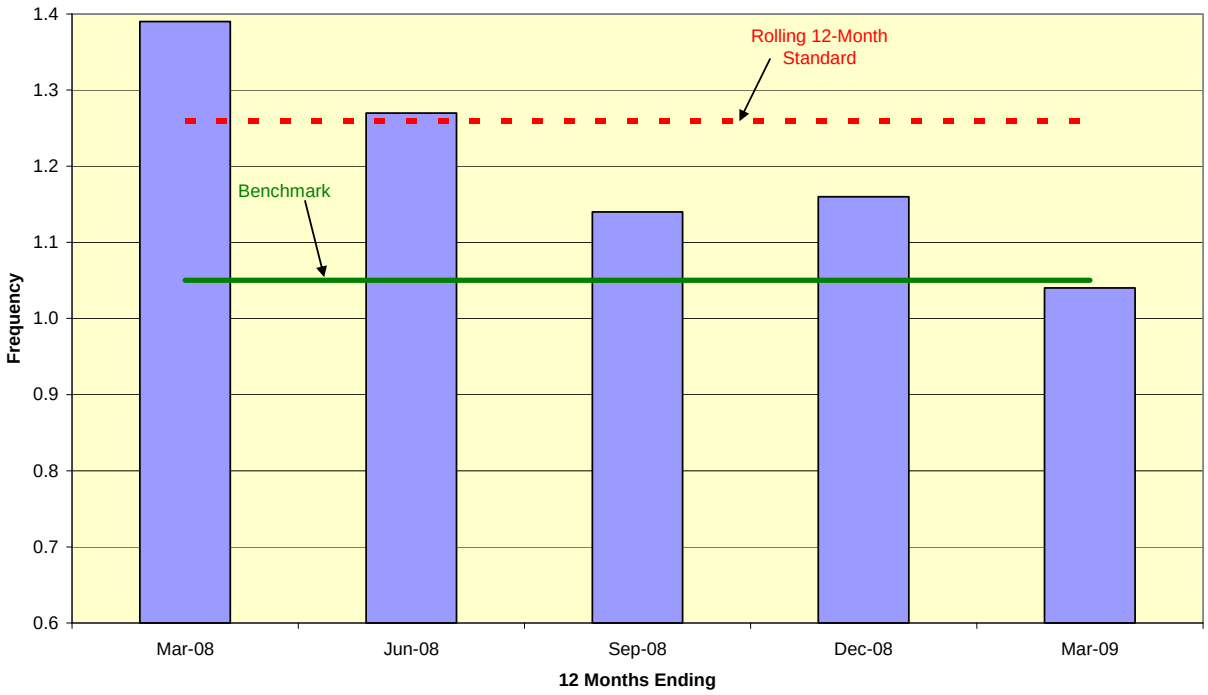



Figure 7 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. Equipment failure was responsible for 29.2 percent of the outages, 30.6 percent of customers affected and 26.5 percent of customer minutes interrupted. Trees off the right-of-way were the second leading cause of service interruptions, with 23.2 percent of the outages, 23.2 percent of customers affected and 31.4 percent of interruption minutes. Weather accounted for 13.7 percent of total outages, 10.7 percent of customers affected and 14.5 percent of interruption minutes.

Figure 8 trends the number of outages by the top three major causes.

**Figure 7. Allegheny Power System**
**Outage Causes**

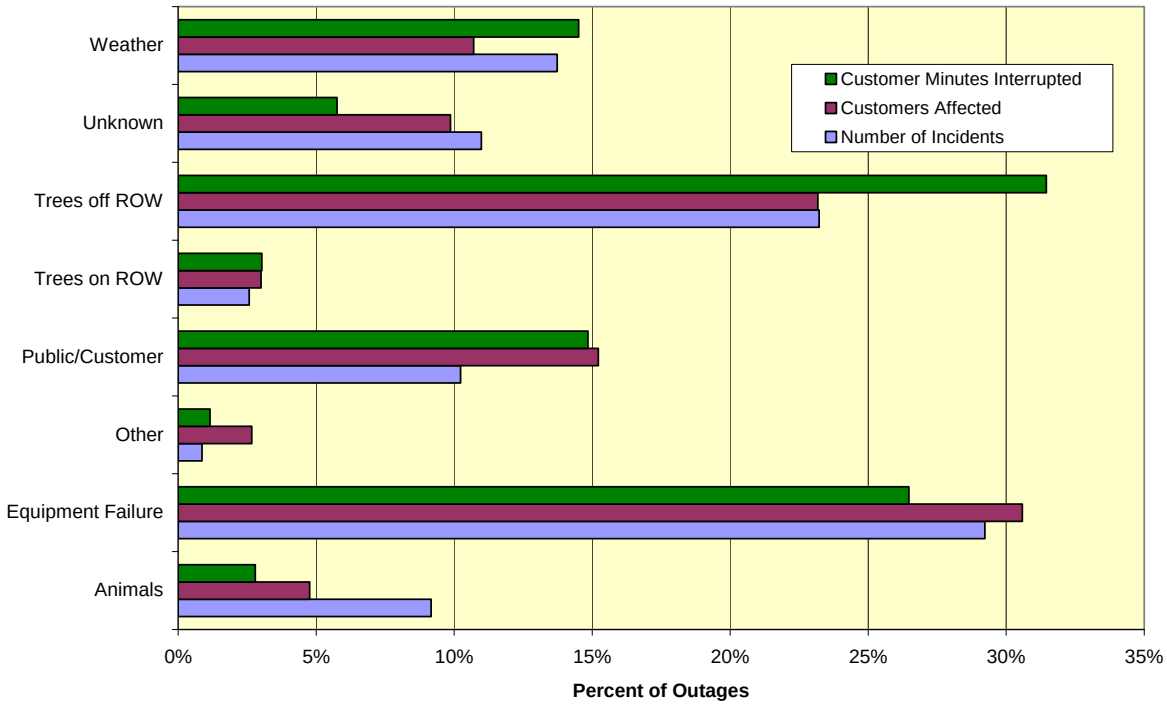
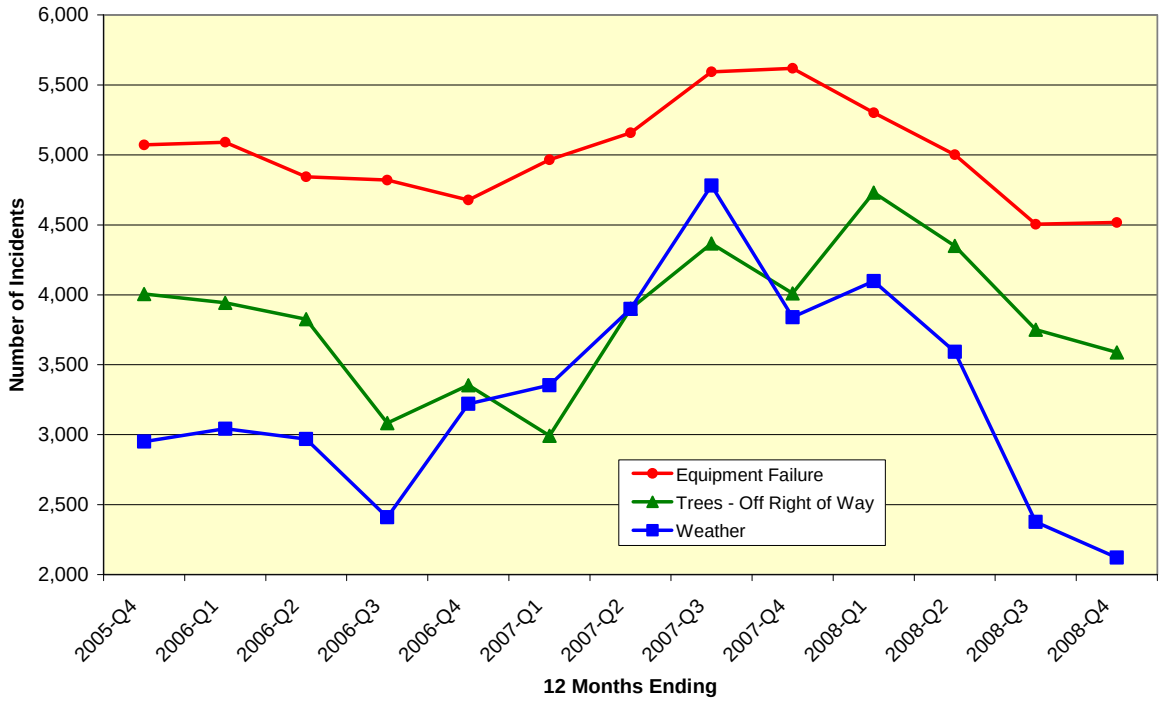



**Figure 8. Allegheny Power System**
**Outage Tracking**



## Duquesne Light Company

Duquesne's overall performance continues to be better than the reliability standard. Duquesne's 2008 CAIDI of 98 minutes was ten minutes lower than the benchmark of 108 minutes. The 2008 SAIFI was an average of 0.99 outages per customer, compared to a benchmark of 1.17 outages.[25] All three indices were better than the benchmark and the three-year average performance standard.

In 2008, Duquesne's service area experienced one major event. The calculation of the reliability indices exclude data related to this event, which was approved by the Commission:

- September 14-22, 2008 – High winds from remnants of Hurricane Ike, gusting to 70 mph; 2.0 million KVA were affected (29 percent of customer load); 1.5 billion KVA-minutes were excluded.

In 2008, Duquesne experienced a total of 7.0 million kilovoltamperes (KVA) interrupted with a total duration of 685.2 million KVA-minutes, which was 15.3 percent higher than that which was reported last year.

Figures 9 and 10 depict trends in the duration of service interruptions for the Duquesne system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

Even though Duquesne's CAIDI values remain below the benchmark, Commission staff was concerned with the general upward trend since a low point in 2001. Staff met with representatives of both Duquesne's management and Duquesne's International Brotherhood of Electrical Workers (IBEW) union to discuss remedies to reverse this trend. As can be seen, the CAIDI values are now trending downward.

[25] Duquesne's system does not provide an actual count of customers interrupted. The data available is in regard to interrupted load. The unit used is KVA, or kilovoltampere, which is the basic unit of apparent power.

**Figure 9. Duquesne Light Company**
**Customer Average Interruption Duration Index (CAIDI)**

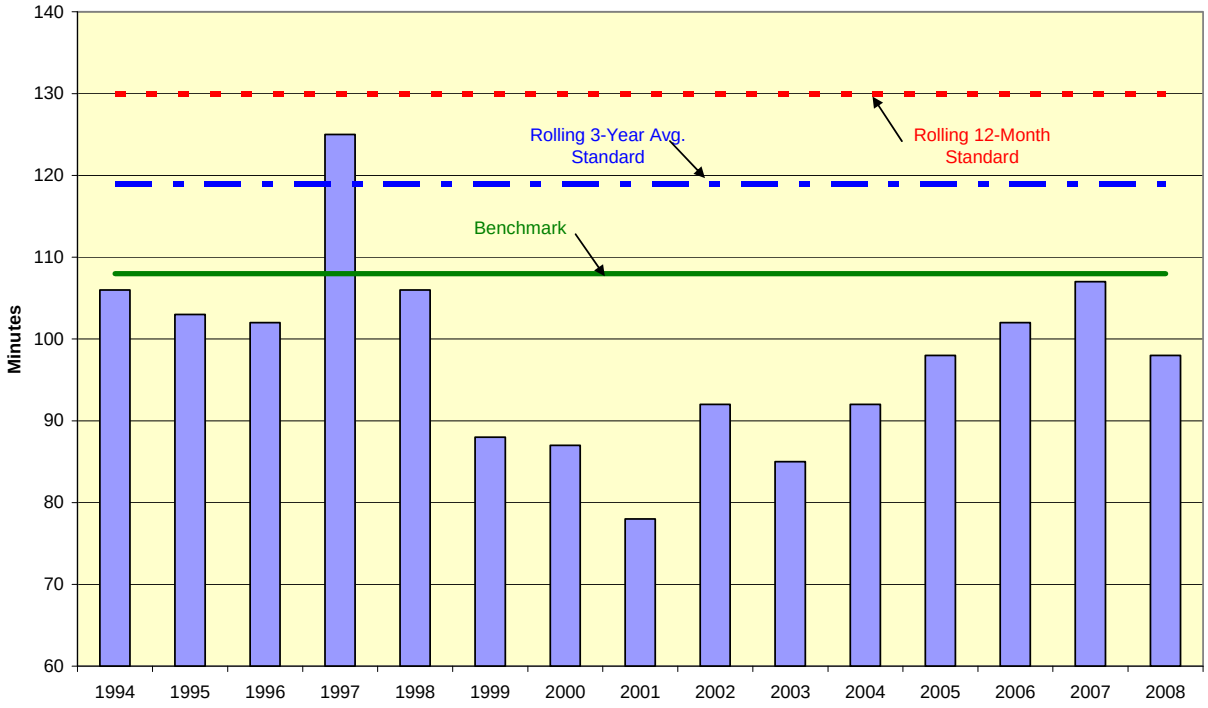
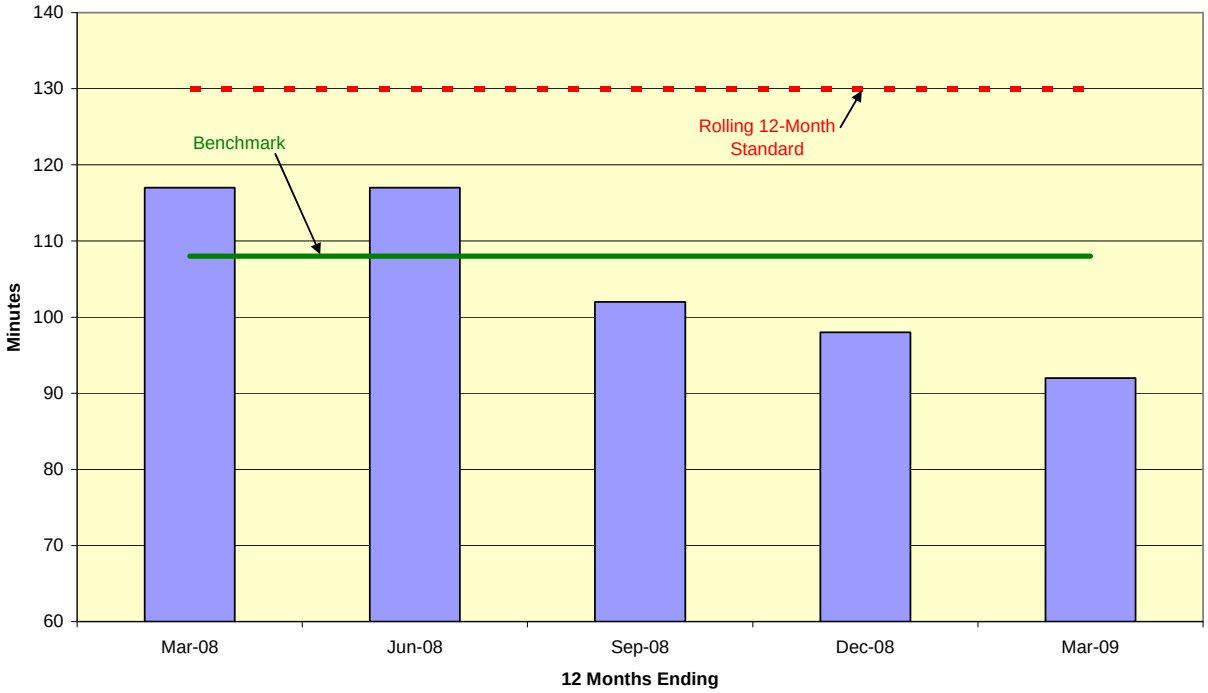



**Figure 10. Duquesne Light Company**
**Customer Average Interruption Duration Index (CAIDI)**



Figures 11 and 12 show trends in the frequency of service interruptions for the Duquesne service territory from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards for SAIFI.

Duquesne's SAIFI reliability performance continues to fall well within the parameters of acceptability. Interruption frequency has remained well below the benchmark since 2004.

**Figure 11. Duquesne Light Company**
**System Average Interruption Frequency Index (SAIFI)**

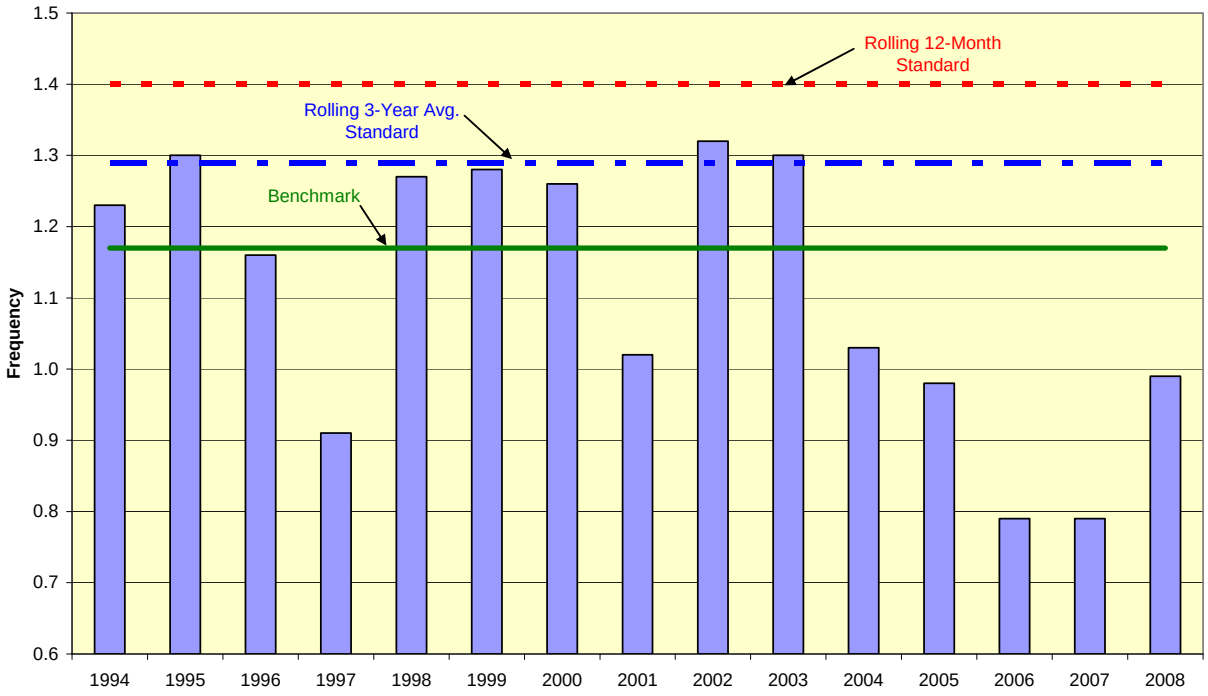


**Figure 12. Duquesne Light Company**
**System Average Interruption Frequency Index (SAIFI)**

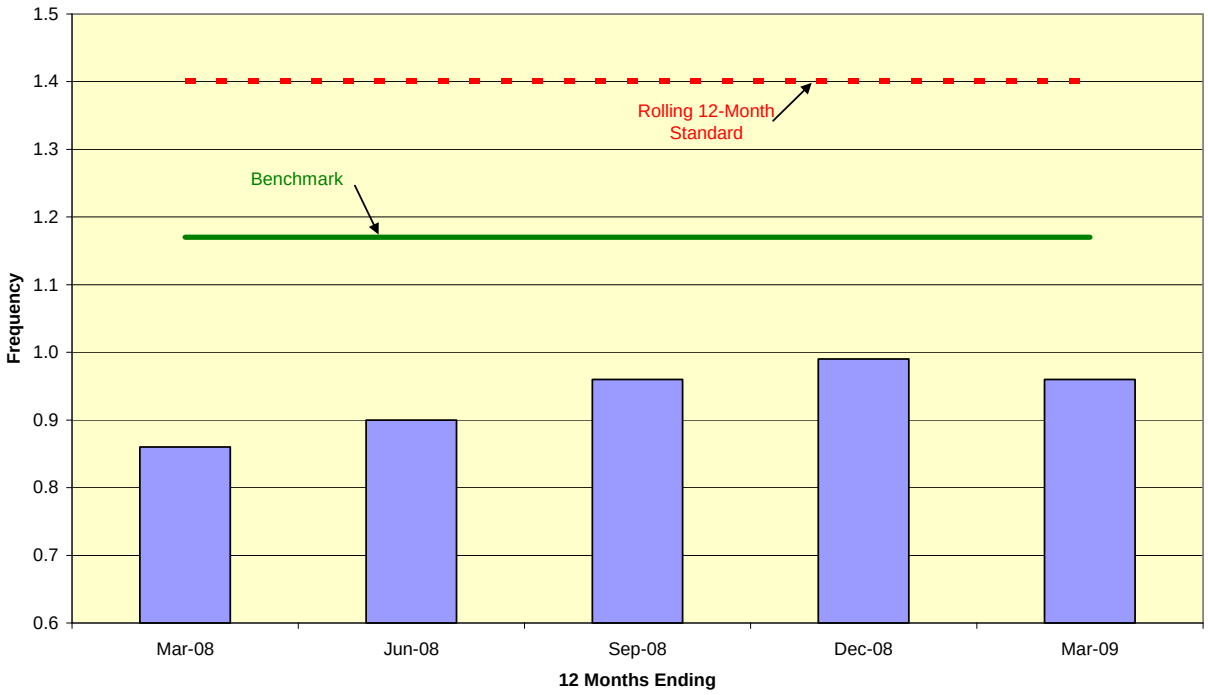



Figure 13 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. Equipment failure was responsible for 28.0 percent of the outages, 35.4 percent of interrupted load and 28.5 percent of interruption minutes. Fallen trees accounted for 19.2 percent of outages, 19.6 percent of interrupted load and 25.5 percent of interruption minutes. Storms were identified as causing 17.2 percent of the outages, 14.7 percent of interrupted load and 25.7 percent of interruption minutes.

Figure 14 trends the number of outages by the top three major causes.

**Figure 13. Duquesne Light Company**
**Outage Causes**

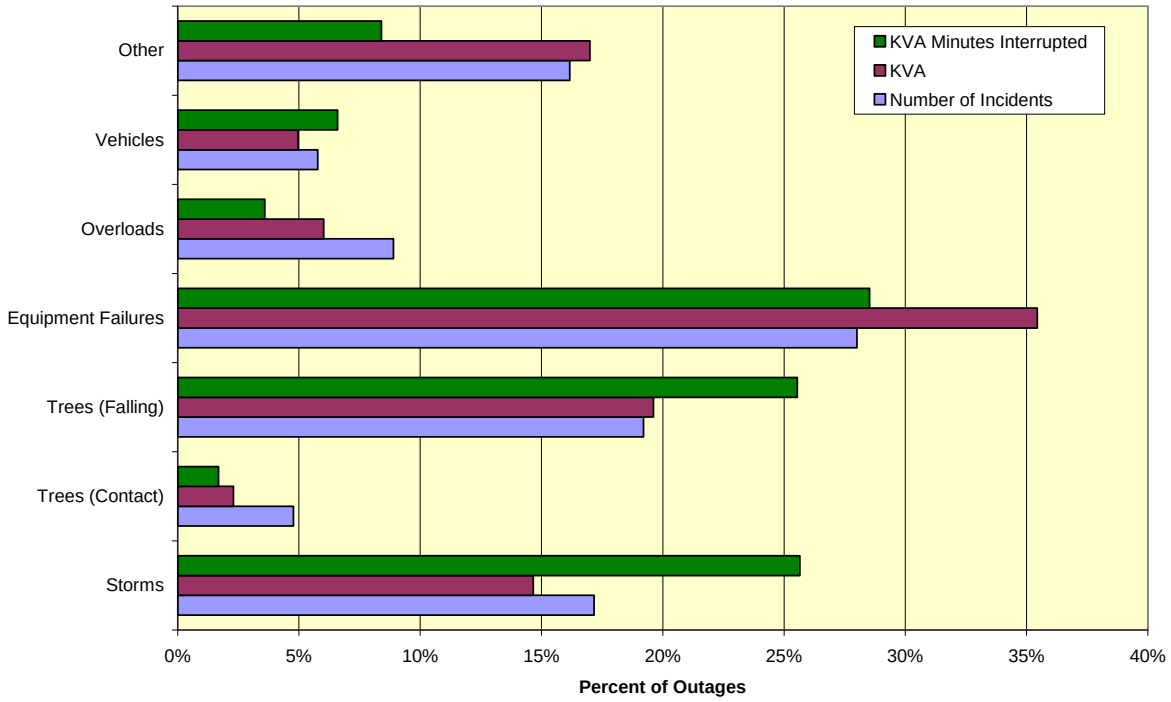
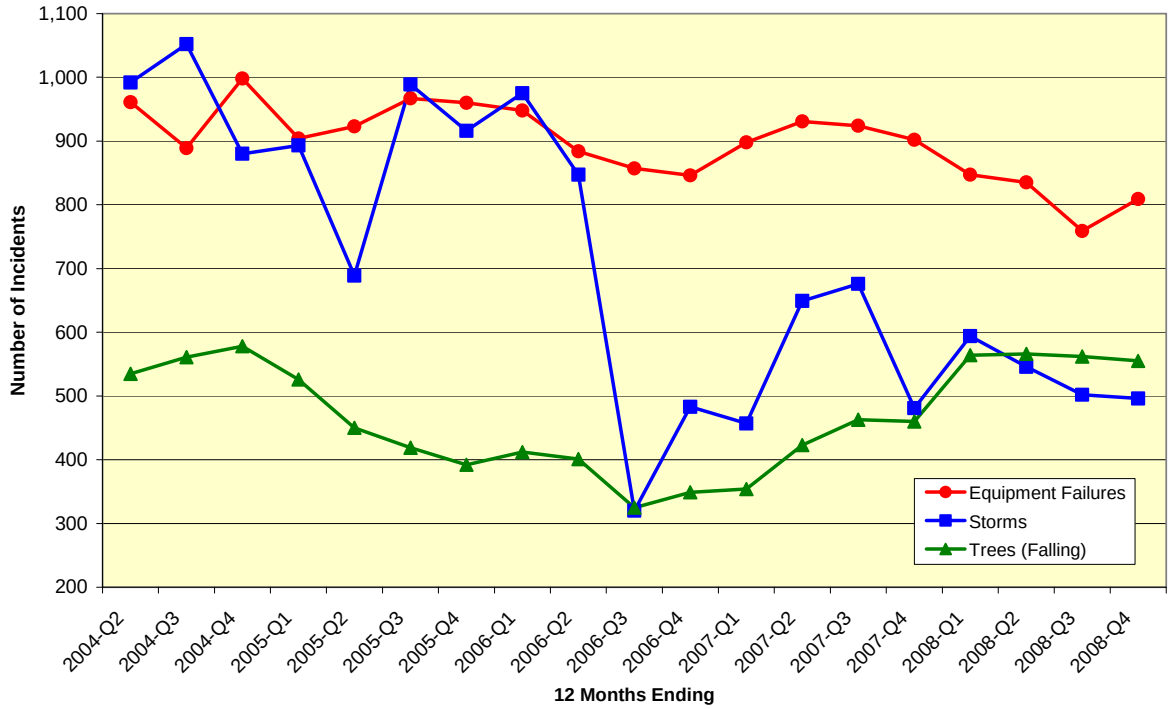



**Figure 14. Duquesne Light Company**
**Outage Tracking**



## Metropolitan Edison Company

Met-Ed's reliability performance summary was filed as a joint report submitted on behalf of the three Pennsylvania operating companies of FirstEnergy: Met-Ed, Penelec and Penn Power.

On May 26, 2004, FirstEnergy filed a Petition for the Amendment of Benchmarks.[26] On February 17, 2006, the Commission entered an Order modifying the benchmarks and standards for the three FirstEnergy companies. Met-Ed's CAIDI benchmark was decreased from 127 minutes to 117 minutes; the SAIFI benchmark was increased from 1.06 interruptions to 1.15 interruptions; and the SAIDI benchmark remained at 135 minutes.

A Joint Petition for Settlement in the investigation of FirstEnergy's reliability performance required Met-Ed to achieve an established reliability benchmark for SAIDI by the end of 2007.[27] The settlement required Met-Ed to achieve at least a five percent improvement over the 2003 achieved SAIDI for the 12 months ending December 31, 2007. In addition, the settlement required that Met-Ed achieve SAIDIs for the calendar years 2005 and 2006 that reflect values equal to or better than its achieved SAIDI for 2003. The resulting settlement SAIDI milestones were 140 for the calendar years 2005 and 2006 and 133 for the calendar year 2007. Met-Ed did not achieve any of these SAIDI milestones.

By letter dated June 22, 2006, the PUC Prosecutory Staff informed Met-Ed that it was in violation of the Settlement and requested that a specific remediation plan be implemented. In response to the letter, Met-Ed agreed to have an independent consultant perform a reliability audit of its operations. The final audit report was submitted by the consultant on July 18, 2007. Met-Ed is in the process of implementing the consultant's recommendations. Quarterly site visits by Commission Staff to Met-Ed's office and field locations have taken place. The last scheduled reliability meeting occurred on December 12, 2008. Met-Ed's reliability performance indices are now meeting Commission standards

Met-Ed's CAIDI for 2008 was 104 minutes, an improvement from 112 minutes in 2007, and 13 minutes lower than the benchmark. Met-Ed's CAIDI has demonstrated consistent improvement since 2004. SAIFI was 1.35 interruptions per customer, compared to last year's 1.63. SAIFI has been trending downward since completion of the reliability audit and now meets the standard. Met-Ed's

[26] Docket No. P-00042115.

[27] On January 16, 2004, the Commission instituted an investigation of FirstEnergy's compliance with the Commission's regulations and orders relating to reliable electric service, and seeking recommendations for reliability improvements. On November 4, 2004, the Commission approved a Joint Petition for Settlement which, among other things, sets forth goals for improving reliability performance and achieving milestone levels of reliability by the end of 2005, 2006 and 2007 for Met-Ed, Penelec and Penn Power. Docket No. I-00040102.

SAIDI for 2008 was 139, which is 43 minutes better than 2007 and only three percent (four minutes) above the Commission-established benchmark.

For the three-year average performance, Met-Ed was 12.9 percent below the CAIDI standard, but was above the SAIFI three-year standard by 23.6 percent.

In 2008, Met-Ed's service area experienced one major event. The calculation of the reliability indices exclude outage data related to this event, which was approved by the Commission:

- March 8-11, 2008 – Thunderstorms and strong winds; 63,403 customers were affected; 13.9 million minutes were excluded.

In 2008, Met-Ed experienced 727,306 customer interruptions with a total duration of 75.3 million customer minutes, or 23.4 percent lower than 2007.

Figures 15 and 16 depict trends in the duration of service interruptions for the Met-Ed system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 15. Metropolitan Edison Company**
**Customer Average Interruption Duration Index (CAIDI)**

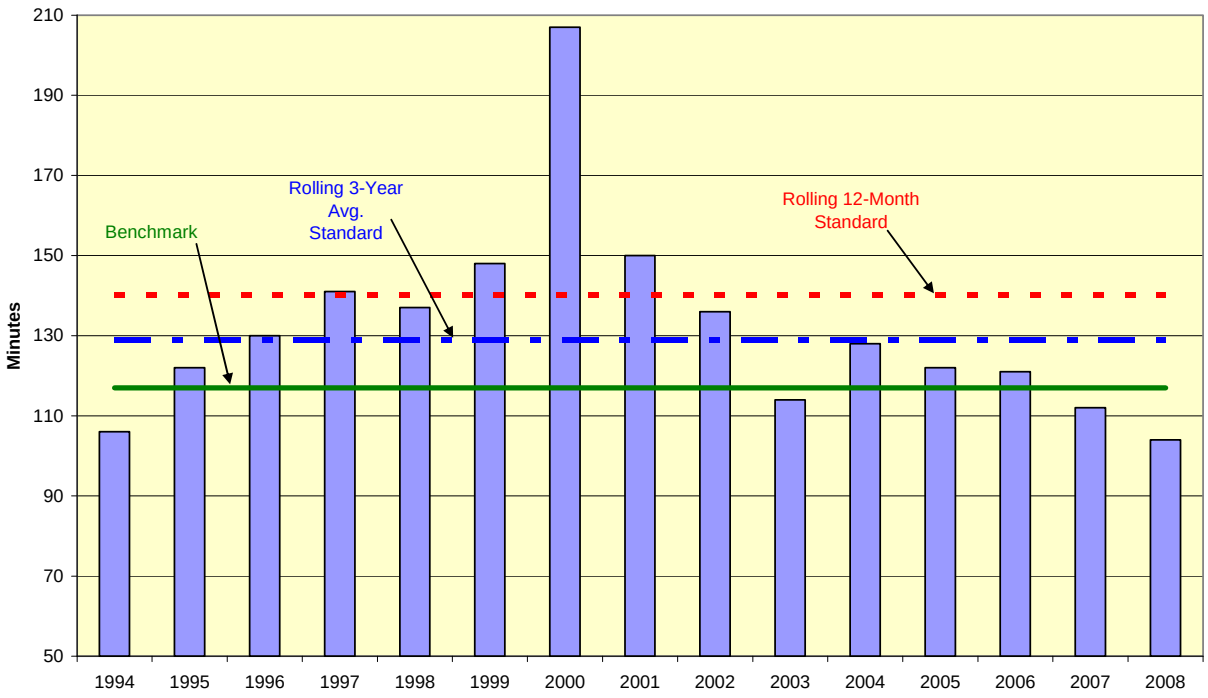
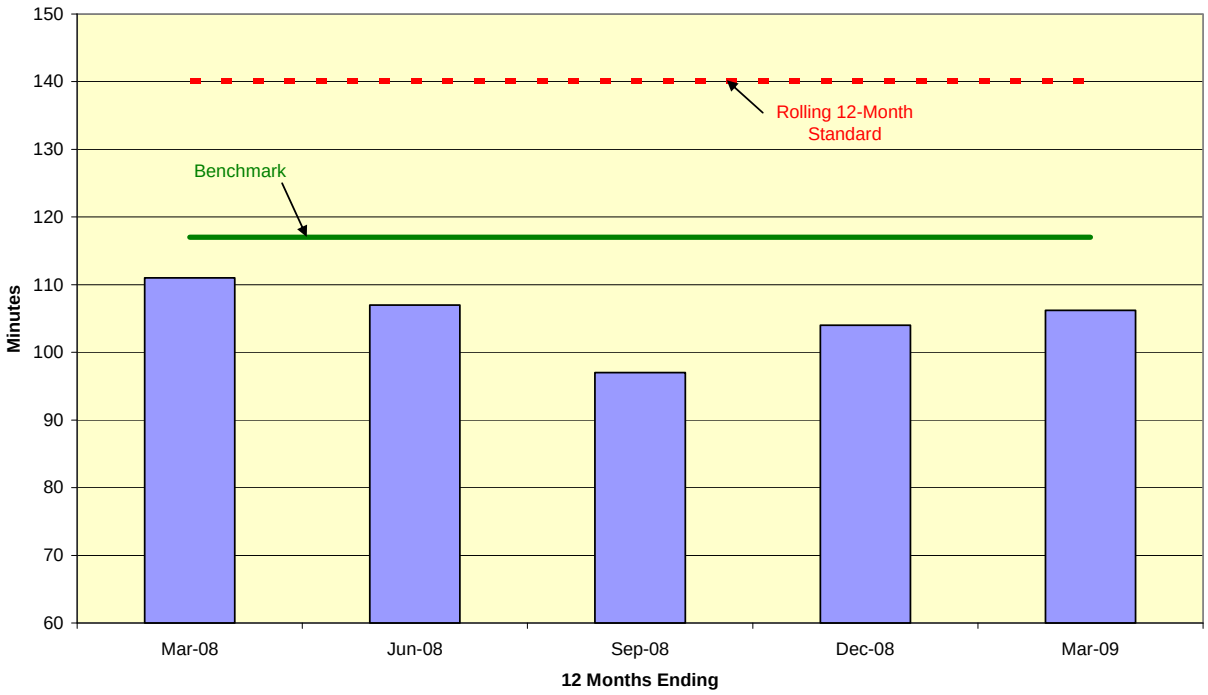


**Figure 16. Metropolitan Edison Company**
**Customer Average Interruption Duration Index (CAIDI)**




CAIDI has consistently remained below the benchmark throughout 2008 and the first quarter of 2009.

In 2008, Met-Ed implemented a series of SAIFI reliability improvement initiatives including aggressive tree trimming, detailed circuit-condition assessments and application of adaptive relaying to allow transient faults to be cleared in a storm. Additional protective equipment, such as fuses and reclosers, were also added to limit the scope of an outage.

Figures 17 and 18 depict trends in the frequency of service interruptions from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 17. Metropolitan Edison Company**
**System Average Interruption Frequency Index (SAIFI)**

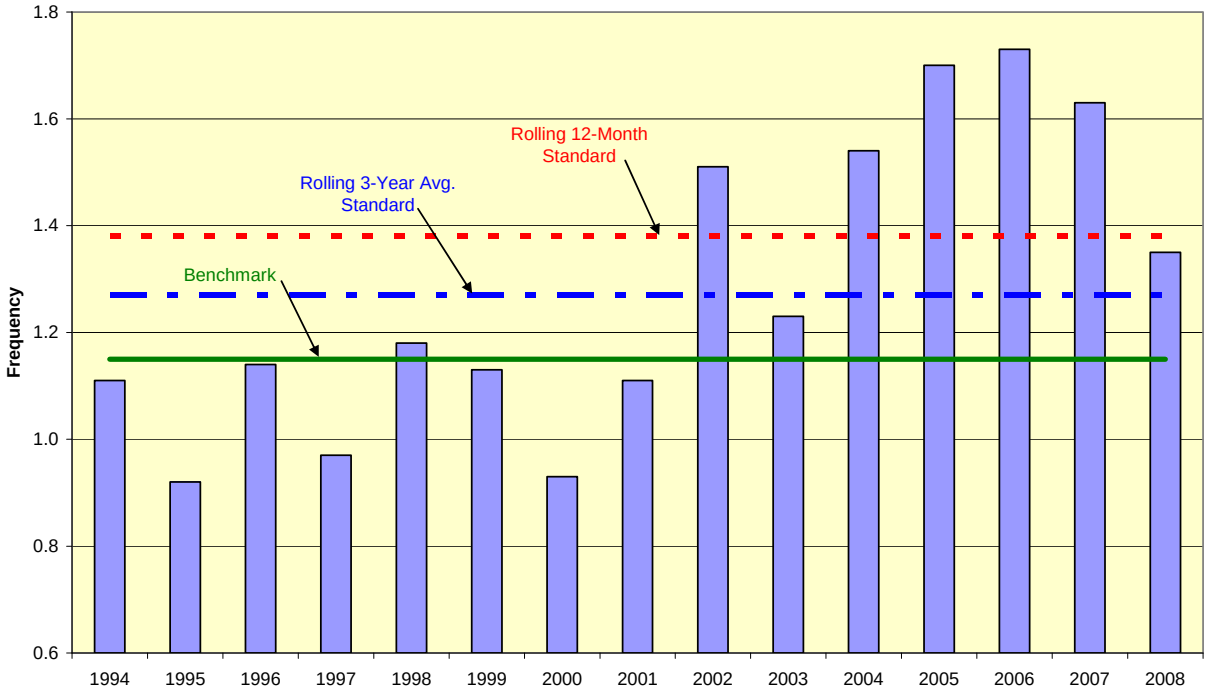
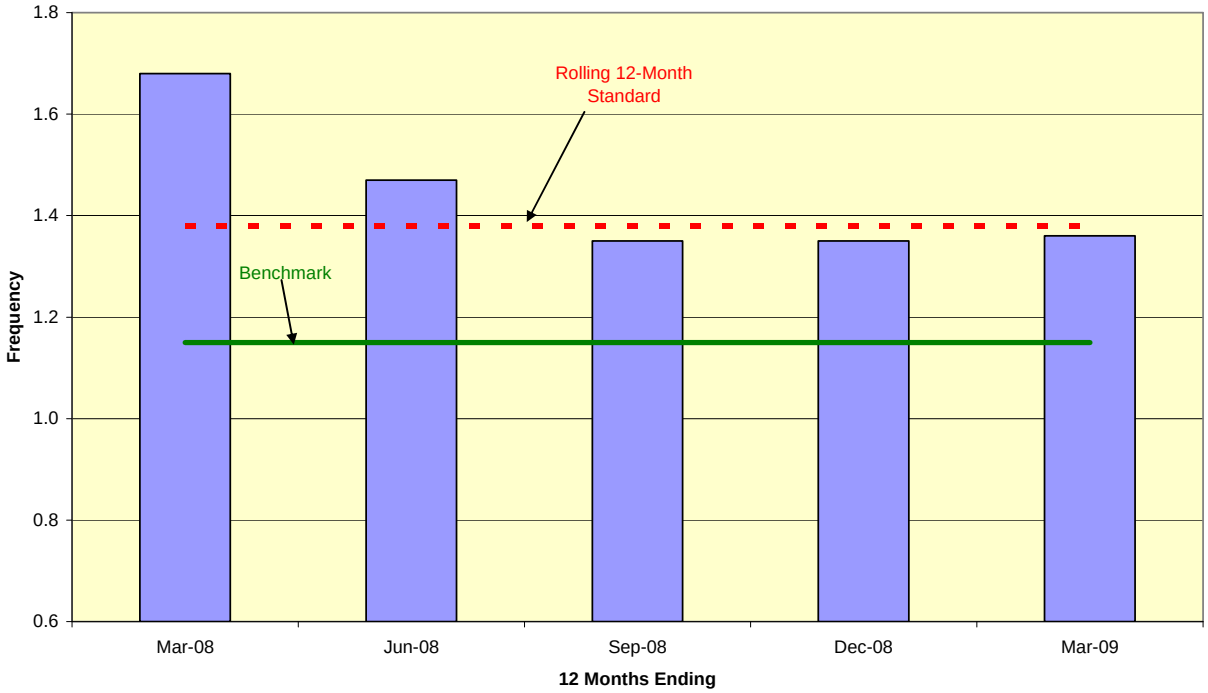



**Figure 18. Metropolitan Edison Company**
**System Average Interruption Frequency Index (SAIFI)**



As discussed above, the frequency of service outages now meets the Commission established rolling 12-month standard.

Figure 19 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. Equipment failure was responsible for 22.0 percent of incidents, 19.0 percent of customers affected and 15.7 percent of interruption minutes. Animals caused 17.3 percent of the outages, 6.8 percent of customers affected and 3.8 percent of interruption minutes. Non-preventable tree-related incidents caused 16.6 percent of the incidents, 22.2 percent of customers affected and 33.3 percent of interruption minutes. Of the total number of incidents, 16.9 percent were assigned to Met-Ed's "unknown" category. This category ranked as the No. 3 cause for outages. Commission staff has met with Met-Ed to address the need to reduce the amount of data attributed to this category. Met-Ed is aggressively installing an adaptive relaying system at distribution substations to reduce the number of outages caused by transient faults.

**Figure 19, Metropolitan Edison Company**
**Outage Causes**

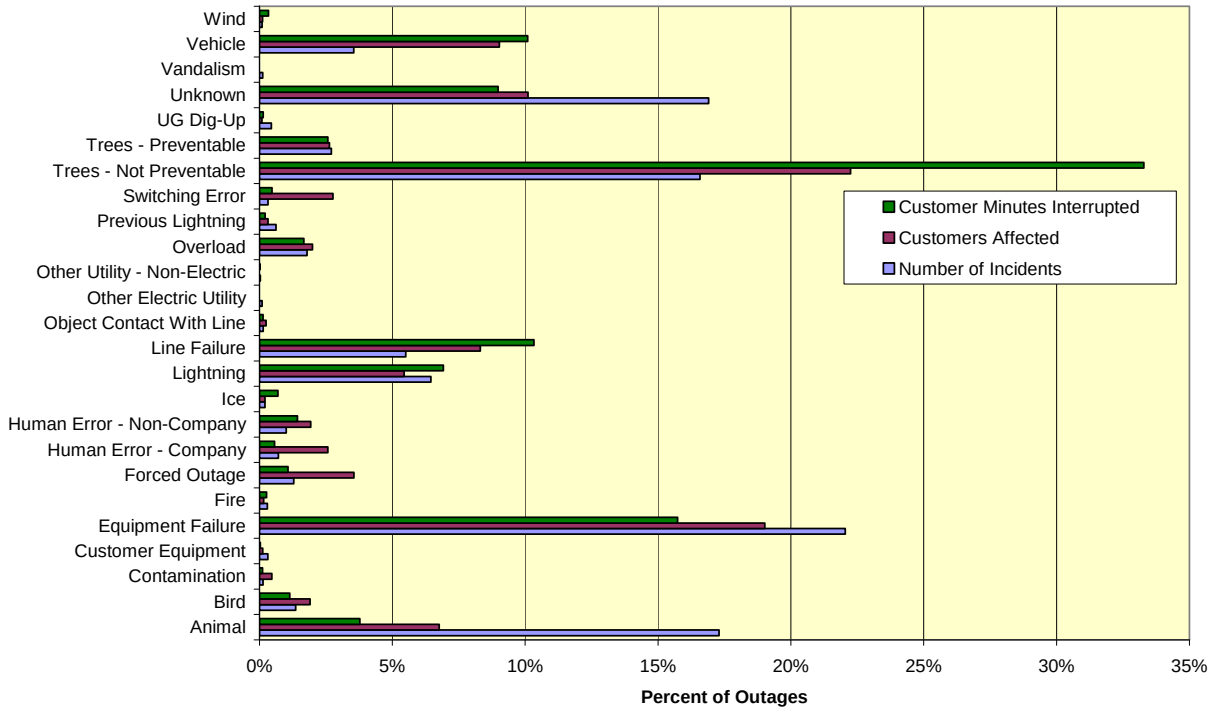
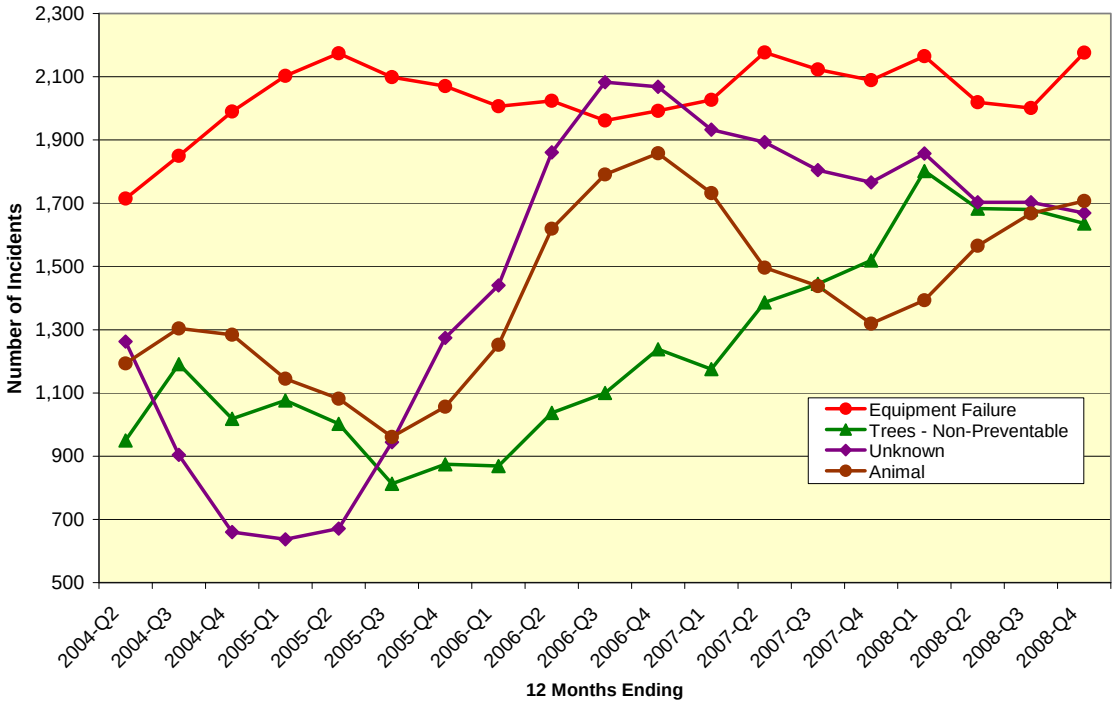


Figure 20 trends the number of outages by the top four major causes.

**Figure 20. Metropolitan Edison Company**
**Outage Tracking**




## Pennsylvania Electric Company

Penelec's reliability performance summary was filed as a joint report submitted on behalf of the three Pennsylvania operating companies of FirstEnergy: Met-Ed, Penelec and Penn Power.

On May 26, 2004, FirstEnergy filed a Petition for the Amendment of Benchmarks.[28] On February 17, 2006, the Commission entered an Order modifying the benchmarks and standards for the three FirstEnergy companies. Penelec's CAIDI benchmark was increased from 115 minutes to 117 minutes; the SAIFI benchmark was increased from 1.15 interruptions to 1.26 interruptions; and the SAIDI benchmark increased from 132 minutes to 148 minutes.

The Joint Petition for Settlement in the investigation of FirstEnergy's reliability performance required Penelec to achieve an established reliability benchmark for SAIDI by the end of 2007.[27] The settlement required Penelec to achieve at least a 25 percent improvement over the 2003 SAIDI for the 12

[28] Docket No. P-00042115.

months ending December 31, 2007. In addition, the settlement required Penelec to achieve SAIDIs for the calendar years of 2005 and 2006 that reflect values equal to or better than its achieved SAIDI for 2003. The resulting settlement SAIDI milestones were 239 for the calendar years 2005 and 2006, and 179 for calendar year 2007. Penelec met the settlement milestone SAIDI in 2006, but Penelec's 2007 SAIDI of 188 failed to meet the 2007 settlement milestone.

By letter dated June 22, 2006, the PUC Prosecutory Staff informed Penelec that its 2005 calendar year performance was in violation of the Settlement and requested that a specific remediation plan be implemented. Penelec implemented an accelerated system reliability improvement plan that brought the company into compliance with both the settlement and the Commission's 12-month reliability benchmarks and standards by the end of the 2006 calendar year.

Because Penelec failed to achieve the 2007 settlement SAIDI milestone and did not achieve the Commission established standard for SAIFI, Commission staff met with Penelec in April of 2008 to discuss its performance. During the meeting, Penelec provided Commission staff with additional system reliability improvement plans. In recognition of the performance improvement demonstrated by Penelec's 2006 reliability indices, Commission staff monitored the implementation of these plans during the summer of 2008 in lieu of any immediate, formal non-compliance action.

A Focused Reliability Assessment, performed by UMS Group Inc. in late 2008 and early 2009, concluded that Penelec has been making measurable improvements in the operation, maintenance and investment activities on its distribution system. Several recommendations were made to bring Penelec into compliance with given performance targets.

Penelec's overall reliability indices in 2008 were higher than last year's. CAIDI was 142 minutes, compared to 110 minutes in 2007, or 0.7 percent worse than the standard. SAIFI was 1.56 service interruptions per customer, compared to last year's 1.71, and 2.6 percent above the standard. Penelec's SAIDI for 2008 was 220, or 3.3 percent above the standard.

For Penelec's rolling three-year average performance, the company was 7.0 percent below the CAIDI three-year standard, but 13.7 percent above the SAIFI three-year standard.

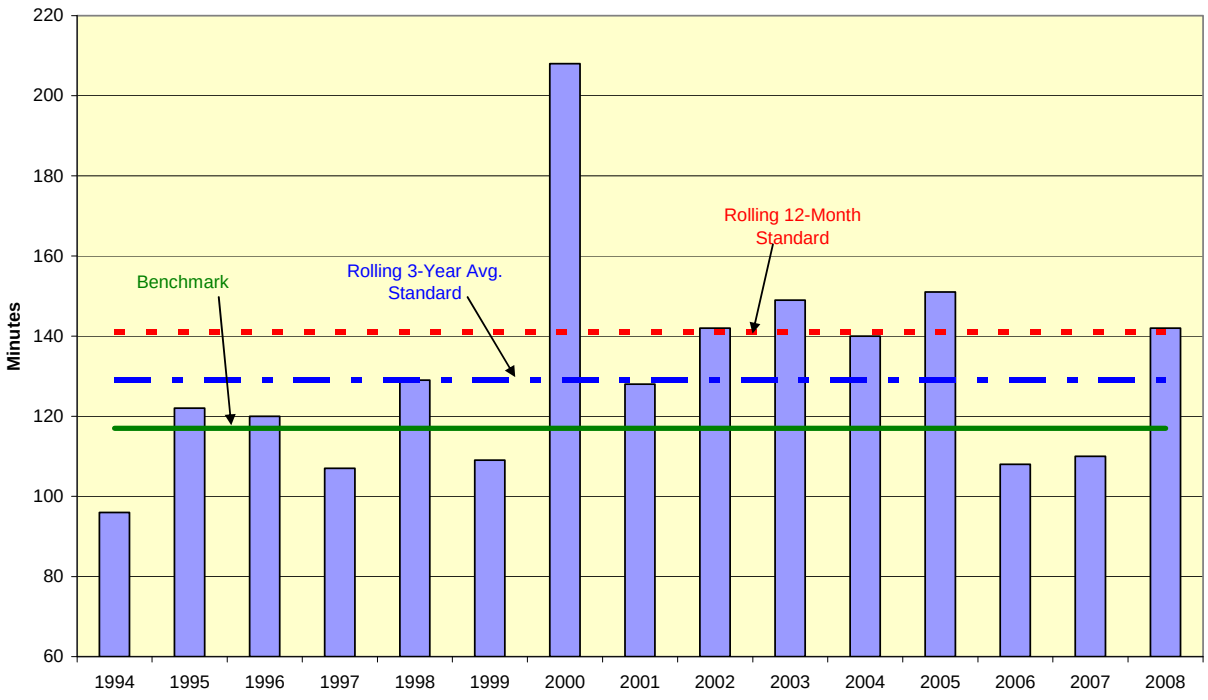
One major event occurred in Penelec's service territory during 2008. The calculation of the reliability indices exclude outage data relating to this event, which was approved by the Commission.

- September 14-19, 2008 – Wind storm with gusts up to 69 miles per hour; 100,977 customers were affected; 64.5 million minutes were excluded.

In 2008, Penelec experienced 900,582 customer interruptions with a total duration of 127.6 million customer minutes, or 16.9 percent higher than 2007.

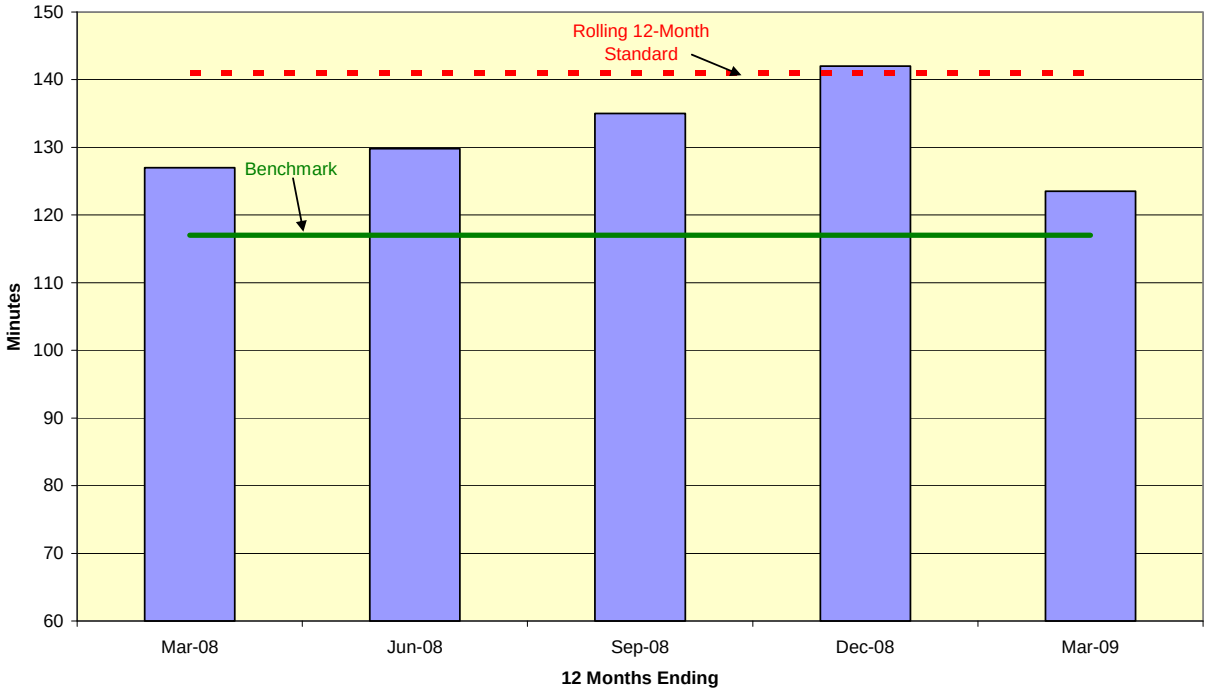
Figures 21 and 22 depict trends in the duration of service interruptions for Penelec from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 21. Pennsylvania Electric Company**
**Customer Average Interruption Duration Index (CAIDI)**




The rolling 12-month average CAIDI values for 2008 show an upward trend toward exceeding the standard. The first quarter of 2009, however, shows a CAIDI of 124 minutes, or just six percent above the benchmark of 117.

**Figure 22. Pennsylvania Electric Company**
**Customer Average Interruption Duration Index (CAIDI)**




Figures 23 and 24 show trends in the frequency of service interruptions from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

The annual SAIFI value for 2008 did not achieve either the performance standard or the three-year average standard. The rolling 12-month averages for the four quarters of 2008, however, show a positive trend toward achieving the standard. The SAIFI value for the 12 months ending March 2009 of 1.26 actually matched the benchmark, indicating a significant improvement over 2008 figures.

Penelec has installed additional reclosers to mitigate interruptions and improve reliability. Over 6,000 cutouts, almost 300 single- and over 40 three-phase reclosers have been installed. Penelec is also optimizing the tree-trimming cycle and enhancing the program to address overhanging limbs and structurally weak trees on the feeder backbone.

**Figure 23. Pennsylvania Electric Company**
**System Average Interruption Frequency Index (SAIFI)**

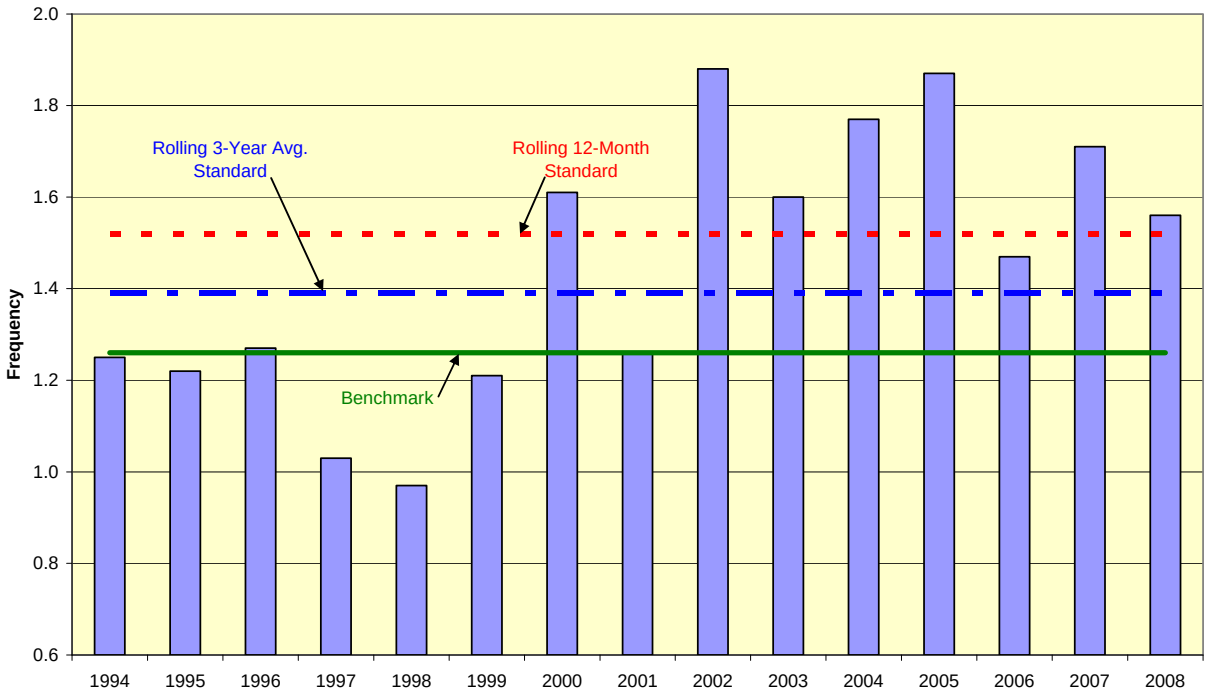



**Figure 24. Pennsylvania Electric Company**
**System Average Interruption Frequency Index (SAIFI)**

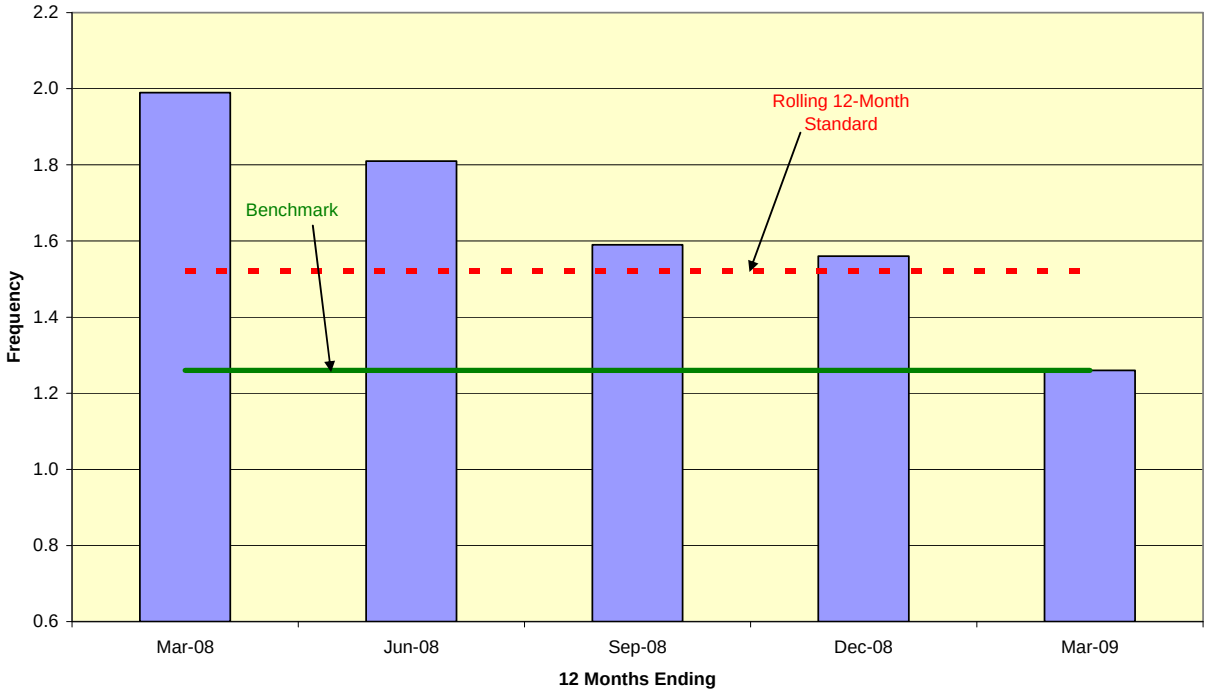


Figure 25 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. Equipment failure was responsible for 32.1 percent of incidents, 32.9 percent of customers affected and 23.9 percent of interruption minutes. Penelec has identified porcelain cutout failures to be a large contributor to equipment failure outages and has been replacing them with polymer cutouts as a preventative measure. Non-preventable tree-related incidents accounted for 17.2 percent of total incidents, 24.4 percent of customers affected and 34.8 percent of interruption minutes. Outages in the "unknown" category caused 13.4 percent of incidents, 9.3 percent of customers affected and 6.5 percent of interruption minutes. Penelec reviews the circuits that have experienced unknown outages to determine if a single device may be causing the outages.

**Figure 25. Pennsylvania Electric Company**
**Outage Causes**

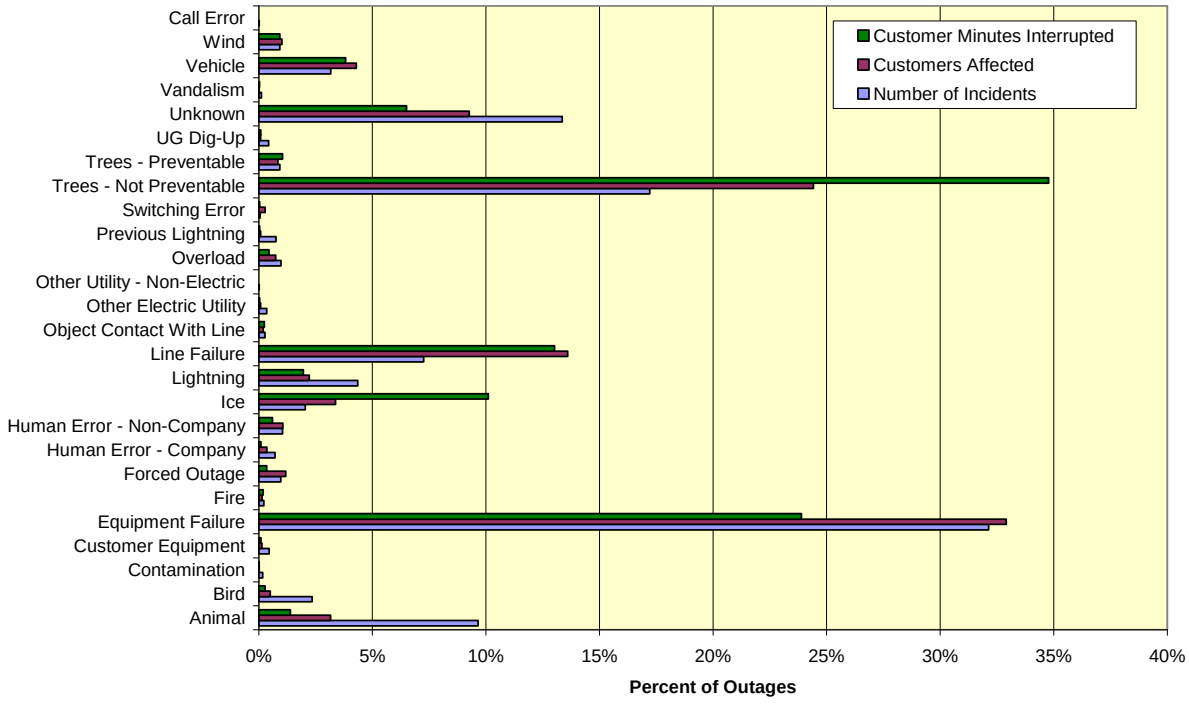
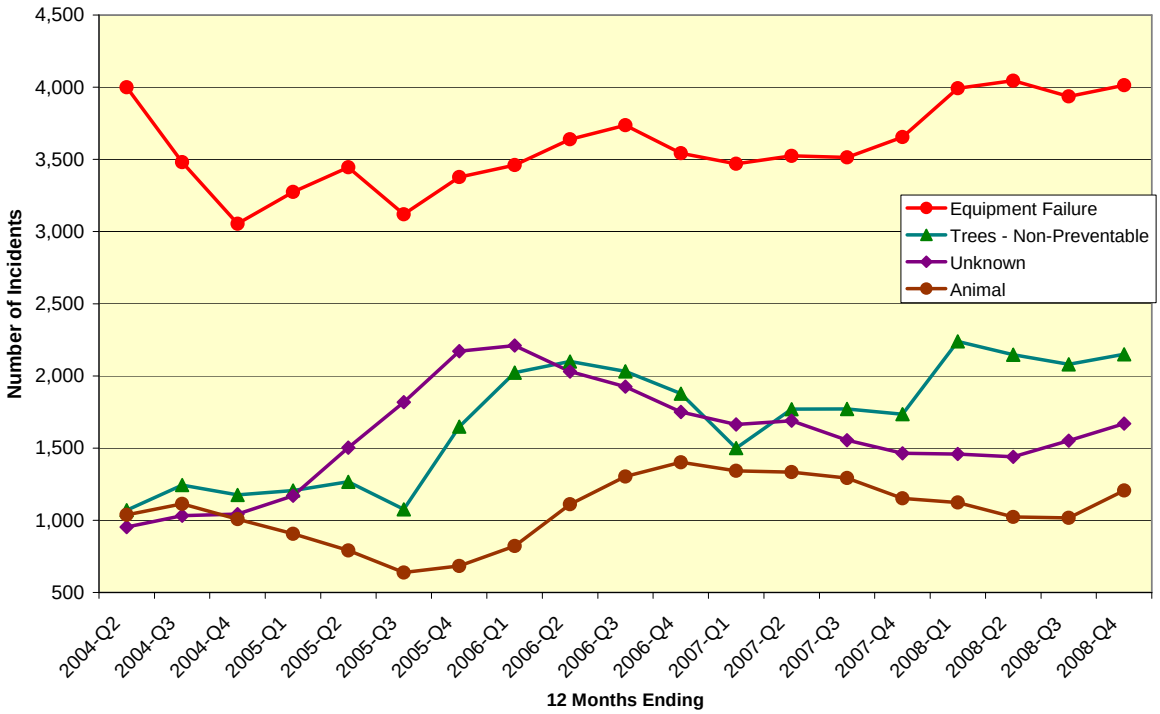


Figure 26 trends the number of outages by the top four major causes.

**Figure 26. Pennsylvania Electric Company Outage Tracking**




## Pennsylvania Power Company

Penn Power's reliability performance summary was filed as a joint report submitted on behalf of the three Pennsylvania operating companies of FirstEnergy: Met-Ed, Penelec and Penn Power.

On May 26, 2004, FirstEnergy filed a Petition for the Amendment of Benchmarks.[29] On February 17, 2006, the Commission entered an Order modifying the benchmarks and standards for the three FirstEnergy companies. Penn Power's CAIDI benchmark was increased from 92 minutes to 101 minutes; the SAIFI benchmark was increased from 1.02 interruptions to 1.12 interruptions; and the SAIDI benchmark was increased from 94 minutes to 113 minutes.

The Joint Petition for Settlement in the investigation of FirstEnergy's reliability performance required Penn Power to achieve an established reliability benchmark for SAIDI by the end of 2007.[27] The settlement required Penn Power

[29] Docket No. P-00042115.

to achieve at least a 30 percent improvement over the 2003 achieved SAIDI for the 12 months ending December 31, 2007. In addition, the settlement required Penn Power to achieve SAIDIs for the calendar years 2005 and 2006 that reflect values equal to or better than its achieved SAIDI for 2003. The resulting settlement SAIDI milestones were 192 for the calendar years 2005 and 2006 and 134 for the calendar year 2007. Penn Power met the settlement milestone SAIDI in 2006, but Penn Power's 2007 SAIDI of 150 failed to meet the 2007 settlement milestone.

In a letter dated June 22, 2006, the PUC Prosecutory Staff informed Penn Power that its 2005 calendar year performance was in violation of the Settlement and requested that a specific remediation plan be implemented. Penn Power implemented an accelerated system reliability improvement plan that brought the company into compliance with both the settlement and the Commission's 12-month reliability benchmarks and standards by the end of the 2006 calendar year. However, because Penn Power failed to achieve the 2007 settlement SAIDI milestone and did not achieve the Commission established standard for CAIDI, the parties to the Joint Petition for Settlement entered into discussions with Penn Power concerning potential repercussions of missing the 2007 Settlement milestone.

Penn Power's overall reliability performance indices in 2008 showed improvement over last year. CAIDI was 111 minutes, compared to 126 minutes in 2007. The 2008 CAIDI was ten minutes less than the standard. SAIFI was 1.13 interruptions, compared to last year's 1.19 and a benchmark of 1.12. Penn Power's three-year average for CAIDI exceeded the three-year performance standard by five minutes, or 4.8 percent.

In 2008, Penn Power's customers experienced two major events. The outage data relating to these events has been excluded from the calculation of the reliability indices.

- February 10-11, 2008 – Strong winds; 19,878 customers were affected; 1.3 million minutes were excluded.
- September 14-22, 2008 – Wind storm with tropical storm force winds over 39 miles per hour for nearly six straight hours; 116,882 customers were affected; 210.5 million minutes were excluded.

In 2008, Penn Power experienced 178,456 customer interruptions with a total duration of 19.8 million minutes, or 16.5 percent lower than 2007.

Figures 27 and 28 depict trends in the duration of service interruptions for the Penn Power system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 27. Pennsylvania Power Company**
**Customer Average Interruption Duration Index (CAIDI)**

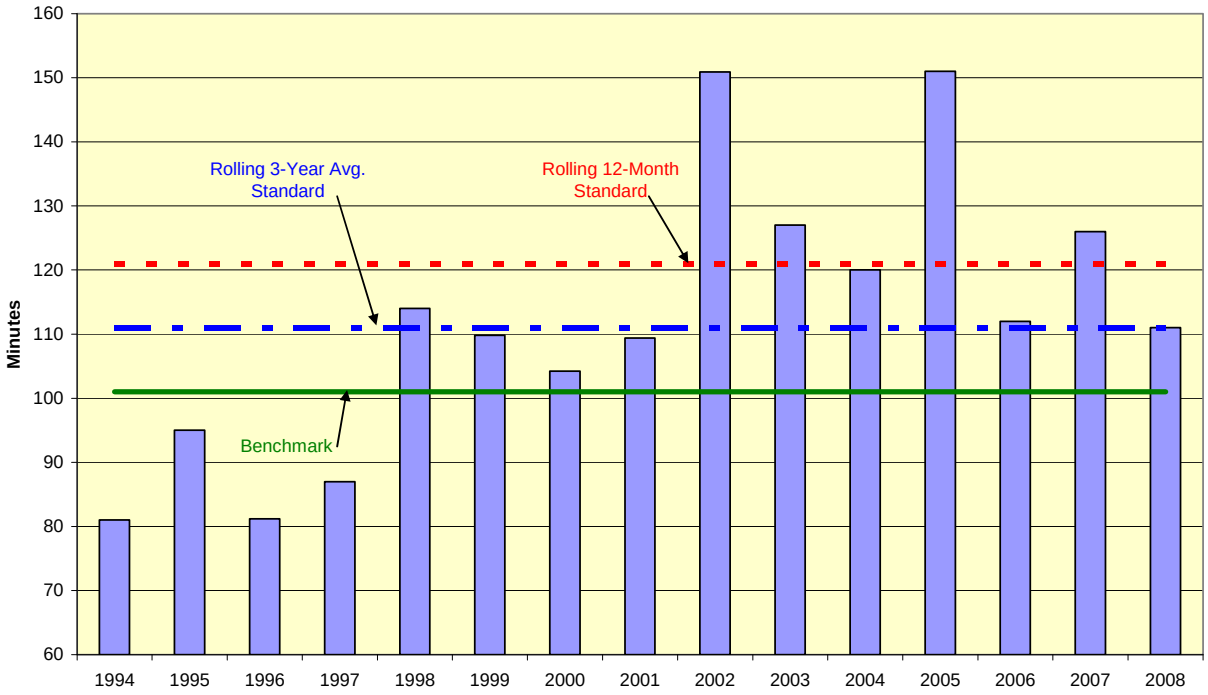
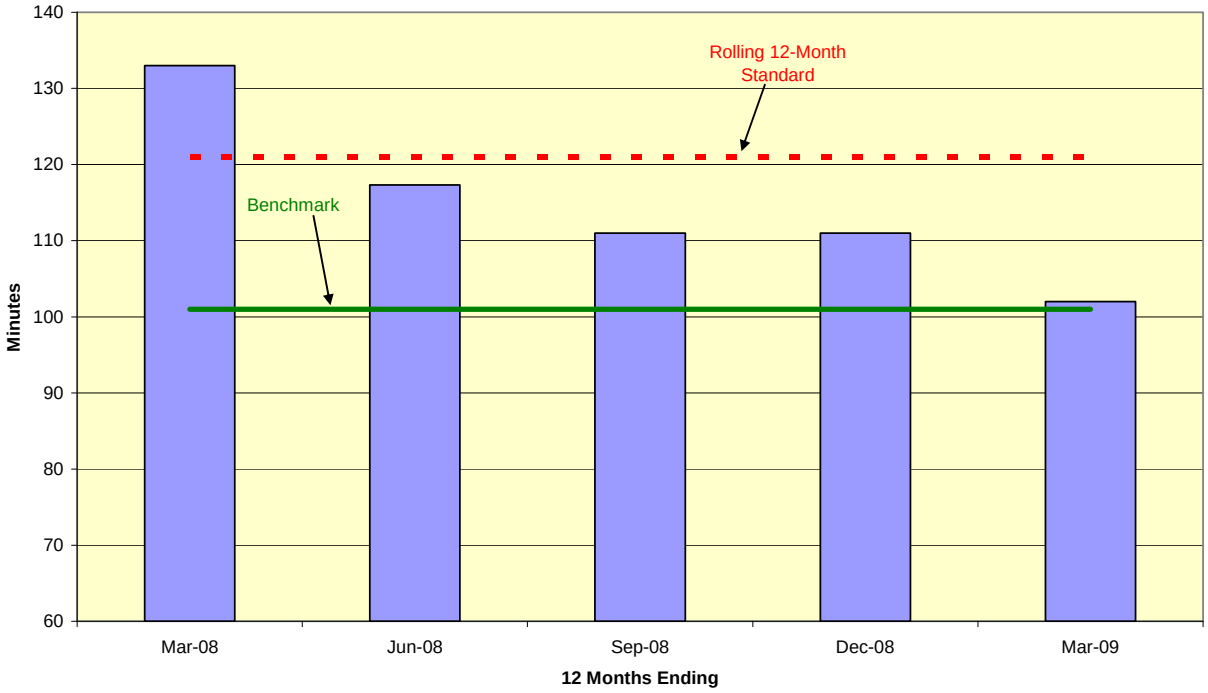


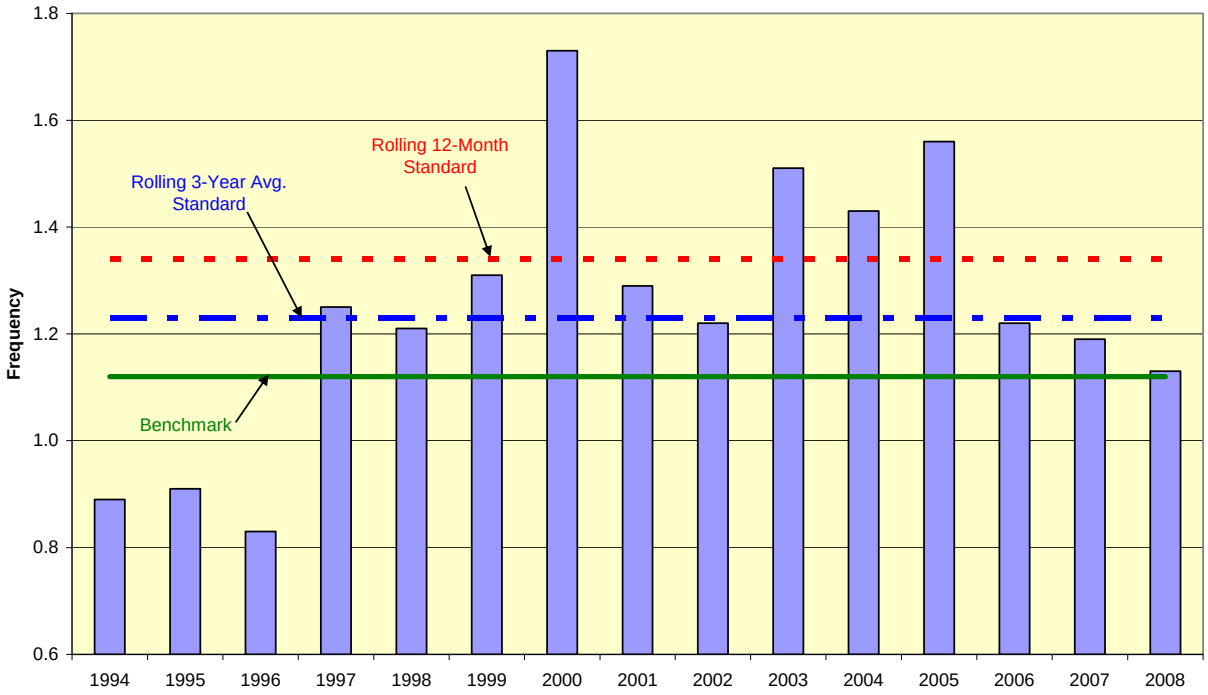

**Figure 28. Pennsylvania Power Company**
**Customer Average Interruption Duration Index (CAIDI)**



CAIDI showed a steady rise throughout 2007 and the first quarter of 2008. The quarterly data, however, shows average outage durations meeting the standard for the last three quarters of 2008. The CAIDI for the first quarter of 2009 was 102 minutes, or just one minute above the benchmark.

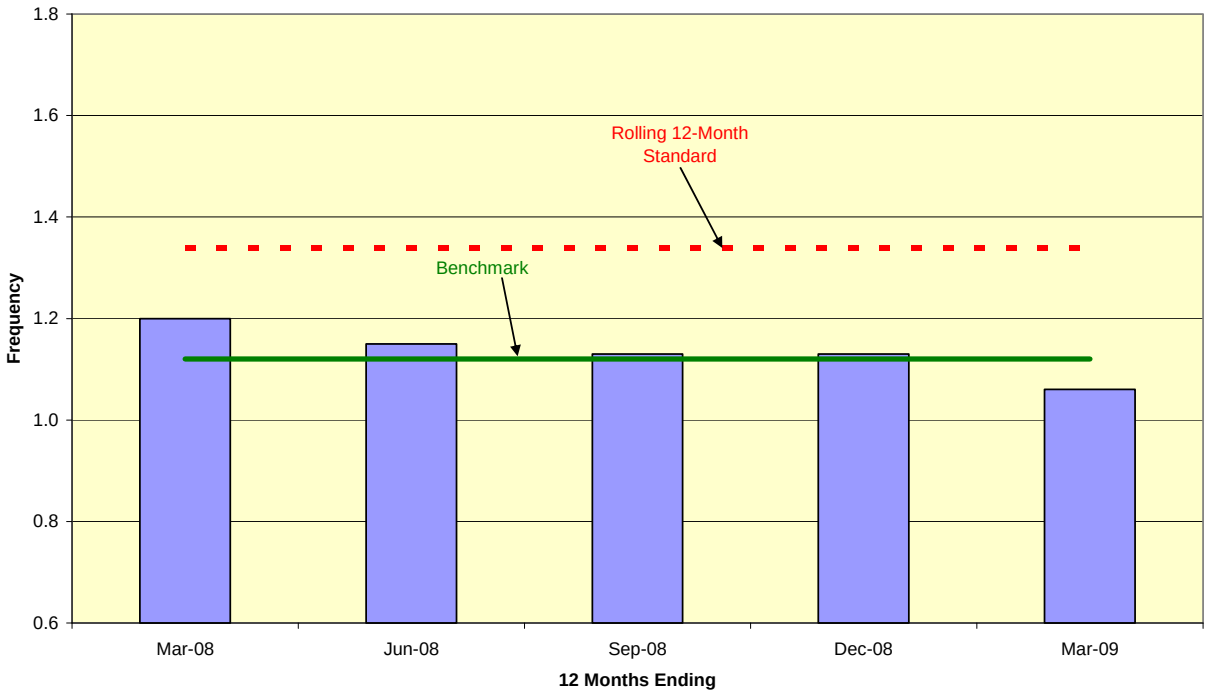
Figures 29 and 30 show trends in the frequency of service interruptions from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 29. Pennsylvania Power Company**
**System Average Interruption Frequency Index (SAIFI)**




SAIFI has shown an improvement in 2006 through 2008, with the 2008 SAIFI at 1.13 compared to the performance standard of 1.34 and the benchmark of 1.12. For the 12 months ending March 2009, SAIFI was 1.06 or 5.4 percent below the benchmark.

**Figure 30. Pennsylvania Power Company**
**System Average Interruption Frequency Index (SAIFI)**




In 2008, Penn Power developed a Reliability Strategy Team which reviewed all outages, by outage cause and weather. As a result, Penn Power took the following actions: aggressive tree trimming, the hiring of additional line service personnel, creative shift coverage to improve outage response and the installation of additional protective devices to minimize the impact and size of outages.

Figure 31 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. Non-preventable tree-related outages represented 22.4 percent of the incidents, 24.5 percent of customers affected and 36.6 percent of interruption minutes. Equipment failure accounted for 13.2 percent of the incidents, 14.9 percent of customers affected and 12.0 percent of interruption minutes. Line failure caused 10.9 percent of outages, 13.0 percent of customers affected and 12.0 percent of interruption minutes.

Figure 32 trends the number of outages by the top four major causes.

**Figure 31. Pennsylvania Power Company**
**Outage Causes**

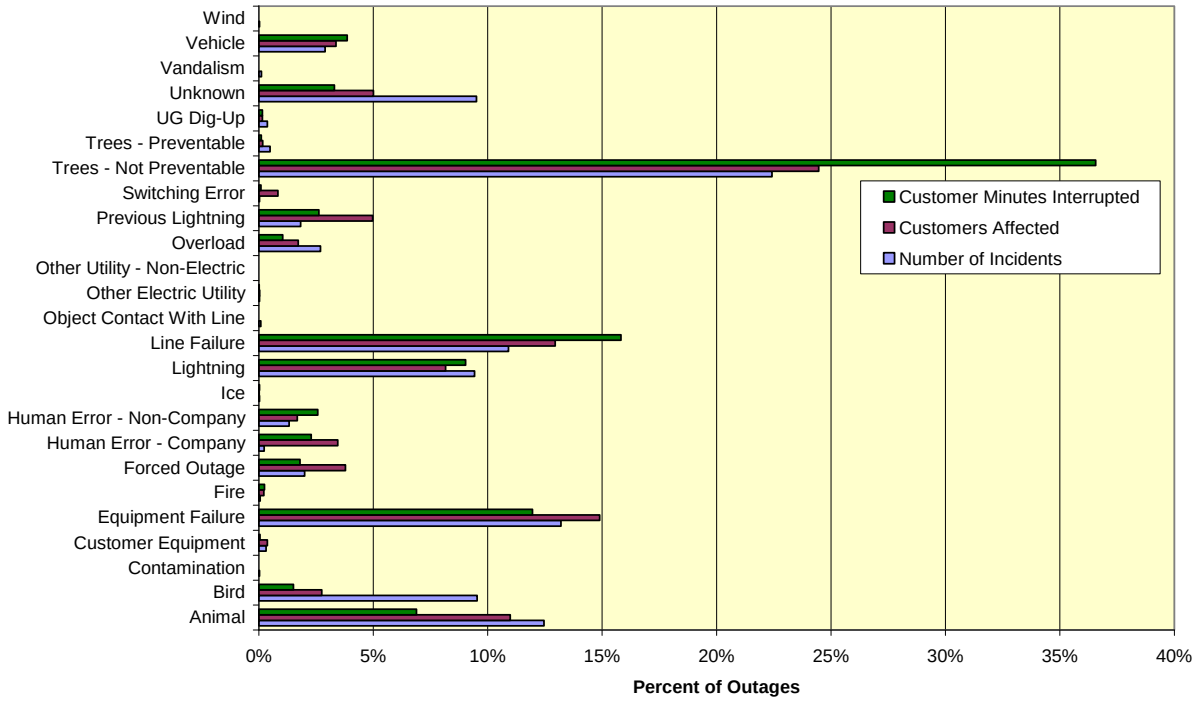
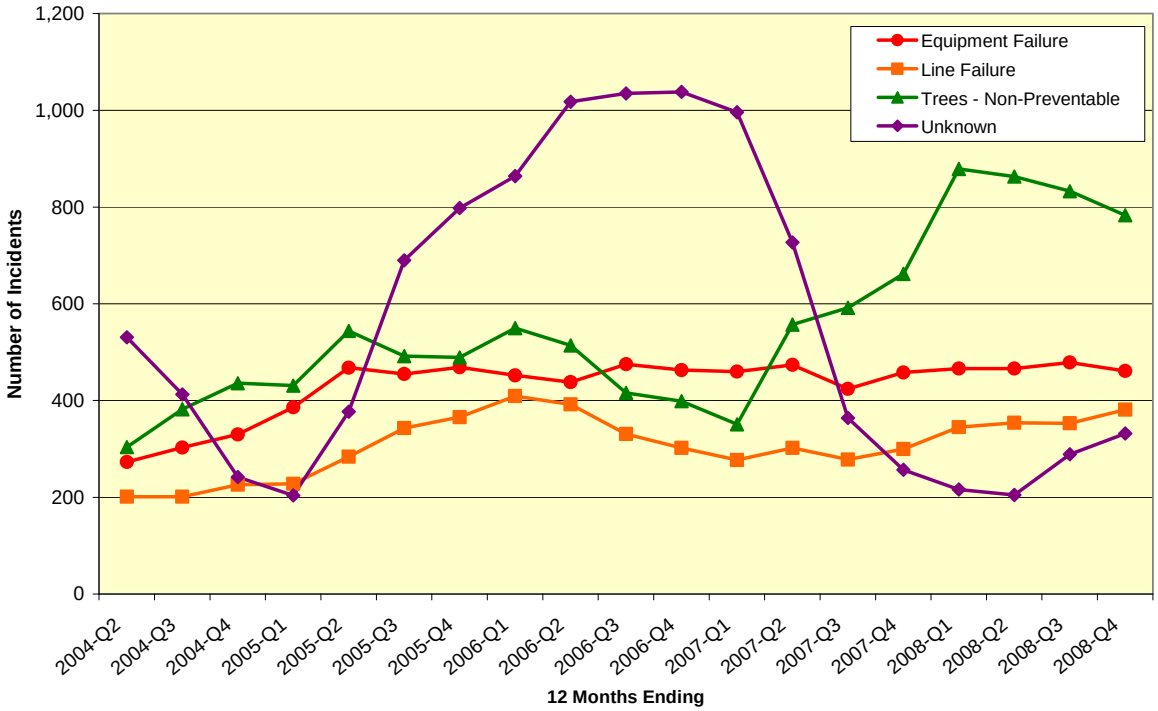



**Figure 32. Pennsylvania Power Company**
**Outage Tracking**



## PECO Energy Company

PECO's overall reliability performance in 2008 was slightly worse than that of the past year, but still better than the benchmark for two of the three indices. The SAIFI value for 2008 of 1.04 interruptions was 15.4 percent below the performance benchmark of 1.23. The CAIDI value of 124 minutes was an increase of 18.1 percent from the 2007 value and above the 12-month benchmark by 10.7 percent. The three-year average for all performance indices met the three-year performance standards.

One major event occurred in PECO's service territory during 2008. The calculation of the reliability indices exclude outage data relating to this event, which was approved by the Commission.

- June 10-14, 2008 – Wind and lightning storm with gusts up to 60 miles per hour and over 5,000 lightning strikes; 199,240 customers were affected.

In 2008, PECO's customers experienced 1,732,242 service interruptions with a total duration of 214.9 million minutes, which was 25.2 percent higher than the 2007 outage minutes.

Figures 33 and 34 depict trends in the duration of service interruptions for the PECO system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 33. PECO Energy Company**
**Customer Average Interruption Duration Index (CAIDI)**

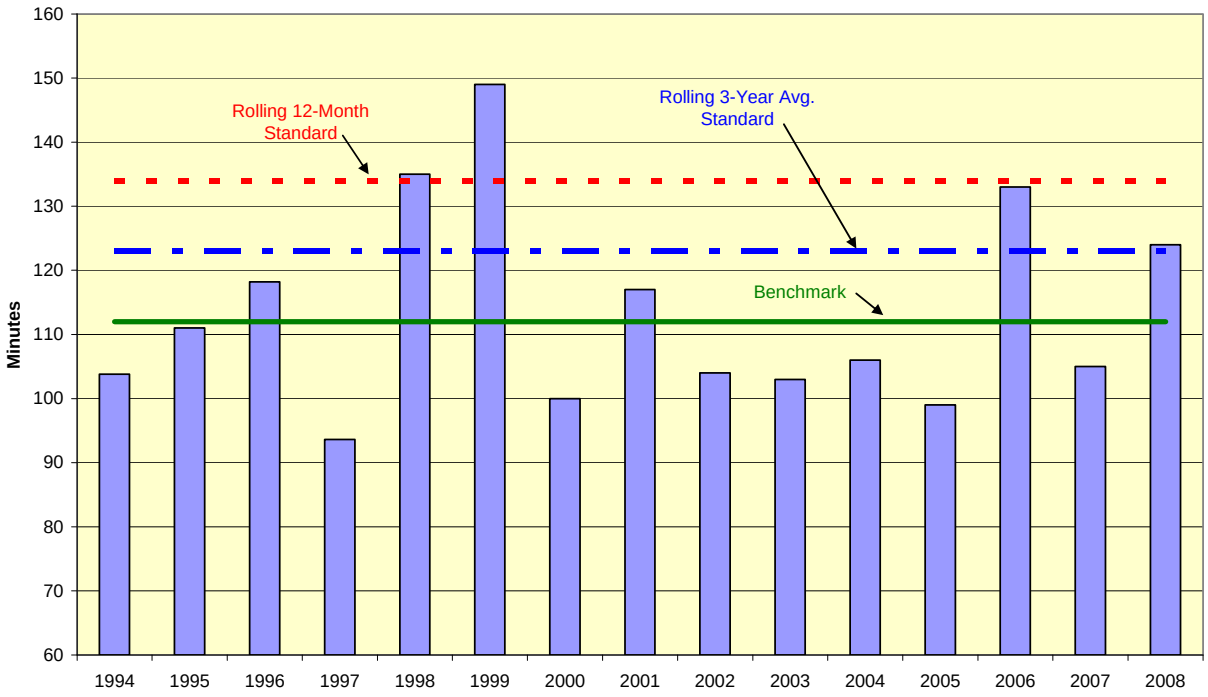
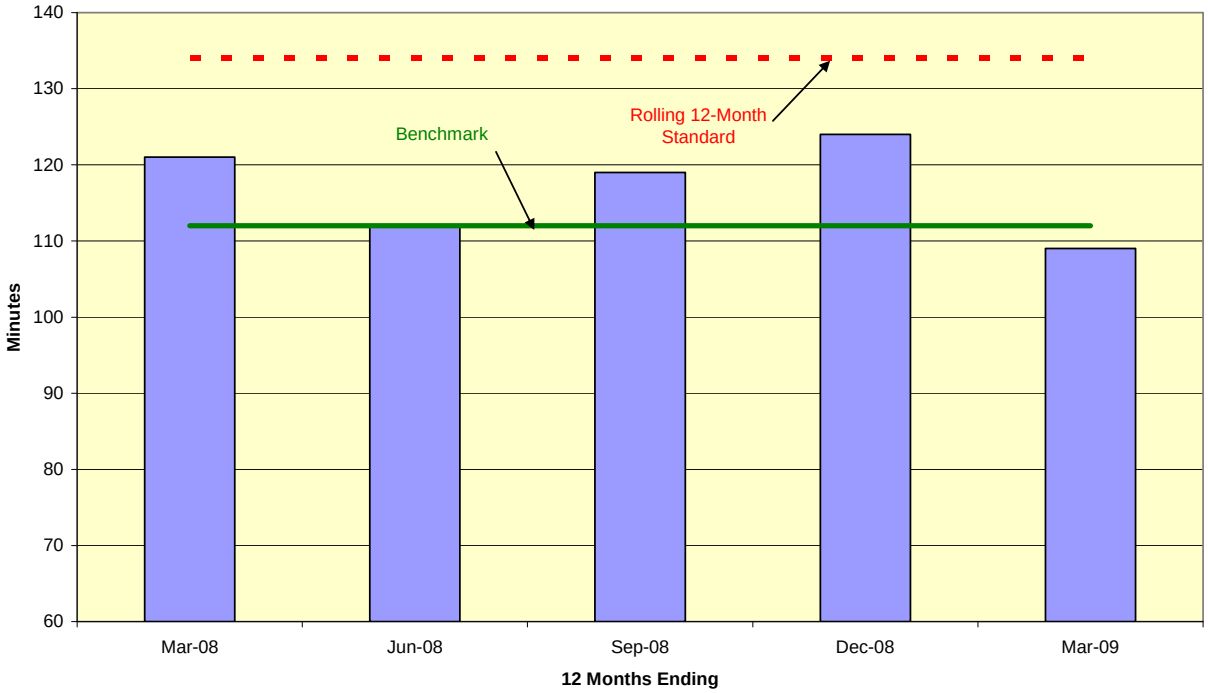



**Figure 34. PECO Energy Company**
**Customer Average Interruption Duration Index (CAIDI)**



As seen here, the 12-month rolling averages for the four quarters of 2008 were better than the benchmark. The average CAIDI for the 12 months ending March 2009 was 109 minutes, or 2.7 percent better than the benchmark.

Figures 35 and 36 show trends in the frequency of service interruptions for the PECO system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards for SAIFI.

**Figure 35. PECO Energy Company**
**System Average Interruption Frequency Index (SAIFI)**

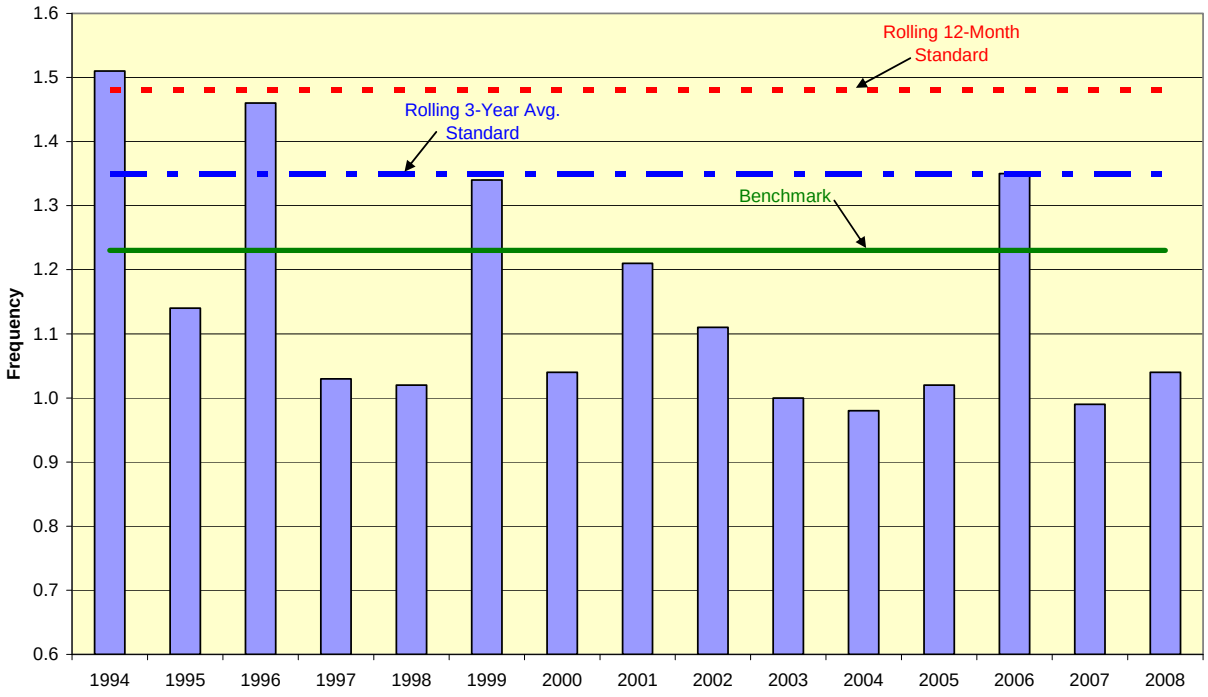
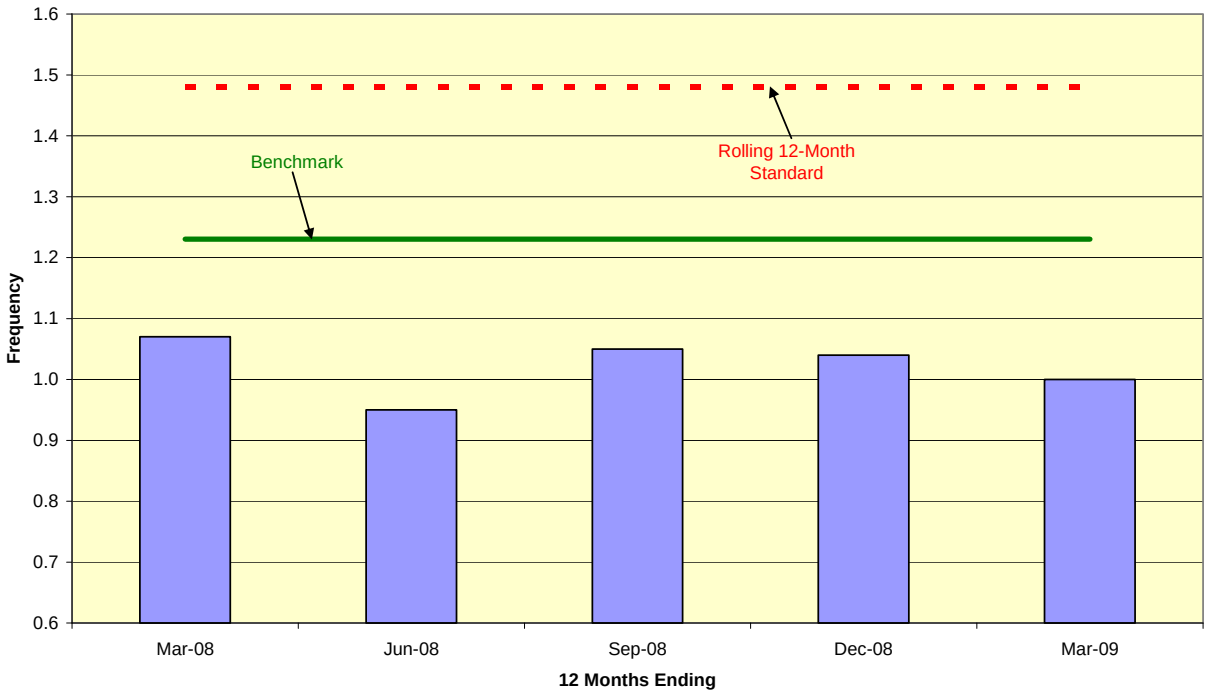


**Figure 36. PECO Energy Company**
**System Average Interruption Frequency Index (SAIFI)**




The rolling 12-month SAIFI averages for the four quarters of 2008 remained well below the benchmark. For the 12-month period ending March 2009, SAIFI was 1.00 or 18.7 percent better than the benchmark.

Figure 37 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. Equipment failure was responsible for 36.1 percent of the incidents, 30.9 percent of customers affected and 27.2 percent of interruption minutes. Tree-related outages (30.4 percent of incidents) were caused by broken branches and trunks or uprooted trees and vegetation in-growth. Together, these outages resulted in 33.3 percent of the customers affected and 41.4 percent of interruption minutes.

PECO has continued its supplemental vegetation management program to prune or remove trees between its normal cycles.

Figure 38 trends the number of outages by the top three major causes.

**Figure 37. PECO Energy Company**
**Outage Causes**

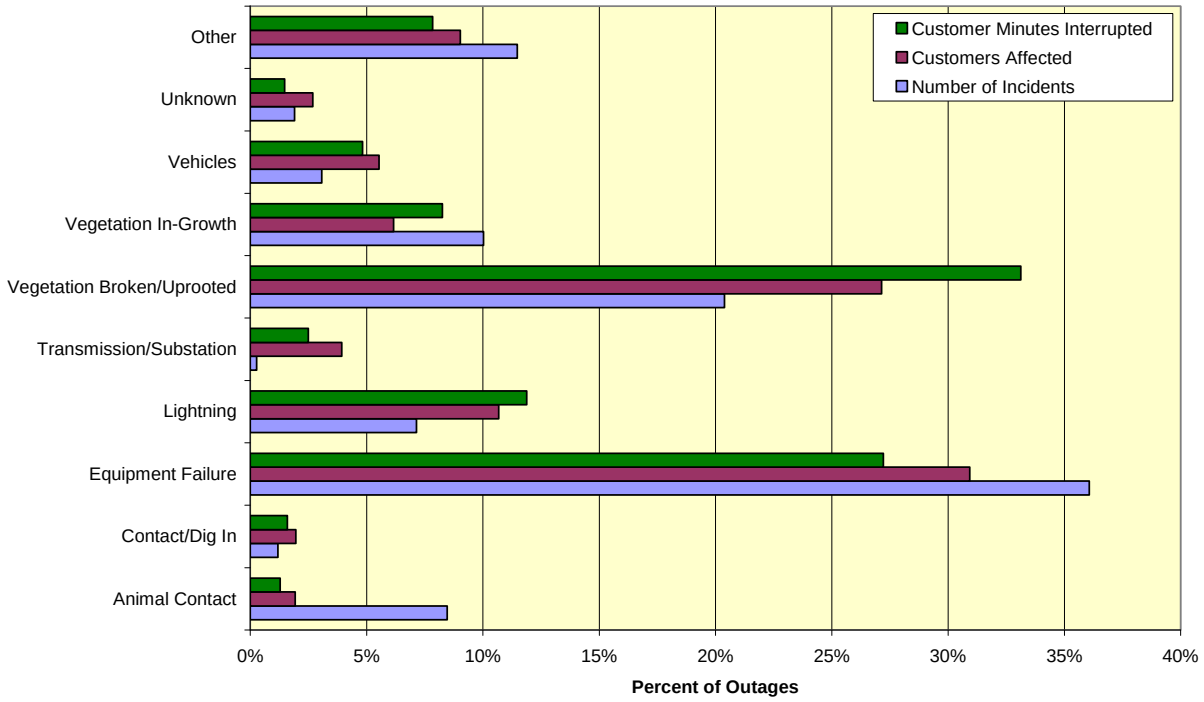
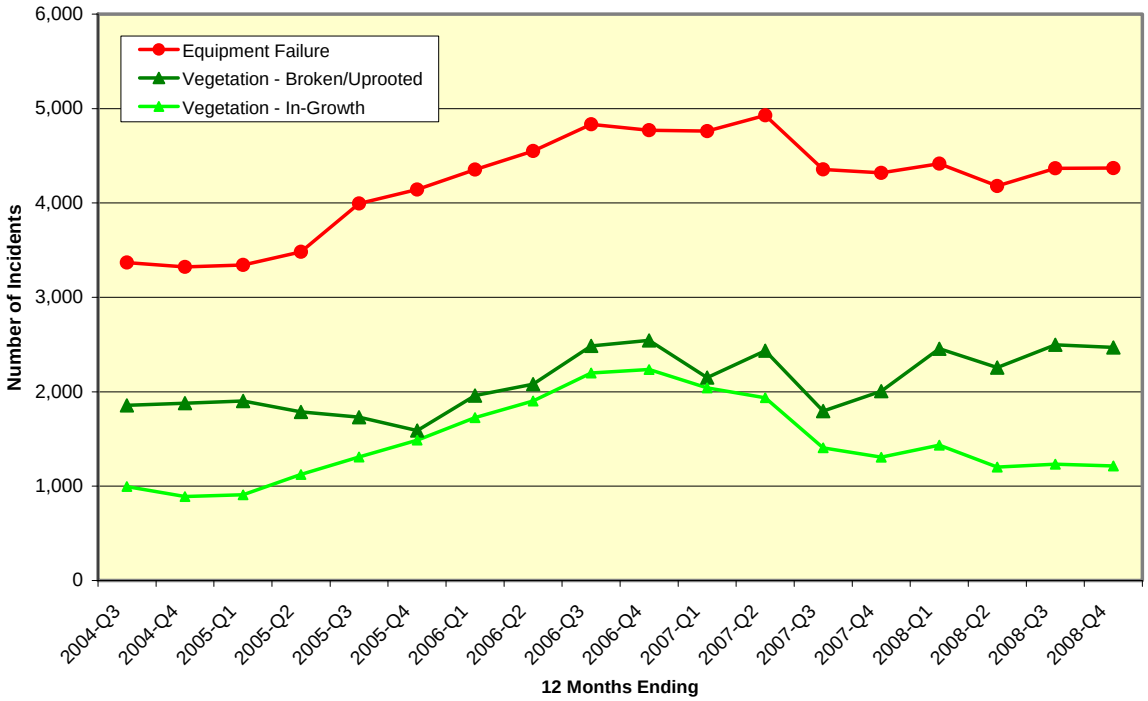



**Figure 38. PECO Energy Company**
**Outage Tracking**



## PPL Electric Utilities Corporation

In 2008, PPL's reliability performance indices met the 12-month standards. Although PPL's CAIDI met the standard, it was 20.7 percent higher than the 2007 value. PPL's SAIFI was 5.4 percent better than last year at 1.05. PPL achieved the three-year CAIDI standard but did not meet the three-year SAIFI standard. The company exceeded the three-year SAIFI standard by 6.0 percent.

No major events occurred in PPL's service territory during 2008. There were, however, seven PUC-reportable storms, other than major events, as compared to an average of 4.2 storms per year during the benchmark years, 1994-1998. Actually, there was an average of seven PUC-reportable storms per year during the three years from 2006 through 2008. There was also an average of 20 storms for the same period that were not reportable, compared to an average of 10.2 storms per year for the five years from 2001 to 2005. The company's overall performance was attributable to these storms, which required opening one or more area emergency centers to manage restoration efforts.

PPL's customers experienced 1,453,426 service interruptions in 2008 with a total duration of 245.3 million minutes, or 14.5 percent higher than last year's figure.

Figures 39 and 40 depict trends in the duration of service interruptions for the PPL system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

CAIDI values have continued to be satisfactory throughout the last five quarters.

**Figure 39. PPL Electric Utilities Corporation**
**Customer Average Interruption Duration Index (CAIDI)**

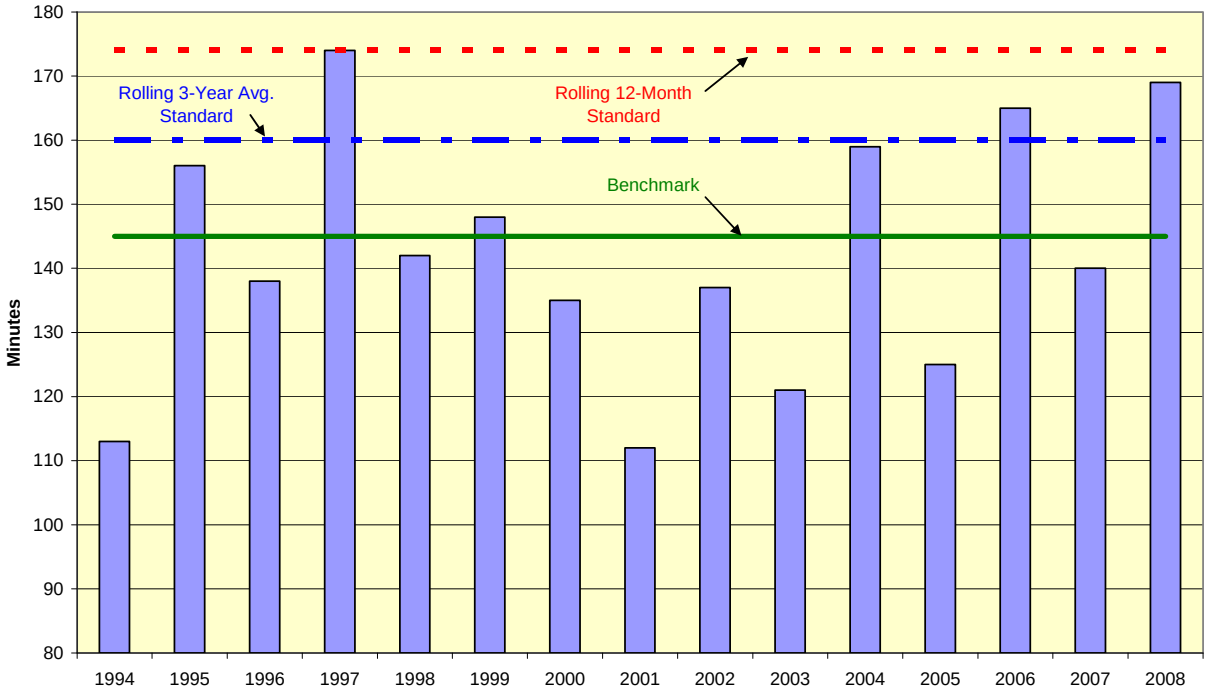
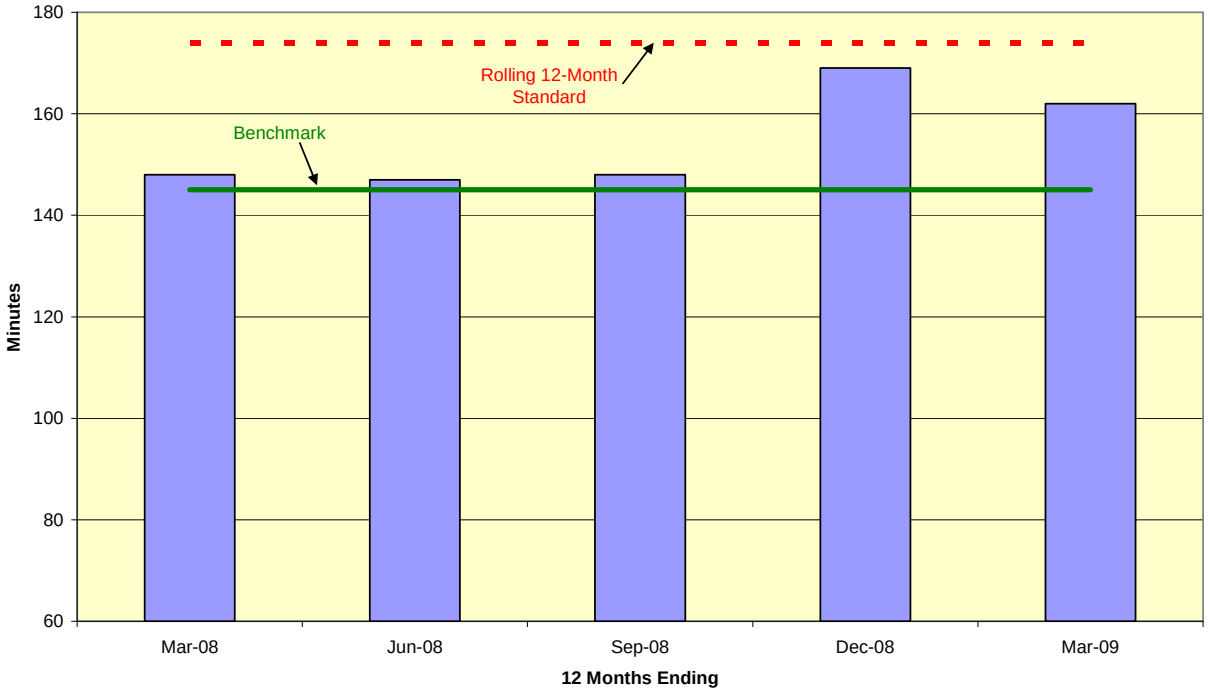



**Figure 40. PPL Electric Utilities Corporation**
**Customer Average Interruption Duration Index (CAIDI)**



Figures 41 and 42 show trends in the frequency of service interruptions for the PPL system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards for SAIFI.

Following a March SAIFI of 1.22, the trend for this index has been positive. For the 12-month rolling average ending March 2009, SAIFI was slightly above the benchmark by 0.7 percent, a substantial improvement of 19.1 percent over the previous year.

**Figure 41. PPL Electric Utilities Corporation**
**System Average Interruption Frequency Index (SAIFI)**

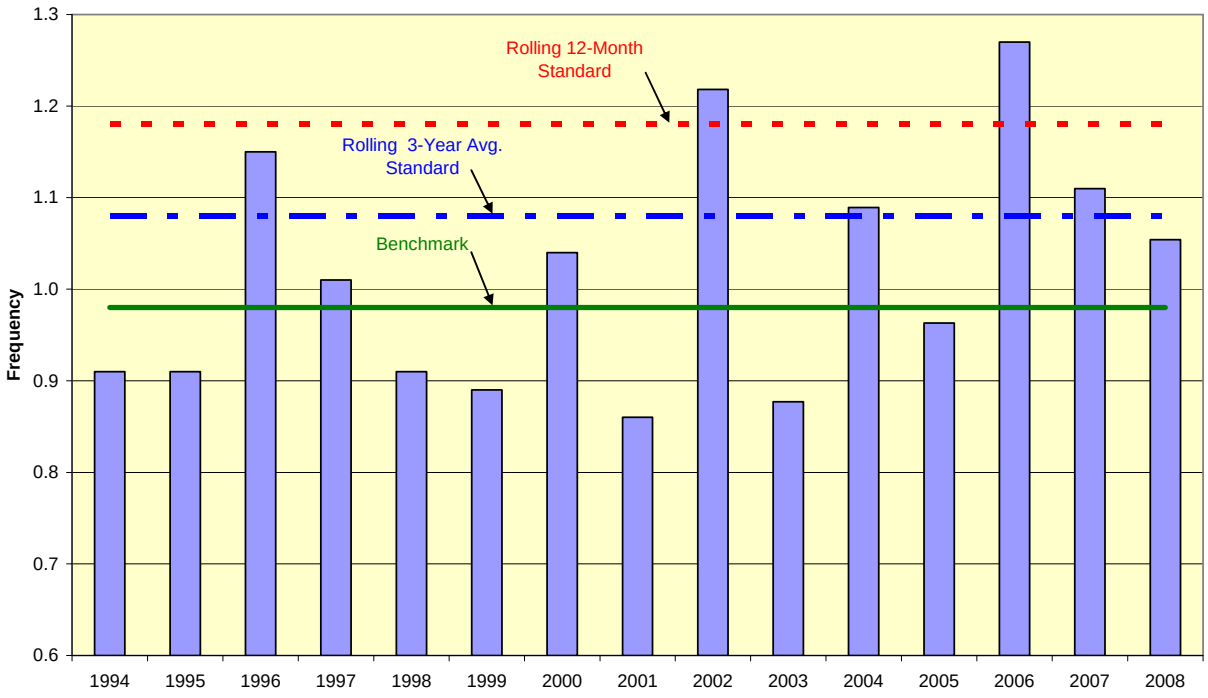


**Figure 42. PPL Electric Utilities Corporation**
**System Average Interruption Frequency Index (SAIFI)**

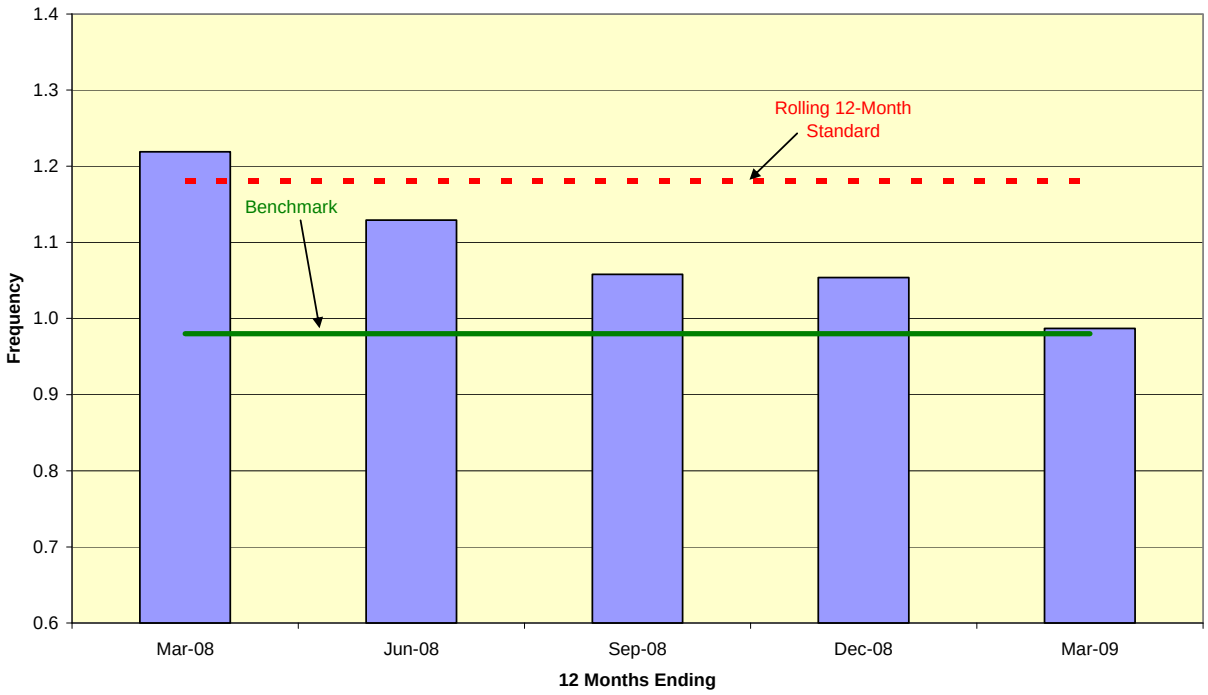



Figure 43 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. Equipment failure represented 27.0 percent of the interruptions, 28.2 percent of customers affected and 20.6 percent of interruptions minutes. Non-trimming tree-related outages were the second largest cause of customer outages (23.9 percent) and 52.4 percent of interruption minutes. Animal-related outages accounted for 23.2 percent of incidents, but affected only 6.3 percent of the customers with an outage duration of 3.3 percent of total minutes, since most of these trouble cases are associated with individual distribution transformers.

PPL reported that 44 percent of trouble cases, 52 percent of customer interruptions and 59 percent of interruption minutes attributed to equipment failure were weather-related and are not considered to be indicators of equipment condition or performance.

Figure 44 trends the number of outages by the top three major causes.

**Figure 43. PPL Electric Utilities Corporation**
**Outage Causes**

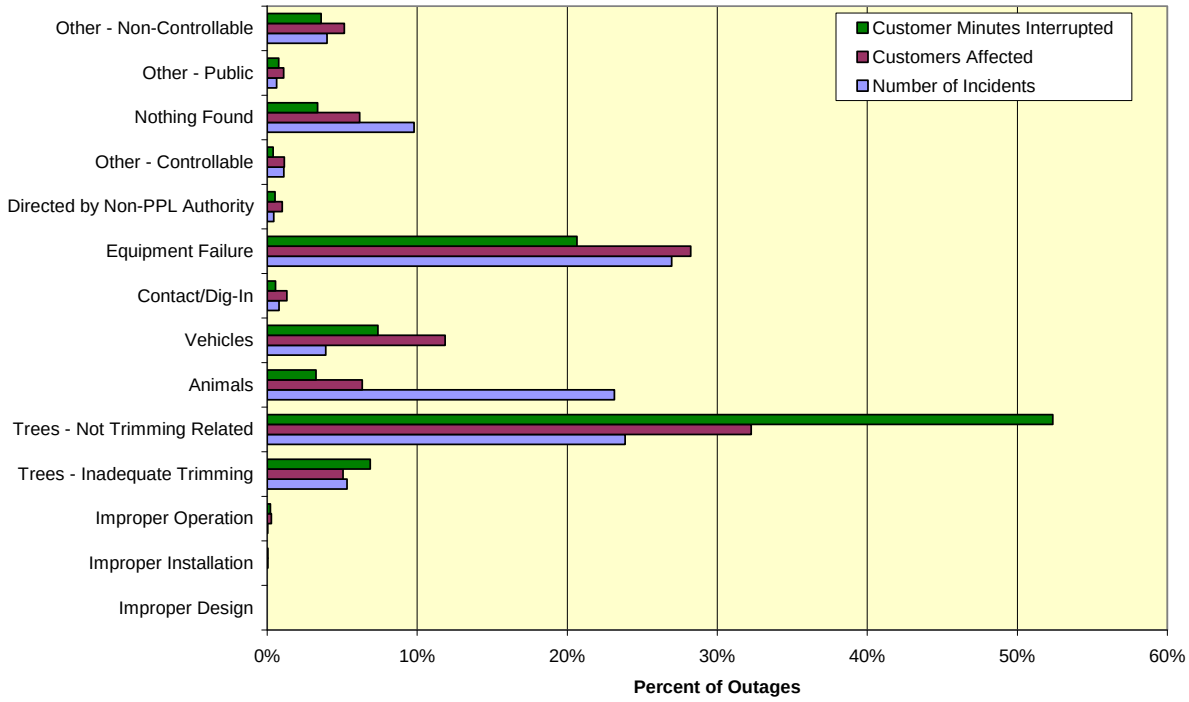
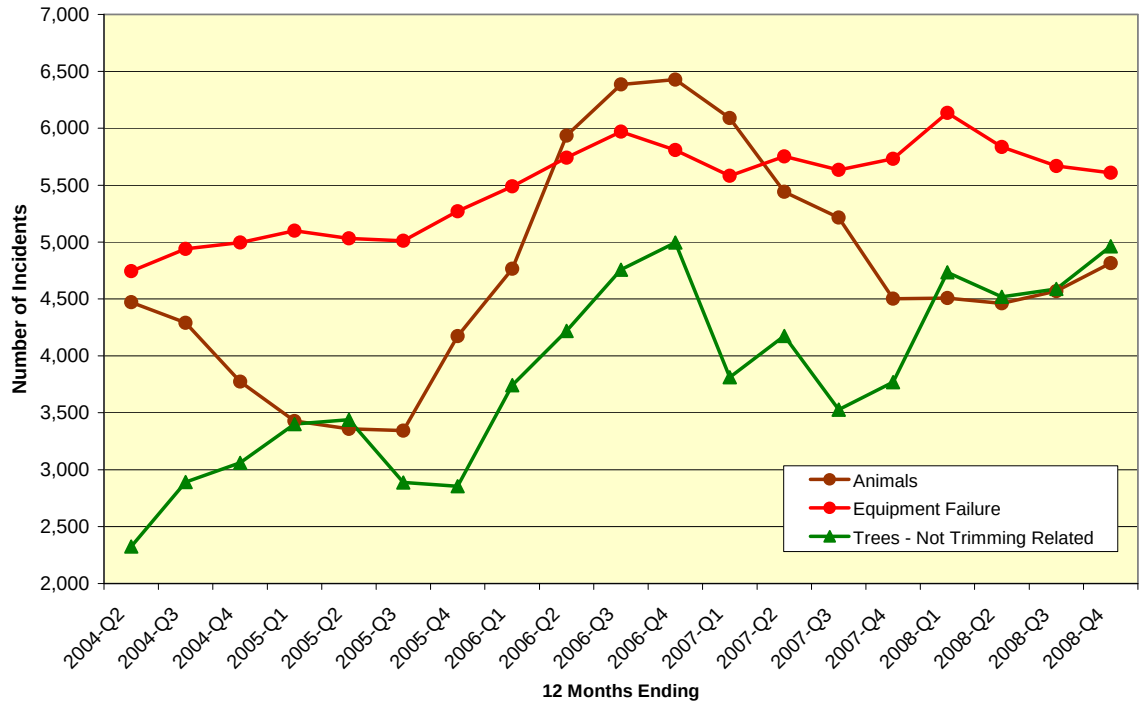



**Figure 44. PPL Electric Utilities Corporation**
**Outage Tracking**



## UGI Utilities, Inc.

UGI's overall reliability performance during 2008 was again better than the established benchmarks. The 2008 CAIDI of 135 minutes was 32 minutes lower than the 2007 CAIDI and 20.1 percent better than the benchmark of 169 minutes. The 2008 SAIFI of 0.67 interruptions was slightly lower than last year's SAIFI and 19.3 percent lower than the benchmark. UGI's three-year averages were all well below the three-year standards for each index.

One major event occurred in UGI's service territory in 2008. The calculation of the reliability indices exclude outage data related to this event, which was approved by the Commission.

- June 10-15, 2008 – Intense thunderstorm with winds exceeding 60 miles per hour; 21,723 customers were affected.

In 2008, UGI's customers experienced 41,680 service interruptions with a total duration of 5.6 million minutes, which was about 21.1 percent lower than that which was reported last year.

Figures 45 and 46 depict trends in the duration of service interruptions for the UGI system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 45. UGI Utilities, Inc.**
**Customer Average Interruption Duration Index (CAIDI)**

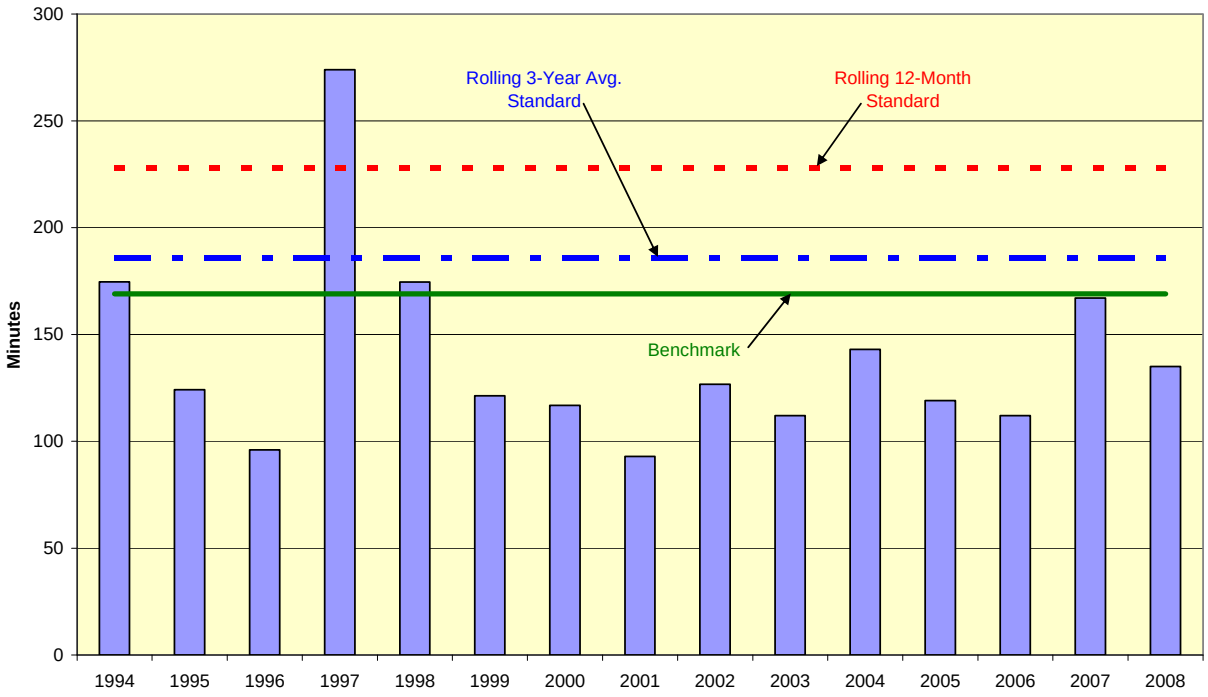
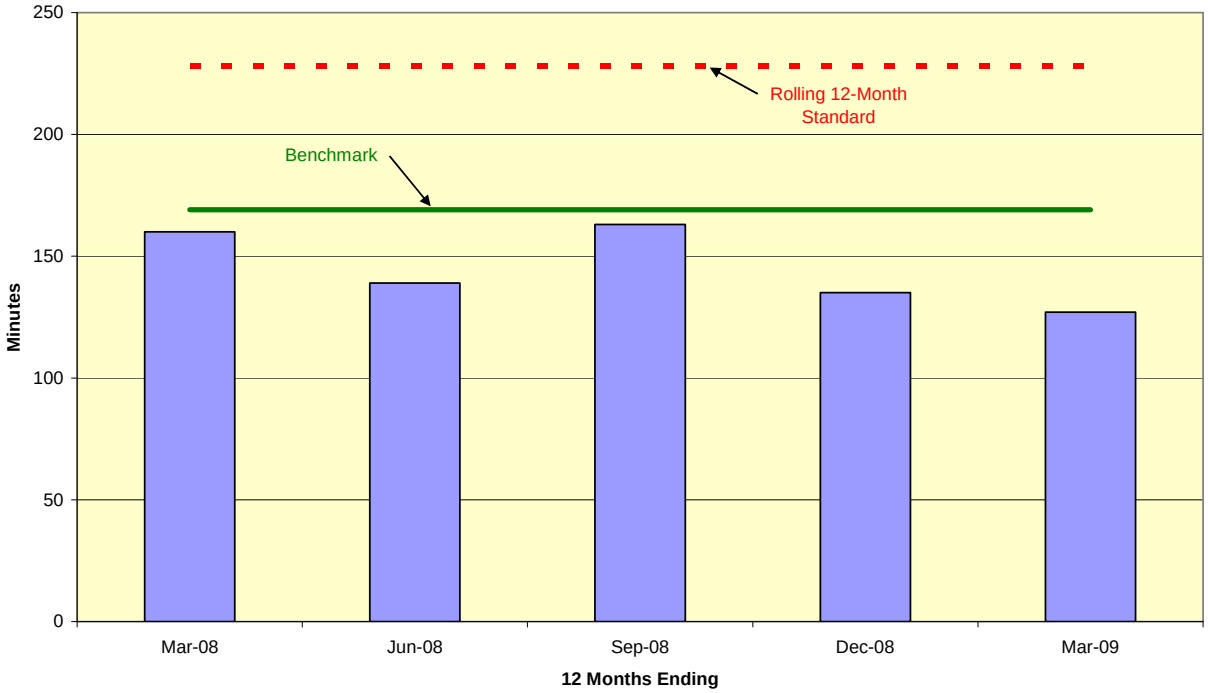



**Figure 46. UGI Utilities, Inc.**
**Customer Average Interruption Duration Index (CAIDI)**



Figures 47 and 48 show trends in the frequency of service interruptions for the UGI system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards for SAIFI.

**Figure 47. UGI Utilities, Inc.**
**System Average Interruption Frequency Index (SAIFI)**

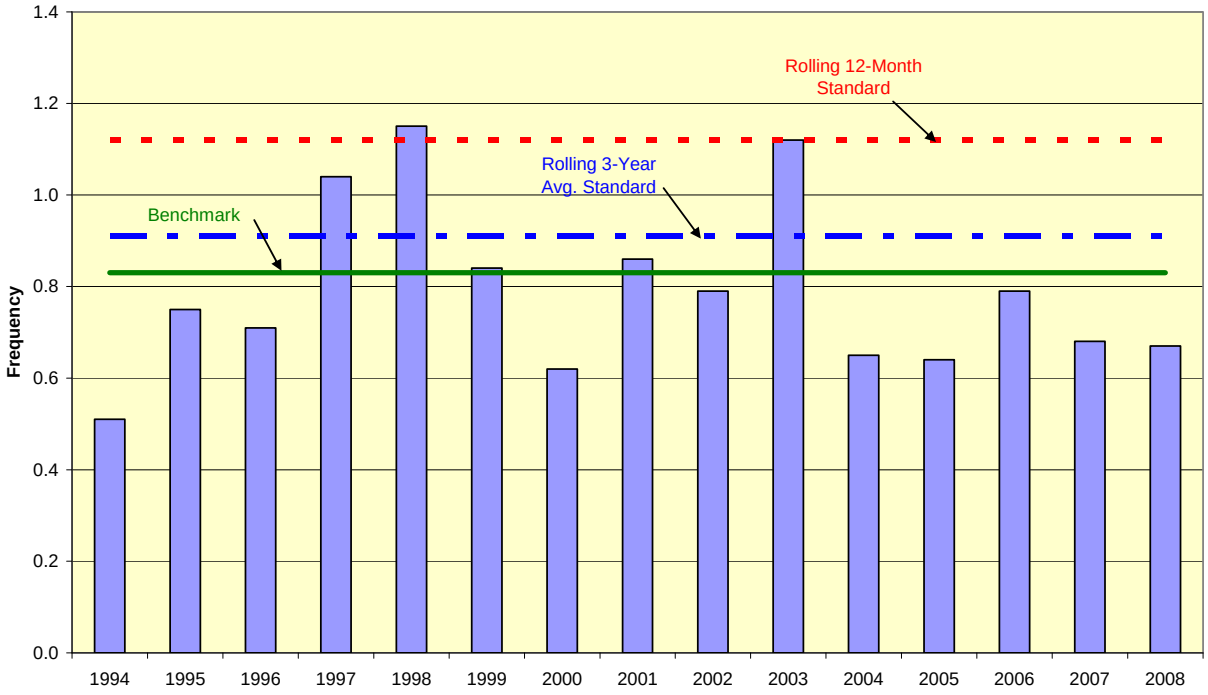


**Figure 48. UGI Utilities, Inc.**
**System Average Interruption Frequency Index (SAIFI)**

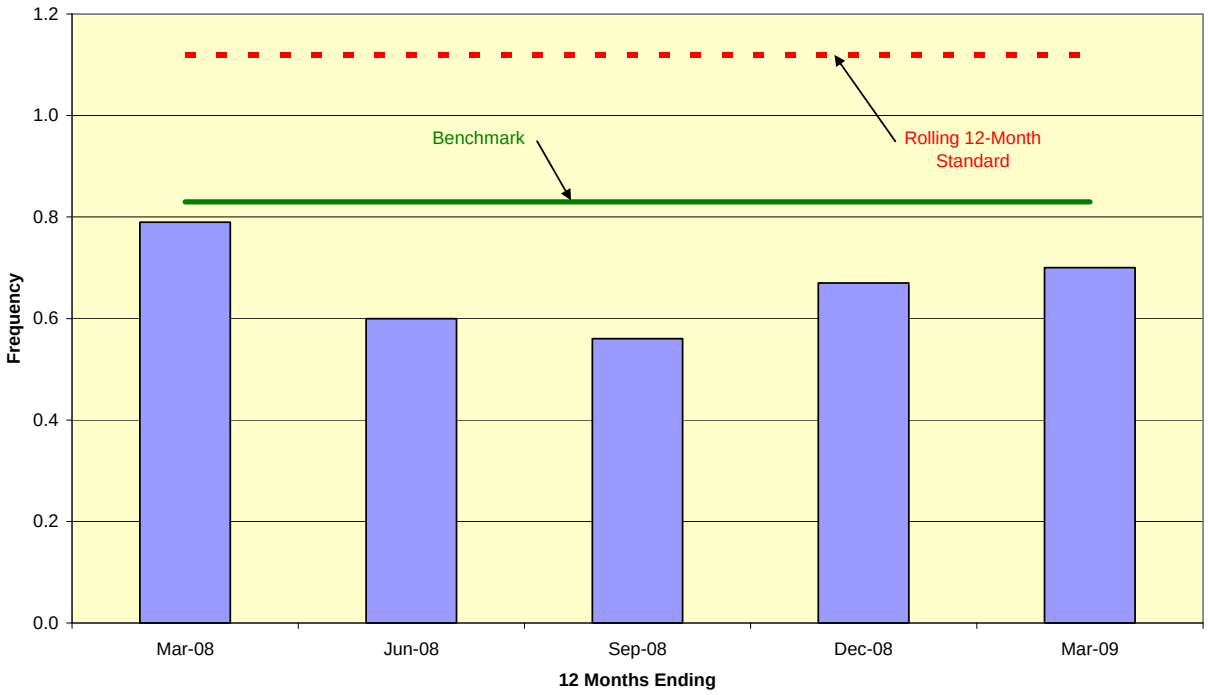



Figure 49 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. Equipment failure caused 37.5 percent of the incidents, resulting in 20.0 percent of customers affected and 11.8 percent of interruption minutes. Tree-related outages represented 19.9 percent of incidents, 24.6 percent of customers affected and 17.7 percent of interruption minutes. Lightning was attributable to 7.6 percent of the outages, 14.9 percent of customers affected and 26.2 percent of interruption minutes.

A significant portion of equipment failures are attributed to problems with a distribution-type fuse cutout, manufactured by A.B. Chance. UGI has implemented a replacement program to identify and replace these defective parts. Almost all of the identified cutouts have been replaced. Additionally, most of the four kV distribution lines have been rebuilt and converted to 13 kV operation.

Figure 50 trends the number of outages by the top four major causes.

**Figure 49. UGI Utilities, Inc.**
**Outage Causes**

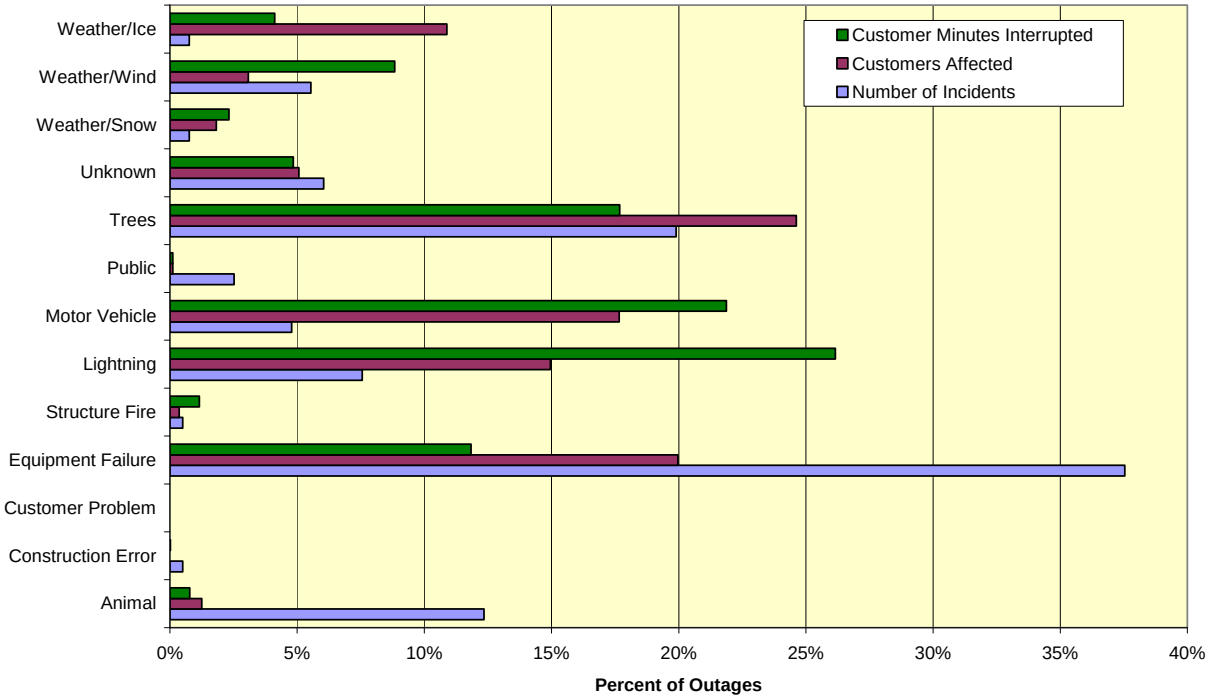
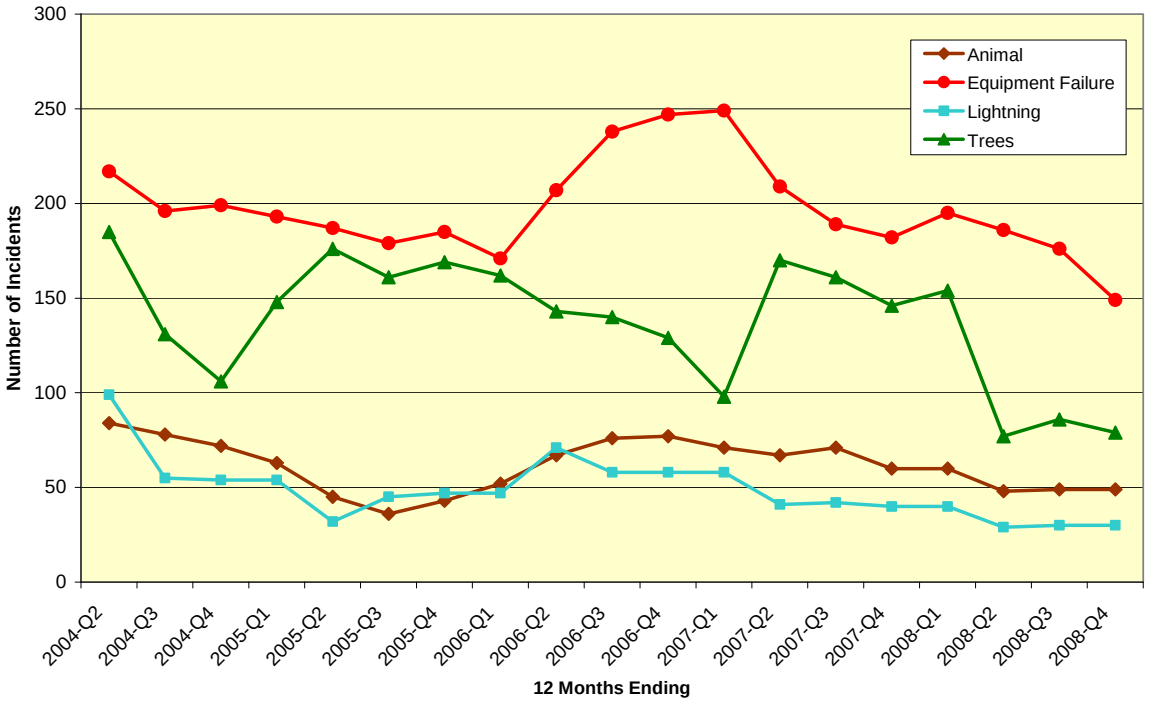



**Figure 50. UGI Utilities, Inc.**
**Outage Tracking**



## Citizens' Electric Company

Citizens' has a relatively small operating area with an electric system consisting of one distribution substation and nine distribution feeder lines.

In 2008, Citizens' CAIDI of 64 minutes was 41 minutes below the benchmark of 105 minutes. The 2008 SAIFI was an average of 0.26 outages per customer, compared to the 12-month benchmark outage frequency 0.2. For the three-year average performance, Citizens' reported that all three indices were lower than the standards.

During 2008, work continued on Citizens' Automated Mapping/Facilities Management system, which is now being used as a data source for engineering analysis models. In November of 2008, Citizens' installed a new Outage Management System (OMS) which is fully integrated with the mapping and customer information systems. The new OMS will be operated in parallel with the old system for at least 12 months to validate reliability statistics generated by the new system. Citizens' is also evaluating the cost effectiveness of integrating the OMS with the Automatic Meter Reading system to automate the detection of outages and verify service restoration.

The calculations for the 2008 reliability indices exclude outage data relating to two major events, which were approved by the Commission:

- March 24, 2008 – A phase conductor failed; 834 customers were affected; 132 interruption minutes were excluded.
- June 10, 2008 – During a severe thunderstorm, the PPL 69 kV supply to Citizens' substation was interrupted and an off right-of-way tree fell on a 12 kV feeder; 6,718 customers were affected; 63 interruption minutes were excluded.

Citizens' experienced a total of 1,776 customer interruptions in 2008, with a total duration of 113,239 minutes, excluding major events, which was 6.8 percent higher than that which was reported last year.

Figures 51 and 52 depict trends in the duration of service interruptions for the Citizens' system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 51. Citizens' Electric Company**
**Customer Average Interruption Duration Index (CAIDI)**

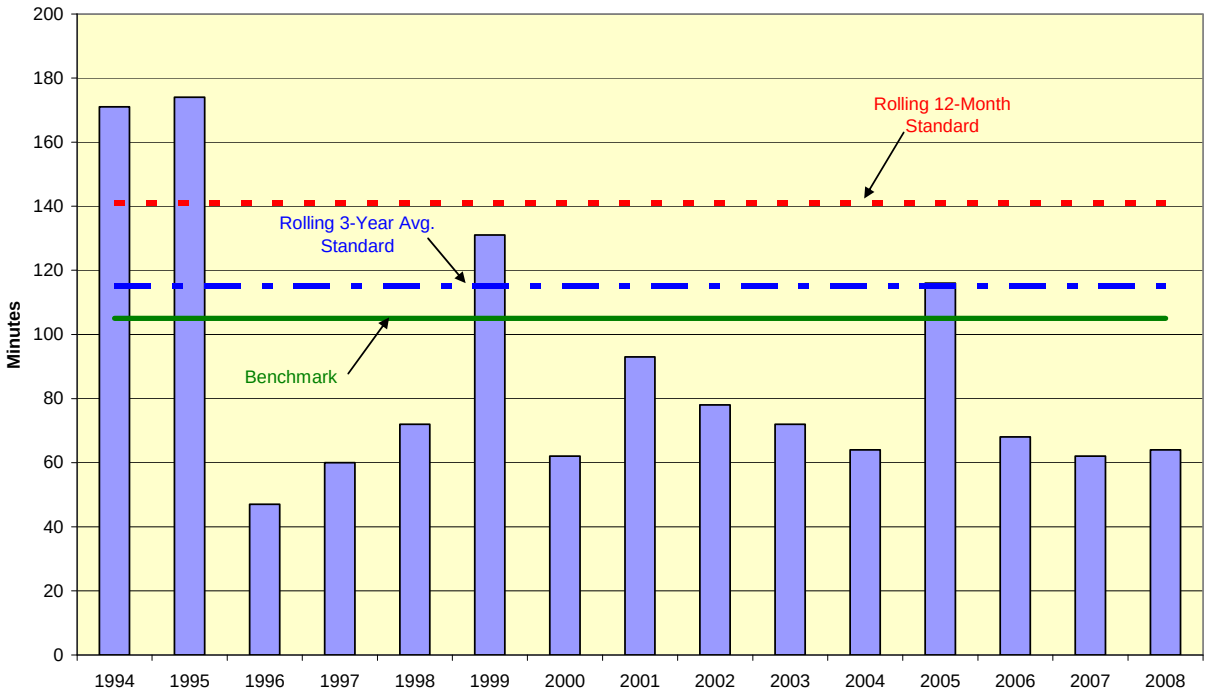
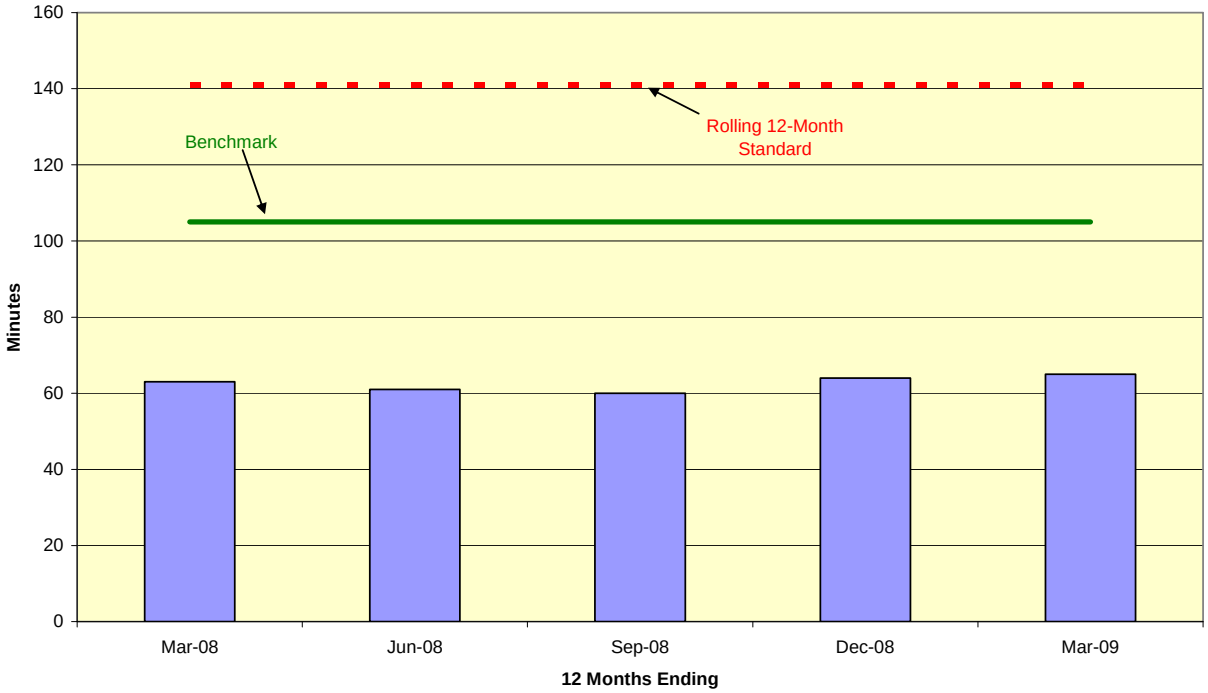
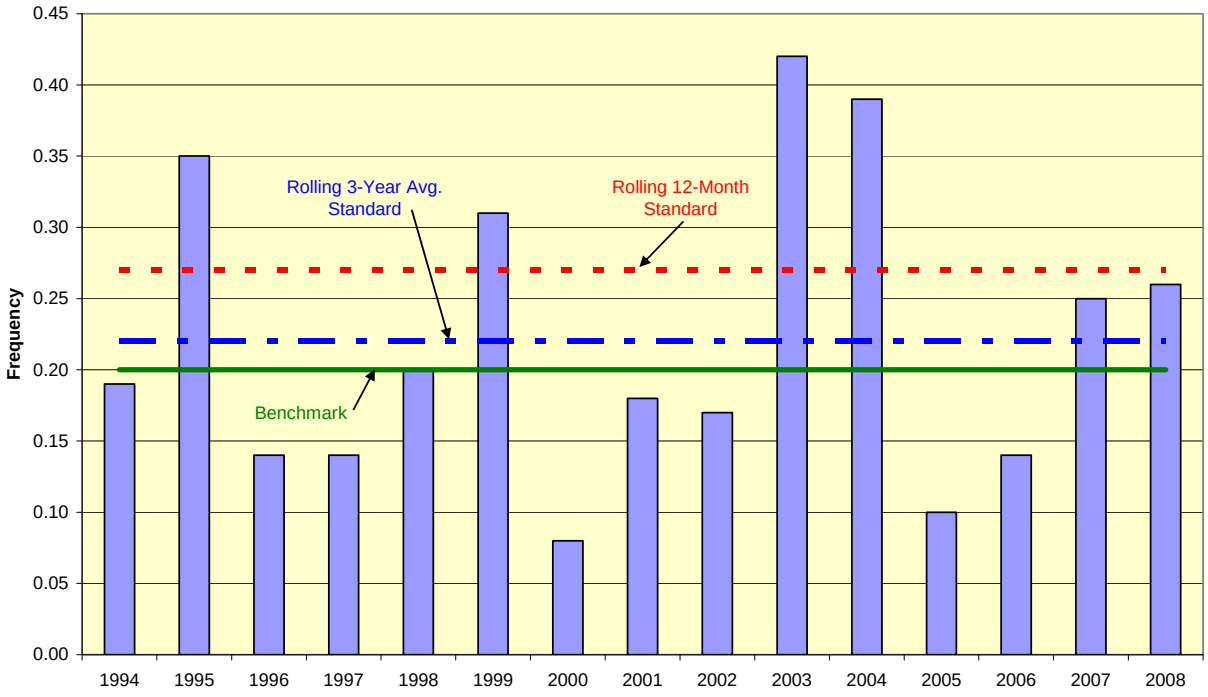



**Figure 52. Citizens' Electric Company**
**Customer Average Interruption Duration Index (CAIDI)**



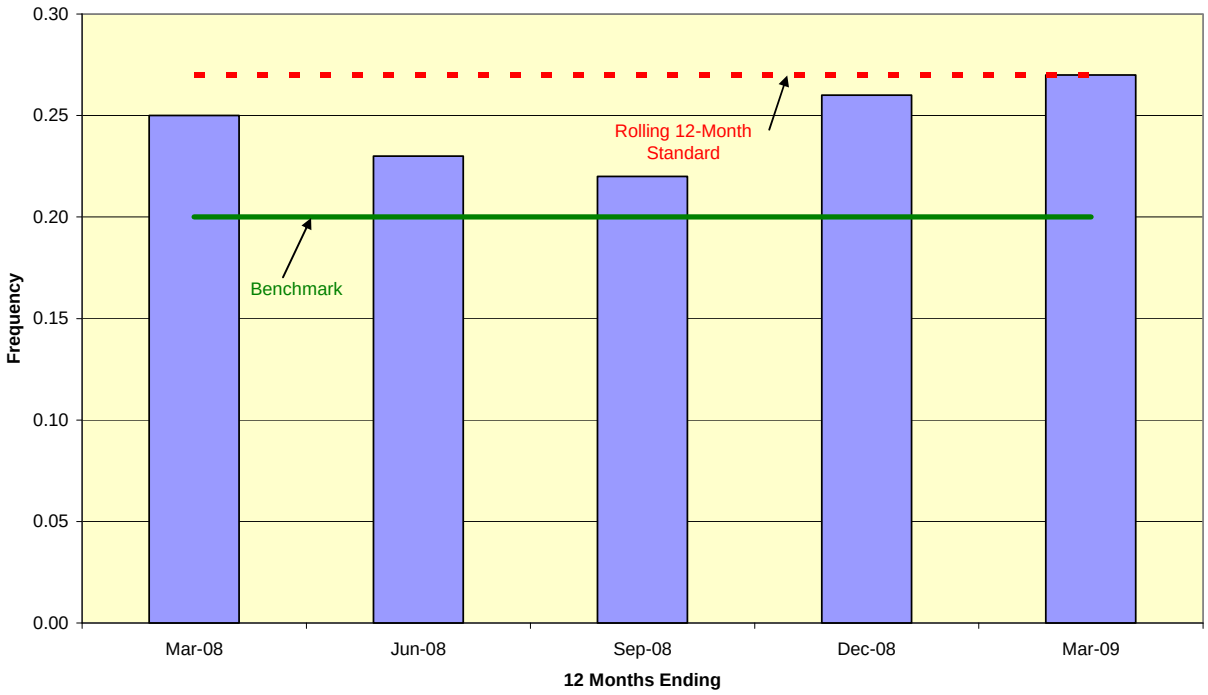
Figures 53 and 54 show trends in the frequency of service interruptions for the Citizens' service territory from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards for SAIFI.

**Figure 53. Citizens' Electric Company**
**System Average Interruption Frequency Index (SAIFI)**




The SAIFI value for the 12 months ending March 2009 equaled the performance standard of 0.27.

**Figure 54. Citizens' Electric Company**
**System Average Interruption Frequency Index (SAIFI)**




Although the outage frequency values shown on these graphs are much smaller than the SAIFI values of larger companies, valid comparisons are not made with other companies' reliability performance, but with the historical performance of Citizens'. Smaller systems tend to experience more variability in service outage data, which is captured in the development of historical benchmarks.

Figure 55 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. The most frequent outage cause was animal related, representing 37.1 percent of the outages and 10.2 percent of customer minutes interrupted. Equipment failure caused 30.6 percent of the service interruptions, 35.9 percent of customers affected and 32.1 percent of interruption minutes. Trees off the right-of-way represented 12.9 percent of outages, 21.8 percent customers affected and 30.9 percent of the interruption minutes.

Figure 56 trends the number of outages by the top four major causes.

**Figure 55. Citizens' Electric Company**
**Outage Causes**

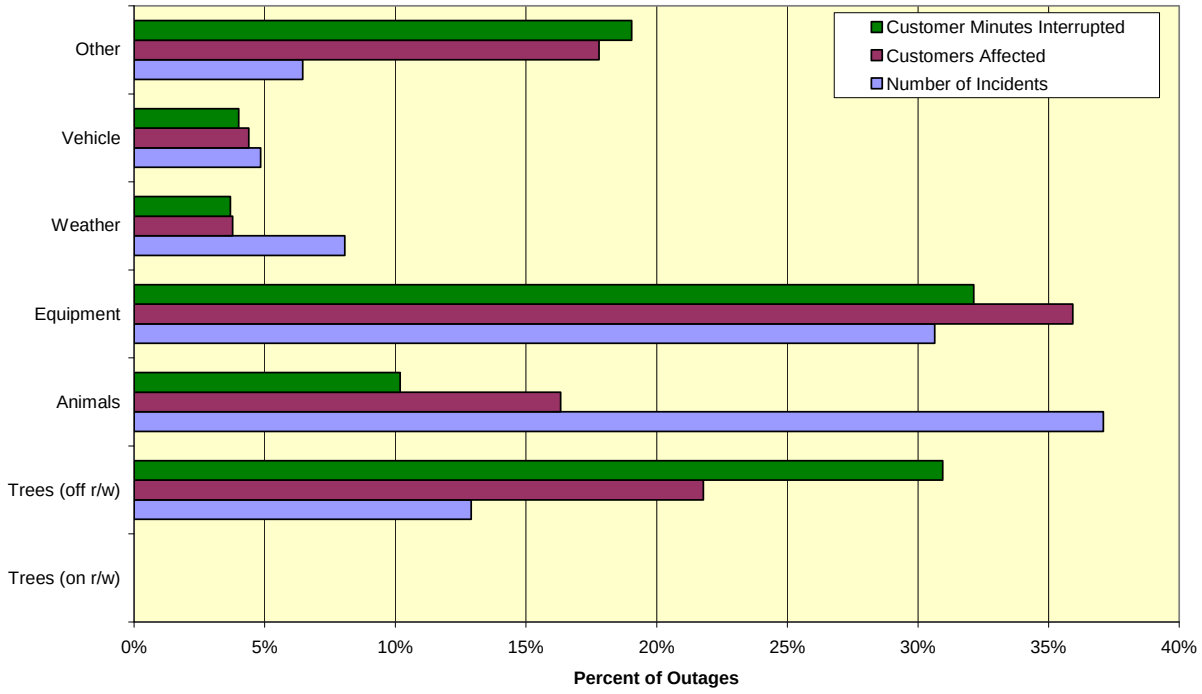
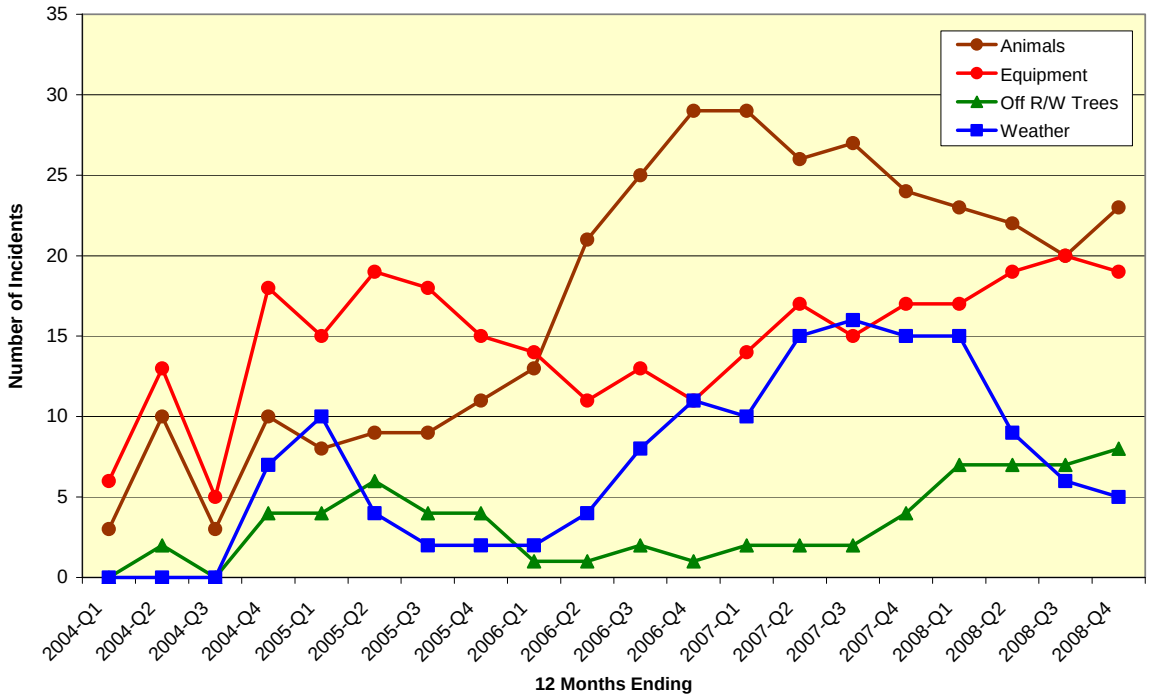



**Figure 56. Citizens' Electric Company**
**Outage Tracking**



## Pike County Light & Power Company

Pike County is the westernmost portion of Orange & Rockland's Northern Operating Division. This area is primarily fed from two 34.5 kV feeders that emanate from New York substations. Thus, sustained interruptions are usually smaller, affecting fewer customers, and will take a longer amount of time per customer to restore service.

The 2008 CAIDI of 236 minutes was 88.8 percent higher than 2007 and 0.4 percent above the standard. Pike attributes this to the impact of a major outage on the CAIDI index. Pike had requested an exclusion for two incidents occurring on October 28, 2008, involving an interruption to 102 customers served by a Met-Ed circuit. The request was denied since the 10 percent customer threshold was not met. (If these incidents had been excluded, CAIDI would be nine percent below the standard.) Nevertheless, the CAIDI three-year average was 12.7 percent below the standard. The outage frequency remained basically unchanged at 0.46 in 2008 or 24.6 percent below the SAIFI benchmark of 0.61. The SAIFI three-year average failed to meet the standard by only 3.0 percent.

The calculations for the 2008 reliability indices exclude outage data relating to three major events, which were approved by the Commission:

- March 8-9, 2008 – Significant rainfall and high winds; 4,195 customers were affected; 453,146 interruption minutes were excluded.
- May 31-June 1, 2008 – Lightning and rain; 2,493 customers were affected; 610,828 interruption minutes were excluded.
- June 16, 2008 – Lightning and rain; 2,493 customers were affected; 181,989 interruption minutes were excluded.

In 2008, Pike County experienced 2,045 customer interruptions with a total duration of 483,029 minutes, which was 92.2 percent higher than that which was reported last year.

Figures 57 and 58 depict trends in the duration of service interruptions for the Pike County system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 57. Pike County Light & Power Company**
**Customer Average Interruption Duration Index (CAIDI)**

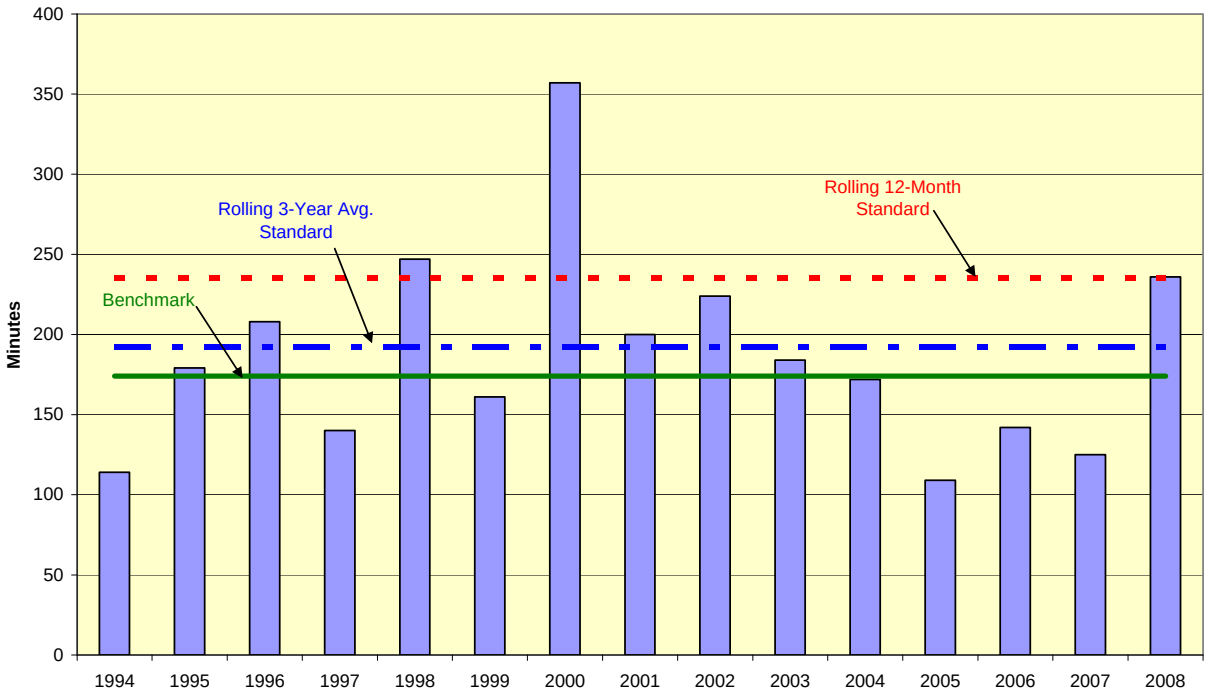
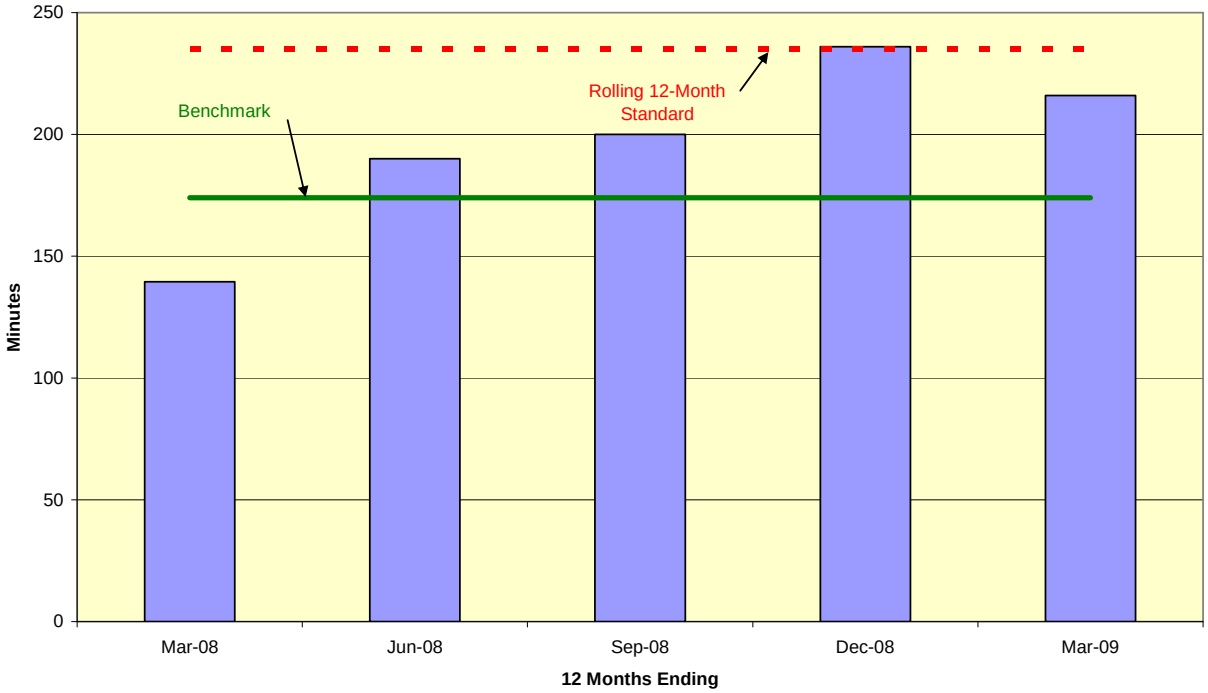



**Figure 58. Pike County Light & Power Company**
**Customer Average Interruption Duration Index (CAIDI)**



The rolling 12-month quarterly CAIDI figures steadily increased throughout 2008, with the fourth quarter CAIDI reaching one minute beyond the standard. The March 2009 CAIDI dropped to 8.1 percent below the standard.

Figures 59 and 60 depict trends in the frequency of service interruptions for the Pike County system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards for SAIFI.

**Figure 59. Pike County Light & Power Company**
**System Average Interruption Frequency Index (SAIFI)**

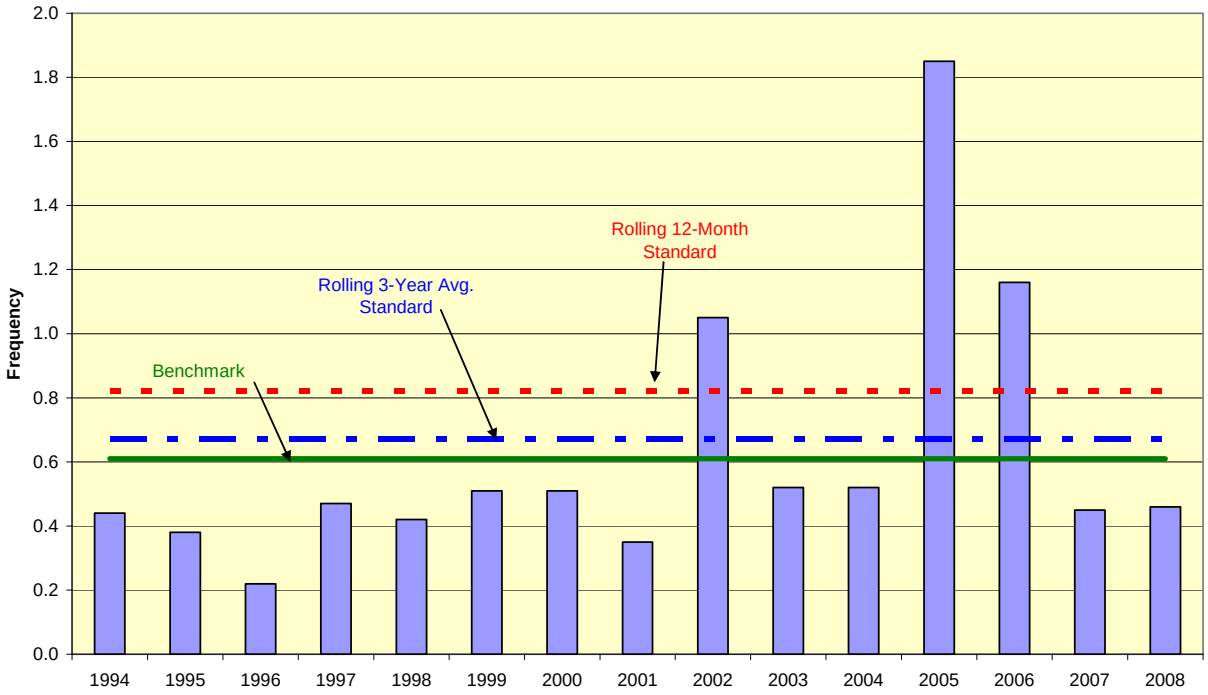
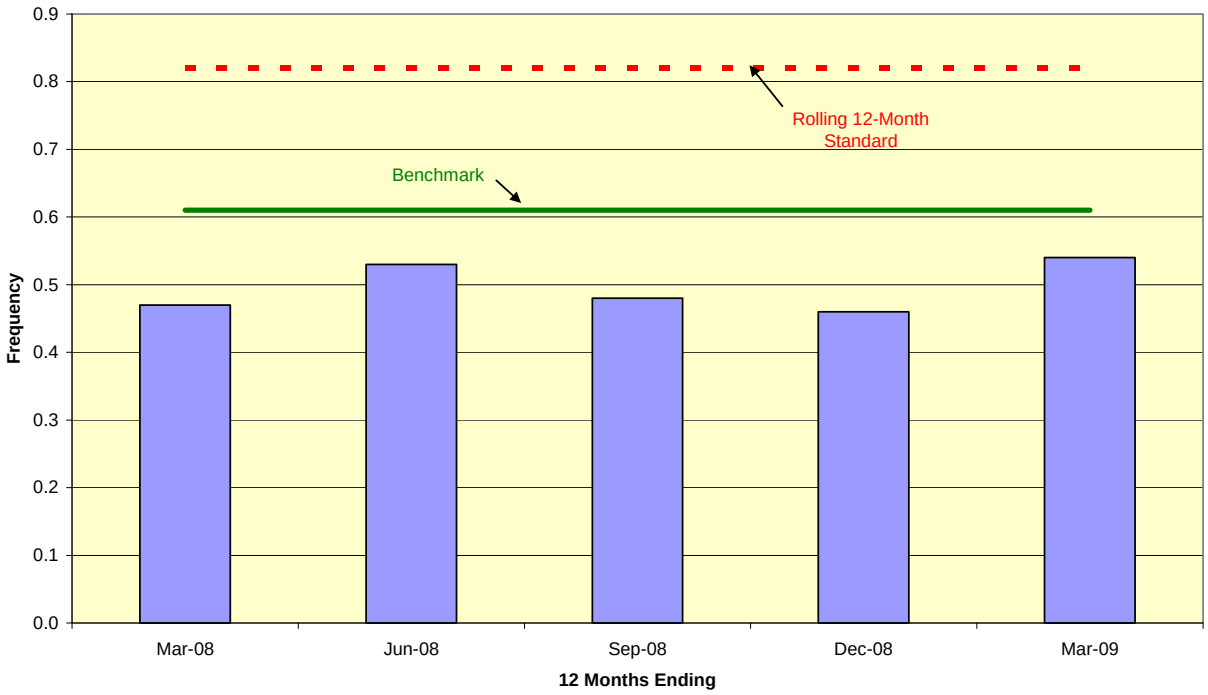


**Figure 60. Pike County Light & Power Company**
**System Average Interruption Frequency Index (SAIFI)**




For most years, SAIFI has been below the revised benchmark of 0.61. The SAIFI value for 2008 of 0.46 was significantly better than the revised performance standard. The March 2009 SAIFI of 0.54 was 11.5 percent below the benchmark.

Figure 61 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. The major cause of service outages is tree contact with 50.8 percent of interruptions affecting 47.4 percent of customers for 65.0 percent of interruption minutes. Equipment failure accounted for 23.1 percent of the outages, 7.4 percent of customers affected and 3.1 percent of interruption minutes. Improvement efforts in this area include a three-year, cycle-based tree clearance program. Also, in 2008, Pike County completed a program to determine the electrical phase for each conductor and transformer on the distribution system. In 2009, radio communication with SCADA control will be added to all Distribution Automation equipment.

Figure 62 trends the number of outages by the top three major causes.

**Figure 61. Pike County Light & Power Company**
**Outage Causes**

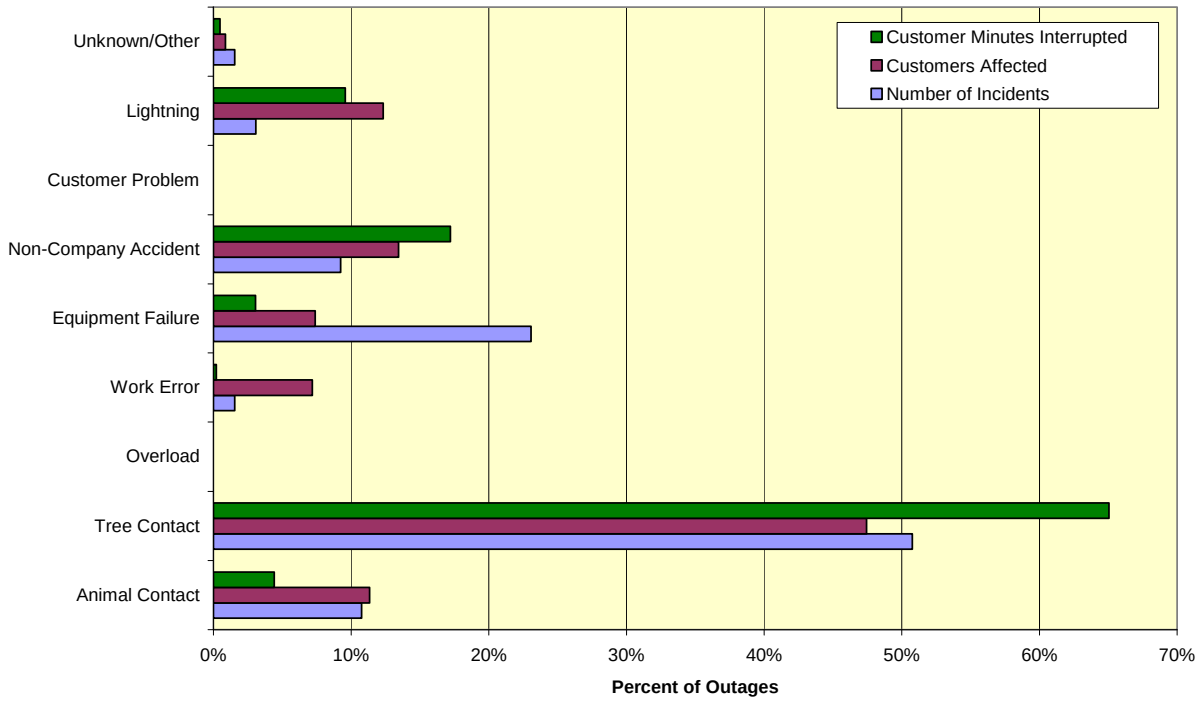
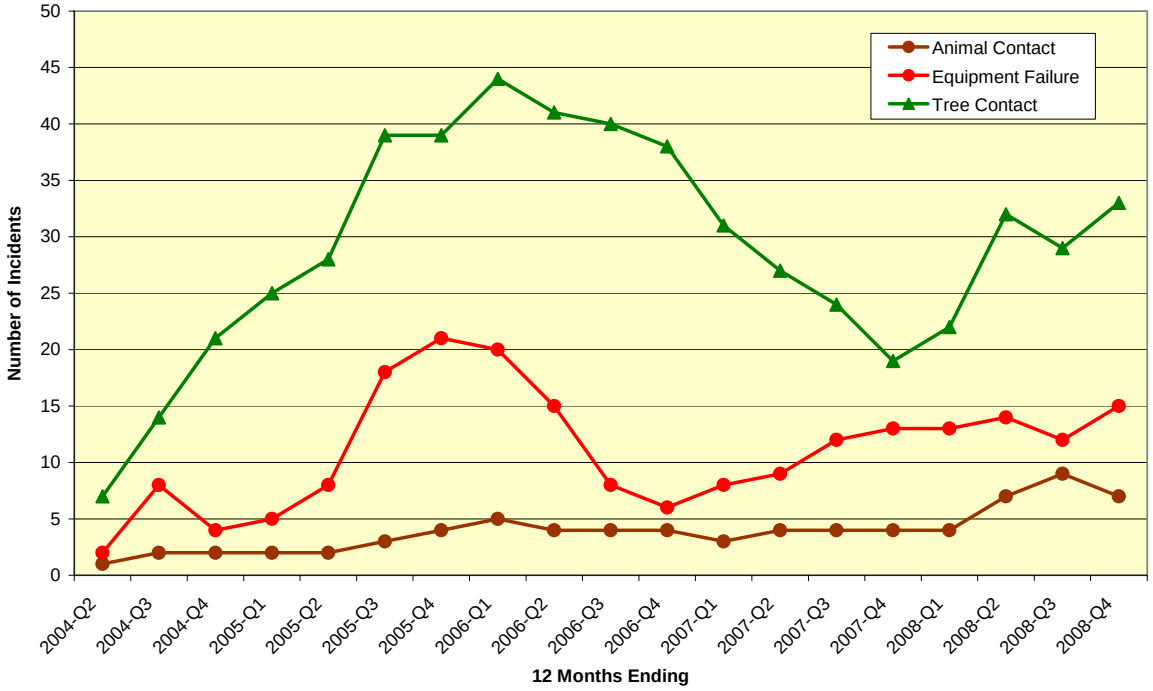



**Figure 62. Pike County Light & Power Company**
**Outage Tracking**



## Wellsboro Electric Company

Wellsboro's overall reliability performance in 2008 was an improvement over its performance in 2007. Wellsboro's CAIDI of 91 minutes was 15.0 percent lower than last year's figure and 26.6 percent lower than the benchmark of 124 minutes. SAIFI decreased from 1.63 to 1.07 and was lower than the benchmark by 13.0 percent. Wellsboro achieved the three-year CAID standard by 29.1 percent but did not achieve the three-year SAIFI standard (3.7 percent).

In 2008, Wellsboro experienced three major events. The calculations for the reliability indices exclude outage data related to these events, which were approved by the Commission.

- March 4-5, 2008 – Ice storm; 669 customers were affected; 810,828 interruption minutes were excluded.
- March 8-9, 2008 – Ice storm; 698 customers were affected; 1.1 million interruption minutes were excluded.
- September 15, 2008 – High wind; 1,111 customers were affected; 199,980 interruption minutes were excluded.

In 2008, Wellsboro experienced 6,410 customer interruptions with a total duration of 586,299 customer minutes.

Figures 63 and 64 depict trends in the duration of service interruptions for the Wellsboro system from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards.

**Figure 63. Wellsboro Electric Company**
**Customer Average Interruption Duration Index (CAIDI)**

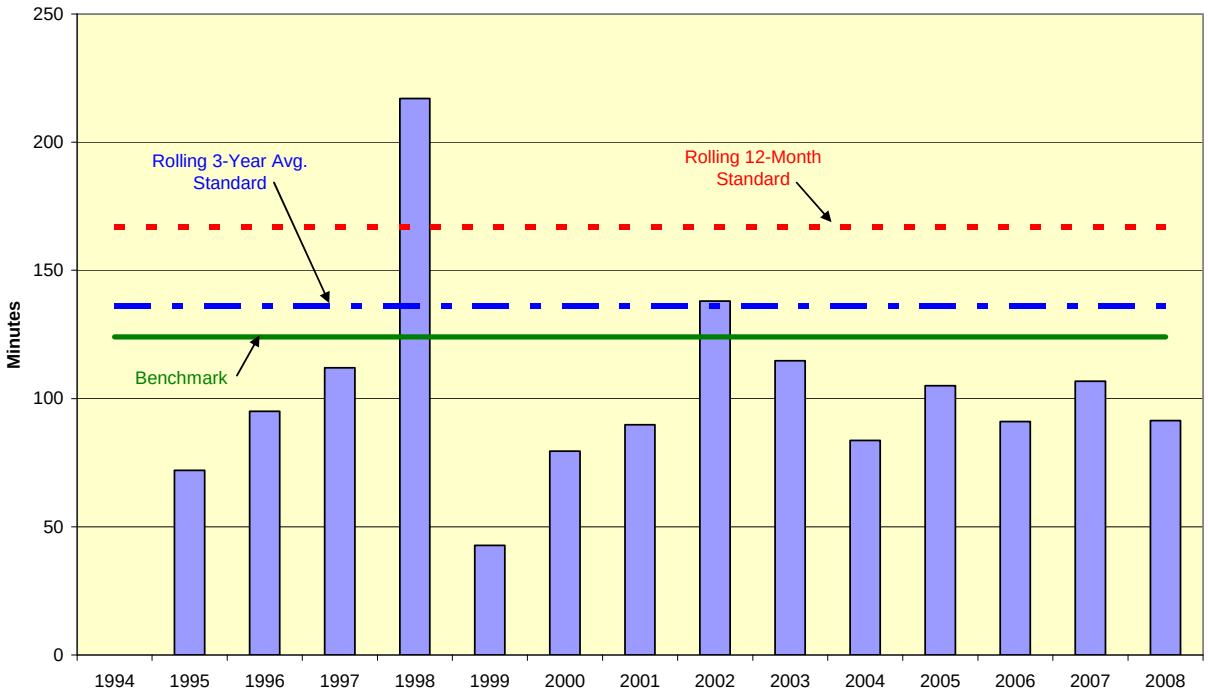
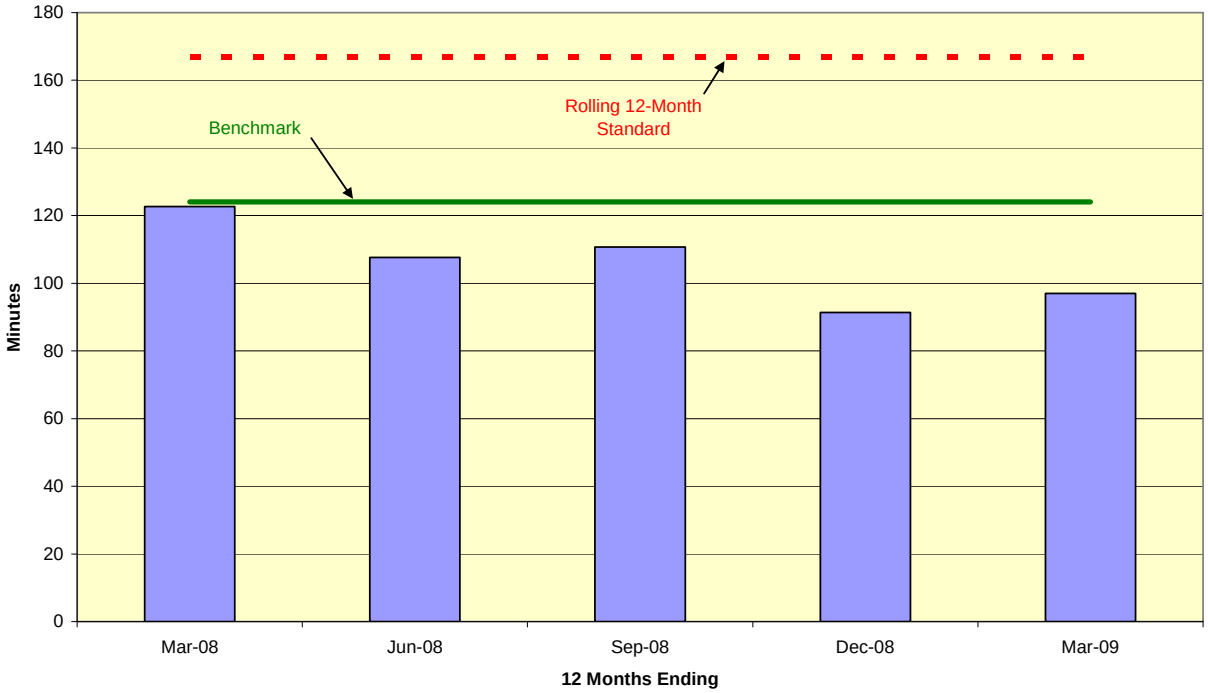



**Figure 64. Wellsboro Electric Company**
**Customer Average Interruption Duration Index (CAIDI)**



Figures 65 and 66 show trends in the frequency of service interruptions from 1994 to 2008, and for the four quarters of 2008 and the first quarter of 2009, compared to the established benchmarks and standards. SAIFI was 3.7 percent above the three-year standard of 1.35.

**Figure 65. Wellsboro Electric Company**
**System Average Interruption Frequency Index (SAIFI)**

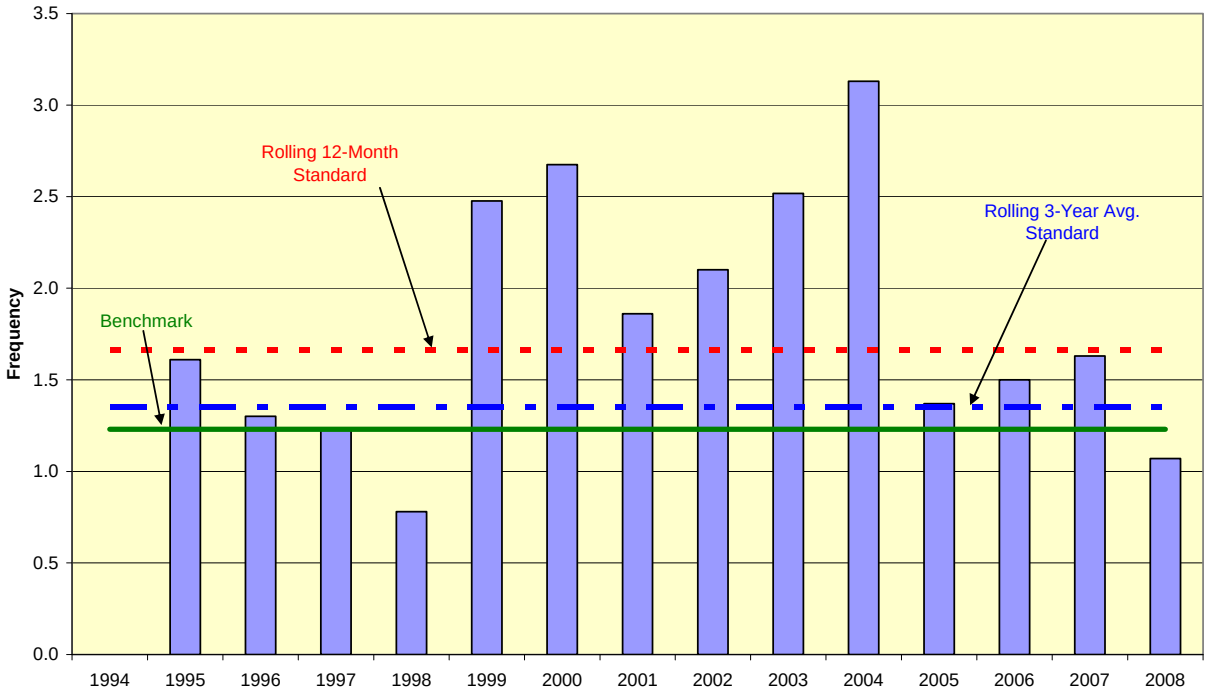
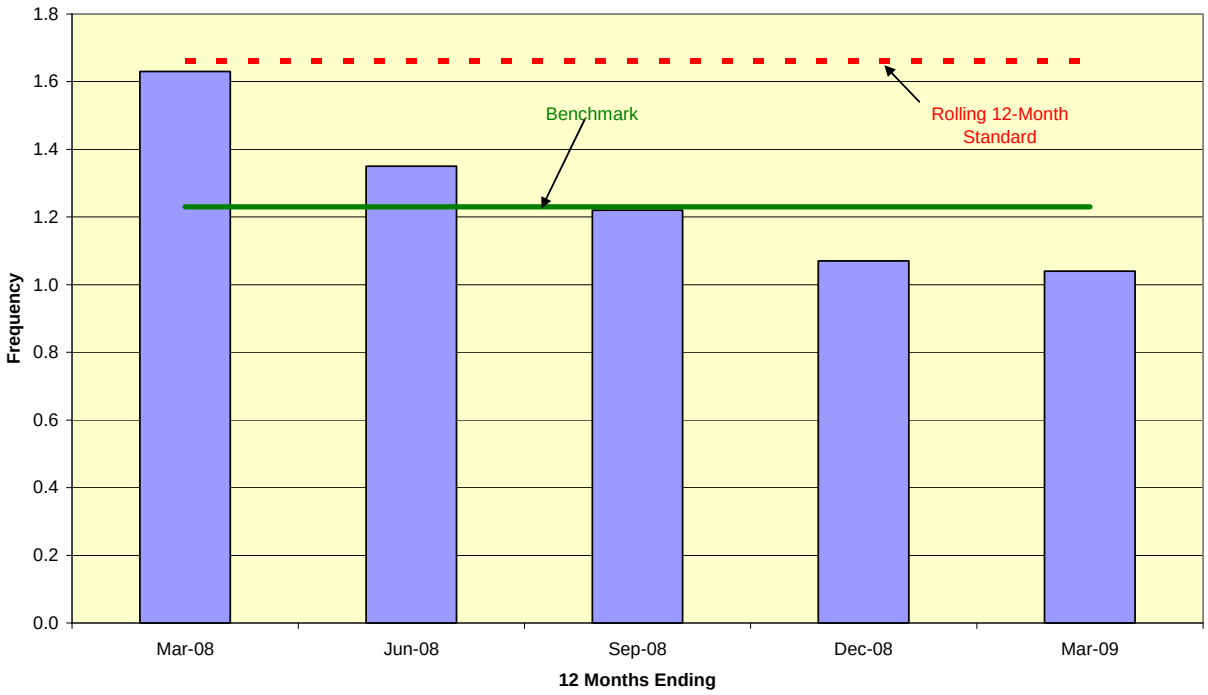


**Figure 66. Wellsboro Electric Company**
**System Average Interruption Frequency Index (SAIFI)**




Wellsboro's Outage Management System tracks causes of outages and is used to identify circuits or individual customers that are experiencing multiple outages due to animal contact, trees, etc. This data assists Wellsboro in preventing future outages from occurring.

Figure 67 shows the distribution of causes of service outages occurring during 2008 as a percentage of total outages. Trees caused 17.2 percent of the outages, representing 20.7 percent of customers affected and 26.7 percent of interruption minutes. Equipment failure was responsible for 20.5 percent of incidents, 22.2 percent of customers affected and 17.6 percent of interruption minutes. Animals were responsible for 22.5 percent of incidents, 20.4 percent of customers affected and 19.9 percent of interruption minutes. Outages with unknown causes represented 29.5 percent of outage incidents.

Figure 68 trends the number of outages by the top four major causes.

**Figure 67. Wellsboro Electric Company**
**Outage Causes**

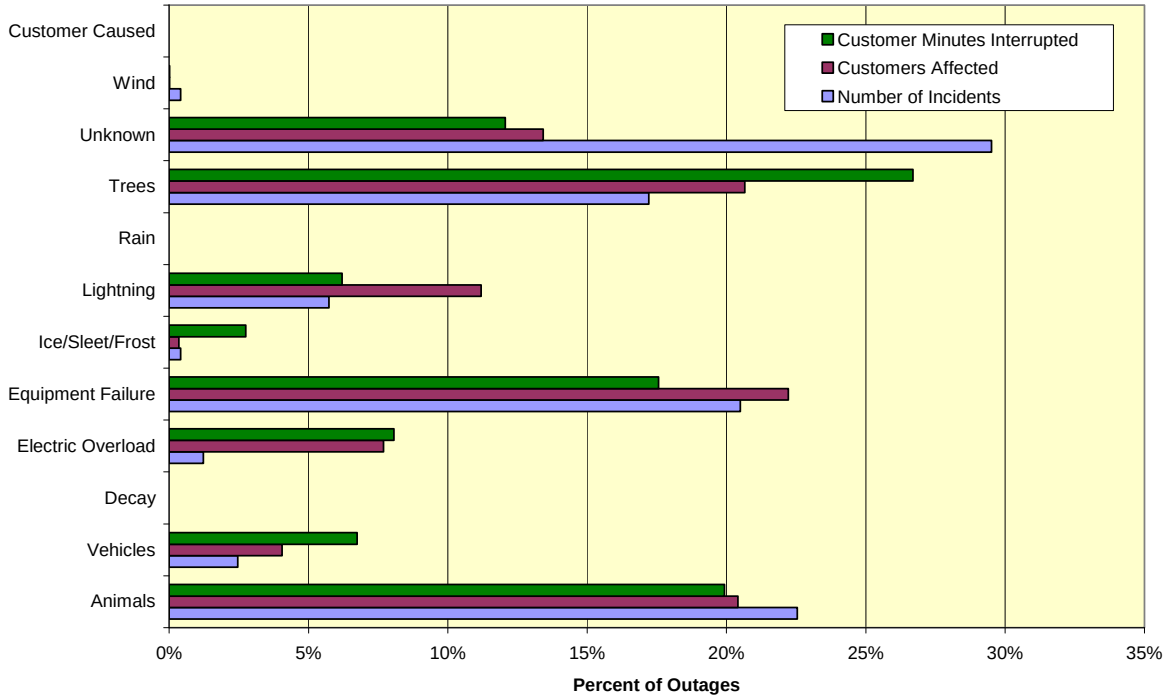
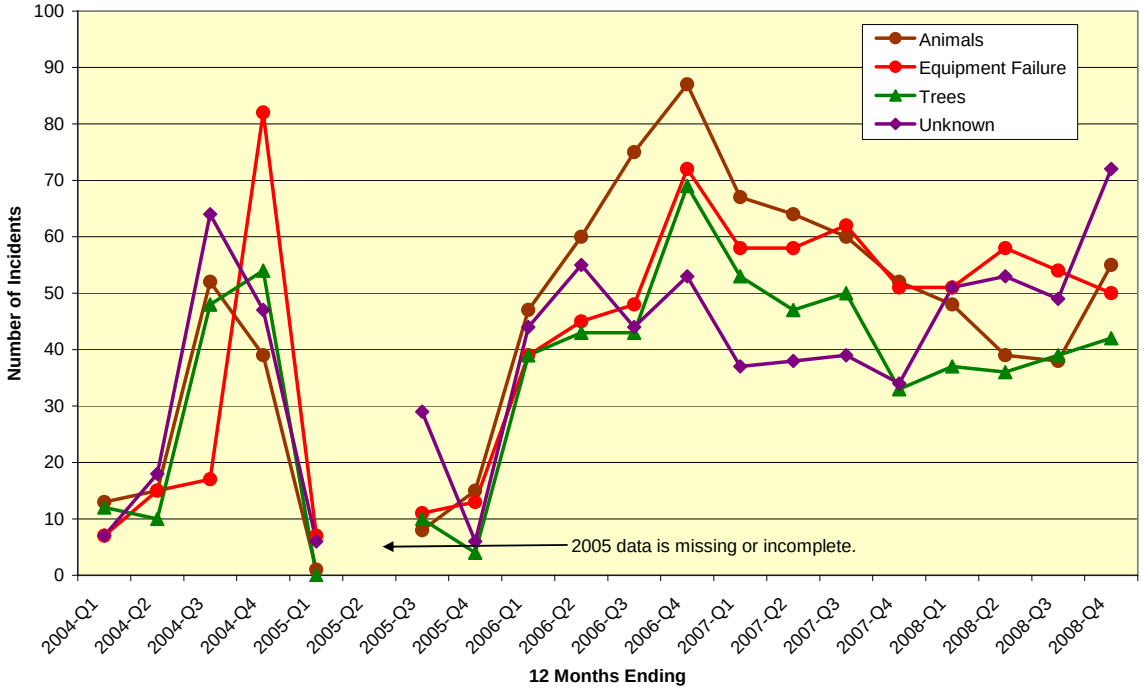



**Figure 68. Wellsboro Electric Company**
**Outage Tracking**



## Section 4 – Conclusion

Over the past few years, electric service reliability has been under increased scrutiny in Pennsylvania. The Electricity Generation Customer Choice and Competition Act mandates that the Commission ensure that levels of reliability that existed prior to the restructuring of the electric utility industry continue in the new competitive markets.

In response to this mandate, the Commission adopted reporting requirements designed to ensure the continuing safety, adequacy and reliability of the generation, transmission and distribution of electricity in the Commonwealth. The Commission also established reliability benchmarks and standards with which to measure the performance of each EDC.

Given the uncertainty of weather and other events that can affect reliability performance, the Commission has stated that EDCs should set goals to achieve benchmark performance or better to allow for those times when unforeseen circumstances push the indices above the benchmark. In recognition of these unforeseen circumstances, the Commission set the performance standard as the minimum level of EDC reliability performance. The standard is the level of performance beyond which the company must either justify its poor performance or provide information on the corrective measures it will take to improve performance. Performance that does not meet the standard for any reliability measure may be the threshold for triggering additional scrutiny and potential compliance enforcement actions.

In 2008, two of 11 EDCs failed to achieve compliance with the 12-month CAIDI performance standards for average duration of service outages. One EDC failed to meet its SAIFI performance standard for the average frequency of service outages per customer.

One of the 11 EDCs failed to perform better than the three-year standard for average duration of service outages. For the average frequency of service outages per customer, five of the 11 EDCs failed to perform better than the three-year performance standard.

A variety of non-compliance enforcement actions were taken with EDCs that failed to meet any of the Commission's electric reliability performance standards. These enforcement actions ranged from meetings with the companies to discuss reliability improvement plans to formal reliability investigations.

# Appendix A – Benchmarks and Standards

| EDC | Reliability Indices | Benchmark | Rolling 12-Month Standard | Rolling 3-Yr Avg. Standard |
|---|---|---|---|---|
| Allegheny Power * | SAIFI | 1.05 | 1.26 | 1.16 |
| | CAIDI | 170 | 204 | 187 |
| | SAIDI | 179 | 257 | 217 |
| Duquesne Light | SAIFI | 1.17 | 1.40 | 1.29 |
| | CAIDI | 108 | 130 | 119 |
| | SAIDI | 126 | 182 | 153 |
| Met-Ed ** | SAIFI | 1.15 | 1.38 | 1.27 |
| | CAIDI | 117 | 140 | 129 |
| | SAIDI | 135 | 194 | 163 |
| Penelec ** | SAIFI | 1.26 | 1.52 | 1.39 |
| | CAIDI | 117 | 141 | 129 |
| | SAIDI | 148 | 213 | 179 |
| Penn Power ** | SAIFI | 1.12 | 1.34 | 1.23 |
| | CAIDI | 101 | 121 | 111 |
| | SAIDI | 113 | 162 | 136 |
| PECO | SAIFI | 1.23 | 1.48 | 1.35 |
| | CAIDI | 112 | 134 | 123 |
| | SAIDI | 138 | 198 | 167 |
| PPL | SAIFI | 0.98 | 1.18 | 1.08 |
| | CAIDI | 145 | 174 | 160 |
| | SAIDI | 142 | 205 | 172 |
| UGI | SAIFI | 0.83 | 1.12 | 0.91 |
| | CAIDI | 169 | 228 | 186 |
| | SAIDI | 140 | 256 | 170 |
| Citizens | SAIFI | 0.20 | 0.27 | 0.22 |
| | CAIDI | 105 | 141 | 115 |
| | SAIDI | 21 | 38 | 25 |
| Pike County *** | SAIFI | 0.61 | 0.82 | 0.67 |
| | CAIDI | 174 | 235 | 192 |
| | SAIDI | 106 | 194 | 129 |
| Wellsboro | SAIFI | 1.23 | 1.66 | 1.35 |
| | CAIDI | 124 | 167 | 136 |
| | SAIDI | 153 | 278 | 185 |

* Revised benchmarks and standards effective 7/20/06.
** Revised benchmarks and standards effective 2/17/06.
*** Revised benchmarks and standards effective 8/17/06.