Review of

Electric Service Quality of Florida Investor-Owned Utilities Tampa Electric Company

June 2005

By Authority of
The State of Florida for
The Public Service Commission
Division of Competitive Markets and Enforcement
Bureau of Regulatory Review

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RR-04-07-001

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1.0 EXECUTIVE SUMMARY

1.0 Executive Summary

1.1 Objectives

This management review of Florida's five electric investor-owned utilities (IOUs) was conducted on behalf of the Florida Public Service Commission (FPSC) by the Bureau of Regulatory Review (BRR). The review was requested by the Division of Economic Regulation in an effort to learn more about each electric utility company's efforts to improve distribution and transmission service quality and reliability during the period 1999-2004. The purpose of the management review was to update and document utility data and process changes due to company restructuring, increased company use of outsourcing, changes within FPSC rules, and other causes. The review objectives were as follows:

- To provide FPSC staff with an update of reliability information originally captured in the Electric Service Quality management reviews of December 1997 and November 2000,
- To document and evaluate any changes in corporate philosophy; company organizational structure; operational procedures; monitoring and measurement systems; operational processes; and company philosophies and capabilities impacting electric service quality and reliability, and
- To document and evaluate electric utility activities and programs of improvement for distribution and transmission facilities during the period 1999-2004

1.2 Scope

This review focused on Tampa Electric Company (Tampa Electric) distribution and transmission procedures, processes, systems, programs and activities aimed at maintaining and/or improving service quality and reliability. The review encompasses the period 1999-2004 and the company reliability results, programs, and improvement efforts during that period. To the extent possible, it documents future plans as well. BRR staff considered both actual and planned company activities relevant to determining whether company service quality and reliability declined over the period 1999-2004. To do so, staff focused on the following data:

- FPSC-received customer complaints
- Company-received customer complaints
- Company internal management reports
- Annual FERC Form-1 filing data
- Annual Reliability Reports filed with the FPSC
- Company-monitored reliability data
- Customer satisfaction surveys
- Company property damage claims

1.3 Methodology

BRR staff analyzed reliability performance indices and trended company performance during the review period. Staff also requested and reviewed company documents pertaining to Tampa Electric distribution and transmission improvement programs and activities. In-person and teleconference interviews were conducted with numerous company employees to better understand procedures, processes, systems, and improvement efforts. Particular attention was paid to improvement program objectives, measurements, budgets, performance results, and changes in utility practices and philosophies that may have impacted service during the period or may have future impact upon service quality and reliability.

1.4 Overall Opinion

Based upon the information gathered in this review, staff presents the following four conclusions and related suggestions regarding the quality of Tampa Electric's distribution and transmission functions.

1.4.1 Distribution Reliability Has Declined

Distribution reliability has declined during the period 1999-2004. Both Tampa Electric's System Average Interruption Duration Index (SAIDI) and Customer Average Interruption Duration Index (CAIDI) have increased indicating longer average system and customer outages. Outage frequency indices are also trending unfavorably for the company, as its SAIFI (System Average Interruption Frequency Index) and MAIFIe (Momentary Average Interruption Event Frequency Index) results have also increased. Further indication of a need for improvement is the company's failure to attain its internal reliability incentive goals for SAIDI and MAIFIe in 2003 and 2004.

Tampa Electric states "the increase in Tampa Electric's distribution reliability indicators is primarily due to the implementation of a new outage management system." The Outage Management System (OMS), implemented in November 2001, now allows the company to "capture more outages, accurately account for the initial outage times . . . and allows for step-restoration which accurately matches the correct number of customers with accurate restoration times." The company also states, "The rise in Tampa Electric's distribution reliability indicators specifically in 2003 and 2004 is primarily due to increased weather and lightning activity."

Staff agrees that the implementation of OMS in late 2001 has led to increased capability to measure outage information and would cause some increases in reliability indices during late 2001 and possibly into 2002, the system's first full year of operation. However, taking into consideration a one-time adjustment for the impact of the new OMS, substantial additional increases in Tampa Electric's reliability indicators remain to be explained. Staff believes that the company's reliability indices indicate that the new OMS and severe weather events are not the only reasons for increased Tampa Electric outages and indices. Staff notes that other factors could be at work, including service area-specific trends, reduced spending, and reduced staffing.

Regarding the impact of hurricanes and other severe weather, staff notes that for purposes of the key indicators of SAIDI, CAIDI, SAIFI and others, hurricane-related impacts have been excluded from company data as required by FPSC rules. In summary, staff believes the negative trends in reliability indicators indicate a need for focused study and corrective action by management.

1.4.2 Vegetation Outages Have Increased

Over the period 1999 through 2004, vegetation-caused outages for Tampa Electric grew steadily from 900 to 1,880 – an increase of 109 percent. In 2001, 2002, and 2003, the annual increases in this outage category were 24 percent, 48 percent, and 20 percent. Only during 2004, a year in which numerous hurricane-related vegetation outages were excluded from the figures, do the totals show a reduction of 6 percent.

Spending for vegetation management has fluctuated in recent years. Between 2000 through 2002, spending ranged from $6.7 to $6.8 million. For 2003, spending fell 22 percent to $5.2 million. Staff does note that total vegetation management spending increased to $5.438 million in 2004 and that Tampa Electric's 2005 budget calls for about $5.974 million in trimming program spending. The 2005 budgeted figure for transmission trimming represents a more than 250 percent increase over 2004 spending in that area. However, the 2005 budget for distribution line clearing is about six percent lower than 2004 spending.

Since the increases in vegetation-related outages began well before the new OMS implementation, staff believes it is unlikely that the sharp increase can be attributed to that system change. Staff believes Tampa Electric should continue to reassess its tree-trimming efforts and expenditures and set goals to substantially reduce future vegetation-caused outages.

1.4.3 Distribution Substation Outages Have Increased

During 2004, distribution substation outages totaled 93 – an increase of 72 percent from the 2003 total of 54 outages. The 2004 total more than tripled the count from four years earlier, when 2001 distribution substation outages numbered 30.

The sharp increases in distribution substation outages generally coincided with expenditure reductions for both distribution and transmission substation maintenance. Total substation maintenance spending over the 1999 to 2004 period dropped by 43 percent. Most of this expenditure reduction occurred between 2001 and 2004.

Between 2001 and 2003, ongoing preventive substation maintenance spending declined from $1,647,000 to $451,000, a drop of 73 percent. In 2004, ongoing spending recovered somewhat to $807,000. However despite this improvement, 2004 spending in this category was still 49 percent below the 2001 level. For 2005, the company has budgeted just $440,291 for ongoing substation maintenance – about half of its 2004 spending level and slightly below the 2004 budget figure.

Regarding the increase in 2004 distribution substation outages, the company notes that it is researching the problem and observes that the most frequent outage cause was interference by animals. Beginning in 2004, the company did broaden its policy on substation animal guard application by requiring that all new substation construction, as well as most substation retrofit projects, would include the addition of animal protection on key substation components.

In light of the increased animal outages that still occurred during 2004, staff urges Tampa Electric to examine options such as expanding its retrofitting animal guards on substations. The company reports that a study of animal outage prevention measures will be completed during the third quarter of 2005. Staff notes that the second leading cause of substation outage time over the last three years has been breakers and leads. The company may also benefit from studying the causes of outages in this category.

Staff believes these studies may assist in identifying solutions to increased substation outages. However, staff also urges the company to revisit its decision to reduce substation inspection frequency and to review the adequacy of substation maintenance expenditure levels.

1.4.4 Preventive Reliability Spending Increased In 2004

After declining during 2002 and 2003, Tampa Electric's spending for ongoing preventive programs aimed at reliability maintenance increased notably in 2004. Last year, preventive maintenance program spending highs (excluding hurricane-related costs) were reached for the 1999 through 2004 period in the distribution and transmission areas. The company's 2005 budget promises even more attention to preventive programs.

Between 2001 and 2003, preventive distribution reliability program spending fell 19 percent from $7.004 million to $5.661 million. During 2004, this spending rebounded by 35 percent to $7.641 million. For 2005, budgeted expenditures of $9.996 million would represent a further increase of 31 percent over 2004 spending.

Preventive program spending for transmission reliability increased slightly from 2001 through 2003, then jumped by 27 percent in 2004. If attained, the 2005 budget would represent a further increase of 15 percent in the transmission area.

Still, total combined distribution and transmission reliability-related spending, which includes both preventive and corrective efforts, declined by 11 percent in 2004 to $31.687 million, after having fallen by 7 percent during 2003. For 2005, the company has budgeted $30.911 million -- a reduction of about 2.4 percent from its 2004 spending.

Staffing for positions involved in frontline distribution reliability functions declined by 15 percent between 2000 and 2004. The distribution bargaining unit employee staffing level for 2004 represented a 13-year low. Staff believes the company should review its workforce requirements and the impact on its reliability results.

Staff believes the 2004 increases in ongoing preventive program spending were significant steps by the company toward improving its service reliability results. In some areas, the increased spending levels may need to be sustained to achieve improvement in reliability indicator results. Staff urges the company to continue to focus increased attention on system maintenance and reliability.

2.0 BACKGROUND AND PERSPECTIVE

2.0 Background And Perspective

2.1 Service Quality Reporting

Since the inception of electric utility regulation, the ability to measure company performance, service quality, and service reliability has been of foremost concern. Performance measurement is essential to assess the company's ability to successfully provide expected service levels. Service quality and reliability measurements are essential to ensure that constructed facilities meet engineering standards and expectations and that service quality and reliability are maintained throughout the useful service life.

Measuring service quality and reliability has not lost its importance over the years. Changing technology has improved company measurement capabilities and has increased the levels of detail and accuracy of reliability reporting. As companies upgrade their procedures, policies, systems, and processes, measurement capabilities will continue to improve.

2.1.1 Previous Service Quality Reviews

The Bureau of Regulatory Review (BRR) has completed two prior Service Quality Reviews at the request of Commission staff. The first review was completed in December 1997 and examined the four major electric utilities' distribution and transmission procedures, processes, and systems related to service reliability and quality. The first review focused more heavily on distribution than on transmission service. In its report, staff concluded that service quality and reliability had declined at two of the major investor-owned electric utilities. Staff recommended that Florida Power Corporation and Florida Power & Light Company develop and implement service quality improvement programs, which the staff would later review.

The second Service Quality Review, completed in November 2000, was a follow-up review of the two companies identified in the initial audit as having declines in service quality and reliability. Staff efforts concentrated specifically on the improvement programs designed and implemented by Florida Power Corporation and Florida Power & Light and the expected improvements in measurement indices. The two remaining utilities included in the initial review were not reexamined during this review.

2.1.2 Importance of Service Quality and Reliability

In today's modern life, electric power has become an essential service to most consumers. Residential consumers rely on electric service to light their homes, heat their water, wash their clothes, cook their meals, and for many other essential uses. Business consumers rely on electric power for many of the same reasons as residential consumers and additionally to light commercial signage, power security and surveillance systems, provide parking lot lighting and security, and to complete many other business tasks and activities. Commercial and industrial consumers rely on electricity to provide lighting for employees and consumers, to power heating and air equipment, to operate elevators and escalators, to power highly technical computer equipment, to power manufacturing equipment, and for many other uses. Today's modern society has become largely dependent on electric power to perform much of its essential activities.

The demand for electric power has continued to increase exponentially over time as new consumer convenience products have reached the marketplace, business operations and applications have changed, and industrial/manufacturing processes and improvements have been introduced. As residential consumers add more convenience products to the household, the demand for reliable electric service increases. Frequent power interruptions become a consumer irritant and nuisance. Business prosperity and growth also increase demand and dependence upon electricity. As commercial/industrial consumers add to existing locations, open new locations, and improve manufacturing processes, their demand for electricity continues to increase. Updates to manufacturing processes and equipment often will change power quality requirements. Increased demand not only brings greater consumer expectations for reliable electric service, it brings higher expectations for electric service quality. Electric reliability relates to the provision of service, while electric quality relates to the level of service provided and can be impacted by increased demand. Thus, the demand for reliable quality electric power continues to grow.

2.2 FPSC Standards For Service Reliability

Chapter 25-6 of Florida Public Service Commission (FPSC) Electric Service Rules provides the regulatory framework for electric public utilities operating under the jurisdiction of the Commission. The ten-part rules for electric utility operations provide guidance in topics such as General Provisions, Records and Reports, General Management Requirements, and Earnings Surveillance Reports. These rules also provide general service provisions and reporting responsibilities for electric utilities operating within the state of Florida. The following sections describe the FPSC Electric Service Rules related to customer complaint reporting, recording of outage data, and reporting of electric service reliability.

2.2.1 FPSC Rule 25-6.021 Customer Complaint Reporting

Chapter 25-6, Part II, Records and Reports, Section 25-6.021 of the FPSC Electric Rules requires electric utilities to keep a record of all written complaints received by the company. The utility must record specific information regarding the complaint, including the complainant's name and address, date the complaint was received, nature of the complaint, results of any investigation, the disposition of the complaint, and the date of the complaint disposition. This rule is important because it provides for standard recording of customers' written complaints received by the company. Records of customer complaints are periodically reviewed by FPSC staff to evaluate the levels and types of complaints recorded at the company level. Consumer complaints submitted directly to the Commission are also reviewed. Staff analysis of FPSC and company-recorded complaints is discussed in Section 3.9.

2.2.2 FPSC Rule 25-6.044 Continuity of Service

Chapter 25-6, Part IV, General Service Provisions, Section 25-6.044 of the rules requires each electric utility to keep a record of system reliability and continuity of service data, customer service interruption notices, and other outage data. The utility must record each outage event as planned or unplanned and identify the origin of the outage, such as generation, transmission, transmission substation equipment or distribution equipment. The rule calls for each utility to determine the cause of each outage and record it in a standardized manner throughout the utility. The rule also requires that each utility record the date and time of the outage event and the number of service interruptions for the event. Distribution and transmission outages and coding are discussed in Section 3.4.

2.2.3 FPSC Rule 25-6.0455 Annual Distribution Service Reliability Reporting

Chapter 25-6, Part IV, General Service Provisions, Section 25-6.0455 of the rules requires each utility to file an annual Distribution Service Reliability Report with the Commission prior to March 1st of the following year for the preceding calendar year. This report provides specific performance measurement indices representing the average system and customer outage frequency and duration during the calendar year. The Distribution Service Reliability Report also provides outage data for the utility's three percent of primary feeders with the highest number of feeder breaker interruptions during the calendar year. Annual Distribution Reliability Report results and the three percent of primary feeders with the highest interruptions are discussed in Section 3.2.

2.2.4 FPSC Rule 25-6.046 Voltage Standards

Chapter 25-6, Part IV, General Service Provisions, Section 25-6.046 of the rules requires each utility to adopt standard nominal voltages conforming to modern usage that may be required of its distribution and transmission system in its entire serving area or for each district in its system. This rule also requires the voltage at the point of delivery shall not exceed a specific percentage above or below the standard voltage adopted. Voltage standards are discussed further in Section 3.3.

2.2.5 FPSC Rule 25-6.047 Constant Current Standards

Chapter 25-6, Part IV, General Service Provisions, Section 25-6.047 of the rules requires each utility supplying constant current street lighting circuits to furnish, as is practicable, the rated current so that it does not vary more than four percent below or above the rated current of the circuit. The rule also provides that the utility will check the equipment supplying the constant current output at least once a year and adjust the current if necessary. Constant current standards and practices are discussed further in Section 3.3.

2.3 FPSC Standards For New Electric Construction and Grounding

Chapter 25-6, Part III, General Management Requirements of the FPSC Electric Rules provides utilities general standards for the construction of new electric utility distribution and transmission facilities throughout the state. Part III also provides instruction for inspection of electric utility plant facilities and grounding of primary and secondary distribution circuits. The following sections further describe FPSC Electric Service Rules related to new distribution and transmission construction, utility plant inspections, and service grounding.

2.3.1 Rule 25-6.034 Standard of Construction

This rule states that the electric utilities shall construct, install, maintain, and operate facilities in accordance with generally accepted engineering practices to ensure continuity of service and uniformity in quality of service. The rule incorporates American National Standard Code (ANSI) for electricity metering and requirements, terminology, and test code for instrument transformers as reasonable and good standards of practice. The rule provides that a utility in compliance with the provisions of these publications and variations approved by the Commission is deemed to have facilities constructed and installed in accordance with generally accepted engineering practices.

2.3.2 Rule 25-6.0345 Safety Standards for Construction of New Transmission and Distribution Facilities

The Commission Safety Standards rule incorporates ANSI safety standards published in August 2001 as the applicable safety standards for transmission and distribution facilities under the Commission's safety jurisdiction. Each public electric utility, rural cooperative, and municipal electric system must comply with these standards for new construction of transmission and distribution facilities. Each of these utilities is also required to report all electric work orders completed by the utility, or its contractors, at the end of each quarter of the year. In the quarterly report, each utility is required to identify all transmission and distribution facilities subject to the Commission's safety jurisdiction and certify that they meet or exceed applicable standards. In addition, compliance inspections are to be completed by the Commission on a random basis or as appropriate.

2.3.3 Rule 25-6.040 Grounding of Primary and Secondary Distribution

This rule requires each utility to effectively ground the neutrals of all its multigrounded distribution circuits to render them reasonably safe to person and property. Electric utilities must conform to applicable provisions of the publications listed in Rule 25-6.034(2) to ensure that the system is grounded to meet the requirements of this standard.

The preceding summaries of Commission Electric Rules related to electric service quality and reliability reporting, continuity of service, standards for new transmission and distribution construction, grounding and voltage requirements, safety reporting requirements, and customer complaint reporting should improve the overall understanding of the remaining chapters of this report. These Commission Electric Rules provide the standards to which all electric utilities operating in the state of Florida are measured for the provisioning of safe, reliable, and quality electric service.

3.0 TAMPA ELECTRIC COMPANY

3.0 Tampa Electric Company

3.1 Company Profile

This section provides an overview of Tampa Electric organizational, operational and growth characteristics. An understanding of these characteristics will help to better appreciate the dynamics impacting Tampa Electric's efforts to provide reliable service.

3.1.1 Organizational Structure

Tampa Electric Company is the principal subsidiary of TECO Energy, Inc., a diversified holding company involved in energy-related businesses. Tampa Electric Company is comprised of an electric division, generally referred to as Tampa Electric, and a natural gas division, generally referred to as Peoples Gas System. Both Tampa Electric and Peoples Gas System are regulated by the Florida Public Service Commission. TECO Power Services, TECO Transport, TECO Coal, and TECO Solutions are among the other TECO Energy, Inc. subsidiary operations and primarily serve the electric operating company.

In 2002, TECO Energy initiated a restructuring program aimed at cost cutting. The strategy for achieving lower costs focused on reducing the workforce through retirements, elimination of positions, and other measures.

In late 2003, TECO Energy once again announced a corporate restructure effort. This time the company announced that the program was intended to "grow the core utility operation, maintain liquidity, generate cash, and maximize the value in existing assets." These actions impacted officers of the company as well as operations and support services personnel. As a result of the 2003 restructure, TECO Energy centralized its oversight along functional lines for power plant operations, energy delivery, energy management, and human resources and technology/support services.

The structure of Tampa Electric is depicted in **Exhibit 1**. As the chart indicates, the Vice President of Energy Delivery, who is primarily responsible for transmission and distribution operations and reliability, reports directly to the President of Tampa Electric.

Tampa Electric Company
Organizational Structure 2004

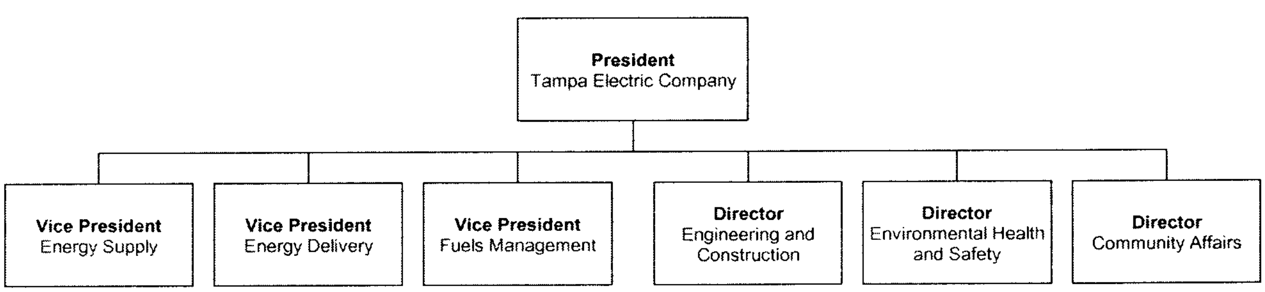


EXHIBIT 1 *Source: DR- 1, Item 1*

The two TECO Energy restructure actions were completed as of December 31, 2003. **Exhibit 2** shows the number of Tampa Electric employees over the period 1999-2004. In total, with the two restructuring efforts, the number of electric department employees decreased by 389, or 14 percent, from year-end 2001 to year-end 2003. Overall, employee levels decreased from 2,850 in 1999 to 2,380 in 2004, a reduction of 16.5 percent during the period as a whole.

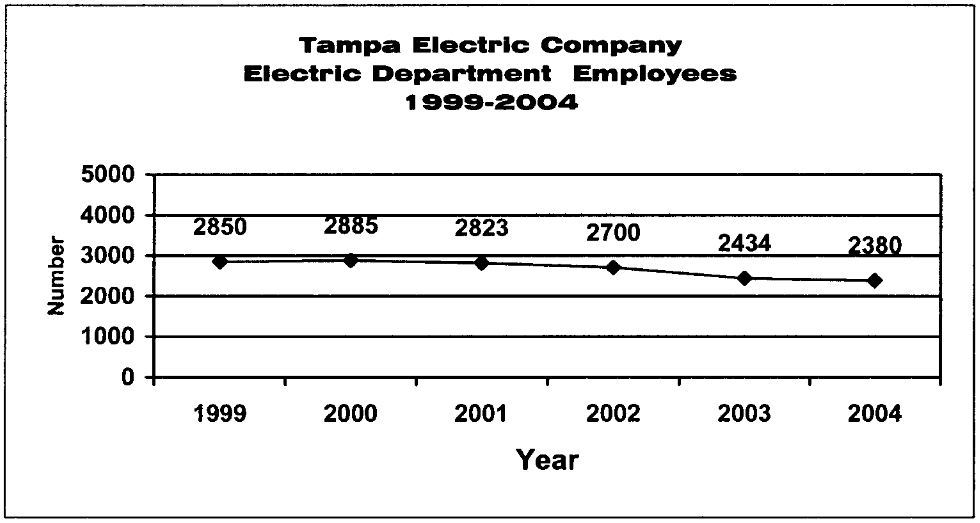


EXHIBIT 2 *Source: FERC Form 1, 1999-2004*

Exhibit 3 shows the current Tampa Electric Energy Delivery reporting structure. The directors of key operational functions report to the Vice President of Energy Delivery. Within this reporting structure are the transmission and distribution operations, which are separated into the geographical service areas of Central, Dade City, Eastern, Plant City, South Hillsborough, Winter Haven, and Western.

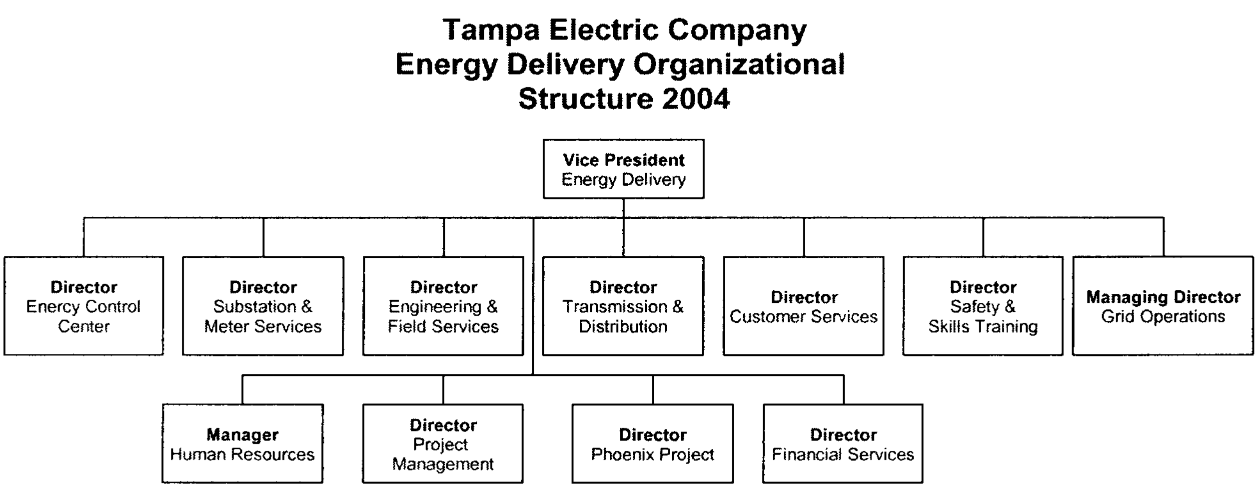


EXHIBIT 3 *Source: DR-1, Item 2*

3.1.2 Operational Characteristics

Tampa Electric is the third-largest investor-owned electric utility in Florida. The company operates five electric plants within its territory having a combined output of 4,256 megawatts (MW) of electric power. Big Bend is the largest generation plant, producing 1,759 MW of power, and is fueled by coal. The only other Tampa Electric generation facility fueled by coal is Polk Plant Unit 1, which produces 260 MW. Together these coal units account for 47 percent of Tampa Electric's generating capacity. The Bayside, Phillips, Polk Plant Units 2 and 3, and peaking units produce the remaining 53 percent (2,236 MW) of Tampa Electric generation. These plants and units are fueled by natural gas or a combination of natural gas and oil.

Tampa Electric currently serves more than 614,000 electric customers within its four-county service territory. Tampa Electric had 2,380 employees as of December 31, 2004. Electric power is transmitted and delivered via 185 substations (49 transmission substations and 136 distribution substations). The transmission system consists of approximately 1,308 pole miles of high-voltage transmission lines. The distribution system consists of 6,866 pole miles of overhead lines and 2,538 trench miles of underground lines.

3.1.3 Growth Characteristics

Tampa Electric overall customer base increased from approximately 576,000 at the end of 1999 to slightly less than 628,000 at the end of 2004. This represents an increase in total customer base of approximately 52,000 during the period 1999-2004, or 9.03 percent over the six-year review period. The customer base consisted of approximately 88 percent residential, 10 percent commercial, 0.5 percent industrial, and 1.5 percent other customers.

During the review period of 1999 through 2004, Tampa Electric operating revenues (including fuel) increased from $1.2 billion in 1999 to $1.7 in 2004, representing a 41.66 percent increase during the period as shown in **Exhibit 4**. The greatest single increase during the period occurred in 2001-2002, when revenues increased from $1.417 billion to approximately $1.598 billion (or nearly 13 percent.)

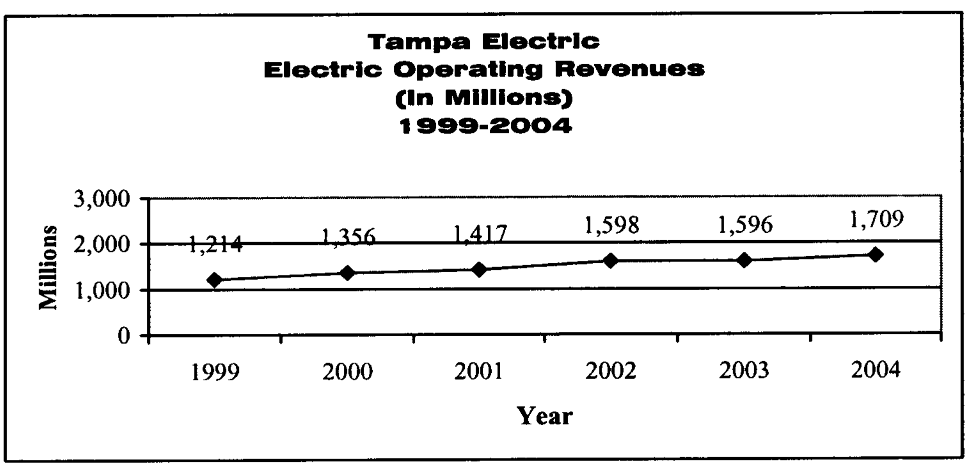


EXHIBIT 4 *Source: FERC Form 1, 1999-2004*

3.2 Statistical Measurements and Reports

Chapter 25-6, Part IV, General Service Provisions, Section 25-6.0455 of the FPSC Electric Service Rules requires each utility to file an annual Distribution Service Reliability Report. This report provides specific performance measurement indices representing the average system and customer outage frequency and duration during the calendar year.

This section examines the distribution reliability results reported to the Commission during the period 1999-2004 and trends these indices to show Tampa Electric reliability performance over a ten-year period. In addition, staff examined other indices used by Tampa Electric to indicate service quality and reliability performance improvement for distribution and transmission services.

The 2004 data reported exclude impacts of Hurricanes Charley, Frances, and Jeanne. Data are also excluded for April, June, and December exception dates as requested by Tampa Electric in Docket Numbers 041375 and 050058. The company states that it believes more stringent analysis of data utilized to produce the 2004 Annual Distribution Reliability Report is necessary before any definitive trending for 2004 can be determined.

Since 2000, Tampa Electric has set a reliability goal stated in terms of an overall System Average Interruption Duration Index (SAIDI) target. This overall SAIDI goal includes transmission, substation and distribution outages. A second reliability goal, a target for Momentary Average Interruption Event Frequency Index (MAIFIe), was added in 2004. **Exhibit 5** lists Tampa Electric's goals and achievements for the period.

Tampa Electric's overall SAIDI goal for 2001 was increased by 10 minutes to adjust for the new automated Outage Management System, which typically increases reported outage times due to increased measurement capabilities. According to the company, the reliability goals are

Tampa Electric
Overall SAIDI* and MAIFIe Goals and Achievements
2000-2005

Year	Goal	Actual
2000	59:00 minutes	58.78 minutes
2001**	69:00	58.33
2002***	69:00	66.78
2003	69:00	86.38
2004	67:00 minutes (SAIDI) 14 occurrences (MAIFIe)	83.08 minutes (SAIDI) 17.31 occurrences (MAIFIe)
2005	67:00 minutes (SAIDI) 14 occurrences (MAIFIe)	To Be Determined To Be Determined

** Overall SAIDI includes Transmission, Substation and Distribution outage minutes.*
*** 2001 SAIDI goal increased by 10 minutes to reflect enhanced measuring capabilities of new OMS system*
**** First full year of operation for new OMS system*

EXHIBIT 5 *Source: Response to ECR DR-14, April 28, 2004* set and monitored at a corporate level and goal results affect all Tampa Electric employees. On an annual basis, if a goal is met, all company employees are eligible for incentive compensation on a percentage basis of their pay. Tampa Electric further notes that in the event that the goal is not met, no employee is eligible for any incentive compensation.

3.2.1 Distribution Reliability Measures and Reports

Duration Indices

Duration indices required for reporting to the Commission are System Average Interruption Duration Index (SAIDI), Customer Average Interruption Duration Index (CAIDI), and L-Bar. Tampa Electric experienced a notable increase in each of these duration indices beginning in 2000. The company explained that the increase in distribution reliability indicators for this period is "primarily due to the implementation of the company's new Outage Management System (OMS)." According to Tampa Electric, its new OMS captures more outages, accurately accounts for the initial outage times via a direct interface with the Energy Management System, and allows for step-restoration, which matches the number of customers with accurate restoration durations. The company also explained that the rise in distribution reliability indicators in 2003 and 2004 "is primarily due to increased weather and lightning activity." Tampa Electric states that it experienced 42 percent more lightning strokes in 2003 versus 2002 and that 2004 lightning stroke totals also reached extraordinarily high levels.

System Average Interruption Duration Index (SAIDI)

This index is generally considered to be a key reflection of operating performance. It indicates the total minutes of interruption time the average system customer will experience in a year. SAIDI is calculated by dividing total customer minutes of interruption by total customers served (or by dividing CAIDI by SAIFI). An upward trend in SAIDI indicates a reduction in reliability, whereas a downward trend is indicative of an increase in reliability. Factors having a direct influence on this index include the severity of the storm season and the component interruptions due to system design.

As shown in **Exhibit 6**, Tampa Electric's SAIDI remained stable at 43 minutes for the first two years of the review period. The index began a steady climb in 2001 and reached 70.87 minutes in 2003 – an increase of 64 percent from 1999. In 2004, SAIDI increased slightly to 72.63 minutes.

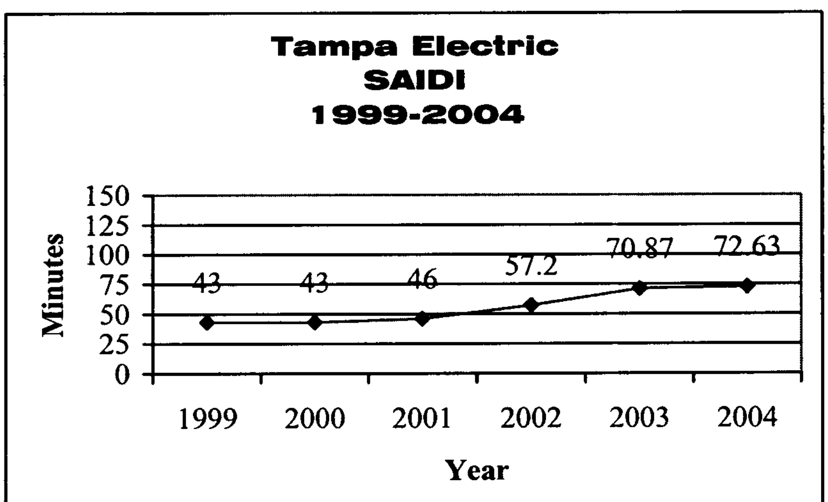


EXHIBIT 6 *Source: Annual Reliability Reports*

Customer Average Interruption Duration Index (CAIDI)

The CAIDI index indicates the average amount of time customers who experienced an interruption were out of service. CAIDI is generally considered to be a reflection of repair or response time, as is the L-Bar measure which is discussed below. CAIDI is calculated by dividing total customer minutes of interruption by the total number of customer interruptions. A decline in CAIDI over time represents an improvement in reliability, while an increase indicates a decrease in reliability. The number of customers affected by a given interruption can have a significant effect on this index, since it has a multiplier effect on the total minutes of interruption. **Exhibit 7** depicts a significant increase in Tampa Electric's CAIDI index over the review period. Tampa Electric's CAIDI index rose 54 percent from 49 minutes in 1999 to 75.26 minutes in 2004. The largest one-year increase in CAIDI occurred in 2002, when CAIDI increased by 22 percent. From 2002, CAIDI increased another 24 percent by 2004.

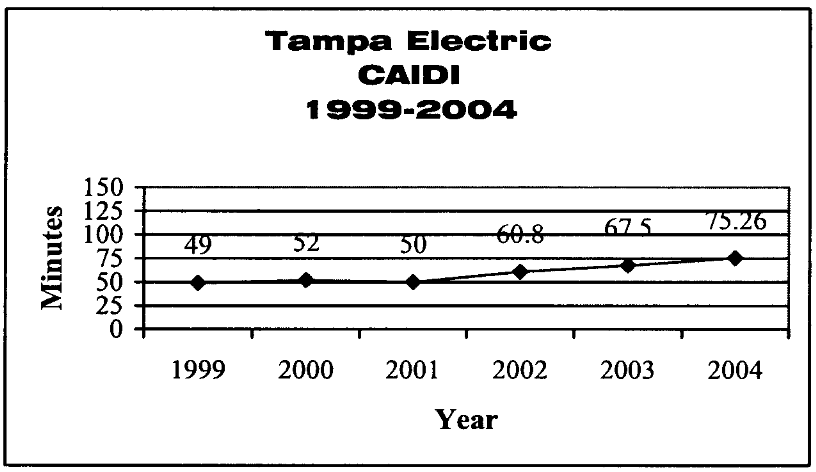


EXHIBIT 7 *Source: Annual Reliability Reports*

Examining the ten-year trend for CAIDI and SAIDI in **Exhibit 8**, both indices generally trend at a relatively steady level (about 52 minutes for CAIDI and 43 minutes for SAIDI) through 2001. During 2002, 2003 and 2004 both indices increase markedly. Tampa Electric explains this increase beginning in 2002 as due to its new OMS. According to Tampa Electric, capturing more accurate data caused the indexes to rise sharply in those years, with issues dealing with system programming and personnel learning curves possibly accounting for increases in 2003 and 2004. Tampa Electric also states that the OMS software glitches were not fully resolved until about May 2003.

Average Duration of an Interruption (L-Bar)

This average length of interruption, also known as "L-Bar," is a measure of the average time to restore an interruption from the moment it is reported. This particular measurement equally averages all interruptions, regardless of the number of customers experiencing the interruptions. L-Bar is reported for both distribution and transmission.

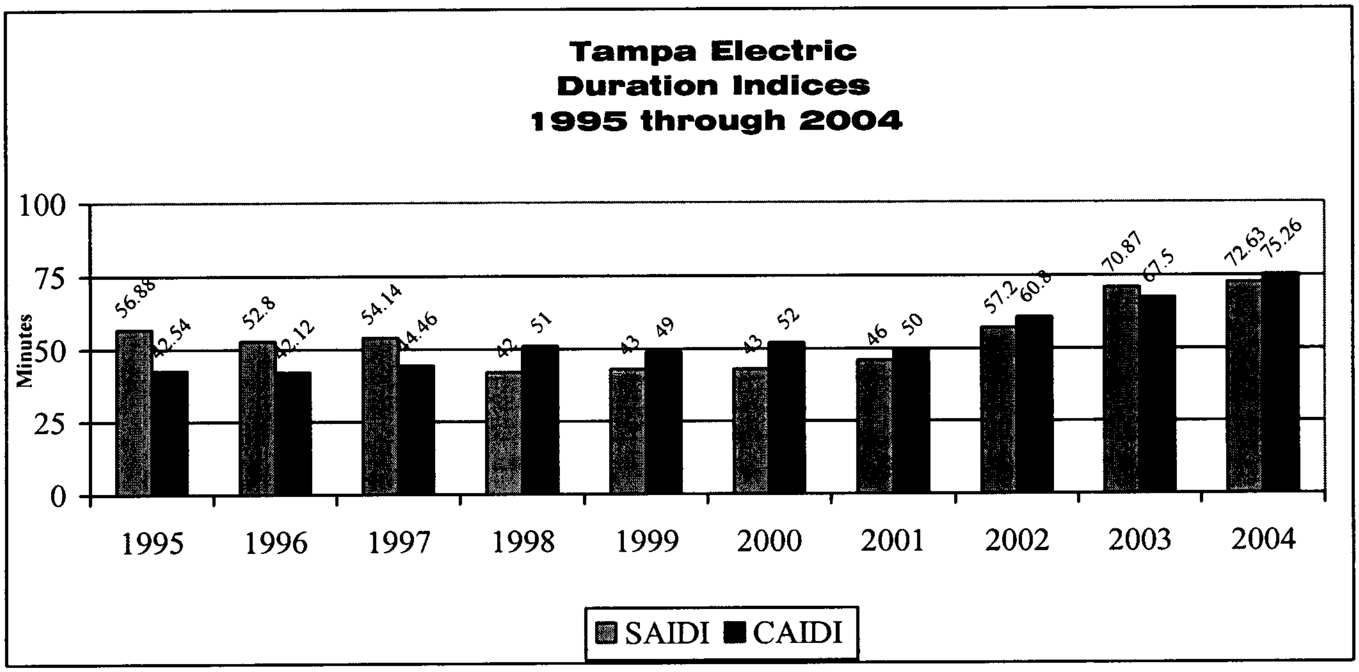


EXHIBIT 8 *Source: Annual Reliability Reports*

Exhibit 9 shows the L-Bar index for both distribution and transmission during the period 1999-2004. Distribution L-Bar increased by about 63 percent over the period as a whole. The largest single increase occurred from 2003 to 2004, when the index increased by 17 percent.

Addressing the rise in distribution L-Bar, the company notes it has been significantly affected by increased adverse weather and lightning activity in its territory. Tampa Electric states that it is addressing the increase in distribution restoration time in a number of ways, including increasing the number of troublemen responding to outages. In 2005, the company plans to increase its number of troublemen again and create "Super Crews" to work evenings and weekend hours.

The company also states that it made improvements in the area of crew callouts. In 2003, the company supplied cellular phones to lineman and apprentices. The company believes that this has improved its ability to contact its frontline employees for off-hours callouts. In 2004, Tampa Electric reports that it implemented an automated callout system. This system automatically calls out a specified number of frontline employees for restoration work. Tampa Electric says that the use of this system results in quicker calling of crews.

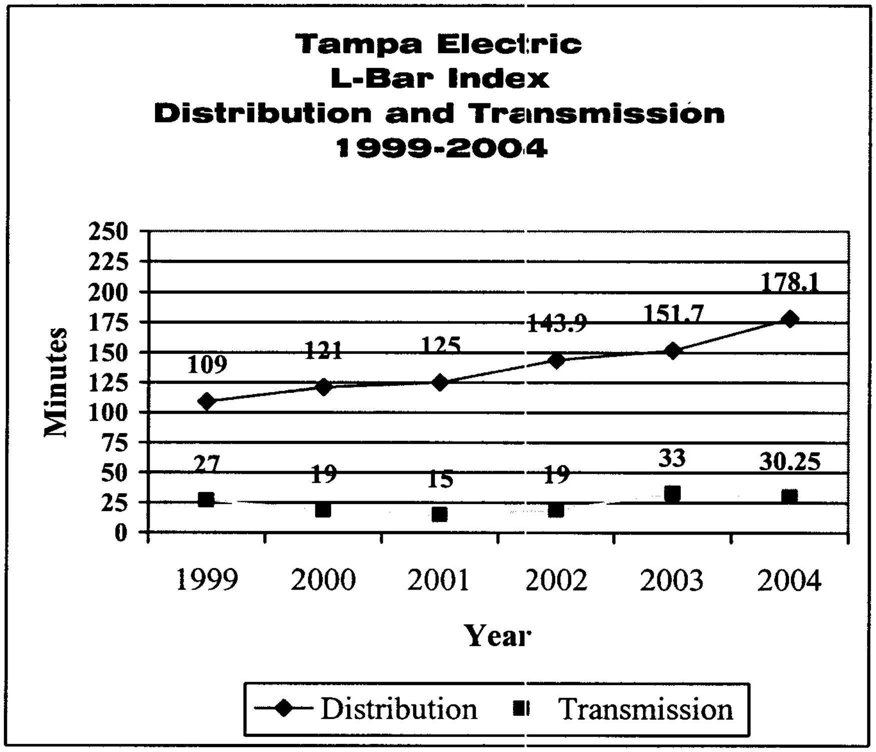


EXHIBIT 9 *Source: Annual Reliability Reports, DR 1-17*

Despite these efforts to improve response to outages, Tampa Electric reports an increasing trend in average response time by repair personnel. After a low of 38 minutes in 1996, response time grew to 48 minutes in 2001, 49 minutes in 2002, 52 minutes in 2003, and 68 minutes in 2004. The represents a 42 percent increase since 2001, and a 79 percent increase over 1996. Longer response times directly impact L-Bar and CAIDI.

Tampa Electric's transmission L-Bar for the first three years of the period decreased by 44 percent between 1999 and 2001, reaching a six-year low of 15 minutes. However, by 2003, a 120 percent increase to a six-year high of 33 minutes had eclipsed this earlier improvement. A slight decrease in 2004 to 30.25 minutes reflects an overall net increase of 12 percent for the 1999-2004 period.

Frequency Indices

The outage frequency measurements reported to the Commission by Tampa Electric are as follows:

- System Average Interruption Frequency Index (SAIFI)
- Total Number of Interruptions ("N")
- Momentary Average Interruption Frequency Index (MAIFIe)
- Customers Experiencing More Than Five Interruptions (CEMI5)
- Feeders With Highest Outages

For each frequency index, Tampa Electric experienced an increase reflecting more outages beginning in 2000. As was the case for its duration indices, the company believes that the increase in its distribution reliability frequency indicators for this period is primarily due to the implementation of the company's more accurate Outage Management System, combined with an increase in weather and lighting events.

System Average Interruption Frequency Index

SAIFI is calculated by dividing the number of customer interruptions by the number of customers served. SAIFI indicates the number of times per year that the average customer was out of service. As shown in **Exhibit 10,** Tampa Electric's SAIFI has remained rather flat over the review period, typically remaining just below the one interruption per year mark. This index is normally considered a reflection of reliability as it relates to system design and condition. Therefore, an upward trend in SAIFI indicates a reduction in reliability.

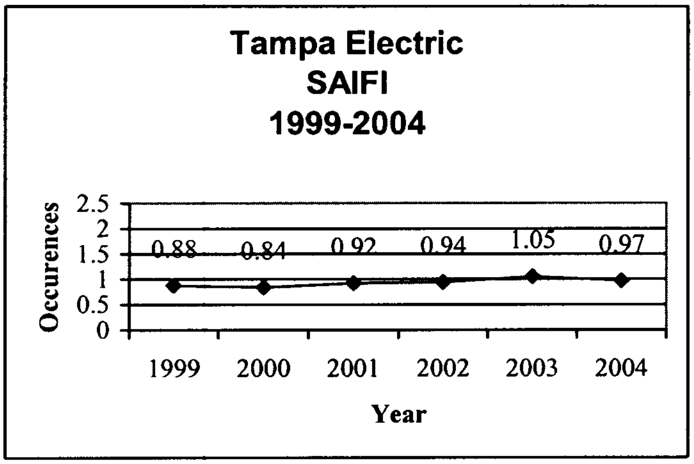


EXHIBIT 10 *Source: Annual Reliability Reports*

The index did show a steady increase from its low in 2000 of 0.84 occurrences to its high in 2003 of 1.05 occurrences. The greatest increase in SAIFI occurred from 2002 to 2003 when the index rose by 12 percent. For the six-year period, Tampa Electric customers experienced, on average, 0.94 interruptions per year.

According to Tampa Electric, the major factor influencing this index is the severity of the storm season. SAIFI is most affected by outages involving large numbers of customers. Years where a severe storm season is combined with a large number of major disturbances reflect the worst frequency indices.

Total Number of Interruptions

The reliability index "N" is defined as the total number of interruptions per year that occur on a utility's system. As shown in **Exhibit 11**, the total number of interruptions for the years depicted remained relatively steady for the three-year period of 1999 through 2001, before rising sharply in 2002 from 9,985 to 11,900, or 19 percent. In 2003, the number of outages rose again by 4 percent over the previous year to 12,341. The index experienced a decline in 2004, falling by 1,298 interruptions (11 percent) from the previous year. Over the review period, there was a net increase in the number of interruptions of 8 percent.

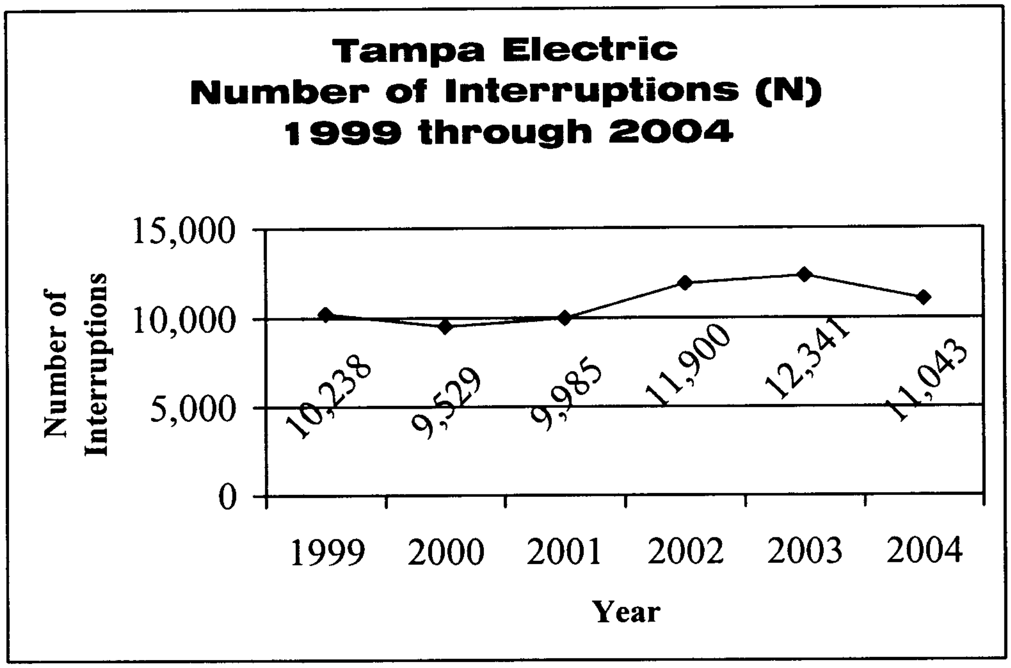


EXHIBIT 11 *Source: FERC Form 1, 1999-2004*

Exhibit 12 illustrates the causes of service interruptions experienced by Tampa Electric. The top three leading known causes of service interruptions for the period 1999-2004 taken as a whole are Lightning (22 percent), Animals (19 percent), and Unknown (14 percent). The category Vegetation takes the fourth spot representing 13 percent of total outages for the six-year period.

As in the 1997 report, the large number of interruptions included in the Unknown category hampers the analysis of outage causes. To help understand the this category, the company states that not every interruption will clearly fit one of the designated categories and that many times it cannot be readily determined what the cause of an outage actually is. Field personnel are highly trained and experienced and can generally identify an outage cause quickly and without much difficulty, but do not spend an inordinate amount of time trying to determine the cause of every outage.

Tampa Electric Interruptions (N) by Cause 1999-2004						
Cause	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Animal	2,088	1636	1,908	2,133	2,192	2,083
Bad Connection	364	324	411	752	841	694
Defective	803	697	513	290	317	210
Down Wire	407	441	646	NR	265	NR
Dig in	20	27	22	NR	NR	NR
Electrical	NR	NR	NR	1,125	1,122	955
Human Interference	NR	NR	NR	349	NR	222
Lightning	2,637	2,422	2,303	2,148	2,481	2,283
Other Weather	700	608	712	976	1,009	911
Unknown	1,496	1,528	1,598	1,783	1,487	1,335
Vegetation	900	910	1,125	1,668	2,003	1,880
Vehicle	298	327	258	331	348	235
All Remaining Causes	525	609	489	345	276	235
TOTAL	10,238	9,529	9,985	11,900	12,341	11,043

NR = not reported separately for years indicated.

EXHIBIT 12 *Source: Annual Distribution Reliability Reports*

Exhibit 13 presents distribution outages over the period by division within Tampa Electric's territory. As the chart indicates, outage totals are the highest in the Western, Central, Eastern, and Plant City areas, reflecting customer concentrations in these divisions.

Tampa Electric Distribution Outages by Division 1999-2004						
Division	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Central	1,815	1,829	1,842	2,482	2,564	2,435
Dade City	347	297	494	393	538	520
Eastern	1,537	1,470	1,653	1,848	1,776	1,730
Plant City	1,591	1,510	1,754	1,861	2,012	1,866
South Hillsborough	1,065	972	909	1,174	1,183	976
Western	2,596	2,316	2,287	2,940	2,915	2,331
Winter Haven	1,245	1,130	1,017	1,155	1,281	1,185
Unknown	0	0	21	40	0	0
TOTAL	10,196	9,524	9,977	11,893	12,269	11,043

EXHIBIT 13 *Source: DR-3, Item 28*

Some divisions have experienced significant increases in outages while others experienced decreases over the study period. Dade City, the division with the smallest number of outages, experienced a 50 percent increase from 1999 to 2004. Similarly, outages in the Central division increased by 34 percent during the review period. The

Eastern and Plant City divisions also experienced significant increases in outages with 13 and 17 percent, respectively. Western, Winter Haven and South Hillsborough outages declined by 5, 9, and 8 percent respectively.

SAIDI results have been reported at the division level since 2002. These results show a similar pattern for these four divisions. Between 2002 and 2004, Dade City's SAIDI increased 76 percent, and Central's grew by 62 percent. The Eastern and Plant City divisions saw increases of 38 and 36 percent, respectively. Of the other three divisions, SAIDI was the same for Western, increased by 21 percent for Winter Haven and by 8 percent for South Hillsborough over the two years. These division-specific results for the Dade City, Central, Eastern and Plant City divisions may indicate a need for focused corrective action by Tampa Electric.

Momentary Average Interruption Frequency Index

Momentary Average Interruption Event Frequency Index (MAIFIe) defines the average number of times an average customer experiences a momentary interruption event. The index is calculated by dividing the total number of customer momentary interruption events by the total number of customers served.

The company's MAIFIe index steadily rose during the report period. As **Exhibit 14** indicates, after briefly dropping in 2000 to a low of 12.67, MAIFIe began to rise steadily each year through 2004, reaching its peak at 19.33 momentaries that year. MAIFIe increased 53 percent from its lowest point in 2000 through 2004.

Customers Experiencing More Than Five Interruptions

The Customers Experiencing More Than Five Interruptions (CEMI5) index reports the number of retail customers that sustain more than five service interruptions for a specified area of service over a given period. This index provides the percentage of total retail customers experiencing more than five interruptions. Tampa Electric began reporting this index in its Annual Reliability Report to the Commission in 2002. CEMI5 increased from 3.02 in 2003 to 3.30 in 2004.

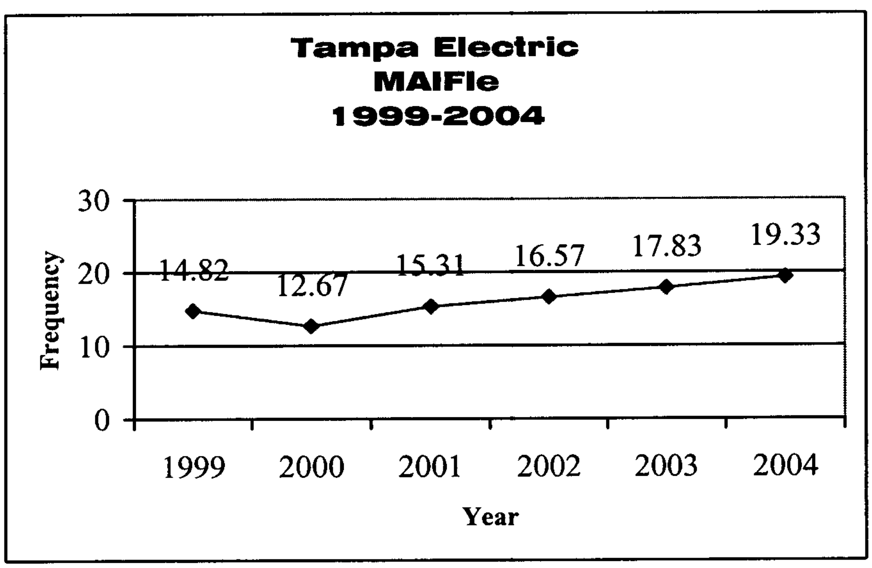


EXHIBIT 14 *Source: Annual Reliability Reports*

Feeders With Highest Number of Outages

The Commission requires IOUs to report the three percent of their feeders experiencing the most breaker lockouts as part of their Annual Distribution Reliability Report. Staff analyzed the reported feeders presented in the 1999-2004 reliability reports filed by Tampa Electric to identify feeders that recurred in reports during the period of review. **Exhibit 15** presents the feeders that appeared more than once in the three percent category. Staff's analysis identified one instance of a feeder appearing on the list five times. Circuit 13910 from the Peach Avenue substation, which serves the Eastern Service area, made the list in 1999, 2001, 2002, 2003, and 2004. Several other feeders have appeared twice between 1999 and 2004.

Tampa Electric indicated that the service areas of Dade City, Plant City, and South Hillsborough appear to receive reliability below the system average with respect to several of the indices. According to the company, each of these service areas has a high percentage of long circuits with many miles of exposure and relatively few customers served by those circuits compared to the remaining service areas. As a result, repair callouts take longer to arrive at and, depending on the location, to discover the cause of the outage.

Tampa Electric states that the following activities are underway to address and improve the reliability performance of feeders on the three percent list. Specifically, the company is addressing these outliers in the following ways:

- The redirection of line clearance activities based on reliability (Reliability Based Tree-Trimming) has concentrated circuit trimming and hot spot trimming in these areas. According to Tampa Electric, this will help reduce both outages and momentaries;

- These service areas were the recipients of a significant number of arrester replacements. Tampa Electric believes these replacements will protect against lightning-induced outages; and

- Since these service areas participated in a Mock Storm Assessment inspection and reported resulting problems in February 2004, they will benefit from resulting ongoing repairs.

Addressing Circuit 13910 originating from the Peach Avenue substation, Tampa Electric states that it serves an older area that has many vegetation barriers. Over the past five years, the major root causes of chronic circuit problems on this circuit were as follows:

- 12.6 percent of the customer interruptions were caused directly by trees.
- 31 percent were attributed to weather, but would often be related to tree contacts.
- 22.2 percent of the customer interruptions were from animals.

Therefore, 65.8 percent of the outages of the entire circuit were caused by these items.

Tampa Electric 3% of Feeders with Highest Number of Outages 1999 Through 2003				
Years	**Circuit No.**	**Substation**	**Service Area**	**Customers Affected**
1999 2000	13178	11th Avenue	Central	50 71
2002 2003	13328	Dade City	Dade City	394 428
2001 2003	13331	Dade City	Dade City	953 428
2001 2004	13576	South Seffner	Eastern	1,834 1,549
1999 2003	13687	Pearson Road	Eastern	1,366 1,347
1999 2004	13007	Mulberry	Plant City	395 340
1999 2002	13010	Mulberry	Plant City	1,253 1,312
2000 2004	13388	Kirkland	Plant City	397 402
2001 2004	13808	Knights	Plant City	1,730 1,682
1999 2001	14050	Polk Power	Plant City	491 479
2002 2003	13003	Rusken	South Hillsborough	582 597
1999 2000	13340	East Bay	South Hillsborough	573 582
1999 2000	13652	Rhodine Road	South Hillsborough	1,617 1,659
2001 2002	13379	Plant Avenue	Western	1,067 975
1999 2000	13405	Keystone	Western	569 1,100
2000 2002	13428	Rocky Creek	Western	1,238 1,225
1999 2000	13482	Woodlands	Western	1,749 1,760
1999 2000	13872	Henderson Road	Western	836 1,018
2001 2003	13290	Lake Silver	Winter Haven	1,008 964
1999 2001 2002 2003 2004	13910	Peach Avenue	Eastern	1,310 1,313 1,248 1,336 934
2002 2003	13927	Lake Gum	Winter Haven	1,456 1,473

EXHIBIT 15 *Source: Tampa Electric Distribution Reliability Reports*

Tampa Electric states that the company is taking corrective action to address this particular circuit. As such, the company has provided the following list of actions it has taken to correct outage-causing problems on Circuit 13910:

- August-October 2004 – Miscellaneous patrolling, tree-trimming, and rebuilding due to Hurricanes Francis and Jeanne.

- January 2004 – Recommended re-conductor/phase balancing of part of a section of the circuit based upon field measurements and calculations. This study was completed due to the numerous amount of wire down. This study was completed in order to prevent future outages.

- January 2004 – Spot infrared on terminal pole due to numerous circuit outages.

- November 2003 – Line recorders were placed on the circuit to determine load in the area due to numerous wire burn-downs.

- November 2003 – Infrared scan of entire circuit.

- September 2003 – Patrolled circuit to replace all blown lightning arresters. Found and replaced 27 defective lightning arresters and turned in two additional corrective actions for circuit.

- June 2003 – Completed tree-trimming of entire circuit and substation that was identified in October 2002.

- October 2002 – Patrolled circuit with line clearance personnel due to numerous customer complaints and determined that the circuit needed to be trimmed.

- February 2000 – Tree-trimmed entire circuit.

Tampa Electric adds that corrective action for Circuit 13910 has included numerous patrols of the circuit including infrared patrols, tree-trimming, and lightning arrester replacements. As a result of all these actions, the company states that the outage rates are improving significantly. Since October 2004, there have been only two trips of the entire circuit, and both were restored immediately. Other outages on the circuit have been limited to 45 or fewer customers.

3.2.2 Transmission Reliability Measures and Reports

The duration and frequency performance indices reported for distribution are really a compilation from both distribution and transmission. The indices previously described, except for L-Bar, are not solely distribution measures. Currently, Tampa Electric states that it is working on a system to capture and report transmission system outage reports similar to distribution. Due to new NERC reporting requirements, Tampa Electric's Energy Delivery section is implementing a process to capture additional transmission outages that do not affect customer reliability but occur on the system.

3.3 Design and Load Characteristics

Chapter 25-6, Part III, General Management Requirements of the FPSC Electric Rules provides utilities general standards for the construction of new electric utility distribution and transmission facilities throughout the state. Part III also provides for inspection of electric utility plant facilities and grounding of primary and secondary distribution circuits.

Chapter 25-6, Part IV, General Service Provisions, Section 25-6.046 of the rules requires each utility to adopt standard nominal voltages conforming to modern usage that may be required of its distribution and transmission system in its entire serving area or for each district in its system. This rule also requires the voltage at the point of delivery shall not exceed a specific percentage above or below the standard voltage adopted. Part IV, Section 25-6.047 of the rules requires each utility supplying constant current street lighting circuits to furnish, as is practicable, the rated current so that it does not vary more than four percent below or above the rated current of the circuit. The rule also provides that the utility will check the equipment supplying the constant current output at least once a year and adjust the current if necessary.

The following sections describe how Tampa Electric works to comply with many of these requirements. They describe Tampa Electric distribution and transmission design and loading characteristics for new electric utility construction, its programs for grounding of primary and secondary distribution circuits, and its voltage standards and programs for controlling voltage fluctuations.

3.3.1 Distribution Line and Substation Design and Loading

<u>Distribution Line Transformer Loading</u>

Tampa Electric must ensure that service reliability and quality are not compromised by increased customer load via either the transmission or distribution systems over the years. According to Tampa Electric, with regard to residential customer loads, field engineering technicians use both experience and rule-of-thumb calculations (i.e., 2,000 sq ft home = 5kW diversified load) to estimate transformer loading requirements when designing electric system expansions. Due to the size and scope of most commercial and industrial customers needs, a more sophisticated process is employed. In these cases, customer service engineers meet with contractors and builders to estimate and calculate electric demand.

Tampa Electric states that the customer information is then passed along to the field engineering technician who makes use of detailed specification tables to determine the size of the appropriate transformer. Theses tables in Tampa Electric's Distribution Engineering Technical Manual take into account such factors as transformer type, power factors, and allowable loading in kilowatts based on commercial customers by type (grocery, retail, lodging, etc.).

As new services and additional load are added to distribution transformers in reply to customer growth and lateral demand, field engineering technicians check the loading level on the transformer. Tampa Electric technicians use the tables described and others to upsize the transformer where appropriate. When a distribution transformer fails, the Outage Management System checks the peak loading of the transformer prior to the failure and recommends the appropriate size transformer for replacement.

Tampa Electric states that its Distribution Planning Department and Grid Planning and Operations Support Department monitor the actual loading levels of the transmission and distribution lines, substation transformers, and other key equipment. When the lines are forecasted to be overloaded under normal conditions, system expansion is planned and installed to relieve the overloaded situation.

The company informed staff that it had made no changes to distribution and transmission design philosophy and loading characteristics during the period 1999-2004. However, Tampa Electric indicates that changes have been made in policy regarding transformer design and load characteristics during the review period.

During the review period, Tampa Electric began using new single-phase transformers, designed to the National Electrical Manufacturers Association (NEMA) TP-1 efficiency standard. These transformers were compared by Tampa Electric to units designed to traditional A&B loss factors. According to Tampa Electric, the TP-1 standard sets minimum energy efficiency criteria for utility distribution transformers. It also enables the manufacturer to offer a more standardized transformer, often resulting in a lower initial cost. While they may be less efficient than transformers designed to custom loss factors, the lower purchase price of the TP-1 design often makes the unit more economical on a total cost of ownership basis. Tampa Electric believes that overall distribution transformer performance is not compromised by the change to the TP-1 efficiency standard. Currently, Tampa Electric purchases most single phase transformers based on the TP-1 standard and all three-phase transformers using the A&B loss factors. Tampa Electric also states that during the same 1999 through 2004 time period, the transformer loading policy was reduced from an initial peak load of 170 percent of nameplate kVA to 140 percent of nameplate kVA to account for future customer load growth and circuit expansion.

Distribution Substation Loading

According to the company, it expands its system with a standard size transformer (a 28 MVA transformer in most cases). Tampa Electric believes this philosophy allows for customer load growth and circuit expansion. Typically, the initial load on the transformer is one-third to one-half of the transformer rating.

3.3.2 Transmission Substation Loading

The company continually monitors the loading on its autotransformers. The company indicated that there have been no changes in loading characteristics during the period 1999 through 2004 for transmission and substation transformers.

Typically, the company's Grid Planning and Operations Support department specifies the replacement of autotransformers with larger transformers as loading grows to the point at which contingency overloading exceeds 100 percent. At this point, the smaller transformer being replaced is put into use at a new transmission substation site such as Tampa Electric's English Creek substation planned for 2007.

3.3.3 Monitoring and Measuring Voltage Levels

According to Tampa Electric, the monitoring of voltage levels occurs both on a proactive and reactive basis. Proactively, the Distribution System Planner determines voltage levels from a computer simulation of the system for future years and recommends corrections to any violations found. This process proactively anticipates and corrects voltage violations before they occur. According to the company, Distribution Planning is responsible for proactive voltage monitoring and correction.

Tampa Electric states its Distribution System Operators continuously monitor the substation distribution transformer voltages remotely via the Energy Management System (EMS). Alarms alert the Distribution System Operator to voltage anomalies, to which he responds by remotely adjusting the voltage levels or by dispatching field personnel to make necessary corrections. Also, customers experiencing or suspecting problems with inadequate voltage levels will call with their concerns. According to Tampa Electric, each customer voltage concern is promptly investigated and adjustments made to the system if a problem is confirmed. Tampa Electric's Energy Control Center and Transmission and Distribution Operations share responsibility for reactive voltage monitoring and correction, respectively.

The following grounding standards are used by Tampa Electric for distribution and transmission facilities:

- Distribution grounds are to be grounded to earth measured to 25 ohms or less.
- All automatic, controlled and gang operated switches are to be grounded to earth measured to 5 ohms or less.
- All transmission pole grounds to be grounded measured to 10 ohms or less and all switch grounds to be ground measured to 5 ohms or less.

The responsibility for monitoring and adjusting transmission voltage falls on Tampa Electric's Grid Operations. EMS receives an updated bus voltage reading every four to eight seconds and alarms the Grid Operations Dispatcher if voltage is outside of the predefined range. Grid Operations is also responsible for reporting to the Florida Reliability Coordinating Council (FRCC) Security Coordinator any voltages that are outside of the FRCC acceptable ranges.

Maintaining a record of voltage levels is a necessary task. To accomplish this, a Daily Voltage Log is automatically generated listing the voltage at every transmission bus every four hours during the day. The log also lists the highest and lowest voltage measured at each transmission bus. Tampa Electric states that this report is updated continuously during the day and is readily available for up to 90 days. In contrast, Tampa Electric states that management reports on voltage and grounding results are not kept for the distribution system.

3.4 Outage Causes and Coding

Chapter 25-6, Part IV, General Service Provisions, Section 25-6.044 of the FPSC Electric Rules requires each electric utility to keep a record of system reliability and continuity of service data, customer service interruption notices and other outage data. The utility must record each outage event as planned or unplanned, and identify the origin of the outage such as generation, transmission, transmission substation equipment, or distribution equipment. The rule requires each utility to determine the cause of each outage and record it in a standardized manner throughout the utility. The rule also requires that each utility record the date and time of the outage event and the number of service interruptions for the event.

This section examines Tampa Electric's outages and codes used to categorize outages during the period 1999-2004 for both distribution and transmission services. This section also examines excluded outages, other outages, unknown outages and their impact on measurements. It also trends Tampa Electric outages over a ten-year period.

3.4.1 Distribution Outages and Coding

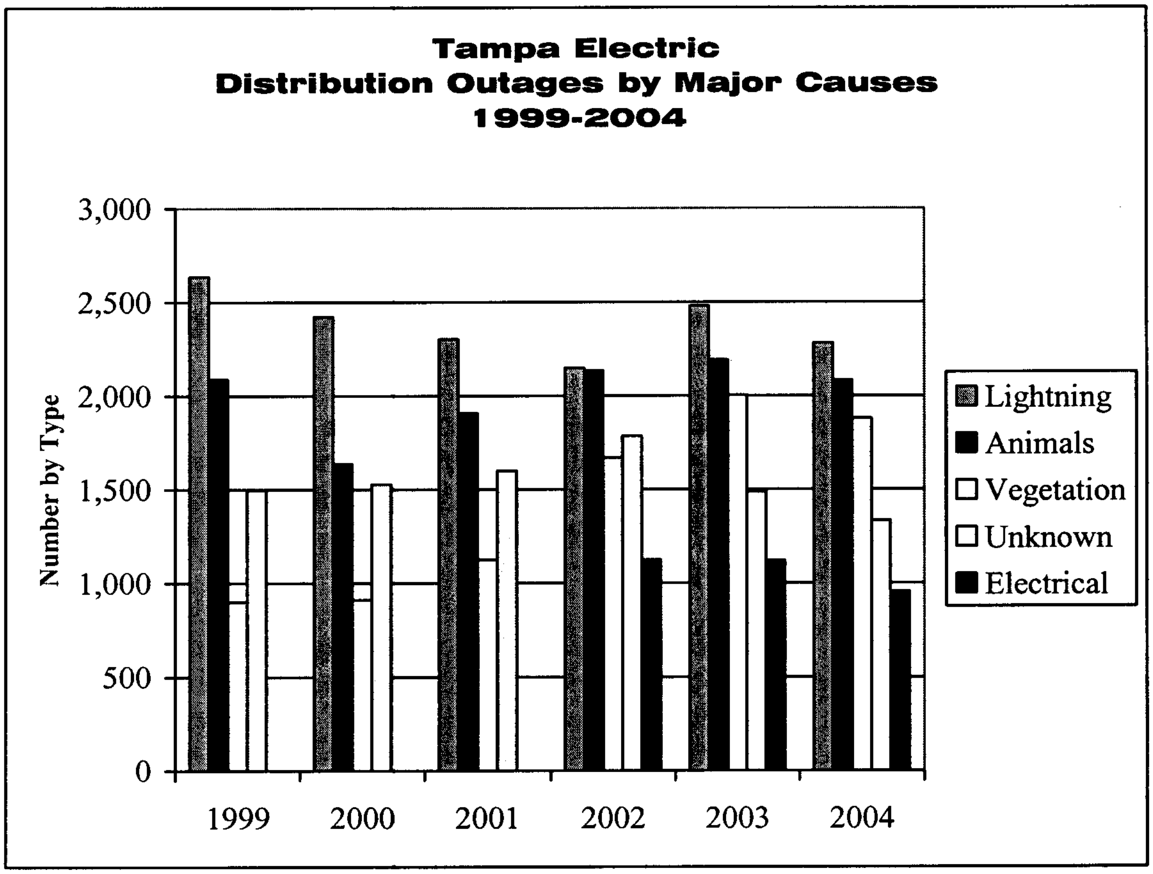
Examining the level of outages annually helps electric utilities identify and track the level of outages across its serving area and within specific geographic areas of the company. Once management identifies increasing levels of outages, it can redirect existing improvement programs or begin implementing new corrective programs.

In November 2001, Tampa Electric migrated from its Trouble Analysis System to its new Outage Management System (OMS) to improve its ability to identify and manage outages. As a result of the new system being implemented, Tampa Electric began receiving more detailed information on outage events and improved outage reporting accuracy. OMS provides details such as call times and expected problems that may be affecting customers. It calculates the number of customers that may be affected and is used to record the restoration times when customers' power is restored. Since the company implemented the new OMS for distribution outage information, there have been three software upgrades to date.

Prior to the implementation of the new OMS, Tampa Electric management estimated that the new system would add ten minutes to the various duration indexes as a result of the improved accuracy, as shown in the increased 2001 company goals from 59 to 69 total SAIDI minutes (including transmission) in Exhibit 5. Tampa Electric management believed this improved accuracy "impacted all reliability indices related to customer outages longer than one minute." This impact manifested itself by giving the appearance of longer and more frequent outages compared to the results from the earlier system in results such as SAIDI. Exhibit 6, shown earlier, illustrates Tampa Electric's actual distribution SAIDI levels for the period 1999-2004.

Tampa Electric currently uses 11 different outage codes to record and analyze the causes of distribution outages its customers' experience. For the period under review, Tampa Electric states it used the following primary cause codes when recording outage causes: lightning, animals, vegetation, unknown, electrical, other weather, bad connection, vehicle, defective equipment, down wire, and all remaining causes.

In 1997, Tampa Electric began reporting outages separately by overhead lines and underground. The totals reflected in **Exhibit 16** report the leading cause codes for the period 1999 through 2004.



**Electrical category not reported for 1999-2001*

EXHIBIT 16 *Source: Annual Reliability Reports*

3.4.2 Transmission Outages and Coding

For transmission outage management, the company uses the Energy Management System (EMS). The Energy Management System is comprised of several applications including Supervisory Control and Data Acquisition ("SCADA") and Automatic Generation Control. This system is used to monitor and control the Electric Grid. In 2001, Tampa Electric states it upgraded EMS.

Tampa Electric records transmission outage causes in a manner similar to how it records outage causes for its distribution system. The primary cause codes for transmission outages are: weather, bad connection, trees, down pole/wire, defective equipment, animals, cars/public, unknown, and other.

In the following exhibits, transmission outages are represented annually by district and by cause code for the period 1999-2004 to date. These outages, detailed by district in **Exhibit 17** and by cause code in **Exhibit 18,** include only transmission outages that affected customers and, as a result, impacted annual overall SAIDI.

Tampa Electric
Transmission Outages Annually by District
1999 through 2004

	1999	2000	2001	2002	2003	2004
Central	3	3	3	2	5	4
Western	2	5	5	4	3	3
Plant City	1	7	6	2	4	8
Winter Haven	3	3	2	3	0	0
South Hillsborough	2	3	2	1	0	2
Eastern	4	6	6	4	0	1
Dade City	0	0	0	0	0	1
TOTAL	15	27	24	16	12	19

EXHIBIT 17 *Source: DR-1, Item 13*

Tampa Electric
Transmission Outages Annually by Cause Code
1999 through 2004

Cause Codes	1999	2000	2001	2002	2003	2004
Weather	5	3	4	2	1	4
Bad Connection	0	2	1	1	1	0
Trees	2	2	3	1	0	4
Down Pole/Wire	1	2	1	2	3	2
Defective Equipment	1	6	1	0	1	5
Animals	1	3	2	0	0	1
Cars & Public	1	3	5	5	1	1
Unknown	3	0	6	1	2	1
Other	1	3	1	2	2	1
TOTAL	15	24	24	14	11	19

** As of November 2004.*
Note: Total annual district numbers for 2000, 2002, and 2003 are different than transmission outages due to single transmission circuit outages impacting multiple districts.

EXHIBIT 18 *Source: DR-1, Item 13*

3.5 Maintenance and Repair

3.5.1 Trouble Reporting and Repair Process

Trouble calls made by customers are the primary source of trouble tickets generated that troublemen must respond to. In a typical year, Tampa Electric troublemen will respond to more than 40,000 trouble tickets.

Exhibit 19 depicts the trouble reporting process. The current procedure typically begins when the customer calls Tampa Electric and reports the problem either directly to a live Customer Service Professional or by way of an Interactive Voice Recognition (IVR) system. Trouble calls from sources such as a Tampa Electric employee or emergency services personnel are handled in an expedited manner as indicated in the exhibit.

Once a customer has called in, a trouble ticket is created in the Outage Management System (OMS). The OMS ticket is then dispatched to a troubleman in the field. The troubleman investigates the problem and either completes the repair and a report describing his actions on his mobile data terminal or creates a crew job ticket for additional field personnel to repair. Upon completion, the report is closed in OMS.

Before being dispatched, trouble tickets are displayed to the distribution system operators via computer screen for analysis. The dispatchers compare and analyze the trouble tickets in order to determine if there is a pattern in service disruptions being reported. The purpose of this analysis is to help the dispatcher to determine the magnitude of the service problem in order to prioritize the dispatching troublemen. For example, multiple calls from an area, indicating a transformer or feeder may be out of service, would be accorded a higher priority than a single residence reporting an outage. Similarly, a school or hospital reporting an outage may be given a higher priority than a feeder experiencing an outage.

Troublemen receive trouble tickets in their vehicles by way of mobile data terminals. With the mobile data terminals installed in their service vehicles, both troublemen and crews can be dispatched directly from their homes, thus avoiding the necessity to travel to a service center to be dispatched. Trouble tickets are worked in order of priority as determined by the troubleman. To help the troubleman in determining what priority to give a trouble ticket, each ticket is coded by the Distribution System Operator to indicate the scope of the problem.

For example, a troubleman may have three trouble tickets assigned to him, each being displayed on his mobile data terminal. One ticket may be coded to indicate the customer is experiencing a "partial outage" and the second may be coded to indicate "all power out". A third ticket, also coded as "all out," is upgraded to indicate multiple calls from the same area - an indication that the outage is widespread. In this example, the troubleman would probably take the "all out" upgraded call first, next would be the "all out" single residence, and third would be the "partial outage".

Tampa Electric
Trouble Reporting Process
As of 12/31/04

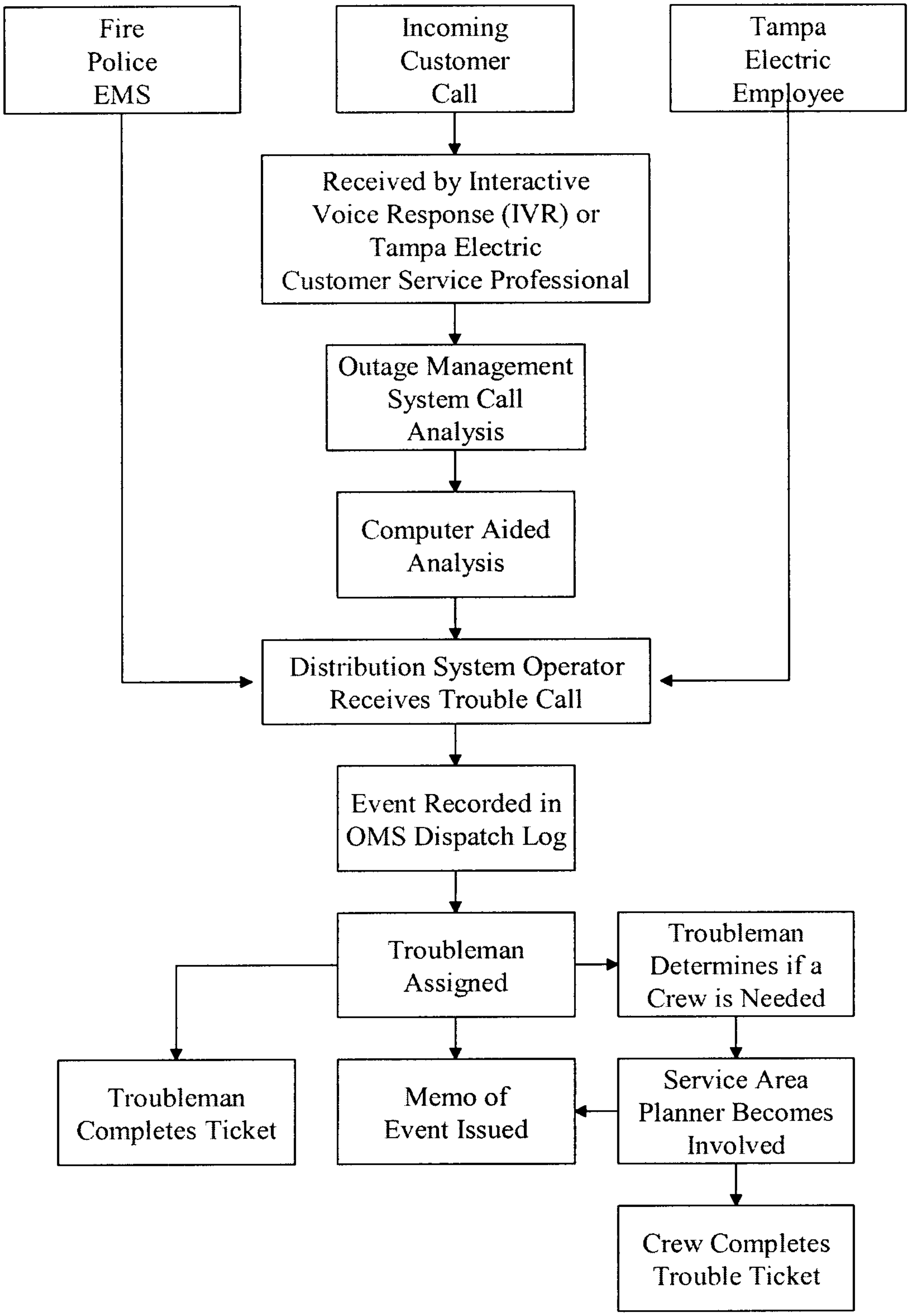


EXHIBIT 19 *Source: DR-4, Item 7*

Although the troublemen are generally responsible for prioritizing their calls, the Distribution System Operators have the authority to direct the order in which trouble tickets are addressed. This is usually done only in critical situations, such as during storm repairs, or in special circumstances, such as giving priority to a customer with a special medical need for electric power. Emergency need customers are identified as such in the OMS system to ensure that they receive priority service in critical situations.

During the course of the day, the status of each trouble ticket can be monitored by the Distribution System Operators through the mobile data terminal. This aids the Distribution System Operator in assigning work and allows the efficiency of troublemen and work crews to be measured.

The mobile data terminal system also has the limited capability to analyze equipment needs on some repair jobs. For instance, when requesting a work crew, a troubleman will enter a request for the part that is to be replaced, such as a transformer. Once the request is entered, the mobile data terminal system will compare the load history for the location with the size of the transformer being requested. The system may then display a recommendation to use a larger or smaller-sized transformer based on that location's load history. The troubleman may accept the recommendation or reject it, based on his knowledge of the location.

If the repair is too large or too complicated for one troubleman to complete, he will make arrangements for a crew to be assigned to address the problem. This is done by inputting the information into the mobile data terminal regarding the problem, requesting a crew, and estimating the crew size needed. This information is then transmitted to the service area and is given to a planner for scheduling.

3.5.2 Trouble Reporting and Repair Data

Trouble Repair Volumes

Exhibit 20 shows the number of distribution repair and restoration troubles completed by Tampa Electric and the percent change between years for the period 1999-2004. Over the six-year review period, Tampa Electric experienced a 44 percent increase in repair volumes from 1999 to projected 2004.

Tampa Electric
Distribution Trouble Repair Volume
1999 - 2004 (projected)

	1999	2000	2001	2002	2003	2004*
Troubles	14,575	13,842	14,661	16,855	16,488	20,965
% Change	-	-5%	5.8%	15%	-2.2%	27.2%

**Projected based on data through September 2004.*

EXHIBIT 20 *Source: DR-1, Item 16*

Repair Dispatch Volumes

Exhibit 21 shows the total number of distribution repair dispatches and the total number of transmission repair dispatches for the review period. Tampa Electric states that distribution information prior to the implementation of OMS in November 2001 is not available. Staff notes that a 59 percent increase in distribution repair dispatches occurred in 2003, and an additional increase of 21 percent occurred in 2004. The 2003 increase resulted from jumps in dispatches for the categories of Overhead Miscellaneous and Underground Miscellaneous. The 2004 increase was largely the result of increases in Overhead Miscellaneous, Primary Line Fuse, Primary Wire, and Service Non-crew dispatches.

The transmission dispatches include both customer and non-customer affected transmission repairs. Tampa Electric notes that the dispatches represent all jobs performed under capital account A42, which would include such items as pole replacements, insulator set replacements, and others. The largest annual increase in transmission repair dispatches occurred in 2004.

Tampa Electric
Distribution and Transmission
Repair Dispatches
1999 - 2004 (projected)

	1999	2000	2001	2002	2003	2004*
Distribution Dispatches	NA	NA	NA	24,463	38,910	47,176
Transmission Dispatches	47	30	49	48	26	53

**Projected based on data through September 2004.*

EXHIBIT 21 *Source: DR-2, Item 8 and DR-1, Item 16*

Restoration Time Frames

Tampa Electric states that its annual average distribution and transmission restoration time frames for the period in review are represented by the metric "L-Bar," which is average minutes. **Exhibit 22** presents these average times in minutes for both distribution and transmission. As shown by the exhibit, Tampa Electric distribution restoration steadily increased 69.56 minutes (64 percent) during the review period 1999-2004. This trend indicates that Tampa Electric customers are experiencing longer restoration time frames associated with service outages.

Tampa Electric
L-Bar (in Minutes)
For Distribution and Transmission
1999 – 2004

	1999	2000	2001	2002	2003	2004
Distribution	108.54	120.62	125.12	143.85	167.37	178.1
Transmission	27.17	19.15	15.4	19.43	32.67	30.25

EXHIBIT 22 *Source: DR-1, Item 17*

As noted in Section 3.2.1, the company has experienced increasing average response times by distribution repair personnel. After a low of 38 minutes in 1996, response time grew to 48 minutes in 2001 then to 68 minutes in 2004. This recent 42 percent increase may reflect a need for attention by management to staffing or procedures.

Transmission outage lengths decreased during the period from 1999 through 2002, with the lowest annual average occurring in 2001 and the highest in 1999. While Tampa Electric 2003-2004 transmission outages lengthened substantially from previous levels of the review period, 2004 average outage duration dropped 7 percent from the peak time frame of 32.67 minutes in 2003 to 30.25 minutes.

Distribution Staffing Levels

Exhibit 23 displays the company's distribution staffing levels over the period 1999-2004, which fluctuated with a general downward trend. The 2004 total of 183 bargaining unit employees was the lowest of the period. This total was also below the comparable headcounts for the period 1992 (225 employees) through 1997 (188 employees). Staff notes this reduction in staffing may explain, in part, the increasing trend in Tampa Electric's repair response time described in Section 3.2.1 as well as its overall increased outage lengths over the study period.

Tampa Electric
Energy Distribution Bargaining Unit Staff Levels
1999-2004

District	1999	2000	2001	2002	2003	2004
Eastern	54	60	55	51	52	51
Central	42	47	48	42	44	37
Western	38	40	37	39	40	34
South Hillsborough	14	13	14	13	15	16
Winter Haven	27	28	29	28	27	24
Plant City	21	23	23	21	22	18
Dade City	5	5	4	4	*0	3
TOTAL	201	216	210	198	200	183

**Covered by Plant City in 2003*

EXHIBIT 23 *Source: DR-5, Item 11*

3.5.3 Scheduled Maintenance and Repair

Maintenance Planning

Tampa Electric identified the following five areas for a general discussion of the procedures for managing the workload on the system, including maintenance work:

The first area is Work Identification. All work is identified and entered into the work request system by various departments. Maintenance requests are usually identified and entered by Field Engineers, System Service Troublemen and Operations Engineers; however any department may call with maintenance needs. The person identifying work assigns a priority and a date needed for completion.

The second area is Work Prioritization and Scheduling. The person identifying the work uses a published decision process to assign the work the appropriate priority code. A Planner for the specific area then reviews work that needs to be done and ensures parts and equipment are available. The Planner then accumulates all job information in one package and generates a schedule that allow for efficient workflow while meeting the schedules dates.

The third area is Workload Management. The Planner identifies the type of crafts and the employee hours need to complete work. Areas of concern and trends in work/craft loads are also identified. The Planner then develops a four-week look ahead for all work. The Planners meet weekly with the Area Management to review the plans, make decisions on whether to outsource any of the work, and hand off the work packages to the Area Supervisors. At this point, management will review backlogged issues, make decisions on critical issues, and decide if contractors are needed to help with the work. Using approved contractors, the management team then reviews with the Planner work that will be outsourced.

The fourth area is Work Execution and Variances. Area supervisors coordinate craftsmen and material and ensure that any special tools are available. After work is completed, crews report any variances that hindered the process using the designated variance form. If scheduled work can not be completed for any reason, a variance report is filled out and the work package is returned to the planner to be rescheduled. Variances are tracked and trended to identify any systemic issues. Cross functional teams (Variance Teams) review and solve problems that have been identified by the process. Problem solving efforts are supported by Operations, Engineering, and Management.

The fifth and last area is Measurements. The company has metrics in place to track schedule compliance, work efficiencies, and effectiveness of the process. Tampa Electric provides the following process flow that it follows for the planning phase of maintenance work:

- Contact the requestor - outline work content
- Field check the job - make sketches as necessary
- Check all planned job files for similar work
- Break the job into discrete tasks
- Estimate how much labor is required for each task
- Identify any materials requirements
- Identify special tools and equipment needs
- Check the environmental and safety considerations
- Assemble the planned job package

Tampa Electric has separate work units for transmission, distribution, and substation work. Because most distribution maintenance work is performed with the system energized, there generally are no conflicts with concurrent transmission or substation work being performed. According to the company, maintenance outages of transmission and substation work are coordinated to minimize the number of simultaneous maintenance outages required. Tampa Electric states that maintenance on the transmission system is grouped by circuit in order to make the best use of scheduled circuit outages whenever practical. In addition, Tampa Electric makes use of both overtime and contract crews in the transmission and distribution areas to address periods of high workload including system maintenance work.

Contractors are used extensively in times of high workloads, either maintenance-related or new construction-related. In addition, skilled contractors are used to perform specialized work where in-house expertise or equipment does not exist. Specifically, Tampa Electric states it uses outsourcing to perform the following activities:

- Outside laboratory services to test circuit breaker and transformer tap changer oils.
- Outside laboratory services to perform oil quality tests for all transformer oil.
- Infrared Inspection of transmission circuits by helicopter
- Transmission system ground-line and climbing inspection
- Distribution pole ground-line inspection and re-enforcement
- Tree-trimming, mowing, herbicide application
- Transmission R/W maintenance including bridge, fence and gate repair
- Street Light Re-lamp program
- Pad mounted equipment painting

The activities just outlined provide fairly detailed insight of the planning process for general maintenance at Tampa Electric. Specific to substation maintenance, projects are identified based on time and operational triggers. This process is described in the following section.

Substation Maintenance

Tampa Electric transmits and distributes electric power through a total of 185 transmission and distribution substations as of December 31, 2004. In 2004, Tampa Electric allocated $25 million of its Operations and Maintenance budget in the area of distribution substation maintenance. In 2004, Tampa Electric spent $217,455 for substation transformer protection (as of November). Breaker oil analysis for 2004 was $5,000 for the company. The company notes that expenditures in this area lagged significantly from what the company budgeted due to unprecedented hurricane activity that affected Florida in 2004.

Tampa Electric's substation operations group has formalized the substation maintenance planning process. The component parts of substation operations subject to the maintenance process are identified. For each component, the type of maintenance needed is identified as preventive and/or corrective. Maintenance cycle parameters are triggered by time and operational triggers and are automatically signaled when substation maintenance is scheduled. Data is manually collected from the field and input into the substation maintenance database. The database generates a work order based on the programmed operational triggers.

In order to reduce its maintenance expenses, Tampa Electric states that it has extended the maintenance cycles of equipment past that recommended by the manufacturer. According to the company, various maintenance cycles were studied to develop cycle extensions that could be safely implemented. This concept of "Reliability Centered Maintenance" is based on extending the maintenance cycle of equipment where prudent--given factors such as age, activity, and overall reliability. According to the company, it both lowers maintenance expense and provides for reliable operation of the system.

Exhibit 24 depicts substation outages for the period 1999 through 2004. Distribution substation outages increased 79 percent over the review period, with animal outages representing the most frequent cause. In 2004, there were two transmission substation outages, while only two occurred in the previous five years.

Tampa Electric Distribution and Transmission Substation Outages 1999 Through 2004							
Category	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**Average**
Transmission	0	1	0	0	1	2	0.67
Distribution	52	39	30	59	54	93	54.50
TOTAL	52	40	30	59	55	95	55.17

EXHIBIT 24 *Source: DR-4, Item 8*

Tampa Electric's current system only records substation outages that result in actual customer outages that have a direct effect on its reliability indices. According to Tampa Electric, the company is creating a new database to capture all transmission and transmission substation outages including outages that do not affect Tampa Electric's reliability indices. The database will capture the time of occurrence and its duration and cause, as well as relay targets.

Substation staffing is depicted in **Exhibit 25**. The trend over the period 1999 through 2004 was downward, with most of the reductions occurring in the construction operations area. Maintenance operations staffing remained relatively stable beginning and ending the study period at 26 employees. Management and administration staffing dropped slightly.

Tampa Electric Substation Operation Employees 1999 - 2004						
	1999	**2000**	**2001**	**2002**	**2003**	**2004**
Construction Operations	42	41	43	42	39	37
Maintenance Operations	26	25	27	26	24	26
Management/Administration	16	16	17	17	15	14
TOTAL	84	82	87	85	78	77

EXHIBIT 25 *Source: DR-4, Item 1*

Exhibit 26 presents the total number of distribution and transmission substation inspections carried out during the review period. As the exhibit indicates, both scheduled and completed inspections have declined steadily between 1999 and 2004 for both distribution and transmission substations.

Tampa Electric states that the frequency of substation inspections was reduced in recent years from monthly to quarterly. Similarly, autotransformers are now inspected annually instead of semiannually. These changes were based upon a review of equipment manufacturers' maintenance interval recommendations and increased reliance on predictive maintenance.

Tampa Electric Substation Inspections					
Distribution			Transmission		
Year	Scheduled	Completed	Year	Scheduled	Completed
1999	1162	1259	1999	463	478
2000	1240	1230	2000	468	473
2001	1006	987	2001	421	417
2002	292	234	2002	260	257
2003	318	372	2003	159	184
2004	294	370	2004	147	158

EXHIBIT 26 *Source: DR-4, Item 1*

Substations with a high number of animal-related outages are enhanced with animal guard features. Such devices are basically enhanced insulation intended to prevent an animal climbing on the substation equipment from completing a circuit and causing a breaker operation. Because of the cost involved, Tampa Electric says it plans to place these devices only on substations shown to have an animal problem and does not plan to retrofit all substations. However, Tampa Electric states that, beginning in 2004, all new substation construction includes the installation of animal protection devices on equipment and bus bars. According to the company, it spent a total of $108,000 on animal protection measures in its substations during 2004.

Corrective maintenance is conducted on a prioritized basis as the need arises. Such maintenance is usually identified as the result of either routine monthly substation inspections or substation outages. The item requiring maintenance is identified and forwarded to a planner who schedules the necessary crews to do the work. Typical corrective maintenance items include the following:

- Repair of oil leaks during substation inspections.
- Bushing replacements found during transformer and circuit breaker diagnostic testing.
- Circuit breaker maintenance due to misoperations or slow operation.

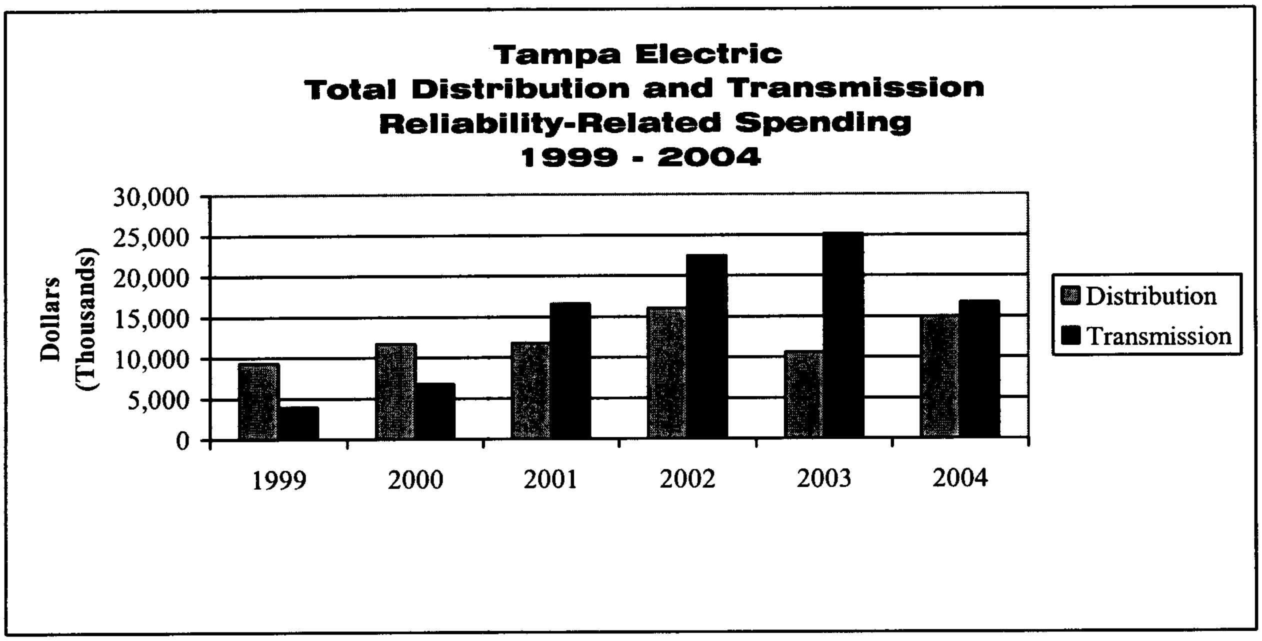
3.6 Reliability Improvement Programs

In this section, staff discusses Tampa Electric's reliability improvement programs and expenses for distribution, transmission, and substation facilities during the review period 1999-

2004. More specifically, staff examined Tampa Electric's ongoing, corrective and regionally targeted programs for improving electric reliability to its customers. Ongoing programs are routine daily programs of operations and maintenance activities aimed at maintaining current service reliability. Corrective programs are usually programs of short duration such as one or two years, aimed at improving overall company reliability and quality of service by addressing a specific problem. Regional programs are specifically tailored programs targeted at either a specific need or at generally improving reliability within a certain geographical area of the service territory.

3.6.1 Distribution Reliability Improvement Efforts

Exhibit 27 shows Tampa Electric's total expenses for distribution and transmission reliability-related spending during 1999-2004. These amounts include both preventive and corrective maintenance and upkeep of the company's distribution and transmission facilities.



*2004 transmission actual expenses are as of the end of September

EXHIBIT 27 *Source: DR-1, Item 19 (revised)*

Tampa Electric's total reliability-related distribution spending has varied widely in recent years. It rose by 72 percent from $9.3 million dollars in 1999 to a peak of approximately $16 million in 2002. In the following two years, distribution reliability spending dropped by 34 percent to $10.6 million in 2003 and then increased by 41 percent in 2004 to approximately $15 million. The company budgeted a total of $18.7 million for 2004 distribution reliability-related efforts. For 2005, Tampa Electric has budgeted expenditures of $18.6 million.

Ongoing Distribution Programs

Ongoing, or preventive maintenance is a key element to ensure that the distribution network is kept in good working order and that damaged, out-dated, and declining facilities are scheduled for replacement. **Exhibit 28** shows the ongoing distribution maintenance programs performed by Tampa Electric. A description of each program includes the basic activities and cycle time for maintenance activities performed by company personnel.

Tampa Electric Ongoing Distribution Maintenance	
Title	**Description**
Meter Testing	• Testing metering equipment and comparing its accuracy to a known standard as specified in Rule 25-6.052 of the Florida Administrative Code • Meter testing can be initiated by the utility or the customer.
Pole Inspection/Repair	• All wood poles are scheduled for comprehensive ground line inspections on a 10 year cycle • Poles are classified into three categories: reinforcement, priority replacement, scheduled replacement.
Pad-mounted Equipment Inspection/Repair	• All pad mounted equipment is scheduled for a comprehensive internal and external inspection on a 7 year cycle.
Pad-mounted Equipment Painting	• Pad mounted equipment is painted on an as needed basis utilizing Customer input.
Network Inspection/Testing	• Periodic inspection of Manholes and vaults. Visually checking for leaking splices, broken cable racks, malfunctioning sump pumps, interior lighting. Inspecting vault tops for trip-fall hazard. • Performing dropout testing to verify Protector operation. • Performing electro-mechanical testing on protectors including dialectic testing and oil-sample testing
Outdoor Lighting Group Relamp Program	• Bulbs and eyes are proactively replaced after 5 years in service.
Avian Protection Retrofits	• Distribution system modifications to decrease outages and protect avian raptor species from distribution hazards.
Capacitor Patrol/Maintenance	• Utilize EMS data to identify possible problems with capacitor banks. • Crews are dispatched to troubleshoot and repair banks as needed.
Distribution Line Tree-Trimming	• Distribution Line Clearance activities including tree-trimming, tree removals and brush removal.

EXHIBIT 28 *Source: DR-1, Item 20*

Exhibit 29 shows Tampa Electric's budgeted and actual expenses for ongoing, preventive distribution reliability programs during the review period 1999 through 2004. Spending for ongoing distribution maintenance rose to nearly $7 million in 2000 (up 16 percent), then steadily declined about 19 percent through 2003 to the low point for the period.

In 2004, Tampa Electric both spent and budgeted the highest amounts for the study period. Spending jumped by 35 percent, while the company had budgeted a 65 percent increase. The difference was due to work reprioritization caused by the 2004 hurricanes, according to Tampa Electric. For 2005, the company has budgeted expenditures of $9.996 million, or 31 percent above the 2004 spending level.

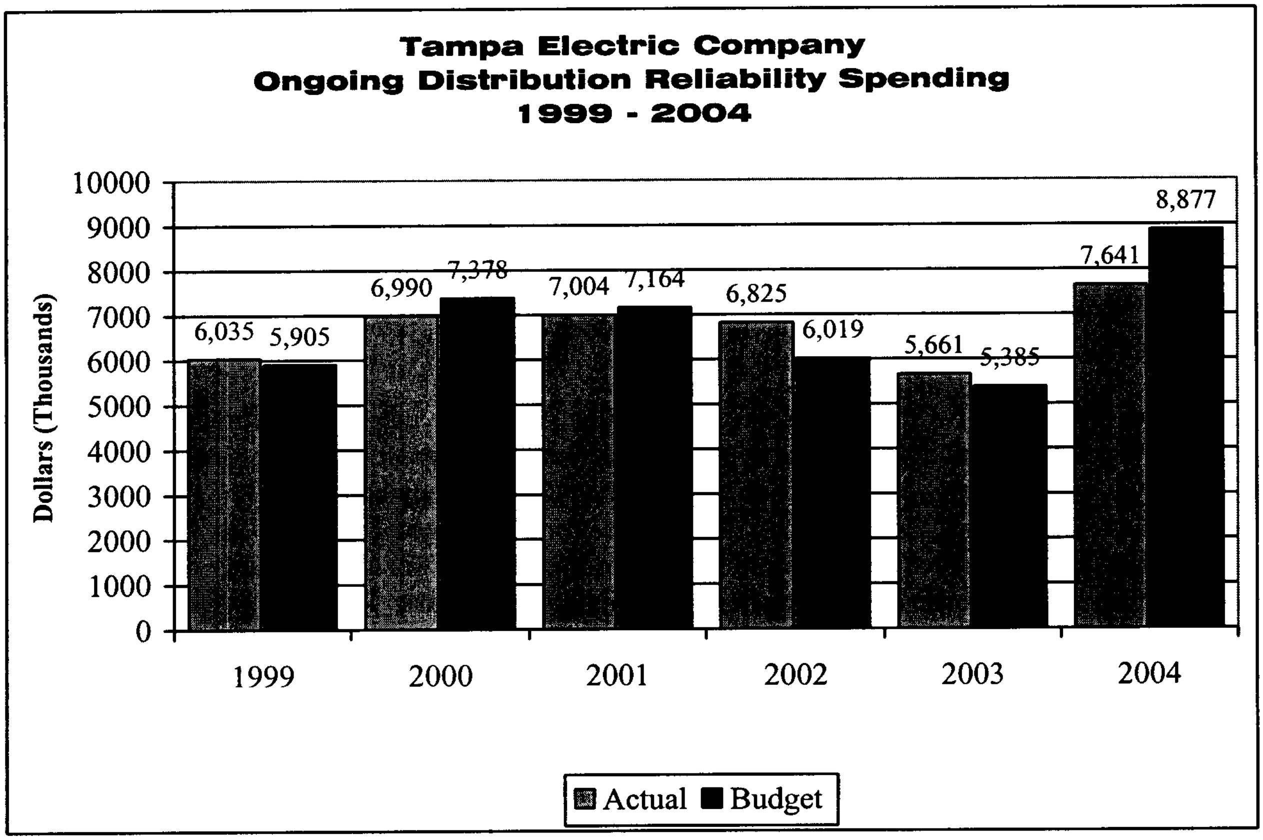


EXHIBIT 29 *Source: DR-1, Item 20*

Distribution Pole Inspection

Tampa Electric has approximately 339,000 total distribution poles in service, over 333,000 of which are wood poles. According to the company, the balance is nearly equally distributed between concrete and composite poles. Constantly exposed to the elements, these poles may become damaged by a variety of causes including rot, termites, weather, woodpeckers, and vehicular accidents. Severely damaged poles may fail and cause power outages to customers, as well as present a safety hazard to them. Energy Delivery System Reliability is responsible for all aspects of the distribution inspection program.

Poles are identified for replacement as appropriate during the distribution inspection activity. This activity can take place throughout the calendar year. The actual replacements take place subsequent to the inspection of the system and are scheduled along with other construction activity. In addition to comprehensive inspections, deficiencies are regularly identified and reported during scheduled and emergency ground patrols. Inspections are planned on a ten-year cycle for both the transmission and distribution systems.

Tampa Electric sometimes applies a temporary brace to poles when they are damaged by vehicles during night or weekend hours. The replacement of these poles is then scheduled along with regular construction work. The company does not track the number of these temporary pole repairs.

From 1999 through 2003, Tampa Electric chose not to perform bracing on any of its distribution poles. Similarly, the company chose not to chemically treat or fumigate poles during the period 1999 through 2004. Distribution poles were either deemed in proper condition or determined to be deficient and categorized for replacement. Tampa Electric states that, for the 2004 inspection program, the company determined that reinforcing bracing was a cost-effective and appropriate method to repair distribution poles with minimal deterioration. In its 1997 reliability review report, staff noted that Tampa Electric routinely braced distribution poles until halting the practice in 1996.

Exhibit 30 shows the results of Tampa Electric's pole inspections for the period 1999 through 2004. As the reader will note in the exhibit, no pole inspections were performed in 1999 or 2002, yet eight poles were replaced in 1999 and 90 were replaced in 2002. Addressing the zero inspections, Tampa Electric states that inspections were not conducted in 1999 and 2002 because they were not incorporated into the maintenance plan for those years. Explaining the pole replacements that were done in those zero inspection years, Tampa Electric states this is simply a lag effect; that is, some poles scheduled for replacement in a prior year were not actually completed until the next year.

Prior to 1995, Tampa Electric used a contractor that was responsible for both inspecting and repairing/bracing wood poles. Tampa Electric has since replaced the original vendor with two others to perform this task.

Tampa Electric notes that inspected poles fell into three categories prior to 2004. The first category was that the pole passed inspection. The second category was labeled "Priority Poles," which are supposed to be replaced within six months. The third category was

Tampa Electric
Distribution Pole Inspections and Results
1999 through 2004

Year	1999	2000	2001	2002	2003	2004
Inspected	0	20,876	13,480	0	3,803	17,000
Braced/Replaced	0	0	0	0	0	1,507
Treated	0	0	0	0	0	0
Replaced	8	501	511	90	237	724

EXHIBIT 30 *Source: DR-2, Item 20*

"Emergency Poles," which are supposed to be replaced immediately. The Priority Pole and Emergency Pole categories are reflected under "Replaced" in Exhibit 30.

According to Tampa Electric, in 2004 the contract was modified to include the additional category of Braced/Repaired. Tampa Electric states that it is up to the contractor to determine if a pole could safely be treated, wrapped, and braced. The inspection contractor performs this work. According to the company, random checks by one of its supervisors are performed to ensure that the poles are properly repaired.

Tampa Electric also reports that, in addition to the inspection program, the company conducted additional pole inspections during the period September 2000 to December 2001. The company hired a contractor to perform a pole audit on all transmission and distribution poles throughout its service territory at a cost of approximately $2.3 million. The main purpose of this audit was to identify third-party attachers, such as cable television and telecommunications providers. The audit also included a visual maintenance inspection of each pole. According to the company, any critical maintenance items identified by the contractor were addressed immediately.

Distribution Line Inspections

Distribution line inspections are a critical element in the maintenance process. To provide reliable service, these lines must be checked for conditions that may lead to an eventual loss of service. Line inspections are accomplished in two ways. The first method is by physical inspection of the lines. With this method, the lines are inspected both physically and visually during circuit patrols. The second method of inspecting the distribution lines is accomplished indirectly through analysis of the line's capability of handling loads as it is currently configured.

Presently, Tampa Electric conducts its overhead line inspections in response to reports of numerous momentaries, poor circuit reliability, or customer concerns. In conducting these patrols, the skills of field engineers, operations engineers, linemen, and troublemen are brought into service. The company said that it continues to invest in infrared "Thermovision" inspections of its distribution, transmission, and substation assets.

In addition, the company has added resources to dedicated, preventive underground distribution line inspections. Due to the lengthy restoration time involved for underground equipment problems, the company felt this was an appropriate focus in order to improve reliability and public safety.

The Adopt-A-Circuit program and the Worst Performing Circuit Team described in the 1997 reliability audit have since been merged. As a result, System Reliability continues to identify Tampa Electric's most problematic circuits. The resulting information is passed along to the service area operations engineer who uses the necessary service area resources to patrol, identify, and correct issues with the circuits.

Tampa Electric continues to perform both contingency and voltage analysis on its distribution system. However, the company now extensively uses computerized contingency analysis and load-flow modeling that provides accurate, detailed information. Additionally, the company said that instead of attempting to study the entire system, its System Planning unit focuses on high loading, poor reliability areas to perform the detailed analysis. Tampa Electric explains that in low-load, low-exposure urban areas, the company has found no value in performing this detailed analysis. According to the company, the focus on high-loading problem areas has been a more valuable application of the company's resources.

Additionally, the operations engineers at the service areas now review the daily operation of circuit breakers and distribution line oil circuit reclosers. Previously, while the operations were logged daily, they were reviewed only monthly by the engineers. Tampa Electric notes that when excessive operations are noted, the operations engineer takes action to remedy the situation. The company said that it no longer performs formal Circuit Performance Reviews with engineers and cooperative education students from System Reliability. Instead the System Reliability engineers and service area operations engineers work collaboratively to recognize, analyze, and implement corrections to reliability problems.

Corrective Distribution Programs

Project Phoenix

Project Phoenix was a 20-month effort that began in May 2003 and ended in December 2004. Project Phoenix tracked overall system reliability. According to Tampa Electric, the purpose of the Phoenix project was to improve Energy Delivery's overall business unit performance. This effort was undertaken as a result of the merger of the former Energy Delivery and Customer Services departments in February 2003. The intent of the program was to leverage the resources in both areas, to take advantage of synergies where possible, and to transition to operating as a cohesive single department.

Key activities of Project Phoenix included the following:

- Setting a series of long-term, aggressive goals that are common across the entire business unit.
- Identifying and pursuing initiatives that will help the company accomplish performance goals.
- Transforming the department by ensuring all activities are aligned.

Tampa Electric states that the following initiatives were undertaken as a result of the Phoenix effort. These initiatives were intended to achieve several objectives, including improving overall reliability and response time:

- Targeted Tree-Trimming Strategy – The System Reliability department implemented a structured "Hot spot" tree-trimming process to help reduce tree-related outages.
- Quicker Crew Call Outs – In 2004, Customer Services replaced the Interactive Voice Response (IVR) unit that provides telephone response for the customer contact center.

As part of the IVR replacement, an "outbound dialer" functionality was installed to allow faster, automated call out of crews for restoration work.

- Super Crews – This concept adds a more flexible type of crew that performs both restorations as well as distribution maintenance work for better resource flexibility. The company hopes to create these "Super Crews" in 2005.

- Customer Complaint Resolution – This process will help resolve customer issues more quickly allowing it more time to respond to actual restoration activities.

- Evaluation of critical maintenance items and Identification of Equipment Needing Maintenance – Replacement of lightning arresters and certain capacitor banks was identified in 2003 as an activity that would maintain or improve reliability. Employee-participants in the spring 2004 annual mock storm exercise identified lightning arresters and capacitor banks that needed repairs. Tampa Electric practiced its storm response procedures and identified equipment needing repairs.

- Better Use of Crews and Schedules – During 2004, improvements were made in the planning and scheduling of crews. The most significant change was the centralization of planners and schedulers for the crews resulting in better data to manage its construction and maintenance activities.

- Better Use of Field Engineers' Time – An evaluation of the process of designing distribution construction work to meet customer's needs and to improve crew availability.

- Better Variance Tracking – A fundamental outcome of the Phoenix evaluation was the monitoring of process variances. Tracking these variances helps in managing the company's overall workload, including crew activities.

- Mapping Review – The Phoenix Team reviewed the business unit's mapping processes and concluded that a Geographical Information System (GIS) is "foundational" to perform key business functions. A team was created in the fourth quarter 2004 to evaluate GIS solutions.

Weather-Related Distribution Programs

Some distribution programs were implemented to improve reliability associated with weather related issues. Tampa Electric states that the company instituted a proactive lightning arrester replacement program that consists of active patrols for and replacement of failed lightning arresters.

In addition, Tampa Electric instituted what it claims is a more aggressive Mock Storm Damage/Assessment and Repair program. In this program, Field Technicians and their runners were assigned circuits to patrol to find damaged equipment to prepare for the upcoming hurricane season and to identify problems on the circuits. The company said that Energy

Delivery personnel participated in an actual damage assessment exercise in their respective service areas in February 2004.

Supervisors reviewed the damage assessment patrol process with Tampa Electric Field Engineering Technicians. These technicians completed circuit patrols identifying maintenance work that needed to be completed (e.g. blown lightning arresters and capacitors out of service.) This identified "damage" was entered into Tampa Electric's Damage Assessment System, captured in the company's WorkPro System, and completed as planned maintenance work prior to storm season.

Lightning Protection

Virtually all equipment on an electric distribution system is susceptible to, and does sustain, lightning damage. Tampa Electric estimates its average annual cost due solely to lightning at more than one-half million dollars. This estimate only includes lightning damage that caused a customer outage and does not include fixed costs associated with responding to these outages. According to Tampa Electric, the most frequently damaged distribution equipment includes transformers, poles and wire, overhead arresters (such as surge arresters and insulators), and underground cable accessories (such as terminators, elbows, bushings, and take-offs).

Tampa Electric uses a variety of lightning protection devices on the transmission and distribution systems. Lightning protection on the distribution system is generally accomplished by installation of lightning arresters. Lightning arresters are installed every one-quarter mile on all distribution lines for general lightning protection of the system. They are generally installed on any structure that supports electrical equipment that may be damaged due to lightning.

Lightning protection on the transmission system is generally provided by the application of an overhead shield wire. The shield wire is connected to the system ground at each pole. This wire is strung above the transmission phase conductors and is used to direct lightning strokes to the ground. Additionally, the company says that it has made limited use of lightning arresters on the transmission system in specific locations. According to the company, it has made no changes to its application of lightning protection during the review period.

For substations, lightning protection is provided by several means. An overhead shield wire connected to the substation ground grid directs lightning strokes to the ground much in way the transmission shield wires work. Lightning arresters are also placed on the high and low side of the transformer, at the termination point of incoming transmission lines, and on the substation bus. In addition, arresters are also installed on all underground feeder exits in substations. As a final note, all lightning arresters are tied to the substation ground grid, which may be compared to a crosshatching of cables buried under the entire area of the substation.

Arresters and Grounds

Exhibit 31 presents expenditures for the installation and replacement of lightning arresters on the Tampa Electric system. Tampa Electric's figures indicate that it increased spending for lightning protection in 2003. The company explained that it devoted these additional resources to arrester replacements in order to improve reliability on its system. Tampa

Electric points out that there were 42 percent more lighting strokes in 2003 compared to 2002, along with a higher frequency of outages related to weather/lightning.

Tampa Electric
Distribution and Transmission
Lightning Protection Program Expenditures
1999 - 2004

Service Area	1999	2000	2001	2002	2003	2004
Central	$ 33,676	$ 61,189	$ 64,367	$ 84,194	$ 103,419	$ 50,615
Dade City	7,983	9,838	14,724	7,291	26,571	10,879
Eastern	29,120	51,129	69,116	64,948	78,320	52,645
Plant City	36,919	36,096	43,059	33,458	88,497	47,742
S.Hillsborough	23,873	29,366	23,779	22,420	52,285	23,629
Winter Haven	37,889	46,174	47,483	39,653	76,704	63,980
Western	48,355	70,565	80,384	90,324	98,121	83,909
TOTAL	$217,815	$304,357	$342,912	$342,288	$523,917	$333,399

EXHIBIT 31 *Source: DR-2, Item 27*

Transmission lightning protection is provided by overhead shield wire, also called static wire. This wire runs above transmission lines and is connected to copper ground wires at each pole that tap onto solid copper rods driven to an appropriate grounding depth. As **Exhibit 32** indicates, actual static wire maintenance spending matched budgeted spending for 1999. However, the exhibit clearly indicates a sharp drop in actual spending. When asked about the large disparity in budget vs. actual amounts for 2000 and 2001, Tampa Electric responded in effect that the budgets for those two years should have been lower; however, the budget variances for those years would have been made available for other maintenance or construction

In 2002, Tampa Electric ceased tracking efforts for transmission static wire maintenance as a separate item. Beginning in 2000, Tampa Electric states that it began to move away from a program of performing both preventive and corrective static wire maintenance to a modified process focused on making repairs on a corrective basis. The company states that shifting maintenance practices to making corrective repairs was directed at maximizing the benefit to the system for each dollar spent. Funds that were budgeted for static wire maintenance but not spent could have been made available for other maintenance or construction.

Tampa Electric states that it intends to focus on more preventive static wire replacements in 2005. As a result of recent inspections, Tampa Electric has identified preventive maintenance work that can be done on static wire splices that will greatly reduce or eliminate corrosion at the joint. The company believes that these inspections and corrective actions should prevent a reduction in service life for the splices and wires and are an integral part of the company's increased focus on maintenance in 2005.

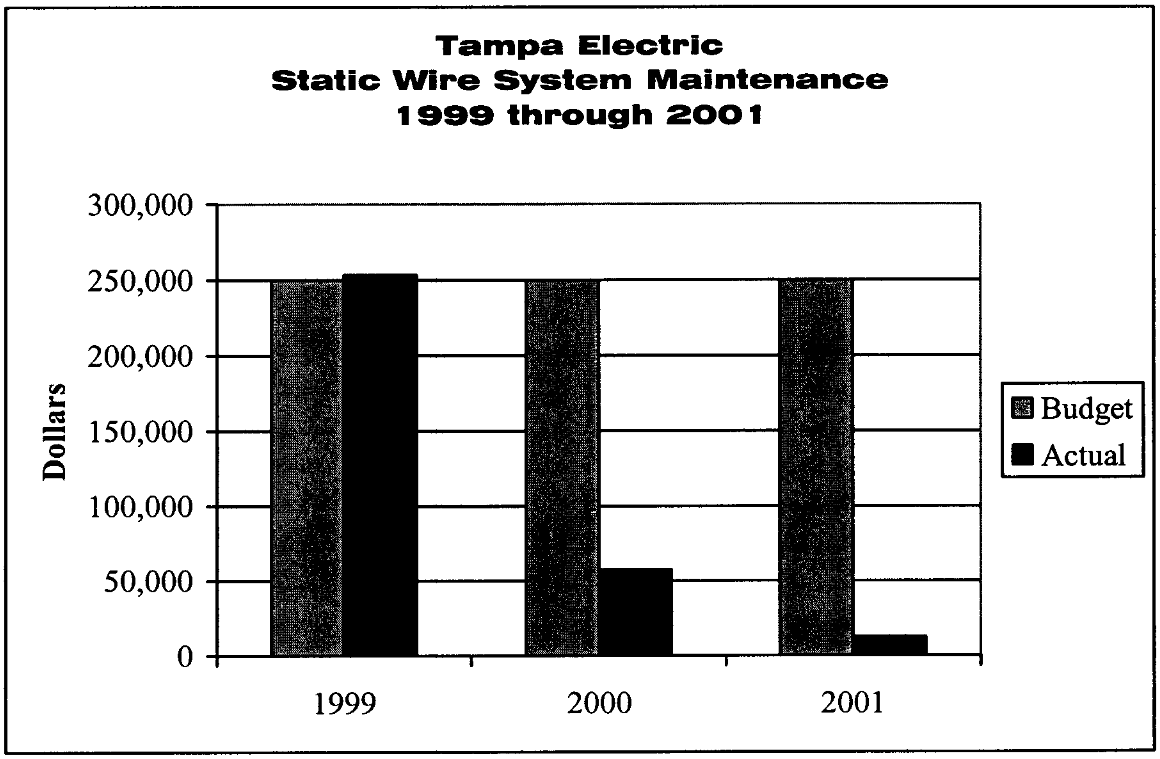


EXHIBIT 32 *Source: DR-2, Item 27*

Tampa Electric states that appropriate lightning protection is installed on every distribution and transmission circuit as a part of the initial construction. In addition to this initial installation, the company identifies issues with lightning protection on its system in a number of ways. Distribution lightning arresters issues are identified by field employees during routine work throughout the year.

In 2004, Tampa Electric performed a mock storm patrol on approximately 10 percent of its distribution system. The term "mock storm" was used because this exercise was conducted to simulate company activities that may be required after a major storm event. Damaged or blown lightning arresters were identified as part of this patrol and repairs were made as appropriate. As part of ground patrols and comprehensive inspections, damage or deficiencies to static wires, ground wires, and connectors are identified.

Tampa Electric contracts with Vaisala, formerly National Lightning Detection Network, to provide lightning data for west central Florida. The data presented represents "flashes" defined as multi-stroke lightning strokes. The lightning flashes affecting Tampa Electric's service area are approximated by multiplying Tampa Electric's percent coverage of the county by the total lightning flashes occurring in the county. These coverage percentages are: Hillsborough County – 100 percent coverage; Pasco County – 11 percent coverage; Pinellas – 5 percent coverage; and Polk County – 21 percent coverage.

Exhibit 33 depicts the total number of lighting strokes recorded annually in Tampa Electric's operating territory. Tampa Electric notes that these stroke counts are gross numbers and have not been adjusted to remove weather events excludable by FPSC guidelines.

There are two basic lightning protection components for distribution facilities, the shield wire design and the arrester design. Tampa Electric utilizes the arrester design and arresters with ground wires. Tampa Electric's lightning protection design includes the following:

- Arresters located at least every one-quarter mile on wood poles and every one-eighth mile on concrete poles and on all equipment poles.
- Circuit breaker reclosing sequenced to decrease potential for equipment damage.
- Surge arresters installed in auto-switch gear.
- Program developed to install meter-based surge arresters.

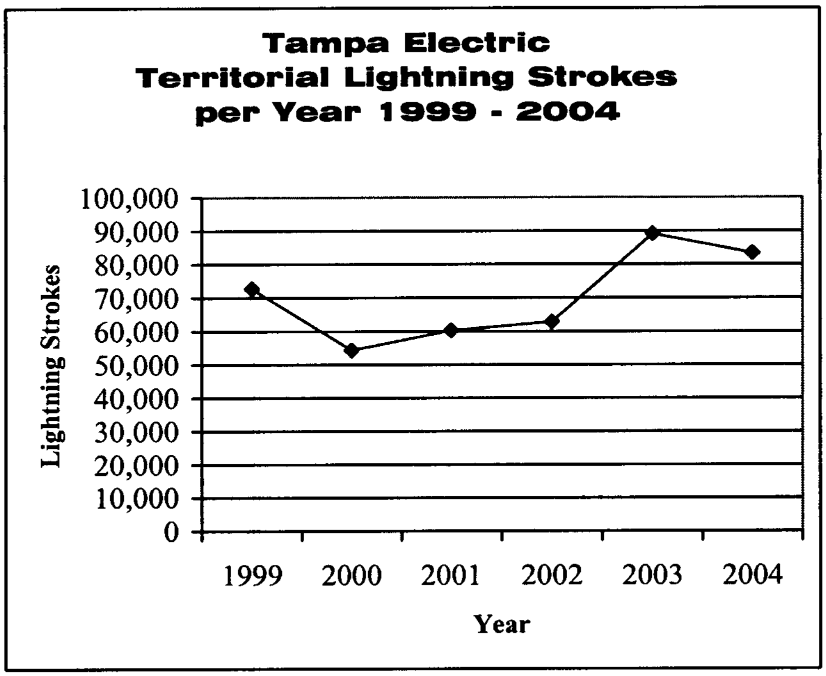


EXHIBIT 33 *Source: DR-3, Item 7*

Exhibit 34 presents lightning arrester activity for the period 1999-2004. From a peak of nearly 3,700 in 2000, arrester replacements dropped in 2001. An even sharper decrease in replacements occurred in 2002 when just 2,237 were performed. A 2003 initiative to change more blown arresters brought the 2002-2003 total to 6,018, or an average of about 3,009 per year. Still, considering this correction, the overall trend in replacements was downward for the six-year period. New arrester installations followed a similar trend.

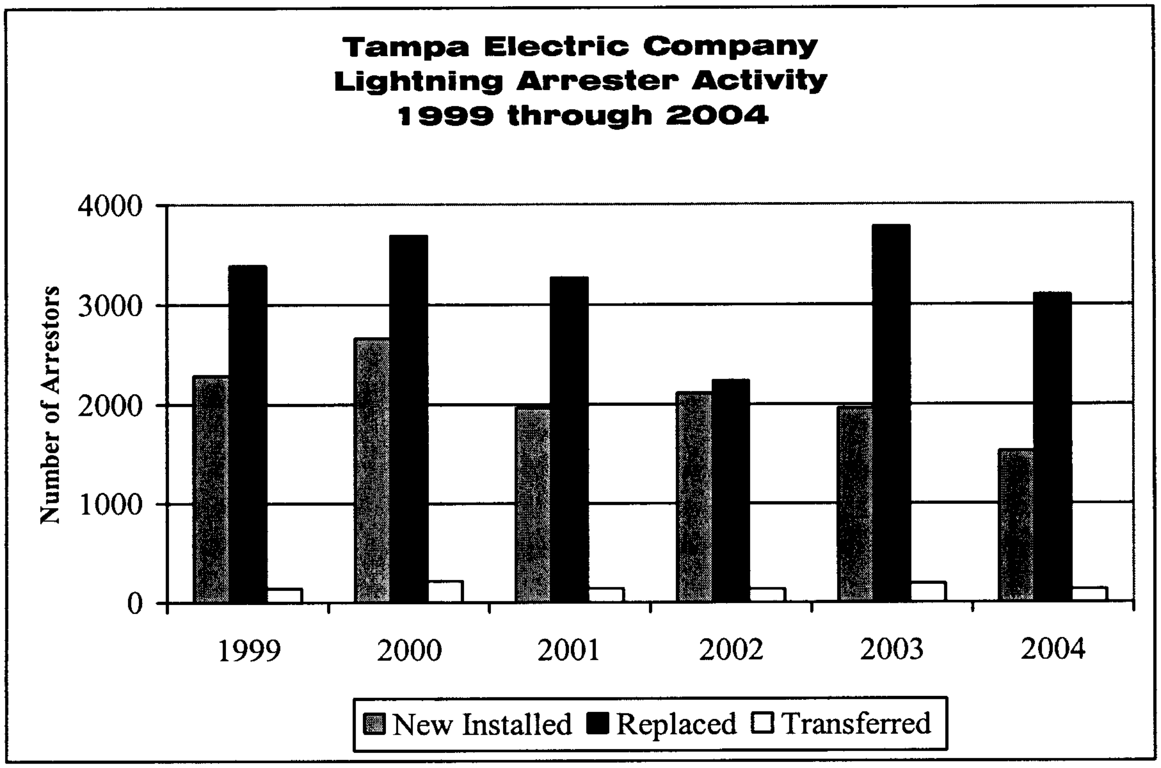


EXHIBIT 34 *Source: DR-2, Item 14*

Underground Distribution Cable Inspection

To maintain the reliability of its underground distribution system, Tampa Electric conducts line patrols similar to those for above-ground equipment. The underground system is on a five-year inspection cycle in which the components are visually inspected for damage or potential problems.

During the period 1999-2002, Tampa Electric states it had an informal underground field inspection program, but did not track the number of inspections performed. The company states that, during that time, all field personnel were asked to report any problems identified directly to operations for correction. In 2003, a formal underground field inspection program was initiated that resulted in 1,162 inspections in 2003 and 4,218 inspections performed in 2004. **Exhibit 35** presents a summary of the underground cable inspections for 2003 and 2004.

The inspection generally consists of the above-ground components, such as pad-mounted transformers, being opened and examined. The lineman opens the transformer cabinet and examines the contents looking for problems such as insect nests and cabinet rust. The exterior portion is similarly inspected, and any corrective measures needing to be taken are written up in memo form and submitted to the appropriate planner for work to be scheduled.

Tampa Electric Underground Cable Inspections 2003 - 2004		
	2003	2004
Total Units Inspected	1162	4218
Transformers Inspected	1081	4085
Switchgear Inspected	81	133
Total Units Repaired/Replaced	280	445
Safety Decal Placement	0	1706
Number of Locks Replaced	32	177
Other Pad mount Issues Reported (e.g., off pad, twisted on pad, encroachment, etc.)	0	163
Total number of work requests created due to inspections	286	608

EXHIBIT 35 *Source: DR-2, Item 23*

The major causes of underground cable failure include lightning, moisture in the cable, and dig-ins. The summer lightning season has the most occurrences of underground cable failures. Lightning entering underground distribution cables from above-ground sources, such as transformers, accounts for most of the subsurface distribution failures each year.

Repairing and replacing underground cable can be a difficult and time-consuming job. The method in which the underground cable has been laid plays a large part in how difficult that job will be. There are generally two methods of placing underground cable: the direct bury method and the conduit method.

With the direct bury method, cable is placed directly in the trench that has been dug and then covered. This method is simple and less expensive than the conduit method, but a draw-back is that to repair or replace the cable is that it must be completely dug-up. The conduit method places a pipe (the conduit) in the ground in which the distribution cable is run. This method is more expensive to install because of the extra material and labor required; however, to repair or replace the cable, it can be pulled out of the conduit and a new or repaired section can be replaced, decreasing the interruption time. According to Tampa Electric, over 95 percent of its underground distribution system is conduit based.

3.6.2 Transmission Reliability Improvement Efforts

As indicated in **Exhibit 36,** transmission reliability spending rose sharply from $3.9 million dollars in 1999 to approximately $25.2 million dollars in 2003. However, in 2004 total transmission reliability spending dropped to $16.7 million, and for 2005 the company has budgeted just $12.3 million.

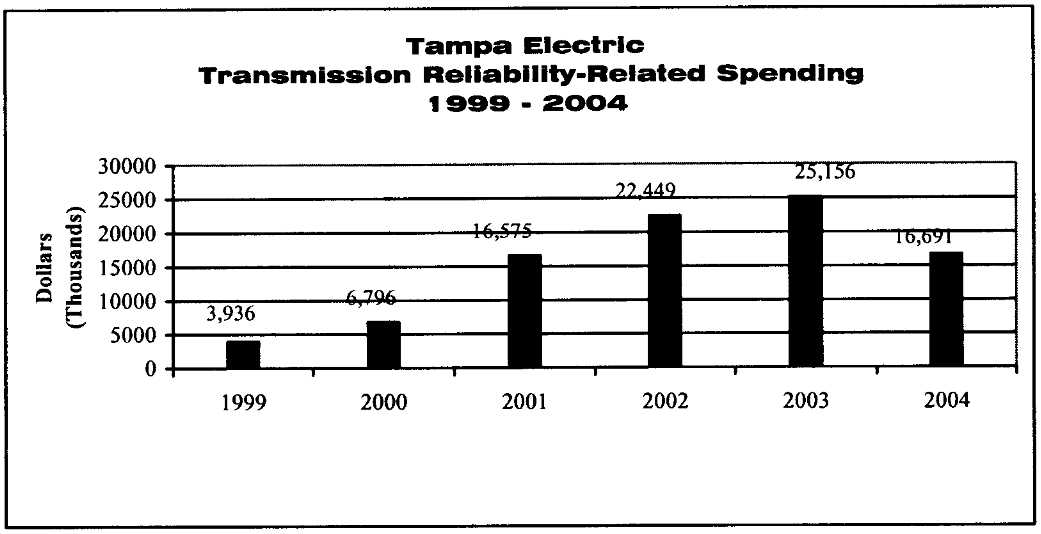


EXHIBIT 36 *Source: DR-1, Item 19*

Ongoing Transmission Programs

Exhibit 37 details Tampa Electric's ongoing transmission maintenance programs performed by company personnel on transmission facilities. Where appropriate, cycle times are also included to show the frequency of certain activities within each transmission program.

Tampa Electric Ongoing Transmission Maintenance	
Title	**Description**
Transmission Ground Patrol	• All transmission circuits are scheduled for patrol by ground twice annually.
Aerial IR Patrol	• All transmission circuits are scheduled for aerial patrol once annually using infrared thermography and visual observation.
Comprehensive Inspection; Underground Cable Inspection	• All transmission circuits are scheduled for comprehensive ground line and climbing inspections on a 10 year cycle. • Includes underground terminal equipment and gas pumping stations.
Right-of-way Inspections	• All transmission rights-of-way are assessed during the ground patrol. Issues with roads, culverts, fences, locks and security and identified and addressed.
Switch Maintenance	• All transmission switches are inspected and scheduled for repair semiannually during the ground patrol as well as during manual operation.
Right-of-way mowing and herbicide	• All transmission rights-of-way are inspected semiannually by line clearance supervisors and mowing and herbicide applications are scheduled and completed.
Transmission Line Tree-Trimming	• Annual right-of-way tree-trimming, tree removals and brush removal for the transmission system.

EXHIBIT 37 *Source: DR-1, Item 20*

Exhibit 38 shows that the budgeted and actual expenses for Tampa Electric's ongoing transmission reliability programs are substantially less than described for distribution programs. Budgeted dollars dropped from 1999 through 2002, but were increased substantially during 2004. The company explained that the increased budget dollars for 2004 was due to additional expenses anticipated for implementing improvements required by NERC and FERC as a result of the Northeast grid outage in 2003. For 2005, budgeted expenditures have grown to over $2 million.

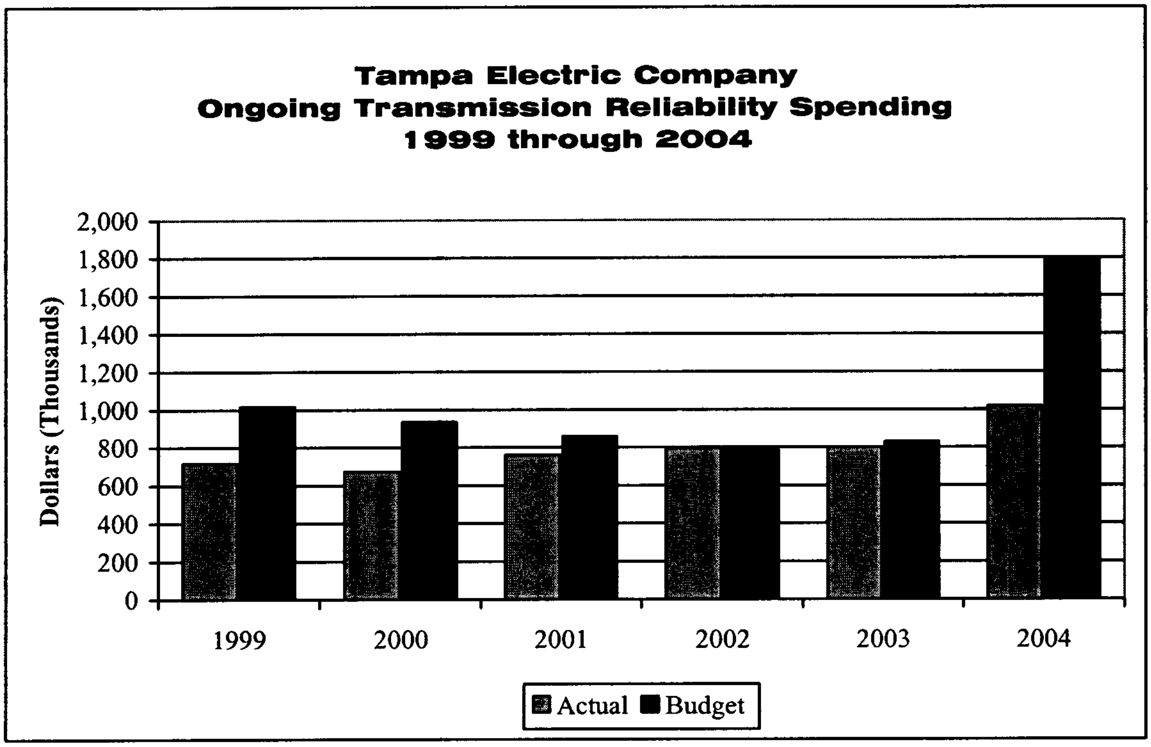


EXHIBIT 38 *Source: DR-1, Item 20 (revised)*

Substation Maintenance Programs

Exhibit 39 details Tampa Electric's ongoing maintenance programs performed on substation facilities. Appropriate cycle times are included for certain activities where a description of the frequency is necessary.

Tampa Electric explains that one substation-related routine maintenance program was canceled during 2000. The former Transformer Cooler/Fan Replacements program was terminated as a result of all substation transformers being retrofitted. According to the company, this necessarily negated the need for the program. All other programs listed were conducted by Tampa Electric during the 1999-2004 review period.

Tampa Electric Substation Maintenance Programs	
Title	**Description**
Breaker Preventative Maintenance	• Oil breakers based on a predictive breaker oil analysis • Vacuum breakers based on 10 year cycle • SF6 breakers based on 8 year cycle • Air magnetic breakers based on 3 year cycle.
Relay/System Protection Preventative Maintenance	• Company adheres to the FRCC requirements for testing transmission and under frequency relays.
Animal Protection	• Included on all new installations and retrofits in old stations during major construction activities.
Transformer Cooler/Fan Replacement; Dissolved Gas Analysis	• Cooler replacements for the problem GSU have been completed. • Radiator fans motors are replaced upon failure.
Substation Grounding Inspection & Maintenance	• Visual inspection of station grounds performed during the quarterly inspections of the substations.
Generation Station Unit Inspections	• Weekly inspection of transformers associated with generation units.
Infrared Inspection	• Annual infrared inspection of substation transformers, breakers and switches.
Visual Inspections	• Quarterly visual inspection of every distribution and transmission substation.

EXHIBIT 39 *Source: DR-1, Item 20*

Exhibit 40 displays total company expenditures for substation maintenance over the study period. After peaking in 2000, both transmission and distribution substation spending declined between through 2004. To an extent, these figures reflect the reductions in substation staffing and inspections previously described. They also appear to correlate to the increases in substation outages.

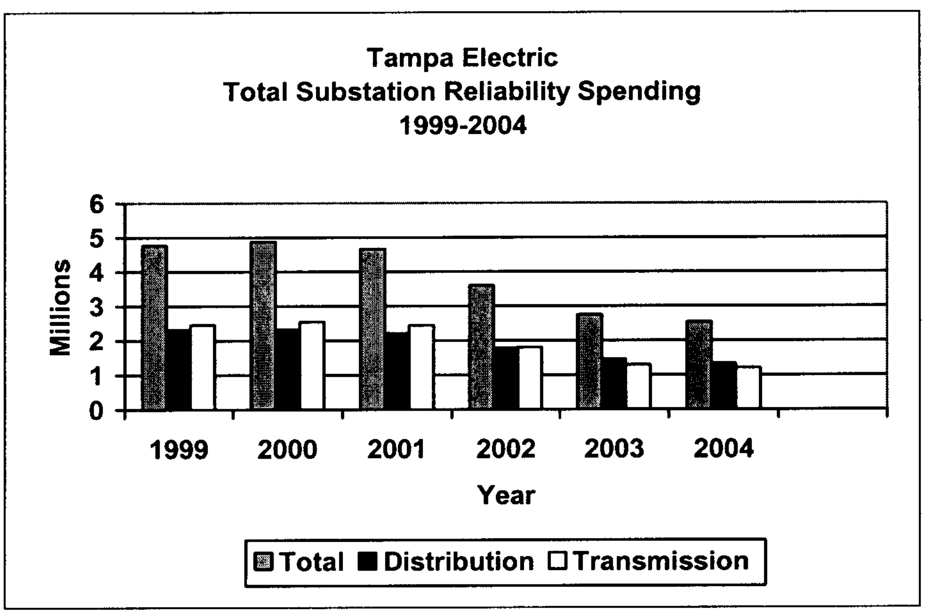


EXHIBIT 40 *Source: DR-5, Item 9*

Exhibit 41 presents Tampa Electric's budget and expenditures for ongoing substation reliability spending between 2001 and 2004. The company indicated that 1999 and 2000 data were not available. The exhibit indicates sharp declines in both budgeted and actual spending in 2002 and 2003. For 2001 and 2002, expenditures on substation reliability were substantially below the amounts budgeted, while 2003 spending was somewhat higher than the modest amount budgeted that year. Spending increased by 79 percent in 2004, while the budget also grew by 74 percent. Despite last year's increases, Tampa Electric has budgeted about 9.2 percent fewer dollars for 2005 ongoing substation maintenance than it budgeted in 2004.

Corrective Transmission Programs

Transmission Pole Inspections

Transmission Operations is responsible for all aspects of the transmission inspection program. Repairs to transmission poles for the subject period were limited to filling woodpecker holes on wood poles or patching lightning damage on concrete poles with repair epoxy. Maintenance files are presently maintained in a hard copy format. Since each circuit file would have to be manually assessed to determine actual number of poles repaired with epoxy, a rule of thumb was applied by the company to estimate transmission pole repairs made. Based on an assumed two packages of epoxy per pole, the company used material records for each of the years to derive its estimate of poles repaired.

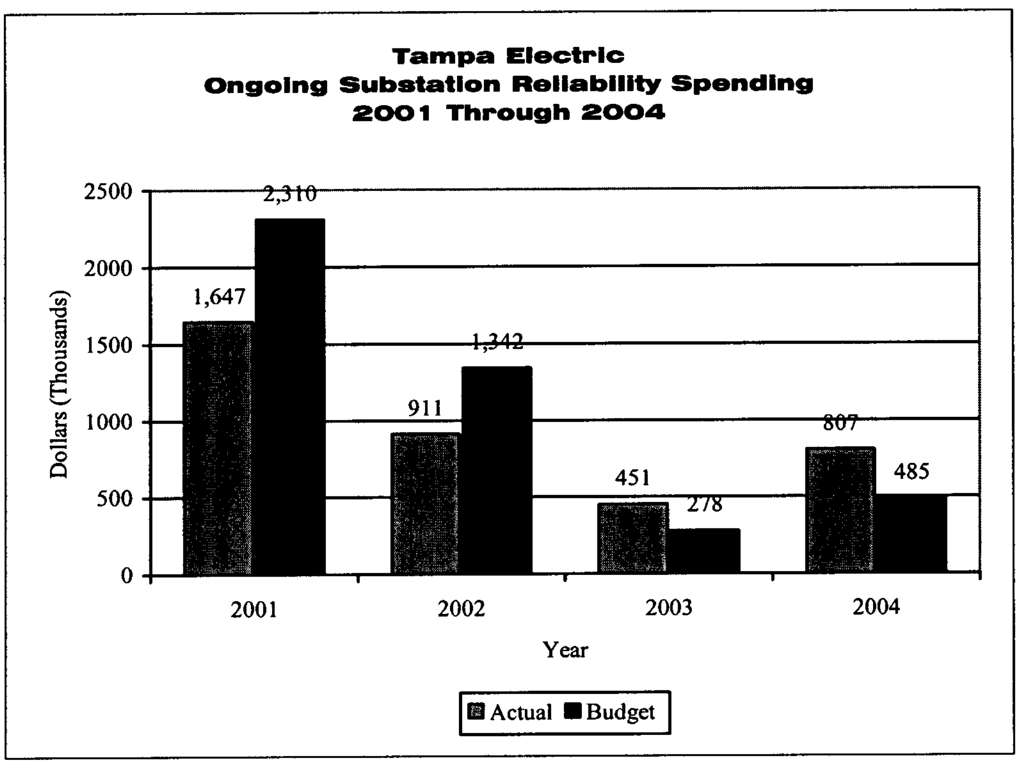


EXHIBIT 41 *Source: DR-1, Item 20 (revised)*

Tampa Electric tracks inspection information by transmission circuit rather than by individual structure. If individual pole inspection information is required, it can be obtained from the circuit records. Inspections are planned for 10 percent of the transmission and distribution systems each year.

Exhibit 42 depicts Tampa Electric's pole inspections for the 1999 through 2004 period. To conduct these inspections, the company employs both ground crew and aerial infrared reconnaissance. Ground crews, for the largest part, drive from pole to pole to conduct their inspections, while aerial crews fly the long stretches of mostly isolated transmission lines. Using infrared camera equipment, air crews may help in locating the position of damaged equipment by reviewing the tapes with Tampa Electric employees or through the use of integrated GPS equipment.

As the exhibit indicates, the categories "Inspected" and "Treated" reflect substantial activity in 1999 and 2004. However, in the intervening years, 2000-2003, activity is substantially reduced. Tampa Electric explained that, beginning in 2000 and into 2003, it focused on "critical needs." However, Tampa Electric explained that, as plans for 2004 were formulated in late 2003, the company refocused on inspections and treating poles. Tampa Electric added that this same focus will continue in transmission pole efforts in 2005.

As part of the transmission pole replacement program, Tampa Electric states that essentially all wood transmission structures that are identified for replacement are replaced with non-wood structures. According to the company, this change in replacement pole type benefits the reliability of the transmission system in a number of ways. Initially, the replacement results in structures that are significantly stronger and more reliable than the original wood poles. In addition, the replacement non-wood structures provide a significantly longer expected life with reduced long-term costs for inspection and maintenance.

Tampa Electric
Transmission Pole Inspection Results
1999 through 2004

	1999	2000	2001	2002	2003	2004
Ground Patrol	All Circuits	All Circuits	All Circuits	All Circuits	All Circuits	All Circuits
Aerial IR Patrol	All Circuits	All Circuits	All Circuits	All Circuits	-None-	All Circuits
Inspected	2,515	197	0	270	0	3,822
Repaired	84	46	147	59	45	76
Treated	123	0	0	0	0	136
Replaced	212	199	92	122	101	205

EXHIBIT 42 *Source: DR-2, Item 20*

Avian Program

During the first quarter of 2004, the company began a program to reduce electrocutions of raptors (e.g. hawks, eagles, ospreys) and associated outages along the company's transmission lines. This was followed by development of the company's Avian Protection Plan. Tampa Electric states that the Avian Protection Plan is based on a comprehensive document outlining internal procedures to be followed when addressing avian issues including nest removal/relocation and bird collisions and electrocutions. The document provides guidelines on how to construct new power lines in a bird-friendly manner and how to retrofit existing facilities. A major component of the Avian Protection Plan is a risk assessment identifying future problem areas in order to proactively retrofit power lines.

In developing the risk assessment, Tampa Electric says that habitat data were used to identify where to survey power lines located in favorable habitat. Approximately 1,240 poles were identified in need of some proactive retrofitting. The Avian Protection Plan lists specific retrofitting recommendations for each of these poles.

Retrofitting typically includes the installing of insulating materials (such as bushing covers and insulated jumpers) or perch deterrents that form physical or chemical barriers to dissuade both perching and nesting. Although retrofitting every pole can nearly eliminate bird electrocutions, the company states that this is not cost effective. Tampa Electric states that since most bird electrocutions occur on just a few of the company's structures, targeting the particular structures most preferred for use by birds is more economical.

3.7 Vegetation Management Program

3.7.1 Distribution Vegetation Management Organization

The Distribution vegetation management organization is headed by the Manager, System Reliability. Responsibilities of this manager include System Reliability, Line Clearance and Reliability Response. The combination of these three functions occurred in October 2003.

The Manager directly supervises six Line Clearance Supervisors, three System Reliability employees, and one Emergency Response employee. Manager responsibilities also include coordinating operational customer complaints for his department and working with the Supervisor Quality Assurance on customer complaint-related issues

3.7.2 Vegetation Program Procedures and Measurements

Vegetation control encompasses the removal and clearing of all plant matter from transmission and distribution lines. Although tree-trimming is the largest component of this process, removal of vines and other vegetative material is also included here. **Exhibits 43** and **44** depict the total miles and number of circuits cleared of vegetation annually from 1999 through 2004 for both distribution and transmission.

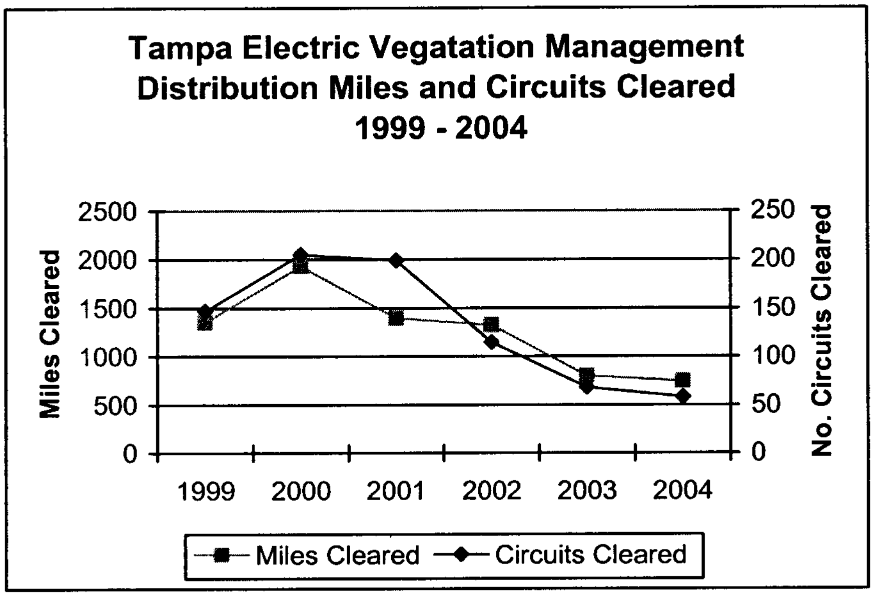


EXHIBIT 43 *Source: DR-5, Item 13*

To perform tree-trimming, Tampa Electric uses four contractors concurrently, each in assigned geographical areas. A fifth contractor is also used for herbicide treatments. Tampa Electric's current contract vegetation management force consists of approximately 100 contractor employees operating in 42 crews. Of these, 40 crews are allocated for distribution assignments and two crews are allotted for transmission. In addition to routine clearing, crews also perform scheduled maintenance trimming, work order trimming, and new construction clearing. Some perform herbicide treatments for distribution and transmission rights-of-way.

Tampa Electric states that it manages the contract work by assigning one of four Field Supervisors to each of the different contractors. Supervisors are also responsible for ensuring contractor productivity and validating billing. Weekly invoices are received from each company detailing man-hours, tree counts trimmed and removed, acres of brush cut, and other work performed and identified by crew.

Tampa Electric states that it measures the cost per tree by crew and, when the contractor deviates from what is expected, the company's supervisors meet with contractor management to determine a course of action to improve productivity. Along with these responsibilities, Tampa Electric Field Supervisors interface between the contract crews and the Tampa Electric customer.

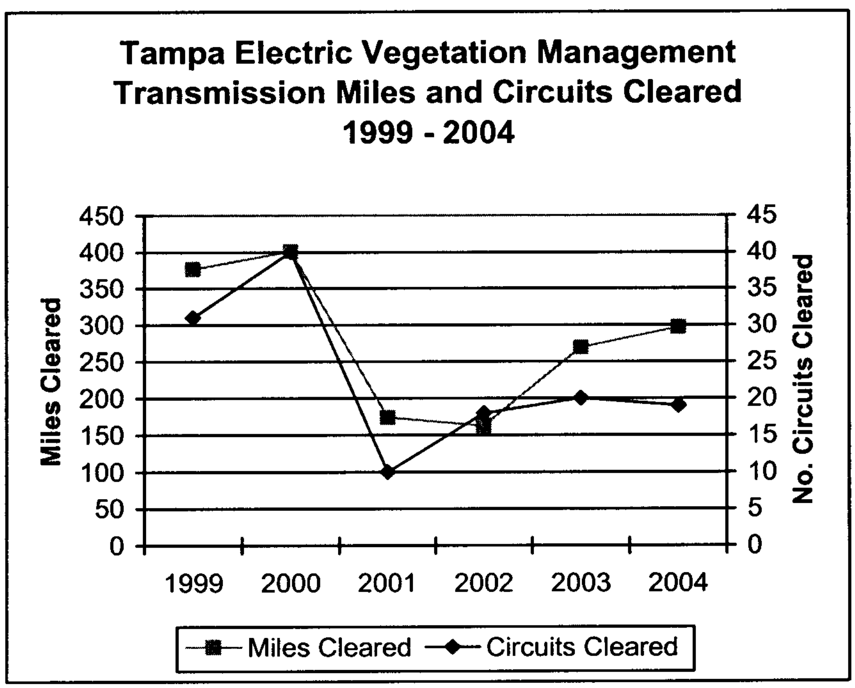


EXHIBIT 44 *Source: DR-5, Item 13*

Tampa Electric's trimming work is scheduled by circuit. Depending on various conditions, it may take weeks or months to complete a circuit. The company pursues reliability-based trimming by analyzing the following three attributes of a circuit:

- length of time since the circuit was last trimmed;
- individual circuit System Average Interruption Duration Index (SAIDI) and Momentary Average Interruption Frequency Index Event (MAIFIe) performance statistics from the previous year; and,
- tree-related outages on the circuit from the previous year.

To maintain continuity, Tampa Electric says it trims feeders and laterals at the same time it trims a circuit. In addition to systematic trimming, the company uses hot spot trimming to correct conditions reported by Tampa Electric employees and customers. For this purpose, one person is designated to coordinate hot spot trimming. An unavoidable consequence of hot spot trimming at times is higher cost. Hot spot trimming may entail more drive time or other impediments to reach the trim spot, therefore increasing the cost per tree-trim.

3.7.3 Distribution Vegetation Program Budgets

Exhibit 45 depicts the vegetation management budget vs. actual dollars spent allocated and spent during the five-year review period. From 1999 through 2002, Tampa Electric elected not to re-bid contracts for vegetation management for a number of its contractors, opting instead to modify those companies purchase orders with variable rate increases provided for labor and equipment. Tampa Electric states that it decided not to re-bid these contracts after determining the contractors' performance was acceptable.

During 2003, purchase orders for Davey, Asplundh, and Lewis Tree Service all were extended by Tampa Electric.

In 2004, the Company extended its purchase orders for the three contractors. In late 2004, these purchase orders were further

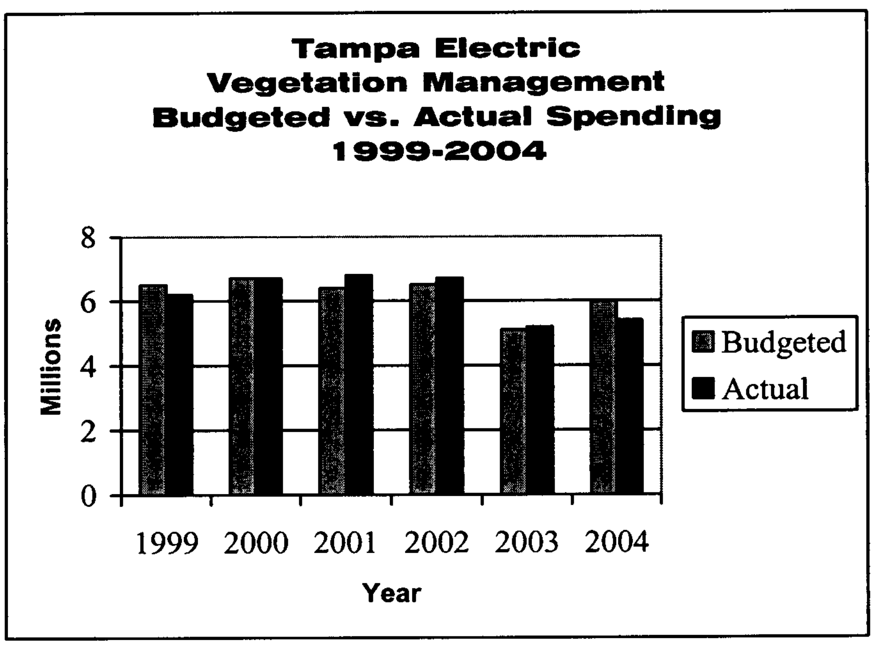


EXHIBIT 45 *Source: DR1, Item 20 (revised), DR-4, Item 4*

extended for these contractors to accommodate increased load as a result of Hurricanes Charley, Frances, and Jeanne. These purchase orders were extended through March 2005 to allow new department leadership to finalize a plan for line clearance in 2005 and to obtain an appropriate vendor bid.

Prior to 2004, Tampa Electric used a performance appraisal rating system for contractors that evaluated cost against completed work units, contractor performance, tree counts and recounts, quality checks and supervisory analysis. Since moving to reliability-based tree-trimming in January 2004, Tampa Electric has determined that the contractor evaluation process should be revised to better reflect the new methodology. In 2005, Tampa Electric Vegetation Management will develop and implement the new contractor evaluation process.

The 2005 budget figure of $5.974 million for total vegetation control represents a net increase of 9.9 percent beyond 2004 actual spending. However, the 2005 budget plans a six percent reduction in distribution trimming spending – $4.514 million versus $4.802 million spent in 2004. Under the 2005 budget, transmission trimming spending will increase by over 250 percent, to $1.285 million from $361,000 in 2006. Also, right-of-way clearance spending planned for 2005 dropped to $175,000 from $275,000 spent in 2004.

With the shift to reliability-based tree-trimming, Tampa Electric believes its vegetation program productivity measurements will shift toward measuring improved reliability on a per circuit basis. The company expects momentary interruptions and tree-caused outages to decline with full implementation of the new reliability based policy.

3.8 Damage Claims Processing and Reporting

3.8.1 Claims Management Organization

Tampa Electric's damage claims handling is performed by the Claims Management group at TECO Energy, Inc. The group consists of the Manager of Claims Management, the Supervisor of Critical Claims, two Senior Claims Administrators, and a clerk. The Manager of Claims Management reports to the Vice President Risk Management/Treasury of TECO Energy, Inc.

This group provides customer claims assistance to Tampa Electric and other TECO Energy, Inc. subsidiaries after an accident has occurred. The Claims Management group also acts as claims adjusters and is on call 24 hours daily. The Claims Management group reports results to management through reports of open claims, new claims for the month, monthly amount paid on claims, and the amount paid annually. Tampa Electric states that records are retained for up to four years.

3.8.2 Claims Received 1999-2004

Exhibit 46 depicts the total dollars paid out for all types of customer property damage claims filed against Tampa Electric for the period 1999 through projected 2004. Tampa Electric was unable to break down property damage by damage caused by power-related sources, versus property damage due to incidents such as auto accidents. Annually claims payments averaged

$1.2 million over the period. In 1999 and 2000, Tampa Electric settled several abnormally large claims. Total annual payments were much lower in 2001 through 2004.

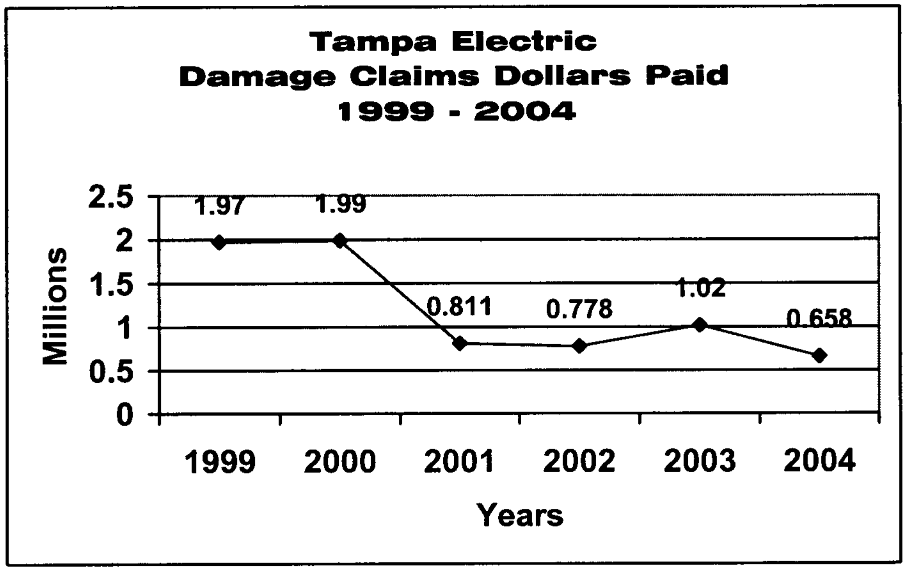


EXHIBIT 46 *Source: DR-1, Item 24*

No active attempt is made to inform customers of their right to file a damage claim with the company. Customers are notified on the back of their monthly bills that they can contact Tampa Electric if they have any questions or need information. The company's phone numbers and the FPSC's toll-free complaint number are provided for reference.

Tampa Electric employs several forms of media to inform customers on how to protect their homes and property against lightning strokes and power surges. This helps to reduce the claims related to energy delivery. Media employed in this effort includes press releases, advertisements, commercial newsletters, and the Internet.

3.8.3 Customer Damage Claims Processing and Reporting

Tampa Electric's STARS Risk Management Information System is used to manage and track the company's damage claims. Other than yearly upgrades to the system, no modifications or changes have been made to systems or processes during the review period.

According to the company, it does not establish objectives for damage claims programs. When asked about related performance measurements, Tampa Electric referred to the company's Claims Procedure Manual, which depicts guidelines for measurement regarding timely customer response and timely input into the STARS system.

As depicted in **Exhibit 47**, the process for resolving a damage claim begins with the customer contacting Tampa Electric to make a complaint. As described in the process for handling customer inquiries, a customer service representative will take down the address from the customer and mail a Customer Claim form.

Once completed, the Customer Claim form is sent to Tampa Electric's Risk Management Department. Risk Management conducts an investigation to verify that there was some type of trouble reported or indicated at the location and time where the damage was claimed to have occurred. If the investigation determines the location did experience trouble during the time in question, the claim is further investigated. Tampa Electric determines whether the trouble reported have caused the damage claimed and ultimately whether the company is liable for the cause of the damage. Once all elements of the claim have been looked at, the company will decide whether to pay the claim or not. If the decision is that the company should pay, the appropriate amount is determined, payment is made, and the case is closed. If the decision is that the company should not pay, the customer is informed of that decision. If a customer disagrees or has additional information, the customer may contact Tampa Electric to re-open the file.

Tampa Electric Company
Damage Claims Process
As of 12/31/2004

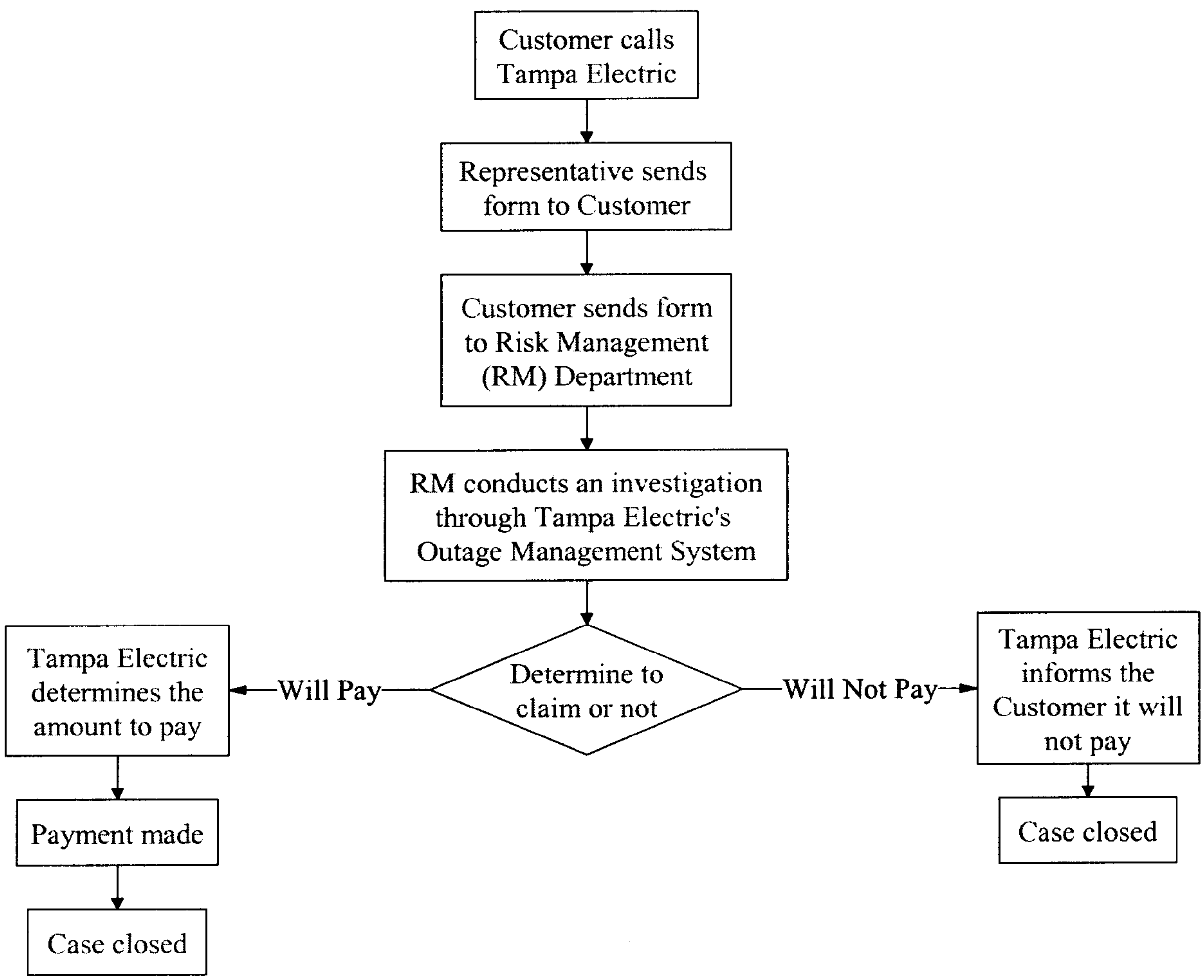


EXHIBIT 47

Source: DR-4

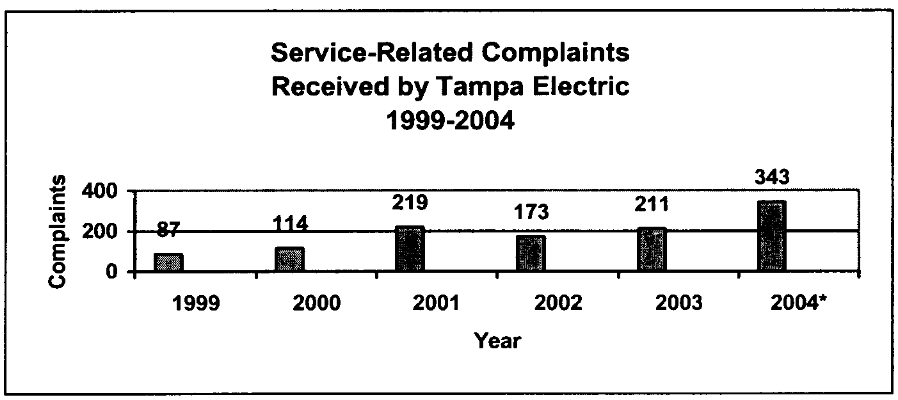
3.9 Customer Complaint Reporting

Both Tampa Electric and the Florida Public Service Commission monitor complaint levels received to assess customer satisfaction and quality of service. A large number of customer complaints are resolved directly by the company, while a relative few result in a complaint to the Commission's Division of Regulatory Compliance and Consumer Assistance for handling. The following discussions and graphs focus solely upon those complaints categorized as service-related and exclude billing-related complaints since the latter are generally not related to reliability issues,

3.9.1 Tampa Electric-Received Service Complaints

Exhibit 48 shows the number of service-related complaints received by Tampa Electric from its customers each year during the period 1999-2004. Service complaints varied widely throughout the period, beginning at 87 for 1999 and 114 in 2000. In 2001, they nearly doubled to 219. In 2002, the total dropped 21 percent to 173 then rebounded by 22 percent in 2003. During 2004, service-related complaints rose, doubtlessly due in part to customer responses to hurricane outages.

Tampa Electric states that during 2003, as a part of Project Phoenix, it identified certain aspects of its customer complaint process that were fragmented and inefficient. As a result, during the fourth quarter of 2003, a Customer Complaint and Resolution Initiative was begun as a means to track and resolve customer complaints in a more orderly fashion. During 2004, the company began to use the WorkPro system to enter information regarding customer complaints where additional field work may be needed. The company trained supervisors in its customer care and field operations units to use this system to more quickly resolve customer complaints.



**As of 9/30/04*

EXHIBIT 48 *Source: DR-1, Item 26*

3.9.2 FPSC-Received Service Complaints

Exhibit 49 depicts total FPSC-logged service-related inquiries for the years 1999 through 2004. These reflect the total inquiries received for the following FPSC tracking categories: delay in connection, electric outage, failure to respond, repair problem, improper disconnect, and electric damage. Inquiries regarding Tampa Electric steadily increased over the period, tripling from 18 in 1999 to 55 in 2002. During 2003, service-related inquiries grew by 24 percent to 68.

The 2004 total increased another 24 percent to 84 inquiries, which includes the impact of hurricane-related complaints.

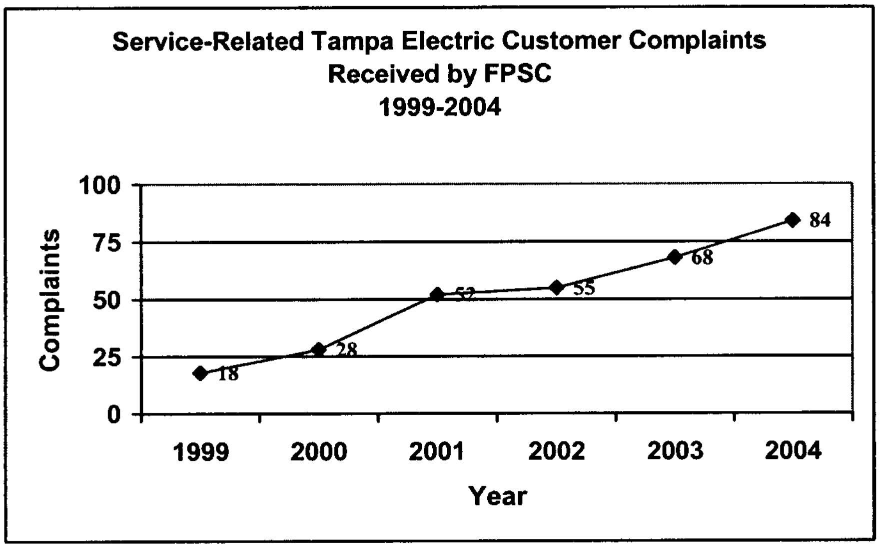


EXHIBIT 49 *Source: FPSC Consumer Activity Tracking System*

3.9.3 Tampa Electric Customer Satisfaction Survey

According to Tampa Electric, results of customer satisfaction surveys indicate that, on average, its customers are satisfied with the quality of electric service they are receiving. Approximately 94.0 percent of the customers responding to the surveys administered from 2000 through 2003 indicated they were either "satisfied" or "very satisfied" with the quality of electric service that they were receiving. The highest dissatisfaction rate of customers responding to the surveys was six percent. When asked about the effect of interruptions, most customers (an average of 77.5 percent) stated short outages of less than one minute had the least impact on them, whereas an occasional long outage of approximately 50 minutes was more of an inconvenience.

Tampa Electric also uses a mail survey. In 1997, the sample size was increased from 2,000 to 4,000 customers to increase the reliability of the survey to the range of plus or minus two to three percent.

The objectives of each survey can vary also. One survey may be comprehensive in nature, gathering customer perceptions on the company's image, to determining the effect of voltage fluctuations, while another may focus on how many momentary interruptions are considered an inconvenience by the customer. The objective of this effort is to identify perceived dissatisfaction by the customer and to develop ways to address and reverse such dissatisfaction. The results of the customer satisfaction surveys are also included as a component in the calculation of Tampa Electric's contribution to the "Success Sharing" program, which is a part of employees' compensation.

Tampa Electric's customer satisfaction surveys are conducted quarterly by staff within the Energy Services and Planning Delivery Business Unit who are experienced and qualified in research techniques. Personnel from Energy Delivery requesting the survey will work with the Research personnel in designing and developing the survey to be used--in some cases, a previous survey will be acceptable.

The company sets a customer favorability goal that measures customers' overall opinion of the Tampa Electric, which includes indicators such as quality of service, reliability, etc. **Exhibit 50** contains the goals and achievements for 2000 through 2004.

Tampa Electric Quality of Service Goals and Achievements 2000 through 2004		
Year	**Customer Favorability Goal**	**Actual**
2000	91%	92%
2001	91%	95.5%
2002	91%	96%
2003	94%	95%
2004	94%	96%
2005	95%	TBD

EXHIBIT 50 *Source: DR-1, Item 14*

4.0 CONCLUSIONS

4.0 Conclusions

This section of the report provides BRR staff conclusions and recommended solutions for improving conditions observed regarding company reliability performance.

4.1 Distribution Reliability Has Declined

Tampa Electric's Annual Reliability Reports indicate that its SAIDI and CAIDI indices have increased substantially during the review period. SAIFI and MAIFIe indices have also increased. Further indication of a need for improvement is the company's failure to attain its internal reliability incentive goals for SAIDI and MAIFIe in 2003 and 2004.

The company states, "the increase in Tampa Electric's distribution reliability indicators is primarily due to the implementation of a new outage management system." The Outage Management System (OMS), implemented in November 2001, allows the company to "capture more outages, accurately accounts for the initial outage times . . . and allows for step-restoration which accurately matches the correct number of customers with accurate restoration times." The company further states, "The rise in Tampa Electric's distribution reliability indicators specifically in 2003 and 2004 is primarily due to increased weather and lightning activity."

Staff agrees that the implementation of OMS in late 2001 increased the company's capability to measure outage information and could have caused some negative impact on reliability indices during late 2001 and possibly into 2002, the system's first full year of operation. However, the exact level of impact on indices has not been determined by staff or Tampa Electric. Staff notes that the company estimated that approximately ten minutes of increased SAIDI would result from OMS' enhanced capability. However, taking this potential ten-minute adjustment into consideration, substantial increases in Tampa Electric's reliability indicators remain to be explained.

While weather events did impact Tampa Electric and other utilities during 2004, staff notes many severe weather events have been excluded from company reliability indices. Regarding lightning, despite the increased recent stroke counts cited by the company, the company experienced higher levels of lightning-caused outages from 1999 through 2001 as compared to the period 2002 to 2004. Over the earlier period, the company maintained low SAIDI levels, ranging from 43 minutes in 1999 and 2000 to 46 minutes in 2001. By comparison, this measure ranged from 57 to 73 minutes between 2002 and 2004.

This increase is obviously much greater than just the 10 minutes expected as a result of OMS implementation. If this 2004 SAIDI level of 73 minutes is adjusted back to "pre-OMS levels" by subtracting the company's estimated ten minutes added by the system's increased measurement capabilities, the resulting 63 minutes of average system interruption would still represent a 46.5 percent increase over the 43 minutes recorded in 2000. Staff believes that the company's reliability indices indicate that OMS and weather events are not the only reasons for increased Tampa Electric outages and indices.

In Section 3.2.1, staff notes that other factors could be at work, including service area-specific trends, reduced spending, and reduced staffing. Four of the company's seven divisions experienced sharp increases in SAIDI and in numbers of outages in recent years. Staff noted that, as discussed in Section 3.2.1, distribution repair response time has increased substantially in recent years, despite corrective distribution reliability programs such as Project Phoenix, which is described in Section 3.6. These trends indicate a need for focused study and corrective action by management.

4.2 Vegetation-Related Outages Have Increased

Over the period 1999 through 2004, vegetation-caused outages for Tampa Electric grew steadily from 900 to 1,880 – an increase of 109 percent. In 2001, 2002, and 2003, the annual increases in this outage category were 24 percent, 48 percent, and 20 percent. Only during 2004, a year in which numerous hurricane-related vegetation outages were excluded from the figures, do the totals show a reduction of 6 percent.

Spending for vegetation management has fluctuated in recent years. Between 2000 through 2002, spending ranged from $6.7 to $6.8 million. For 2003, spending fell 22 percent to $5.2 million. Staff does note that total vegetation management spending increased to $5.438 million in 2004 and that Tampa Electric's 2005 budget calls for about $5.974 million in trimming program spending. The 2005 budgeted figure for transmission trimming represents a more than 250 percent increase over 2004 spending in that area. However, the 2005 budget for distribution line clearing is about six percent lower than the 2004 spending level.

Since the increases in vegetation-related outages began well before the new OMS implementation, staff believes it is unlikely that the sharp increase can be attributed to that system change. Staff believes Tampa Electric should continue to reassess its tree-trimming efforts and expenditures and set goals to substantially reduce future vegetation-caused outages.

4.3 Distribution Substation Outages Have Increased

During 2004, distribution substation outages totaled 93 – an increase of 72 percent from the 2003 total of 54 outages. The 2004 total more than tripled the count from four years earlier, when 2001 distribution substation outages numbered 30.

The sharp increases in distribution substation outages generally coincided with expenditure reductions for both distribution and transmission substation maintenance. Total substation maintenance spending over the 1999 to 2004 period dropped by 43 percent. Most of this expenditure reduction occurred between 2001 and 2004.

Between 2001 and 2003, ongoing preventive substation maintenance spending declined from $1,647,000 to $451,000, a drop of 73 percent. In 2004, ongoing spending recovered somewhat to $807,000. However despite this improvement, 2004 spending in this category was still 49 percent below the 2001 level. For 2005, the company has budgeted just $440,291 for ongoing substation maintenance – about half of its 2004 spending level and slightly below the 2004 budget figure.

Regarding the increase in 2004 distribution substation outages, the company notes that it is researching the problem and observes that the most frequent outage cause was interference by animals. Beginning in 2004, the company did broaden its policy on substation animal guard application by requiring that all new substation construction, as well as most substation retrofit projects, would include the addition of animal protection on key substation components.

In light of the increased animal outages that still occurred during 2004, staff urges Tampa Electric to examine options such as expanding its retrofitting animal guards on substations. The company reports that a study of animal outage prevention measures will be completed during the third quarter of 2005. Staff notes that the second leading cause of substation outage time over the last three years has been breakers and leads. The company may also benefit from studying the causes of outages in this category.

Staff believes these studies may assist in identifying solutions to increased substation outages. However, staff also urges the company to revisit its decision to reduce substation inspection frequency and to review the adequacy of substation maintenance expenditure levels.

4.4 Preventive Reliability Spending Increased in 2004

After declining during 2002 and 2003, Tampa Electric's spending for ongoing preventive programs aimed at reliability maintenance increased notably in 2004. Last year, preventive maintenance program spending highs (excluding hurricane-related costs) were reached for the 1999 through 2004 period in the distribution and transmission areas. The company's 2005 budget promises even more attention to preventive programs.

Between 2001 and 2003, preventive distribution reliability program spending fell 19 percent from $7.004 million to $5.661 million. During 2004, this spending rebounded by 35 percent to $7.641 million. For 2005, budgeted expenditures of $9.996 million would represent a further increase of 31 percent over 2004 spending.

Preventive program spending for transmission reliability increased slightly from 2001 through 2003, then jumped by 27 percent in 2004. If attained, the 2005 budget would represent a further spending increase of 15 percent in the transmission area.

Still, total combined distribution and transmission reliability-related spending, which includes both preventive and corrective efforts, declined by 11 percent in 2004 to $31.687 million, after having fallen by 7 percent during 2003. For 2005, the company has budgeted $30.911 million -- a reduction of about 2.4 percent from its 2004 spending.

Staffing for positions involved in frontline distribution reliability functions declined by 15 percent between 2000 and 2004. The distribution bargaining unit employee staffing level for

2004 represented a 13-year low. Staff believes the company should review its workforce requirements and the impact on its reliability results.

Staff believes the 2004 increases in ongoing preventive program spending were significant steps by the company toward improving its service reliability results. In some areas, the increased spending levels may need to be sustained to achieve improvement in reliability indicator results. Staff urges the company to continue to focus increased attention on system maintenance and reliability.

5.0 Company Comments

5.0 Company Comments

This chapter contains company comments in response to each of staff's four conclusions presented in Chapter 4.0. These comments are reproduced below as presented by Tampa Electric.

5.1 Distribution Reliability Has Declined

Company Comments:

Tampa Electric recognizes the overall decline in electric service reliability in recent years. Recognizing the importance of reliability to overall electric service, the company believes it should continue to set rather aggressive goals to prompt innovative, creative solutions with enhanced utilization of the workforce to improve reliability. As described thoroughly in the report, Tampa Electric increased spending and implemented ideas in 2004 to turn reliability performance around. This effort is reflected in the leveling of the trend and slight improvement of SAIDI performance in 2004. The company will continue to focus its efforts and resources towards improving its reliability performance.

5.2 Vegetation-Related Outages Have Increased

Company Comments:

Tampa Electric agrees that in reviewing budget data, vegetation management spending has fluctuated in recent years. For 2003, spending was down as noted in comparison to the previous three years. Actual spending in 2004 represented a 4% increase over 2003 spending. The 2005 vegetation management budget of $6.0 million represents a 10% increase over 2004 actual spending of $5.4 million with a focus on reliability-based tree trimming. As with all company programs, Tampa Electric will continue to assess its tree-trimming efforts and expenditures and attempt to reduce future vegetation-caused outages.

5.3 Distribution Substation Outages Have Increased

Company Comments:

In the Document Request 4-13a response dated February 11, 2005, Tampa Electric stated that prior to 2002, substation inspections were scheduled monthly. Since 2002, this interval was reduced to a quarterly interval. This change in schedule was necessitated due to a heavy circuit switching schedule to support workload associated with new construction. During these switching operations, *substation personnel are in substations and do a cursory review of the facility. This reduction in inspection frequency has not generated a proportional increase in corrective work in substations; therefore at this time, the company believes the frequency is appropriate.*

Tampa Electric has completed its survey of all distribution substations for animal protection. Based on this survey, Tampa Electric will continue to install animal protection on all new substations and during upgrades to existing substations.

Regarding outages related to breakers and leads, Tampa Electric has instituted a policy to review misoperation of distribution breakers and undertake the necessary corrective work. Overall, Tampa Electric will continue to review the adequacy of its substation maintenance expenditure levels.

5.4 Preventive Reliability Spending Increased in 2004

Company Comments:

As recommended by Staff, the company has and will continue to focus on system maintenance and reliability, including its workforce requirements. Tampa Electric reviews its workforce requirements on an ongoing basis and to-date in 2005, the company has added 15 Apprentice Linemen that help support frontline distribution reliability activities throughout its entire service area.

APPENDIX

Glossary of Terms

Arresters - or Surge Arrester - Device that protects lines and equipment against voltage surges caused by lightning, equipment switching, or abnormal system conditions. The surge arrester is connected from the line to ground to provide a conducting path. This limits the voltage on lines or equipment and dissipates excess energy harmlessly.

CAIDI - Customer Average Interruption Duration Index - Measure of the average duration of interruptions experienced by the customers interrupted.

Capacitor - An electrical device that maintains or increases voltage in power lines and improves the efficiency of the electrical system by reducing inductive losses that produce wasted energy.

CEMI5 - Customers Experiencing Multiple Interruptions Index - Measure of the total number of customers experiencing more than a certain number of sustained outages relative to the total number of customers served.

CSR - Customer Service Representative.

Distribution Feeder Line - A distribution feeder is the main circuit or trunk line that carries electricity to residential and commercial customers.

Feeder - An electric circuit with limited capacity extending from the main distribution line feeder, usually supplying a small number of customers (often used interchangeably with "circuit").

FPSC - Florida Public Service Commission

Interruption - Interruption of electric service to a customer, usually of one minute or more in duration. Usually excludes Momentary Interruptions, defined below.

kVA - Kilovolt-amperes - A unit of electrical force equal to 1,000 volt-amperes. The kilovolt-ampere is the practical unit of apparent power.

L-BAR - Average length of all service interruptions experienced, this measure is not weighted for the number of customers affected by an interruption.

MAIFIe - Momentary Average Interruption Event Frequency Index - Measure of the total number of customer momentary interruption events relative to the total number of customers served.

Momentary Interruption - Interruption of service to a customer of less than one minute in duration. Usually represents loss of power for a fraction of a second caused by transient conditions, such as tree limbs or animals contacting with components of the distribution system. Momentaries can cause air conditioners to quickly shut off then back on, and many digital clocks to reset to 12:00.

N - Number of Interruptions, as reported in the Distribution Service Reliability Report to the FPSC.

Outage - In a strict sense regarding electric distribution, the condition of a piece of equipment being out of service, which may not result in service interruption to customers, for example through the use of circuit breakers and switching. Term is also used more loosely as interchangeable with interruption of service.

Padmount Transformers - Transformers located on the ground on concrete pads and protected by steel cabinets. This type of transformer is used in conjunction with underground distribution systems.

SAIDI - System Average Interruption Duration Index – This is a measure of the average duration of interruptions for the total number of customers served by the system (conceptually equivalent to CMI/C and SU).

SAIFI - System Average Interruption Frequency Index – This index is a measure of the average frequency of interruptions for the customers served by the system.

Substation - An assemblage of equipment designed for switching, changing or regulating the voltage of electricity. This definition does not include service equipment, line transformers, line-transformer installations, or minor distribution or transmission equipment. High electrical voltages from 69,000 to 765,000 volts are required to move electricity through transmission lines across great distances. Electric motors and appliances are not designed to use electricity at these high voltages, so voltage reductions must take place at a substation near a community served or along the transmission line serving a very large customer.

Transformer - An electromagnetic device that increases the voltage of electricity as it leaves the power plant so it can travel long distances or that lowers the voltage of electricity for distribution.

Trouble Ticket - Generic term referring to a trouble call received from a customer and the resulting work order to resolve the problem. Trouble tickets may or may not involve an interruption of service.