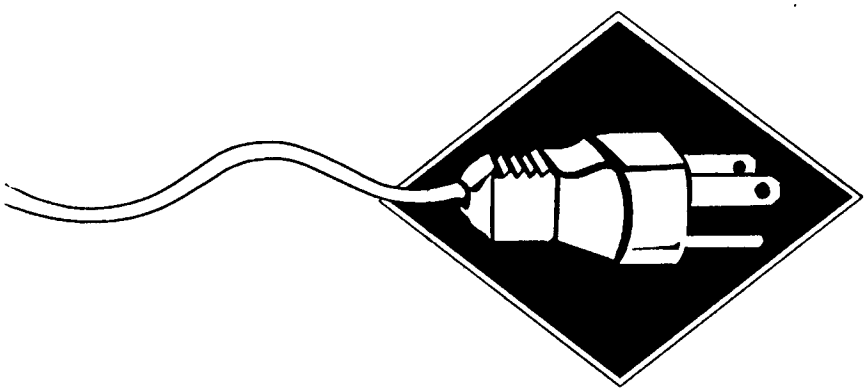
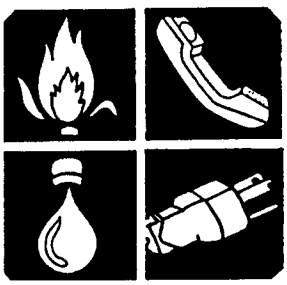


Preliminary Review of

Vegetation Management, Lightning Protection and Pole Inspection at Florida Power & Light Company

July 2005

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



1.0 Background

1.1 Objectives

This preliminary review of Florida Power & Light Company (FPL) was conducted on behalf of the Florida Public Service Commission (FPSC) by the Bureau of Regulatory Review (BRR) within the Division of Competitive Markets and Enforcement. The review was requested by the Division of Economic Regulation to learn more about each Florida investor-owned electric utility company's efforts to maintain and improve distribution and transmission service reliability during the period 1999-2004. The review objectives were as follows:

- To provide an update of reliability information originally gathered through the reliability review reports published in December 1997 and November 2000,

- To document and evaluate any changes in corporate philosophy; company organizational structure; operational procedures; monitoring and measurement systems; 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 specifically examined FPL's approach to protecting its system and its customers against three outage causes: vegetation, lightning, and pole failure. The scope for this preliminary review was limited to these three focus areas to allow for timely completion of the review for use in the company's pending rate increase proceeding. Staff plans to complete the full reliability review of FPL at a later date.

This preliminary review encompasses the period 1999-2004 and the company reliability results, programs, and improvement efforts during that period. To an extent, it also documents current plans as reflected in 2005 budget data. This report examines relevant data and information in order to determine whether reliability in each of the three focus areas changed over the period 1999-2004. To do so, staff focused on the following data and sources:

- Written company procedures
- Annual Distribution Reliability Reports filed with the FPSC
- Company-monitored reliability data
- Company internal audit reports

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 FPL distribution and transmission improvement programs and activities. In-person and

teleconference interviews were conducted with company managers to better understand procedures, processes, systems, and improvement efforts for each focus area. 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 study period.

1.4 Reliability Results

The four tables below show FPL's distribution reliability performance for system outage duration and frequency and customer outage duration during the period 1999-2004. These and other indices are used by the company and the Florida Public Service Commission to assess overall reliability performance. These performance indices have also been provided for each of the specific areas reviewed.

FPL Overall Company Reliability Results				
Year	Outages	SAIDI[1]	CAIDI[2]	SAIFI[3]
1999	86,647	75.2	60.6	1.24
2000	86,728	70.3	58.3	1.21
2001	87,927	69.1	56.6	1.22
2002	94,559	68.2	52.8	1.29
2003	96,255	68.2	50.5	1.35
2004	88,966	69.7	57.3	1.22

FPL Distribution Vegetation Reliability Results				
1999	12,303	10.3	66.8	0.15
2000	12,394	9.5	67.2	0.14
2001	13,417	11.3	68.6	0.16
2002	16,906	11.5	68.0	0.17
2003	19,307	14.4	71.3	0.20
2004	15,225	12.8	73.9	0.17

FPL Distribution Lightning Reliability Results				
1999	4,598	9.7	71.3	0.14
2000	5,183	9.0	72.3	0.12
2001	5,013	7.5	67.2	0.11
2002	4,625	6.9	60.6	0.11
2003	5,074	7.7	66.8	0.12
2004	4,212	7.8	68.6	0.11

FPL Distribution Pole Reliability Results				
1999	117	0.2291	54.7	0.0042
2000	121	0.2327	62.6	0.0037
2001	151	0.2199	51.3	0.0043
2002	132	0.1327	53.8	0.0025
2003	98	0.3278	56.8	0.0058
2004	158	0.8154	66.1	0.0123

Table 1

1.5 Overall Opinion

Based on a focused review of the three functional areas of vegetation management, lightning protection, and pole inspections, staff's overall opinion for each area is provided below. Staff findings related to vegetation and poles are described in greater detail in Section ***5.0 Conclusions***.

1.5.1 Vegetation

Staff has found that FPL's vegetation-related outages increased during the period and remained above the 1999 level in 2004. FPL vegetation–related SAIDI, CAIDI, and SAIFI also increased during the period. The number of total distribution line miles FPL trimmed decreased in 2000-2001, but increased during 2002-2004.

1.5.2 Lightning

Staff's review of FPL's lightning protection efforts during the period revealed that FPL has adequately addressed lightning protection. No issues were identified by staff.

1.5.3 Poles

Staff has found that FPL may not be completing sufficient numbers of formal specific pole inspections throughout its territory to identify the condition of deteriorated poles in a timely manner. Staff has also found that FPL has not procedurally documented a cycle completion period for formal specific pole inspections in order to ensure all distribution poles have been inspected and their condition documented.

[1] SAIDI - System Average Interruption Duration Index
[2].CAIDI - Customer Average Interruption Duration Index
[3] SAIFI - System Average Interruption Frequency Index

2.0 Vegetation Management

2.1 Programs and Controls

In June 2003, FPL organized its vegetation management organization into separate Distribution and Transmission organizations within the Power Systems business unit. Distribution vegetation management is headed by the Manager of Distribution Vegetation Management, reporting to the Director of Operations Support, under the Vice President for Distribution Operations.

The Supervisor of Transmission Vegetation Management reports directly to the Manager of Transmission Operations. The Manager of Transmission Operations reports to the Director of Transmission/Substation Operations, who reports to the Vice President of Transmission operations. Vegetation trimming for both distribution and transmission organizations is performed by outside contractors. Separate groups of contractors and crews are used by the distribution and transmission vegetation management organizations.

The goal of FPL distribution and transmission vegetation management is to target and manage the growth of vegetation encroaching on its circuits and rights of way in order to prevent potential outages and provide safe, reliable, and cost-effective electric service.

2.1.1 Distribution

Prior to 2004, FPL's distribution vegetation management policy required feeders to be trimmed on a variable cycle averaging three years, with "hot spot" trimming of feeders and customer trim requests on laterals. In 2004, FPL altered its policy to combine scheduled trimming for both feeders and laterals between substations into the same trim cycle. This policy change will combine lateral and feeder line vegetation trimming into a single cycle to reduce outages due to lateral line vegetation.

In 2003, FPL modified its Customer Trim Request program to reduce the number of unplanned requests. The program reduced FPL trim requests during 2003 and 2004 and redirected distribution vegetation contractor resources to completing more miles of scheduled trimming. Requests located within FPL's trimming responsibility and identified to be non-hazardous are redirected to scheduled maintenance trimming. Customer requests inspected and found to be within FPL's trimming responsibility and considered hazardous are immediately scheduled to be trimmed.

All distribution vegetation work including line clearing, removals, inspections, and restoration work are completed by contractors. Established benchmark measures are used to evaluate contractor performance in total miles of trimming completed, feeder miles completed, cost effectiveness, crew productivity and safety. FPL sets annual feeder and lateral trim mile objectives, which are tracked separately. Internally, distribution vegetation management is also measured against reliability indices and annual targeted objectives in reduced vegetation-related customer interruptions. One of distribution vegetation management's most important target

objectives for each year is the number of miles trimmed. FPL met this objective in 2002-2004, but did not reach the objective in 1999-2001.

FPL distribution vegetation management arborists regularly review contractor crew performance and, in 2004, the Quality Assurance group began conducting audits of contractor productivity and quality performance. However, only one FPL internal audit was conducted on vegetation management during the period 1999-2004. FPL's internal audit department reviewed controls related to the accrual of liabilities associated with appropriate valuation of contractor services rendered, but not yet paid. The audit identified only one weakness in assuring that the Manager of Vegetation Management signs approvals for all quarterly accruals. The internal audit found one quarter when proper approval was not documented. No FPL internal audits related to transmission vegetation management were conducted during the period.

2.1.2 Transmission

FPL transmission vegetation management policy is to target only those plants that are incompatible with FPL's use of the land and allow natural competition from desired species to reduce influx and growth of the target species. The transmission system is organized into four transmission management areas. Within each geographic area, smaller vegetation management units called "corridors" are established. Each corridor is further divided into contiguous homogeneous groups of trees or plants with distinguishable characteristics and land use. These are called "stands."

The stand is the basic management unit and generally consists of more than a transmission span in length. Each stand is field inventoried and organized into descriptions of vegetation species, use, acreage, density, height, growth rate, fire hazard and accessibility. The stands are also organized into "work prescriptions." The descriptions and prescriptions are organized and entered into the Transmission Vegetation Management System and scheduled to meet annual vegetation plan objectives. Upon the completion of scheduled work, a new prescription and schedule are written and the cycle continues.

All transmission tree trimming, clearing, mowing, and spraying is outsourced to contractors. FPL transmission vegetation management uses contract arborists to monitor condition assessments and ensure vegetation policies are followed in each area by trim crews. Condition assessments examine rights of way for trees growing or falling into the line, conditions for possible fires, blocked access to the right of way by vegetation, and possible environmental issues impacting vegetation efforts. Condition assessments are completed bi-annually by contractors and are used to update the documented prescription of work.

2.2 Budget and Expenditures

FPL distribution vegetation reliability budget dollars increased 42.5 percent during the period: from $30.6 million in 1999 to $43.6 million in 2004. At the same time, actual distribution vegetation expenses increased 26.4 percent during the period: from $32.9 million in 1999 to $41.6 million in 2004. FPL's distribution vegetation maintenance expenditures per mile trimmed increased from $3,504 in 1999 to $3,737 in 2000 and peaked at $4,245 in 2001. Expenditures per mile trimmed decreased from the $4,245 high in 2001 to $3,924 in 2002, to $3,953 in 2003, and reached its lowest level of $2,743 per mile in 2004.

Transmission vegetation budget dollars increased 35 percent over the period, ranging between $2.3 million in 1999 and $3.1 million in 2004. Actual transmission vegetation expense increased 50 percent over the period and ranged from $2.6 million in 1999 to $3.9 million in 2004.

2.3 Reliability Results

FPL's Annual Distribution Reliability Reports for the period 1999-2003 show an increasing trend in vegetation-related outages. FPL's vegetation-related outages increased 23.8 percent during the period or about 4.0 percent on average per year. These outages increased 56.9 percent between 2000 and 2003, although vegetation-related outages dropped 21.1 percent in 2004. Vegetation-related outages in 2004 remained above the 1999 outage level by 23.8 percent. The following table shows FPL vegetation-related outages and the annual percent of increase during the period.

FPL Distribution Vegetation Outages		
Year	Outages	Customer Interruptions
1999	12,303	580,015
2000	12,394	537,434
2001	13,417	641,304
2002	16,906	679,954
2003	19,307	826,750
2004	15,225	726,900

Table 2

FPL states the increased vegetation-related outages during this period were primarily associated with reduced miles of lateral trimming. This means that lateral lines did not receive cyclical trimming similar to feeder circuits and were often the cause of vegetation-related outages during the period 2000-2003. The company said that the reduction in lateral trimming was primarily the result of competing resources associated with customer trim requests and increased restoration activities due to weather. The table below, shows that FPL reduced its trimming of lateral circuits during 2001-2003 and increased feeder miles trimmed.

FPL Distribution Lateral and Feeder Trimming Miles					
Year	Feeder Miles	Lateral Miles	Total Trimmed	System OH Miles	Percent of System OH Miles
1999	3,845	2,823	6,668	38,510	16.9%
2000	3,455	3,145	6,600	40,201	16.4%
2001	4,069	1,867	5,936	40,458	14.7%
2002	5,356	1,294	6,650	40,679	16.3%
2003	5,282	1,902	7,184	41,122	17.5%
2004	4,379	4,911	9,289	41,144	22.6%

Table 3

The total percent of system overhead miles trimmed decreased in 2000 and 2001, but increased during 2002-2004.

Company data shows that, in 1999, FPL completed 6,668 miles of tree trimming for the year. In that year, FPL reports it reduced the number of interruptions due to trees by 20 percent. In 2000, FPL completed 6,600 miles of tree trimming. In 2001, FPL trimmed 5,936 miles of feeders and laterals. FPL data shows that, in 2001, approximately 71,931 customer interruptions were due to the reduced number of vegetation trimming miles completed. FPL data also shows that a mileage shortfall in vegetation trimmed was partially due to higher tree density and removal rates. According to FPL data, 43,356 additional customer interruptions were due to higher-than-expected outages on untrimmed lateral lines during 2001.

In 2002 and 2003, FPL completed more feeder trimming miles, but did not substantially increase lateral trimming miles. In 2003, FPL revised its customer trim policy to reduce the amount of discretionary customer-requested trimming and to maximize regular scheduled maintenance trimming. Company data indicates that between 1999 and 2003, FPL trim miles increased by 7.7 percent. In 2004 alone, FPL vegetation trimming miles increased by 29.3 percent, from 7,184 miles in 2003 to 9,289 miles of trimming completed. This was partially due to FPL putting on additional crews in December to meet the year-end target of 8,935 miles.

As previously stated, FPL's distribution vegetation management goal is to target and manage the growth of vegetation encroaching on its circuits and rights of way to prevent potential outages and provide safe, reliable, and cost-effective electric service. Staff believes that increased vegetation outages during the period indicate FPL distribution vegetation management did not fully reach its goal of reduced outages and reliable electric service.

As shown in the table below, vegetation-related SAIDI increased by 24.3 percent during the period, from 10.3 minutes in 1999 to 12.8 minutes in 2004. Vegetation-related CAIDI increased by 10.6 percent, from 66.8 minutes in 1999 to 73.9 minutes in 2004. Vegetation-related SAIFI increased by 13.3 percent, from 0.15 interruptions in 1999 to 0.17 interruptions in 2004.

FPL Distribution Vegetation SAIDI, CAIDI and SAIFI			
Year	SAIDI	CAIDI	SAIFI
1999	10.3	66.8	0.15
2000	9.5	67.2	0.14
2001	11.3	68.6	0.16
2002	11.5	68.0	0.17
2003	14.4	71.3	0.20
2004	12.8	73.9	0.17

Table 4

In the area of transmission, vegetation-related outages have been relatively insignificant, compared to distribution vegetation-related outages and total transmission outages. Of the total 2,538 outages during the period, the primary outage cause was birds, with 602 outages, followed by lightning, with 505 outages. The total of 82 vegetation-related outages represented 3.2 percent of all transmission outages during the period. The chart below shows annual transmission vegetation-related outages during the period and the percent of total transmission outages annually.

FPL Transmission Vegetation Outages		
Year	Outages	% of Total Outages
1999	13	2.9%
2000	19	4.2%
2001	19	4.2%
2002	6	1.5%
2003	17	4.2%
2004	8	2.0%

Table 5

3.0 Lightning Protection

3.1 Programs and Controls

Based on staff's review of lightning-related data and stable lightning-related results, staff believes FPL has adequately addressed lightning protection during the period 1999-2004. FPL appears to have met its goal of mitigating the effects of lightning, even with a substantial increase in lightning strokes during 2003 and 2004.

3.1.1 Distribution

Several groups within FPL's distribution organization are responsible for performing lightning protection efforts. Lightning protection is incorporated into FPL maintenance & reliability, new construction, and restoration activities. FPL lightning protection philosophy is documented in the Distribution Construction Standards and the Distribution Engineering Reference Manual. Over the years, FPL has engaged in a number of activities to assess the impact of lightning on distribution reliability. The goal of FPL lightning-related activities is to mitigate the effects of lightning through short-term and long-term results.

The backbone of FPL's short term distribution protection program is its use of lightning arresters. FPL also uses thermovision inspections to identify lightning arresters showing signs of overheating in an early prefailure mode for replacement. Longer range programs of research and development are also implemented to further mitigate lightning damage through the development of model feeder design and construction, aimed at reducing the effects of direct and indirect lightning strokes. FPL reduces the risk of lightning outages through the use of heavy-duty surge arresters, regular thermovision inspections, and research and development that has improved system protection design against lightning. FPL research and development shows that, in most cases, existing protection and framing standards are adequate for near by lightning strokes. FPL's research and development program constructed a section of distribution line using recommendations from technical research and is currently monitoring this section to further evaluate potential benefits of the improved design under operational field conditions.

FPL's thermovision program was started in 1998 to identify and replace distribution equipment in a prefail mode to prevent equipment failure outages. The program consists of four vans specially equipped with thermographic cameras and four two-man teams trained to identify potential equipment hot spots prior to equipment failure. In 1999, FPL expanded the thermovision program to verify the location of arrester stations to ensure their compliance with FPL standards.

In 2003, FPL added visual pole inspections as part of the thermovision program. During the period 1999-2004, FPL completed 3,422 thermovision feeder inspections. The number of thermovision feeder inspections increased 25.1 percent, from 561 circuits in 1999 to 702 circuits in 2003. In 2004, the thermovision program inspected 612 of the company's 2,863 distribution feeders, or about 21.4 percent of the total. The 612 inspections completed in 2004 represent a decrease of 12.8 percent from 2003.

3.1.2 Transmission

FPL's transmission facilities inspection and lightning protection efforts are shared by the entire transmission/substation organization. Contractors are used to outsource bonding and grounding projects, field ground resistance measurements, and initial grounding projects. FPL's current transmission design standard and installation specifications for bonding and grounding are included in FPL's Transmission Installation Specification Book. The specification also addresses substation lightning shielding, protection and control, and transmission line protection. FPL also occasionally outsources lightning shielding protection of substations to contractors.

Transmission lightning-related improvement programs include:

- Event response root cause analysis of momentary and transient interruptions,
- Performance evaluations of lightning metrics,
- Climbing inspections integrating ground resistance measurements with the inspection of transmission facilities, and
- Standard design reviews of transmission structure design and standards for bonding, grounding, structure insulation levels, phase spacing and shielding.

3.2 Budget and Expenditures

As described in Section 3.1, several groups within FPL's distribution organization are responsible for performing lightning protection efforts. Lightning protection is incorporated into FPL maintenance and reliability, new construction, and restoration activities. FPL's distribution lightning budget is employed to mitigate the effects of lightning through short-term and long-term results. Therefore, the budget activities reviewed by staff include the replacement of lightning arresters and the inspection of distribution equipment through FPL's thermovision program. The chart below shows lightning arrester and thermovision inspection expenditures during the period.

FPL Distribution	Lightning-Related Expenditures	
Year	Lightning Arresters	Thermovision
1999	$1,590,920	$2,549,351
2000	$1,852,948	$2,514,636
2001	$1,700,145	$4,126,872
2002	$1,893,821	$3,393,583
2003	$1,942,407	$3,311,737
2004	$2,332,694*	$2,807,929

* Expenditures estimated based on FPL data

Table 6

The annual expenditures for lightning arresters increased by 46.6 percent during the period 1999-2004. Expenditures for the period ranged between $1.6 million and $2.3 million. Thermovision expenditures for the period ranged between $2.5 million in 1999 and $2.8 million in 2004. This represents an increase of 12 percent in thermovision expenditures over the period.

Total expenditures for FPL's Camp Blanding lightning research and development program during the period was $1.4 million.

In 2000, transmission lightning-related expenditures were $263,030. In 2001 and 2002 lightning-related expenditures increased to $325,799 and $609,736 respectively before decreasing to $48,878 in 2003. In 2004, lightning-related expenditures again increased to $395,474.

3.3 Reliability Results

3.3.1 Distribution

FPSC Annual Distribution Reliability Reports for 1999-2004 show increased distribution lightning-related outages through 2003. The table below shows that lightning-related outages decreased in 2004 to below the 1999 level. Lightning outage levels peaked in 2000 and 2003. FPL notes that lightning stroke counts in its service territory were abnormally high in 2003 and 2004 compared to other years during the period.

FPL Distribution Lightning Outages		
Year	Outages	Customer Interruptions
1999	4,598	512,696
2000	5,183	471,244
2001	5,013	432,933
2002	4,625	454,292
2003	5,074	473,454
2004	4,212	474,050

Table 7

Customer interruptions caused by lightning-related outages dropped from 512,696 in 1999 to 474,050 in 2004, down 7.5 percent. In 2001, lightning-related customer interruptions dropped to its lowest level of the period at 432,933 interruptions, 15.6 percent below the 1999 level. However, customer interruptions increased 9.5 percent to 474,050, by year-end 2004.

In addition, FPL lightning-related SAIDI, CAIDI and SAIFI dropped from 1999 levels during the period, which further indicates improved lightning-related performance. The chart below shows FPL lightning-related SAIDI, CAIDI, and SAIFI levels for the period.

FPL Distribution Lightning-related SAIDI, CAIDI and SAIFI			
Year	SAIDI	CAIDI	SAIFI
1999	9.7	71.3	0.14
2000	9.0	72.3	0.12
2001	7.5	67.2	0.11
2002	6.9	60.6	0.11
2003	7.7	66.8	0.12
2004	7.8	68.6	0.11

Table 8

3.3.2 Transmission

The FPL transmission department evaluates transmission lightning performance through metrics including:

- Lightning outages per 100 thousand strokes,
- Outages per 100 circuit miles per year, and
- Corporate reliability measurements of SAIDI, CAIDI, MAIFI, N, M, and T

The total number of outages is identified as (N), Momentaries (M) are outages less than a minute, and Transients (T) are voltages that are experienced in the system, but do not directly impact customer service through outages or interruptions.

Lightning was the second highest cause for FPL transmission outages during the period 1999-2004, accounting for 505 of the total 2,538 transmission outages or 19.9 percent of the total outages. Lightning-related transmission outages increased 16.5 percent, from 85 in 1999 to 99 in 2004. The largest increase during the period was from 2002-2003 when this outage type increased 20.8 percent, from 77 to 93. However, FPL notes that during the period 1999-2004, the overall transmission lightning system performance has improved. Customer interruptions have decreased from 80,973 to 31,859 over the period, meaning that fewer customer interruptions related to lightning are experienced by transmission customers. In addition, FPL notes that SAIFI has decreased from 0.022 to 0.008 indicating that the system frequency of lightning events is very low.

4.0 Pole Inspection

4.1 Programs and Controls

FPL's distribution facilities inspection efforts are performed as part of maintenance and reliability, new construction, and restoration activities for distribution. The entire transmission/substation organization is responsible for transmission facilities inspections.

The goal of FPL pole inspection activities is to identify and treat, brace, or replace poles that endanger the provision of safe, reliable electric service and to minimize interruptions due to pole failures. FPL states the risk to the company for not completing company-wide distribution and transmission pole inspections is an increased exposure to interruptions associated with pole failures.

In the aftermath of the 2004 hurricane season, FPL hired a consultant to review its service restoration efforts, infrastructure resilience and overall performance in response to its customers affected by the hurricanes. The consultant commended FPL for its restoration plans, employee efforts, and implementation of its restoration plans. The consultant also offered over fifty enhancement recommendations in its report to FPL's Board of Directors. Within these recommendations, the consultant identified the need for a post-mortem process to evaluate infrastructure damaged and destroyed by the hurricanes to evaluate the reasons for infrastructure failure. When implemented, this review will provide invaluable insight into wood pole and other infrastructure failures.

4.1.1 Distribution

FPL's pole inspection activities consist of:

- Visual inspections completed in conjunction with the thermovision program,
- Employee assessments completed in conjunction with other planned and routine field work, and
- A specific pole inspection program through outsource contractors.

The objective of pole inspection activities is to identify poles that may need treatment, bracing, or replacement. Treating or bracing a pole can effectively extend the life of the pole, therefore, avoiding costs to replace the pole. FPL currently builds its distribution facilities to meet or exceed the National Electrical Safety Code (NESC) Grade B Construction criteria. FPL design specifications require poles to withstand wind speeds of at least 118.6 miles per hour. FPL specific pole inspection contractors follow guidelines for determining the structural stability of the pole in keeping with American National Standards Institute (ANSI) and NESC standards.

Many of the pole inspections completed by FPL are visual inspections completed in conjunction with the thermal inspections of distribution equipment on FPL's feeder lines. Since 2003, FPL thermovision employees have conducted visual inspections of poles to identify

obvious pole deficiencies, such as cracked cross arms and woodpecker holes. These conditions are reported, along with any other potentially faulty equipment identified, to the local work centers for resolution. Visual pole inspections identify only conditions such as those mentioned and poles that are observed to be in need of replacement.

During the period 1999-2004, FPL completed inspections of 3,422 distribution feeder circuits through thermovision. FPL does not document the number of visual pole inspections completed by employees during thermovision inspections. It estimates that, based upon an average of 113 wooden poles per feeder, a total of 386,002 visual pole inspections were completed during the period. In these inspections, FPL identified 1,678 poles, or .43 percent of the 386,002 poles viewed, required replacement.

Most of FPL's pole inspection activities are completed by field technicians prior to climbing a pole in their daily work. Field technicians are required to inspect the pole they will be working from to ensure it is safe to climb and complete the assigned work. FPL design guidelines and work methods require that poles encountered or involved in new construction, maintenance, or restoration projects be evaluated and, when necessary, replaced. However, FPL does not formally document or track the number of field inspections completed by its employees through day-to-day activities. Therefore, the impact of these inspections on identifying poles needing to be treated, braced, or replaced is not known.

The third element of FPL's pole inspection program is the specific pole inspection program. Since 1999, FPL's specific pole inspections have been completed by the same contractor. FPL does not assign a targeted percent of total poles planned for annual inspections. Instead, FPL assigns specific geographical areas to be inspected by the contractor. Contractor inspection activities include pole assessment for internal and external decay including sounding, boring, and inspecting the pole structure below ground level. This inspection provides a more thorough evaluation of pole conditions than does the visual inspection. Specific pole inspections represent the smallest portion of FPL's inspection program and the only formally documented inspections completed on distribution poles.

The current specific pole contract expired in December 2004 and will be bid by FPL during 2005. Controls for tracking the contractor's completion of specific pole inspections are included in the weekly reports of pole-by-pole inspections, the restorable pole summary, the nonrestorable pole summary, the maintenance summary, and the high ground wire readings for pole ground wires report. Contractor billed work is reported and verified through the weekly detail report and map work with unit costs and invoices submitted by the contractor.

FPL data shows that 83,144 inspections were completed through the specific pole inspection program during 1999-2004, or about 13,857 per year. These inspections were confined to the North Florida, West Palm Beach, and Boca Raton districts. FPL states that the specific pole inspection program has been directed toward the these districts for the last several years due to the older populations of poles in these areas. FPL also states that, in 2005, the specific pole inspection program will focus on the Boca Raton district because of a slight increase in the number of pole-related outages of all types over the last several years. FPL states

that, as a result of the small amount of total outages attributed to failed poles, there was no need for formal pole inspection programs in the other areas.

The 83,144 specific pole inspections completed during the period exceeded the scheduled total of 72,845 by 14.1 percent. As a result of the specific pole inspections, FPL treated 38,736 poles, representing 46.6 percent of the poles inspected, braced 2,202 poles, representing 2.6 percent of the poles inspected, and replaced 1,421 poles, representing 1.7 percent of the poles inspected.

Visual inspections identified a lower percentage of problem poles than did the more thorough specific pole inspections. In the visual inspections, FPL identified 1,678 poles, or .43 percent of the 386,002 poles viewed, as requiring replacement. However, through the specific pole inspections 1.7 percent of the 83,144 poles inspected were identified as needing replacement.

4.1.2 Transmission

FPL's inspection policy of transmission facilities consists of a combination of climbing inspections and visual inspections. FPL's transmission department has developed a transmission line climbing inspection manual and a ground assessment (patrol) guide as a subset of the climbing inspection manual. These documents guide contractors through the process required for completing climbing inspections and ground patrols.

Climbing inspections are performed on a cyclical basis for entire transmission line sections. Inspection cycles are established based on framing configuration, transmission components, customer counts, historical inspection information, and other criteria. Cycles are scheduled for three, four, or eight years, based on equipment conditions within the segment and climbing inspection results. Annual climbing inspections of transmission structures is generally outsourced and completed by contractors. The number of climbing inspections completed annually are tracked by FPL, but visual inspections are not included in total inspection counts.

FPL's transmission department inspects wooden poles on a three-year cycle as part of the Climbing Inspection program. Wooden pole inspections are documented in the transmission department's maintenance system. FPL transmission group does not track poles treated or braced, but does track the number of poles replaced. The table below shows the number of transmission poles replaced during the period 1999-2004.

FPL Transmission Poles Replaced						
Area	1999	2000	2001	2002	2003	2004
Central	336	219	422	430	283	101
North	761	224	600	339	195	115
South	316	468	311	474	176	425
West	533	414	288	340	914	846
Total	1,946	1,325	1,621	1,583	1,568	1,487

Table 9

Visual inspections are conducted through ground patrols by local service centers. Unlike climbing inspections, the transmission department does not consistently document the many

types of ongoing visual/ground patrols. FPL states that it identified 22,920 visual inspections of transmission equipment completed through ground patrols during the period.

Aerial inspections of transmission lines are conducted annually by helicopter or fixed wing aircraft. Aerial inspections are also used to visually inspect FPL transmission structures. Inspection results are entered into the Orion computer database, and update the status of transmission equipment and inspection results. Based on inspection results, work and replacement items are prioritized for budgeting, scheduled repair, or replacement.

4.2 Budget and Expenditures

Expenditures for the North Florida specific pole inspections ranged between a high of $668,735 in 2000 to a low of $265,350 in 2004. Total North Florida expenditures for pole inspections during the period were $2.2 million, which was 26.6 percent lower than budgeted. FPL explained that increased pole inspection expenditures during 2000, 2002 and 2003 in North Florida were due to a greater number of predicted pole failures by FPL. However, these anticipated pole failures did not materialize as projected.

Expenditures for West Palm Beach ranged between a high of $454,986 in 2001 to a low of $111,584 in 2003. Total West Palm Beach expenditures for pole inspections during the period were $1.4 million, which was 30 percent lower than budgeted. Boca Raton expenditures in 2004 were $76,382. FPL stated that the Boca Raton expenditures were due to accelerated work performed from the 2005 budget.

Transmission climbing inspections include the inspection of poles as a part of the total transmission structure. Climbing inspection expenditures ranged from a high of $1.3 million in 2001 and 2002 to a low of 1.0 million in 1999. Climbing inspection dollars for the period totaled $7.0 million.

4.3 Reliability Results

Based on FPL information, the distribution SAIDI index for pole outages rose during the period from 0.2 minutes in 2001 to 0.8 minutes in 2004. Additionally, the number of customers interrupted by pole-related outages also increased from a low of 9,880 in 2002 to a high of 51,679 in 2004. FPL states that pole-related outages are not currently a significant risk issue, representing 0.8 minutes of the company's 69.7 minutes of FPL's 2004 system average duration.

The number of transmission poles replaced during the period 1999-2004 was 9,530. Transmission pole inspections include assessment and reporting of current conditions of transmission components to prevent failure. FPL measures customer interruptions and SAIFI values associated with transmission pole failures. Transmission pole-related SAIFI was 0.015 for 1999 and 0.000 for all other years between 2000 and 2004. Transmission SAIFI for poles in 2005 to date remains at 0.000, as does customer interruptions for pole outages.

5.0 Conclusions

The following conclusions are made based on staff's evaluation of FPL's vegetation management, lightning protection, and pole inspection programs.

5.1 Vegetation Management

Finding 1: FPL distribution vegetation outages increased in 2000-2003 and may indicate a reduction in reliability during those years.

Description: FPL vegetation-related outages increased 23.8 percent during the period 1999-2004. As shown in the table below, these outages increased from 12,394 in 2000 to 19,307 in 2003 (55.8%) then decreased in 2004 to 15,225 (-21.1%).

FPL Distribution Vegetation Outages 1999-2004		
Year	Outages	% Increase
1999	12,303	-
2000	12,394	.7 %
2001	13,417	8.3 %
2002	16,906	26.0 %
2003	19,307	14.2 %
2004	15,225	-21.1%

As shown in the table below, FPL vegetation miles trimmed increased 39.3 percent, from 6,668 miles in 1999 to 9,289 miles in 2004. However, between 1999 and 2003 FPL's vegetation trim miles had only increased 7.7 percent.

FPL Distribution Vegetation Miles Trimmed 1999-2004		
Year	Miles	% Increase
1999	6,668	
2000	6,600	-1.0%
2001	7,803	18.2%
2002	6,649	-14.8%
2003	7,184	8.0%
2004	9,289	29.3%

FPL's distribution policy prior to 2004 required vegetation to be cleared from feeders on a variable cycle averaging three years. Prior to 2004, FPL trimmed lateral circuits on a "hot

spot" basis. This meant that laterals did not receive cyclical trimming similar to feeder circuits and were often the cause of vegetation-related outages during the period 2000-2003. In 2004, FPL expanded its variable cycle policy to include lateral circuits and is joining the feeder and lateral cycles for all circuits from each substation. This change in FPL's trimming philosophy may partially explain the drop in 2004 vegetation-related outages. Staff believes that FPL's vegetation-related outage reduction in 2004 may be, in part, due to a result in hurricane-related outage exclusions. The period 2000-2003 indicates a pattern of increased vegetation-related outages and reduced service reliability.

Impact: Continued increases in vegetation-related outages, caused by vegetation encroachment, impact overall service reliability through both momentary interruptions and service outages.

Company Response: FPL agrees that vegetation outages increased in 2000-2003. However, FPL does not agree that there has been a reduction in reliability during those years. FPL's SAIDI results, which encompasses both the average frequency of outages (SAIFI) and their average duration (CAIDI) and therefore, is the most relevant for customers, has actually decreased during this period. FPL's SAIDI results during this timeframe were:

	2000	2001	2002	2003
SAIDI	70.3	69.1	68.2	68.2

FPL's 2003 SAIDI level of 68.2 was achieved despite record lightning levels experienced in its service area. FPL notes that in 2003, as well 2004, FPL's SAIDI was the lowest of all the Florida IOU's.

5.2 Lightning Protection

Staff believes lightning protection has been adequately addressed by FPL and no issues were identified.

5.3 Pole Inspections

Finding 2: FPL's specific distribution pole inspections do not appear to be conducted throughout every service area in sufficient number, are not completed in a timely cyclical manner, and may allow degraded poles to go unidentified.

Description: FPL's specific distribution pole inspection program includes several activities to assess poles for internal and external decay including sounding, boring, and inspecting below ground level. As a result of these inspections, the pole may be treated or braced to extend the life of the pole or be replaced with a new pole.

Company documents indicate that only three geographic areas have been inspected (North Florida, West Palm Beach, & Boca Raton) by the specific distribution pole program during the period 1999-2004. Company responses indicate that a total of 83,144 specific distribution pole inspections were completed in the five-year period and that no other specific pole inspections were completed during the period. FPL's total wood pole distribution

population consists of 1,024,152 poles. This suggests that he company would take more than 60 years to review every distribution pole through the specific pole inspection program at the current pace.

Based on information supplied by FPL, the System Average Interruption Duration Index for pole outages rose from 0.1 minutes in 2001 to 0.8 minutes (700%) in 2004. In addition, the number of customers interrupted (CI) by pole-related outages also increased from a low of 9,880 in 2002 to a high of 51,679 (423%) in 2004. Pole-related outages are not currently considered to be a high-risk issue by FPL and represent 0.3 minutes of the company's 73.9 minutes of system average outage duration.

However, the increases in the frequency of customer interruptions related to pole outages during the period are sizeable, and staff believes this increase is important. Additionally, the limited geographical coverage and number of poles evaluated by FPL's distribution specific pole inspection program indicate that the company is not conducting enough inspections and may allow degraded poles to go unidentified for extended periods.

Impact: Staff believes that specific pole inspection reviews are needed to thoroughly assess the condition and need for pole repair, treatment, or replacement. If these inspections are not conducted throughout FPL's service territory in a timely manner, degraded poles may go unidentified and untreated and not be replaced for extended periods. This condition would ultimately impact the stability of distribution poles and allow weakened and rotten poles to remain in service.

Company Response: FPL Response – FPL disagrees. FPL's pole inspection program consists of three major initiatives. Its "targeted" pole inspection program, pole inspections performed as part of the thermovision program, and pole inspections performed as part of daily construction, maintenance, and restoration work. FPL's targeted pole inspection program, which is the smallest of FPL's pole inspection initiatives, is the only program that specifically tracks individual pole inspections. However, while FPL's thermovision program only tracks exceptions, FPL estimates that its thermovision pole inspection initiative has resulted in approximately 368,000 pole inspections over the last five years. The combination of the thermovision and the targeted pole inspection programs would result in an over 469,000 wooden pole inspections, which translates to an 11 year inspection cycle. This does not take into account FPL's pole inspections performed as part of its daily work, FPL's largest pole inspection initiative, which FPL does not specifically track.

FPL notes that in 2004, total interruptions due to poles accounted for 158 interruptions or .02% of all interruptions and 1% of FPL's SAIDI. However, only a portion of these 158 pole failures are due to deteriorated poles. For instance, 28 of the 158 (18%) of the pole outages were pole outages resulting from fires.

Additionally, FPL notes that during the 3 hurricanes (category 2, 3, and 4 storms) that made direct landfall in FPL's service territory in 2004, FPL replaced only 12,705 wood poles, approximately 1% of its wood pole population, even though over 150,000 poles experienced

winds above their design criteria. FPL believes this speaks highly of its pole infrastructure status and existing pole inspection and maintenance processes.

Finding 3: FPL has no documented distribution procedures stating the accepted company cycle time for specific distribution pole inspections.

Description: FPL has no documented distribution procedures identifying specific pole inspection cycle time for completing inspections. The company has established a four-year cycle for thermovision inspections of feeders, but has no such cycle time for completing specific distribution pole inspections. Most Florida electric utilities have documented procedures stating the required or targeted cycle for completing formal inspections of distribution poles to ensure all poles are reviewed on a timely basis.

Impact: The lack of documented procedures specifying the company's accepted cycle time for specific distribution pole inspections may allow pole inspections to go incomplete for lengthy periods and rotten or compromised poles to go untreated, not braced, or not replaced for extended periods.

Company Response: FPL agrees that it does not have a procedure stating a cycle time for pole inspections. However, FPL believes that its current processes and initiatives are adequate and sufficient. In 2004, total interruptions due to poles accounted for 158 interruptions, or 0.2% of all interruptions and 1% of FPL's SAIDI. In addition, only a portion of these 158 pole interruptions resulted from deteriorated poles. This is with a total pole population of over 1 million poles.

Additionally, FPL notes that during the three hurricanes (category 2, 3, and 4 storms) that made direct landfall in FPL's service territory in 2004, FPL replaced only 12,705 wood poles, approximately 1% of its wood pole population, even with 150,000 poles experiencing winds above their design criteria. FPL believes this speaks highly of its pole infrastructure status and existing pole inspection and maintenance processes.